Student Edition

SAXON MATH™

5/4

$\frac{1}{8}$

$\frac{2}{8} = \frac{1}{4}$

$\frac{6}{8} = \frac{3}{4}$

$1 - \frac{1}{4} = \frac{3}{4}$

Hake
Saxon

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Stephen Hake
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SAXON™
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LETTER FROM AUTHOR STEPHEN HAKE

Dear Student,

We study mathematics because of its importance to our lives. Our school schedule, our trip to the store, the preparation of our meals, and many of the games we play involve mathematics. You will find that the word problems in this book are often drawn from everyday experiences.

As you grow into adulthood, mathematics will become even more important. In fact, your future in the adult world may depend on the mathematics you have learned. This book was written to help you learn mathematics and to learn it well. For this to happen, you must use the book properly. As you work through the pages, you will see that similar problems are presented over and over again. ***Solving each problem day after day is the secret to success.***

Your book is made up of daily lessons and investigations. Each lesson has four parts. The first part is a Warm-Up that includes practice of basic facts and mental math. These exercises improve your speed, accuracy, and ability to do math "in your head." The Warm-Up also includes a problem-solving exercise to familiarize you with strategies for solving complicated problems. The second part of the lesson is the New Concept. This section introduces a new mathematical concept and presents examples that use the concept. In the next section, the Lesson Practice, you have a chance to solve problems involving the new concept. The problems are lettered a, b, c, and so on. The final part of the lesson is the Mixed Practice. This problem set reviews previously taught concepts and prepares you for concepts that will be taught in later lessons. Solving these problems helps you remember skills and concepts for a long time.

Investigations are variations of the daily lesson. The investigations in this book often involve activities that fill an entire class period. Investigations contain their own set of questions instead of a problem set.

Remember, solve every problem in every practice set, every problem set, and every investigation. Do not skip problems. With honest effort, you will experience success and true learning that will stay with you and serve you well in the future.

Stephen Hake
Temple City, California

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Stephen Hake
Temple City, California

LESSON

1

Review of Addition • Addition Stories • Missing Addends, Part 1

WARM-UP

Facts Practice: 100 Addition Facts (Test A)[†]

Mental Math:

Add ten to a number:

a. $\begin{array}{r} 20 \\ +\ 10 \\ \hline \end{array}$ **b.** $\begin{array}{r} 34 \\ +\ 10 \\ \hline \end{array}$ **c.** $\begin{array}{r} 10 \\ +\ 53 \\ \hline \end{array}$

d. 5 + 10 **e.** 25 + 10 **f.** 10 + 8

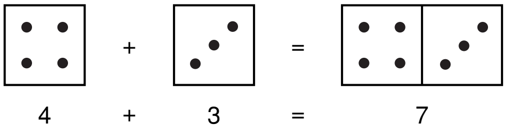
Patterns:

As a class, count by twos from 2 through 40 while the teacher or a student lists the numbers in a column on the board. Study the list. Which digits appear as final digits? Which digits do not appear as final digits?

NEW CONCEPTS

Review of addition

Addition is the combining of two groups into one group. For example, when we count the dots on the top faces of a pair of dot cubes (dice), we are adding.



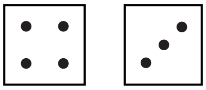
The numbers that are added are called **addends.** The answer is called the **sum.** The expression 4 + 3 = 7 is a **number sentence.** A number sentence is a complete sentence that uses numbers and symbols instead of words. Here we show two ways to add 4 and 3:

$$\begin{array}{rl} 4 & \text{addend} \\ +\ 3 & \text{addend} \\ \hline 7 & \text{sum} \end{array} \qquad \begin{array}{rl} 3 & \text{addend} \\ +\ 4 & \text{addend} \\ \hline 7 & \text{sum} \end{array}$$

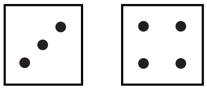
[†] For instructions on how to use the Warm-up activities, please consult the preface.

Notice that if the order of the addends is changed, the sum remains the same. This property of addition is true for any two numbers and is called the **commutative property of addition.** **When we add two numbers, either number may be first.**

$4 + 3 = 7$



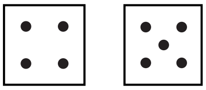
$3 + 4 = 7$



When we add zero to a number, the number is not changed. This property of addition is called the **identity property of addition.** If we start with a number and add zero, the sum is identical to the starting number.

$$4 + 0 = 4 \qquad 9 + 0 = 9 \qquad 0 + 7 = 7$$

Example 1 Write a number sentence for this picture:



Solution A number sentence for the picture is $\mathbf{4 + 5 = 9}$. The number sentence $\mathbf{5 + 4 = 9}$ is also correct.

When adding three numbers, the numbers may be added in any order. Here we show six ways to add 4, 3, and 5. Each way the answer is 12.

$$\begin{array}{r}4\\3\\+\ 5\\\hline 12\end{array}\qquad\begin{array}{r}4\\5\\+\ 3\\\hline 12\end{array}\qquad\begin{array}{r}3\\4\\+\ 5\\\hline 12\end{array}\qquad\begin{array}{r}3\\5\\+\ 4\\\hline 12\end{array}\qquad\begin{array}{r}5\\4\\+\ 3\\\hline 12\end{array}\qquad\begin{array}{r}5\\3\\+\ 4\\\hline 12\end{array}$$

Example 2 Show six ways to add 1, 2, and 3.

Solution We can form two number sentences that begin with the addend 1.

$$\mathbf{1 + 2 + 3 = 6} \qquad \mathbf{1 + 3 + 2 = 6}$$

We can form two number sentences that begin with the addend 2.

$$\mathbf{2 + 1 + 3 = 6} \qquad \mathbf{2 + 3 + 1 = 6}$$

We can form two number sentences that begin with the addend 3.

$$\mathbf{3 + 1 + 2 = 6} \qquad \mathbf{3 + 2 + 1 = 6}$$

Addition stories

Many word problems tell a story. Some stories are about **putting things together.** Look at this story:

John had 5 marbles. He bought 7 more marbles.
Now John has 12 marbles.

There is a pattern to this story. John had **some** marbles. Then he bought **some more** marbles. When he put the marbles together, he found the **total** number of marbles. **"Some and some more"** stories like this have an addition pattern.

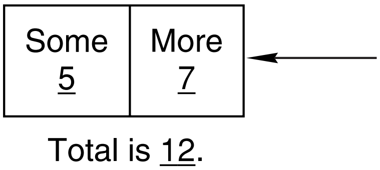
Pattern	Problem
Some	5 marbles
+ Some more	+ 7 marbles
Total	12 marbles

Here we show the pattern written sideways.

Pattern: Some + some more = total

Problem: 5 marbles + 7 marbles = 12 marbles

Here we show a diagram for the story:



Example 3 Miguel saw 8 ducks. Then he saw 7 more ducks. How many ducks did Miguel see in all?

Solution This problem follows the idea of "some and some more." We show the addition pattern below.

Pattern: Some + some more = total

Problem: 8 ducks + 7 ducks = 15 ducks

We find the total number by adding 8 and 7. Miguel saw **15 ducks** in all.

Example 4 Samantha saw rabbits in the field. She saw 5 rabbits in the east field. She saw 3 rabbits in the west field. She saw 4 rabbits in the north field. How many rabbits did Samantha see in all?

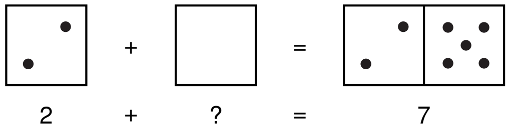
Solution In this story there are three addends.

Pattern	Problem
Some	5 rabbits
Some more	3 rabbits
+ Some more	+ 4 rabbits
Total	12 rabbits

Samantha saw **12 rabbits** in all.

Missing addends, part 1

Some of the problems in this book will have an addend missing. When one addend is missing and the sum is given, the problem is to find the missing addend. Can you figure out the missing addend in this number sentence?



Since we know that $2 + 5 = 7$, the missing addend is 5. We will often use a letter to represent a missing number, as we see in the example below.

Example 5 Find each missing addend:

(a) $\begin{array}{r} 4 \\ +\ N \\ \hline 7 \end{array}$

(b) $B + 6 = 10$

Solution (a) The letter N stands for a missing addend. Since $4 + 3 = 7$, the letter N stands for the number **3** in this number sentence.

(b) In this problem the letter B is used to stand for the missing addend. Since $4 + 6 = 10$, the letter B stands for the number **4.**

LESSON PRACTICE

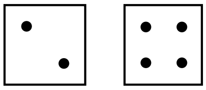
Practice set Add:

a. $5 + 6$ **b.** $6 + 5$ **c.** $8 + 0$

d. $4 + 8 + 6$ **e.** $4 + 5 + 6$

f. Diane ran 5 laps in the morning. She ran 8 laps in the afternoon. How many laps did she run in all?

g. Write two number sentences for this picture to show the commutative property:



h. Show six ways to add 1, 3, and 5.

Find each missing addend:

i. $7 + N = 10$ **j.** $A + 8 = 12$

MIXED PRACTICE

Problem set

1. There were 5 students in the first row and 7 students in the second row. How many students were in the first two rows?

2. Ling had 6 coins in her left pocket and 3 coins in her right pocket. How many coins did Ling have in both pockets?

Find each sum or missing addend:

3. $9 + 4$

4. $8 + 2$

5. $\begin{array}{r} 4 \\ + \ N \\ \hline 9 \end{array}$

6. $\begin{array}{r} W \\ + \ 5 \\ \hline 8 \end{array}$

7. $\begin{array}{r} 6 \\ + \ P \\ \hline 8 \end{array}$

8. $\begin{array}{r} Q \\ + \ 8 \\ \hline 8 \end{array}$

9. $3 + 4 + 5$

10. $4 + 4 + 4$

11. $6 + R = 10$

12. $X + 5 = 6$

13. $\begin{array}{r} 5 \\ 5 \\ + \ 5 \\ \hline \end{array}$

14. $\begin{array}{r} 8 \\ 0 \\ + \ 7 \\ \hline \end{array}$

15. $\begin{array}{r} 6 \\ 5 \\ + \ 4 \\ \hline \end{array}$

16. $\begin{array}{r} 9 \\ 9 \\ + \ 9 \\ \hline \end{array}$

17. $\begin{array}{r} M \\ + \ 9 \\ \hline 10 \end{array}$

18. $\begin{array}{r} 9 \\ + \ F \\ \hline 12 \end{array}$

19. $\begin{array}{r} Z \\ + \ 5 \\ \hline 10 \end{array}$

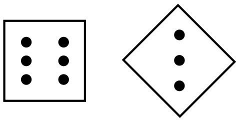
20. $\begin{array}{r} 0 \\ + \ N \\ \hline 3 \end{array}$

21. $3 + 2 + 5 + 4 + 6$

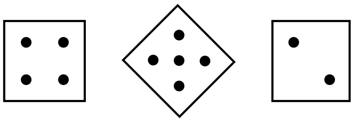
22. $2 + 2 + 2 + 2 + 2 + 2 + 2$

Write a number sentence for each picture:

23.



24.



25. Show six ways to add 2, 3, and 4.

26. Sometimes a missing number is shown by a shape instead of a letter. Choose the correct number for Δ in the following number sentence:

$$\Delta + 3 = 10$$

A. 3 B. 7 C. 10 D. 13

LESSON 2

Missing Addends, Part 2

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add ten to a number:

a. 40 + 10 **b.** 26 + 10 **c.** 39 + 10
d. 7 + 10 **e.** 10 + 9 **f.** 10 + 63

Patterns:

As a class, count by fives from 5 to 100 while the teacher or a student lists the numbers in a column on the board. Which digits appear as final digits? Which numbers in the list are numbers we say when we count by twos from 2 to 100?

NEW CONCEPT

Derek rolled a dot cube three times. The picture below shows the top face of the cube for the first two rolls.

First roll Second roll

The total number of dots on all three rolls was 12. Can you draw a picture of Derek's third roll?

We will write a number sentence for this problem. The first two numbers are 5 and 3. We do not know the number of the third roll, so we will use a letter. We know that the total is 12.

$$5 + 3 + T = 12$$

To find the missing addend, we first add 5 and 3, which makes 8. Then we think, "Eight plus what number equals twelve?" Since 8 plus 4 equals 12, the third roll was ⚃.

Example Find each missing addend:

(a)
$$\begin{array}{r} 6 \\ N \\ +\ 5 \\ \hline 17 \end{array}$$

(b) $4 + 3 + 2 + B + 6 = 20$

Solution (a) We add 6 and 5, which makes 11. We think, "Eleven plus what number equals seventeen?" Since 11 plus 6 equals 17, the missing addend is **6.**

(b) First we add 4, 3, 2, and 6, which equals 15. Since 15 plus 5 is 20, the missing addend is **5.**

LESSON PRACTICE

Practice set Find each missing addend:

a. $8 + A + 2 = 17$

b. $B + 6 + 5 = 12$

c. $4 + C + 2 + 3 + 5 = 20$

MIXED PRACTICE

Problem set

[†]**1.** *(1)* Hoppy ate 5 carrots in the morning and 6 carrots in the afternoon. How many carrots did Hoppy eat in all?

2. *(1)* Five friends rode their bikes from the school to the lake. They rode 7 miles, then rested. They still had 4 miles to go. How many miles was it from the school to the lake?

Find each sum or missing addend:

3. *(1)* $9 + N = 13$

4. *(1)* $7 + 8$

5. *(1)*
$$\begin{array}{r} P \\ +\ 6 \\ \hline 13 \end{array}$$

6. *(2)*
$$\begin{array}{r} 5 \\ 2 \\ +\ W \\ \hline 12 \end{array}$$

7. *(1)*
$$\begin{array}{r} 4 \\ 8 \\ +\ 5 \\ \hline \end{array}$$

8. *(1)*
$$\begin{array}{r} 9 \\ 3 \\ +\ 7 \\ \hline \end{array}$$

[†] The italicized numbers within parentheses underneath each problem number are called *lesson reference numbers.* These numbers refer to the lesson(s) in which the major concept of that particular problem is introduced. If additional assistance is needed, refer to the discussion, examples, or practice problems of that lesson.

9. *(2)*
$$\begin{array}{r} 8 \\ B \\ + \ 3 \\ \hline 16 \end{array}$$

10. *(1)*
$$\begin{array}{r} 9 \\ 7 \\ + \ 3 \\ \hline \end{array}$$

11. *(1)*
$$\begin{array}{r} 2 \\ 9 \\ + \ 6 \\ \hline \end{array}$$

12. *(1)*
$$\begin{array}{r} 3 \\ 8 \\ + \ 2 \\ \hline \end{array}$$

13. *(1)*
$$\begin{array}{r} 9 \\ 5 \\ + \ 3 \\ \hline \end{array}$$

14. *(2)*
$$\begin{array}{r} 2 \\ M \\ + \ 4 \\ \hline 9 \end{array}$$

15. *(2)*
$$\begin{array}{r} 5 \\ 3 \\ + \ Q \\ \hline 9 \end{array}$$

16. *(2)*
$$\begin{array}{r} 2 \\ 3 \\ + \ R \\ \hline 7 \end{array}$$

17. *(2)*
$$\begin{array}{r} 5 \\ 3 \\ + \ T \\ \hline 10 \end{array}$$

18. *(1)*
$$\begin{array}{r} 8 \\ 4 \\ + \ 6 \\ \hline \end{array}$$

19. *(2)*
$$\begin{array}{r} 2 \\ X \\ + \ 7 \\ \hline 11 \end{array}$$

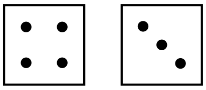
20. *(1)*
$$\begin{array}{r} 5 \\ 2 \\ + \ 6 \\ \hline \end{array}$$

21. *(2)* $5 + 5 + 6 + 4 + X = 23$

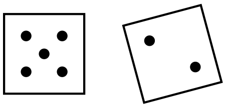
22. *(1)* Show six ways to add 4, 5, and 6.

Write a number sentence for each picture:

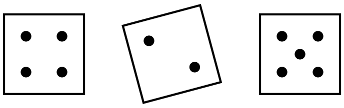
23. *(1)*



24. *(1)*



25. *(1)*



26. *(1)* Which number is $\square$ in the following number sentence?

$$6 + \square = 10$$

A. 4 B. 6 C. 10 D. 16

LESSON 3

Sequences • Digits

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add ten, twenty, or thirty to a number:

a. $\begin{array}{r} 20 \\ +\ 20 \\ \hline \end{array}$ **b.** $\begin{array}{r} 23 \\ +\ 20 \\ \hline \end{array}$ **c.** $\begin{array}{r} 43 \\ +\ 10 \\ \hline \end{array}$ **d.** $\begin{array}{r} 24 \\ +\ 30 \\ \hline \end{array}$ **e.** $\begin{array}{r} 50 \\ +\ 30 \\ \hline \end{array}$ **f.** $\begin{array}{r} 10 \\ +\ 65 \\ \hline \end{array}$

g. One less than 24 is 23. What number is one less than 36? ... one less than 43? ... one less than 65?

Vocabulary:

Copy these two patterns on a piece of paper. In each of the six boxes, write either “addend” or “sum.”

$$\boxed{} + \boxed{} = \boxed{} \qquad \begin{array}{r} \boxed{} \\ +\ \boxed{} \\ \hline \boxed{} \end{array}$$

NEW CONCEPTS

Sequences

Counting is a math skill we learn early in life. Counting by ones, we say “one, two, three, four, five, ….”

1, 2, 3, 4, 5, …

These numbers are called **counting numbers.** The counting numbers continue without end. We may also count by numbers other than one.

Counting by twos: 2, 4, 6, 8, 10, …

Counting by fives: 5, 10, 15, 20, 25, …

These are examples of counting patterns. A counting pattern is a **sequence.** The three dots mean that the sequence continues without end. A counting sequence may count up or count down. We can study a counting sequence to discover a rule for the sequence. Then we can find more numbers in the sequence.

Example 1 Find the rule and the next three numbers of this counting sequence:

10, 20, 30, 40, _____, _____, _____, …

Solution The rule is **count up by tens.** Counting this way, we find that the next three numbers are **50, 60,** and **70.**

Example 2 Find the rule of this counting sequence. Then find the missing number in the sequence.

30, 27, 24, 21, _____, 15, …

Solution The rule is **count down by threes.** If we count down three from 21, we find that the missing number in the sequence is **18.** We see that 15 is three less than 18, which follows the rule.

Digits To write numbers, we use **digits. Digits are the numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.** The number 356 has three digits, and the last digit is 6. The number 67,896,094 has eight digits, and the last digit is 4.

Example 3 The number 64,000 has how many digits?

Solution The number 64,000 has **five digits.**

Example 4 What is the last digit of 2001?

Solution The last digit of 2001 is **1.**

LESSON PRACTICE

Practice set Write the rule and the next three numbers of each counting sequence:

a. 10, 9, 8, 7, _____, _____, _____, …

b. 3, 6, 9, 12, _____, _____, _____, …

Find the missing number in each counting sequence:

c. 80, 70, _____, 50, …

d. 8, _____, 16, 20, 24, …

How many digits are in each number?

e. 18

f. 5280

g. 8,403,227,189

What is the last digit of each number?

h. 19

i. 5281

j. 8,403,190

MIXED PRACTICE

Problem set

1. Blanca has 5 dollars, Susan has 6 dollars, and Britt has 7 dollars. Altogether, how much money do the three girls have?
(1)

2. On William's favorite CD there are 9 songs. On his next-favorite CD there are 8 songs. Altogether, how many songs are on William's two favorite CDs?
(1)

3. How many digits are in each number?
(3)

(a) 593 (b) 180 (c) 186,527,394

4. What is the last digit of each number?
(3)

(a) 3427 (b) 460 (c) 437,269

Find each missing addend:

5. $5 + M + 4 = 12$ *(2)*

6. $8 + 2 + W = 16$ *(2)*

Write the next number in each counting sequence:

7. 10, 20, 30, ______, … *(3)*

8. 22, 21, 20, ______, … *(3)*

9. 40, 35, 30, 25, ______, … *(3)*

10. 70, 80, 90, ______, … *(3)*

Write the rule and the next three numbers of each counting sequence:

11. 6, 12, 18, ______, ______, ______, … *(3)*

12. 3, 6, 9, ______, ______, ______, … *(3)*

13. 4, 8, 12, ______, ______, ______, … *(3)*

14. 45, 36, 27, ______, ______, ______, … *(3)*

Find the missing number in each counting sequence:

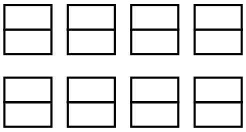
15. 8, 12, ______, 20, … *(3)*

16. 12, 18, ______, 30, … *(3)*

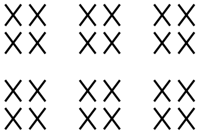
17. 30, 25, ______, 15, … *(3)*

18. 6, 9, ______, 15, … *(3)*

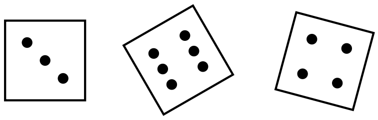
19. *(3)* How many small rectangles are shown? Count by twos.



20. *(3)* How many X's are shown? Count by fours.



21. *(1)* Write a number sentence for the picture below.



22. *(1)* $\begin{array}{r} 4 \\ 8 \\ 7 \\ +\ 5 \\ \hline \end{array}$

23. *(1)* $\begin{array}{r} 9 \\ 5 \\ 7 \\ +\ 8 \\ \hline \end{array}$

24. *(1)* $\begin{array}{r} 8 \\ 4 \\ 7 \\ +\ 2 \\ \hline \end{array}$

25. *(1)* $\begin{array}{r} 2 \\ 9 \\ 7 \\ +\ 5 \\ \hline \end{array}$

26. *(1)* If Δ = 3 and □ = 4, then Δ + □ equals which of the following?

A. 3 B. 4 C. 5 D. 7

LESSON 4

Place Value

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add ten, twenty, or thirty to a number:

a. 66 + 10 **b.** 29 + 20 **c.** 10 + 76

d. 38 + 30 **e.** 20 + 6 **f.** 40 + 30

g. What number is one less than 76? ... than 49? ... than 68?

Problem Solving:

Tom has a total of nine coins in his left and right pockets. Copy and complete this table listing the possible number of coins in each pocket. Your table should have ten rows of numbers.

Number of Coins

Left	Right
0	9
1	
2	

NEW CONCEPT

To help us with the idea of **place value,** we will use pictures to show different amounts of money. We will use \$100 bills, \$10 bills, and \$1 bills.

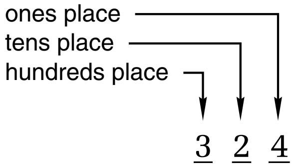
Example 1 How much money is shown in the picture below?

Solution Since there are 2 hundreds, 4 tens, and 3 ones, the amount of money shown is **\$243.**

Example 2 Use money manipulatives or draw a diagram to show how to make \$324 with \$100 bills, \$10 bills, and \$1 bills.

Solution To show $324, we use 3 hundreds, 2 tens, and 4 ones.

The value of each place is determined by its position. Three-digit numbers like 324 occupy three different places.



Example 3 Use money manipulatives or draw a diagram to show both $203 and $230. Which is the greater amount of money, $203 or $230?

Solution Using bills, we show $203 and $230 like this:


$203


$230

The amount **$230 is greater than $203.**

Example 4 The digit 7 is in what place in 753?

Solution The 7 is in the third place from the right, which shows the number of hundreds. So the 7 is in the **hundreds place.**

LESSON PRACTICE

Practice set

a. Use money manipulatives or draw a diagram to show $231 in $100 bills, $10 bills, and $1 bills.

b. Use money manipulatives or draw a diagram to show $213. Which is less, $231 or $213?

c. The digit 6 is in what place in each of these numbers?

(a) 16 (b) 65 (c) 623

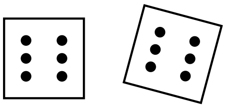
d. Use three digits to write a number equal to 5 hundreds, 2 tens, and 3 ones.

MIXED PRACTICE

Problem set

1. (1) When Robert looked at the cards in his hand, he saw 3 clubs, 4 diamonds, 5 spades, and 1 heart. How many cards did he have in all?

2. (1) Write a number sentence for this picture:



3. (3) How many cents are in 4 nickels? Count by fives.

Find each sum or missing addend:

4. (1) $$\begin{array}{r} 4 \\ +\ N \\ \hline 12 \end{array}$$

5. (1) $$\begin{array}{r} 4 \\ 5 \\ +\ 3 \\ \hline \end{array}$$

6. (1) $$\begin{array}{r} 13 \\ +\ Y \\ \hline 19 \end{array}$$

7. (1) $$\begin{array}{r} 7 \\ +\ S \\ \hline 14 \end{array}$$

8. (2) $4 + N + 5 = 12$

9. (2) $N + 2 + 3 = 8$

Write the rule and the next three numbers of each counting sequence:

10. (3) 9, 12, 15, ______, ______, ______, ...

11. (3) 30, 24, 18, ______, ______, ______, ...

12. (3) 12, 16, 20, ______, ______, ______, ...

13. (3) 35, 28, 21, ______, ______, ______, ...

14. (3) How many digits are in each number?
(a) 37,432 (b) 5,934,286 (c) 453,000

15. (3) What is the last digit of each number?
(a) 734 (b) 347 (c) 473

16. (4) Draw a diagram to show $342 in $100 bills, $10 bills, and $1 bills.

17. (4) How much money is shown by this picture?

Find the missing number in each counting sequence:

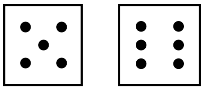
18. 24, ______, 36, 42, …
(3)

19. 36, 32, ______, 24, …
(3)

20. How many ears are on 10 rabbits? Count by twos.
(3)

21. The digit 6 is in what place in 365?
(4)

22. Write a number sentence for this picture:
(1)



Find each missing addend:

23. $2 + 5 + 3 + 2 + 3 + 1 + N = 20$
(2)

24. $4 + B + 3 + 2 + 5 + 4 + 1 = 25$
(2)

25. Show six ways to add 6, 7, and 8.
(1)

26. In the number 123, which digit shows the number of hundreds?
(4)

A. 1 B. 2 C. 3 D. 4

LESSON

5

Ordinal Numbers • Months of the Year

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

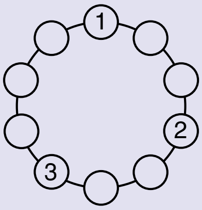
Add a number ending in zero to another number:

a. $\begin{array}{r} 24 \\ +\ 60 \\ \hline \end{array}$ **b.** $\begin{array}{r} 36 \\ +\ 10 \\ \hline \end{array}$ **c.** $\begin{array}{r} 50 \\ +\ 42 \\ \hline \end{array}$ **d.** $\begin{array}{r} 33 \\ +\ 30 \\ \hline \end{array}$ **e.** $\begin{array}{r} 40 \\ +\ 50 \\ \hline \end{array}$

f. What number is one less than 28? ... 87? ... 54?

Patterns:

Copy this design of ten circles on a piece of paper. In each circle, write a counting number from 1 to 10 that continues the pattern of "1, skip, skip, 2, skip, skip, 3, ..."



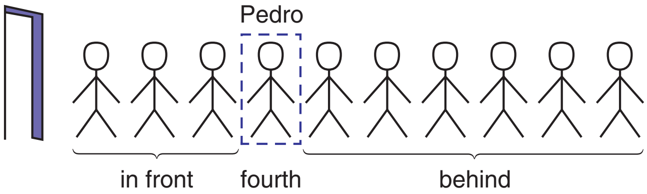
NEW CONCEPTS

Ordinal numbers

If we want to count the number of children in a line, we say, "one, two, three, four, ..." These numbers tell us how many children we have counted. To describe a child's position in a line, we use words like *first, second, third,* and *fourth.* Numbers that tell position or order are called **ordinal numbers.**

Example 1 There are ten children in the lunch line. Pedro is fourth in line. (a) How many children are in front of Pedro? (b) How many children are behind him?

Solution A diagram may help us understand the problem. We draw and label a diagram using the information given to us.



(a) Since Pedro is fourth in line, we see that there are **three children** in front of him.

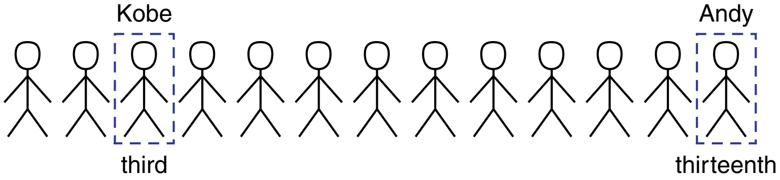
(b) The rest of the children are behind Pedro. From the diagram, we see that there are **six children** behind him.

Many times ordinal numbers are abbreviated. The abbreviation consists of a counting number and the letters *st, nd, rd,* or *th.* Here we show some abbreviations.

first	1st	sixth	6th	eleventh	11th
second	2nd	seventh	7th	twelfth	12th
third	3rd	eighth	8th	thirteenth	13th
fourth	4th	ninth	9th	twentieth	20th
fifth	5th	tenth	10th	twenty-first	21st

Example 2 Andy is 13th in line. Kobe is 3rd in line. How many students are between Kobe and Andy?

Solution We begin by drawing a diagram.



From the diagram we see that there are **nine students** between Kobe and Andy.

Months of the year

We use ordinal numbers to describe the months of the year and the days of each month. This table lists the twelve months of the year in order. A common year is 365 days long. A leap year is 366 days long. The extra day in a leap year is added to February.

Month	Order	Days
January	first	31
February	second	28 or 29
March	third	31
April	fourth	30
May	fifth	31
June	sixth	30
July	seventh	31
August	eighth	31
September	ninth	30
October	tenth	31
November	eleventh	30
December	twelfth	31

When writing dates, we can use numbers to represent the month, day, and year. For example, if Robert was born on the second day of June in 1988, then he could write his birth date this way:

6/2/1988

The form for this date is "**month/day/year.**" The 6 stands for the sixth month, which is June, and the 2 stands for the second day of the month.

Example 3 Jenny wrote her birth date as 7/8/89. (a) In what month was Jenny born? (b) In what year was she born?

Solution (a) In the United States we usually write the number of the month first. The first number Jenny wrote was 7. She was born in the seventh month, which is **July.**

(b) When confusion is unlikely, we often abbreviate years by using only the last two digits of the year. So we assume that Jenny was born in **1989.**

Example 4 Mr. Chitsey's driver's license expired on 4/29/03. Write that date using the name of the month and all four digits of the year.

Solution The fourth month is April. The year 03 represents 2003. So Mr. Chitsey's license expired on **April 29, 2003.**

LESSON PRACTICE

Practice set

a. Kiyoko was third in line, and Kayla was eighth in line. How many people were between them?

b. Write your birth date in month/day/year form.

c. In month/day/year form, write the date that Independence Day will next be celebrated.

MIXED PRACTICE

Problem set

1. *(1)* At the grocery store there were 5 people in the first line, 6 people in the second line, and 4 people in the third line. Altogether, how many people were in the three lines?

Find each missing addend:

2. *(2)*

$$\begin{array}{r} 2 \\ 6 \\ +\ X \\ \hline 15 \end{array}$$

3. *(2)*

$$\begin{array}{r} 1 \\ Y \\ +\ 7 \\ \hline 14 \end{array}$$

4. *(2)*

$$\begin{array}{r} 3 \\ Z \\ +\ 5 \\ \hline 12 \end{array}$$

5. *(2)*

$$\begin{array}{r} 1 \\ N \\ +\ 6 \\ \hline 13 \end{array}$$

6. *(2)*
$$\begin{array}{r} 2 \\ 5 \\ +\ W \\ \hline 10 \end{array}$$

7. *(1)*
$$\begin{array}{r} 2 \\ +\ A \\ \hline 7 \end{array}$$

8. *(1)*
$$\begin{array}{r} R \\ +\ 5 \\ \hline 11 \end{array}$$

9. *(1)*
$$\begin{array}{r} 3 \\ +\ T \\ \hline 5 \end{array}$$

10. *(5)* Todd was born on 8/15/93. Write Todd's birth date using the name of the month and all four digits of the year.

Write the rule and the next three numbers of each counting sequence:

11. *(3)* 12, 15, 18, _____, _____, _____, ...

12. *(3)* 16, 20, 24, _____, _____, _____, ...

13. *(3)* 28, 35, 42, _____, _____, _____, ...

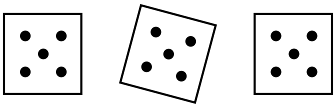
Find the missing number in each counting sequence:

14. *(3)* 30, _____, 42, 48

15. *(3)* 30, _____, 40, 45

16. *(4)* Draw a diagram to show $432 in $100 bills, $10 bills, and $1 bills.

17. *(1)* Write a number sentence for the picture below.



18. *(4)* The digit 8 is in what place in 845?

19. *(4)* Use three digits to write the number that equals 2 hundreds plus 3 tens plus 5 ones.

20. *(3)* If the pattern is continued, what will be the next circled number?

1, 2, ③, 4, 5, ⑥, 7, 8, ⑨, 10, ...

21. *(3)* Seven boys have how many eyes? Count by twos.

22. *(1)*
$$\begin{array}{r} 5 \\ 8 \\ 4 \\ 7 \\ 4 \\ +\ 3 \\ \hline \end{array}$$

23. *(1)*
$$\begin{array}{r} 5 \\ 7 \\ 3 \\ 8 \\ 4 \\ +\ 2 \\ \hline \end{array}$$

24. *(1)*
$$\begin{array}{r} 9 \\ 7 \\ 6 \\ 5 \\ 4 \\ +\ 2 \\ \hline \end{array}$$

25. *(1)*
$$\begin{array}{r} 8 \\ 7 \\ 3 \\ 5 \\ 4 \\ +\ 9 \\ \hline \end{array}$$

26. *(5)* Jenny was third in line. Jessica was seventh in line. How many people were between Jenny and Jessica?

A. 3　　B. 4　　C. 5　　D. 6

LESSON

6

Review of Subtraction • Addition and Subtraction Fact Families

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Nine is one less than ten. When adding 9 to a number, we may mentally add 10 and then think of the number that is one less than the sum. For 23 + 9 we may think, "23 + 10 is 33, and one less than 33 is 32."

a. $\begin{array}{r} 33 \\ +\ 10 \\ \hline \end{array}$ **b.** $\begin{array}{r} 33 \\ +\ \ 9 \\ \hline \end{array}$ **c.** $\begin{array}{r} 46 \\ +\ 10 \\ \hline \end{array}$ **d.** $\begin{array}{r} 46 \\ +\ \ 9 \\ \hline \end{array}$ **e.** $\begin{array}{r} 65 \\ +\ 10 \\ \hline \end{array}$ **f.** $\begin{array}{r} 65 \\ +\ \ 9 \\ \hline \end{array}$

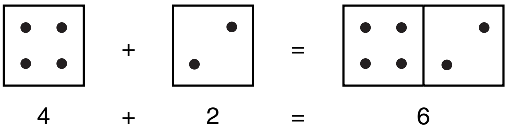
Problem Solving:

Terrell has a total of nine coins in his left and right pockets. He has **some coins** (at least two) in each pocket. Make a table that lists the possible number of coins in each pocket.

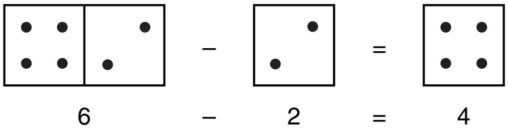
NEW CONCEPTS

Review of subtraction

Remember that when we add, we combine two groups into one group.



When we **subtract,** we separate one group into two groups. To take away two from six, we subtract.



When we subtract one number from another number, the answer is called the **difference.** If we subtract two from six, the difference is four.

$$\begin{array}{r} 6 \\ -\ 2 \\ \hline 4 \end{array} \quad \text{difference}$$

Here we write “two subtracted from six” horizontally:

$$6 - 2 = 4$$

We can check a subtraction answer by adding the difference to the number subtracted. This is like doing the problem “in reverse.” The sum of the addition should equal the starting number.

Subtract Down
Six minus two
equals four.

$$\Big\downarrow \quad \begin{array}{r} 6 \\ -\ 2 \\ \hline 4 \end{array} \quad \Big\uparrow$$

Add Up
Four plus two
equals six.

$$\underset{\textbf{Add}}{\underleftarrow{\overset{\textbf{Subtract}}{\overrightarrow{6 - 2 = 4}}}}$$

The order of numbers matters in subtraction. The expression $6 - 2$ means “take two from six.” This is not the same as $2 - 6$, which means “take six from two.”

Addition and subtraction fact families

A **fact family** is a group of three numbers that can be arranged to form four facts. The three numbers 2, 4, and 6 form an addition and subtraction fact family.

$$\begin{array}{r} 2 \\ +\ 4 \\ \hline 6 \end{array} \qquad \begin{array}{r} 4 \\ +\ 2 \\ \hline 6 \end{array} \qquad \begin{array}{r} 6 \\ -\ 2 \\ \hline 4 \end{array} \qquad \begin{array}{r} 6 \\ -\ 4 \\ \hline 2 \end{array}$$

Recognizing addition and subtraction fact families can help us learn the facts.

Example The numbers 3, 5, and 8 form an addition and subtraction fact family. Write two addition facts and two subtraction facts using these three numbers.

Solution

$$\begin{array}{r} \mathbf{3} \\ \mathbf{+\ 5} \\ \hline \mathbf{8} \end{array} \qquad \begin{array}{r} \mathbf{5} \\ \mathbf{+\ 3} \\ \hline \mathbf{8} \end{array} \qquad \begin{array}{r} \mathbf{8} \\ \mathbf{-\ 3} \\ \hline \mathbf{5} \end{array} \qquad \begin{array}{r} \mathbf{8} \\ \mathbf{-\ 5} \\ \hline \mathbf{3} \end{array}$$

LESSON PRACTICE

Practice set Subtract. Check your answers by adding.

a. $\begin{array}{r} 14 \\ -\ \ 8 \\ \hline \end{array}$ **b.** $\begin{array}{r} 9 \\ -\ 3 \\ \hline \end{array}$ **c.** $\begin{array}{r} 15 \\ -\ \ 7 \\ \hline \end{array}$ **d.** $\begin{array}{r} 11 \\ -\ \ 4 \\ \hline \end{array}$ **e.** $\begin{array}{r} 12 \\ -\ \ 5 \\ \hline \end{array}$

f. The numbers 5, 6, and 11 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

g. Describe how to check a subtraction answer. Show an example.

MIXED PRACTICE

Problem set

1. *(6)* $\begin{array}{r} 14 \\ -\ \ 5 \\ \hline \end{array}$

2. *(6)* $\begin{array}{r} 15 \\ -\ \ 8 \\ \hline \end{array}$

3. *(6)* $\begin{array}{r} 9 \\ -\ 4 \\ \hline \end{array}$

4. *(6)* $\begin{array}{r} 11 \\ -\ \ 7 \\ \hline \end{array}$

5. *(6)* $\begin{array}{r} 12 \\ -\ \ 8 \\ \hline \end{array}$

6. *(6)* $\begin{array}{r} 11 \\ -\ \ 6 \\ \hline \end{array}$

7. *(6)* $\begin{array}{r} 15 \\ -\ \ 7 \\ \hline \end{array}$

8. *(6)* $\begin{array}{r} 9 \\ -\ 6 \\ \hline \end{array}$

9. *(6)* $\begin{array}{r} 13 \\ -\ \ 5 \\ \hline \end{array}$

10. *(6)* $\begin{array}{r} 12 \\ -\ \ 6 \\ \hline \end{array}$

11. *(1)* $\begin{array}{r} 8 \\ +\ N \\ \hline 17 \end{array}$

12. *(1)* $\begin{array}{r} A \\ +\ 8 \\ \hline 14 \end{array}$

13. *(1)* $3 + W = 11$

14. *(2)* $1 + 4 + M = 13$

15. *(6)* The numbers 4, 6, and 10 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

Write the rule and the next three numbers of each counting sequence:

16. *(3)* 16, 18, 20, ______, ______, ______, ...

17. *(3)* 21, 28, 35, ______, ______, ______, ...

18. *(3)* 20, 24, 28, ______, ______, ______, ...

19. *(5)* How many days are in the tenth month of the year?

20. *(4)* Draw a diagram to show $326.

21. *(4)* The digit 6 is in what place in 456?

Find each missing addend:

22. *(2)* $2 + N + 4 = 13$

23. *(2)* $A + 3 + 5 = 16$

24. *(2)* $1 + 2 + 3 + M + 5 + 6 = 20$

25. *(1)* Show six ways to add 3, 4, and 5.

26. *(1)* The ages of the children in Tom's family are 7 and 9. The ages of the children in Mary's family are 3, 5, and 9. Which number sentence shows how many children are in both families?

A. $3 + 7 = 10$

B. $7 + 9 = 16$

C. $2 + 3 = 5$

D. $3 + 5 + 9 = 17$

LESSON

7 Writing Numbers Through 999

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add one less than ten to a number:

a. 28 + 9 **b.** 44 + 9 **c.** 87 + 9

Review:

d. 63 + 20 **e.** 46 + 50 **f.** 38 + 30

Patterns:

The months of the year repeat. Twelve months after January is January of the next year. Twenty-four months after January is January again. (a) What month is twenty-five months after January? (b) On Valentine's Day, Kadeeja's sister was 22 months old. In what month was Kadeeja's sister born?

NEW CONCEPT

Whole numbers are the counting numbers and the number zero.

0, 1, 2, 3, 4, 5, ...

To write the names of whole numbers through 999 (nine hundred ninety-nine), we need to know the following words and how to put them together:

0	zero	10	ten	20	twenty
1	one	11	eleven	30	thirty
2	two	12	twelve	40	forty
3	three	13	thirteen	50	fifty
4	four	14	fourteen	60	sixty
5	five	15	fifteen	70	seventy
6	six	16	sixteen	80	eighty
7	seven	17	seventeen	90	ninety
8	eight	18	eighteen	100	one hundred
9	nine	19	nineteen		

You may refer to this chart when you are asked to write the names of numbers in the problem sets.

Note: The names of two-digit numbers that are greater than 20 and do not end with the number 0 are written with a hyphen.

Example 1 Use words to write the number 44.

Solution We use a hyphen and write **"forty-four."** Notice that "forty" is spelled without a "u."

To write three-digit numbers, we first write the number of hundreds and then we write the rest of the number. **We do not use the word "and" when writing whole numbers.**

Example 2 Use words to write the number 313.

Solution First we write the number of hundreds. Then we write the rest of the number to get **three hundred thirteen.** (We do not write "three hundred *and* thirteen.")

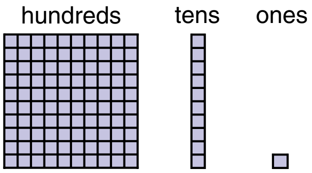
Example 3 Use words to write the number 705.

Solution First we write the number of hundreds. Then we write the rest of the number to get **seven hundred five.**

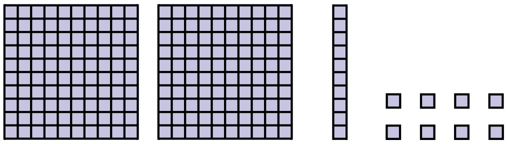
Example 4 Use digits to write the number six hundred eight.

Solution Six hundred eight means "six hundreds and eight ones." There are no tens, so we write a zero in the tens place and get **608.**

In Lesson 4 we used $100 bills, $10 bills, and $1 bills to demonstrate place value. Here we show another model for place value. Small squares stand for ones. The long, ten-square rectangles stand for tens. The large, hundred-square blocks stand for hundreds.



Example 5 Use words to write the number shown by this model:



Solution Two hundreds, one ten, and eight ones is 218, which we write as **two hundred eighteen.**

LESSON PRACTICE

Practice set Use words to write each number:

a. 0

b. 81

c. 99

d. 515

e. 444

f. 909

Use digits to write each number:

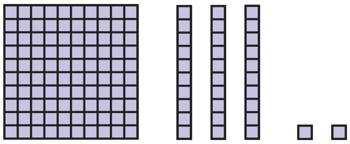
g. nineteen

h. ninety-one

i. five hundred twenty-four

j. eight hundred sixty

k. Use words to write the number shown by this model:



MIXED PRACTICE

Problem set

1. *(1)* Annie has 8 dollars. She needs 6 dollars more to buy the radio. How much does the radio cost?

2. *(1)* Bixby poured 8 ounces of soda into a pitcher containing 8 ounces of juice. How many ounces of liquid were in the mixture?

Find each missing addend:

3. *(2)* $5 + N + 2 = 11$

4. *(2)* $2 + 6 + N = 15$

Subtract. Check by adding.

5. *(6)* $\begin{array}{r} 13 \\ -\ 5 \\ \hline \end{array}$

6. *(6)* $\begin{array}{r} 16 \\ -\ 8 \\ \hline \end{array}$

7. *(6)* $\begin{array}{r} 13 \\ -\ 7 \\ \hline \end{array}$

8. *(6)* $\begin{array}{r} 12 \\ -\ 8 \\ \hline \end{array}$

Use digits to write each number:

9. *(7)* two hundred fourteen

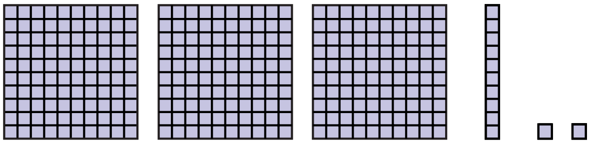
10. *(7)* five hundred thirty-two

Use words to write each number:

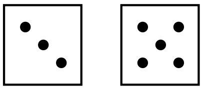
11. *(7)* 301

12. *(7)* 320

13. *(7)* Use words to write the number shown by this model:



14. *(1)* Write a number sentence for this picture:



Write the rule and the next three numbers of each counting sequence:

15. *(3)* 12, 18, 24, _____, _____, _____, …

16. *(3)* 15, 18, 21, _____, _____, _____, …

Find the missing number in each counting sequence:

17. *(3)* 35, 42, _____, 56, …

18. *(3)* 40, _____, 56, 64, …

19. *(4)* How much money is shown by this picture?

20. *(6)* The numbers 7, 8, and 15 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

21. *(5)* Brad was twelfth in line. His sister was sixth in line. How many people were between Brad and his sister?

22. *(3)* Six nickels is equal to how many cents? Count by fives.

23. *(1)* 4 + 7 + 8 + 5 + 4

24. *(1)* 2 + 3 + 5 + 8 + 5

25. *(1)* 5 + 8 + 6 + 4 + 3 + 7 + 2

26. *(6)* Which addition sentence is related to $12 - 5 = 7$?

A. $7 + 5 = 12$

B. $12 + 5 = 17$

C. $12 + 7 = 19$

D. $12 - 7 = 5$

LESSON

8 Adding Money

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add one less than ten to a number:

a. 56 + 9 **b.** 63 + 9 **c.** 48 + 9

Review:

d. 74 + 20 **e.** 60 + 30 **f.** 49 + 40

Problem Solving:

Terrell has a total of nine coins in his left and right pockets. He has some coins in each pocket. He has more coins in his right pocket than in his left pocket. Make a table that lists the possible number of coins in each pocket.

NEW CONCEPT

Sakura had $24. Then on her birthday she was given $15. How much money does Sakura now have?

We can use $10 bills and $1 bills to add $15 to $24.

Sakura had $24.

She was given $15.

Now she has …

The total is 3 tens and 9 ones, which is $39.

We can also add $24 and $15 with pencil and paper. When we use pencil and paper, we first add the digits in the ones place. Then we add the digits in the tens place. (Remember to include the dollar sign in the answer.)

Add ones.
Add tens.

$$\begin{array}{r} \$24 \\ +\ \$15 \\ \hline \$39 \end{array}$$

Example Add: $32 + $7

Solution To add with pencil and paper, we write the numbers so that the digits in the ones place are lined up.

$$\begin{array}{r} \$32 \\ +\ \$\ \ 7 \\ \hline \mathbf{\$39} \end{array}$$

LESSON PRACTICE

Practice set Add:

a. $53 + $6 **b.** $14 + $75 **c.** $36 + $42

d. $27 + $51 **e.** $15 + $21 **f.** $32 + $6

MIXED PRACTICE

Problem set Use digits to write each number:

1. (7) three hundred forty-three

2. (7) three hundred seven

3. (7) Use words to write the number 592.

Find each missing addend:

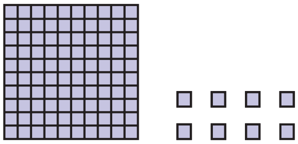
4. (2) $\begin{array}{r} 2 \\ 4 \\ +\ N \\ \hline 12 \end{array}$ **5.** (2) $\begin{array}{r} 1 \\ R \\ +\ 6 \\ \hline 10 \end{array}$ **6.** (2) $\begin{array}{r} 1 \\ T \\ +\ 7 \\ \hline 14 \end{array}$ **7.** (2) $\begin{array}{r} 2 \\ 6 \\ +\ N \\ \hline 13 \end{array}$

8. (8) $\begin{array}{r} \$25 \\ +\ \$14 \\ \hline \end{array}$ **9.** (8) $\begin{array}{r} \$85 \\ +\ \$14 \\ \hline \end{array}$ **10.** (8) $\begin{array}{r} \$22 \\ +\ \$\ \ 6 \\ \hline \end{array}$ **11.** (8) $\begin{array}{r} \$40 \\ +\ \$38 \\ \hline \end{array}$

12. (6) $\begin{array}{r} 13 \\ -\ \ 9 \\ \hline \end{array}$ **13.** (6) $\begin{array}{r} 17 \\ -\ \ 5 \\ \hline \end{array}$ **14.** (6) $\begin{array}{r} 17 \\ -\ \ 8 \\ \hline \end{array}$ **15.** (6) $\begin{array}{r} 14 \\ -\ \ 6 \\ \hline \end{array}$

16. (1, 8) Grey has $23. Beckie has $42. Together, Grey and Beckie have how much money?

17. *(7)* Use words to write the number shown by this model:



18. *(5)* Sarah was born on the fifth day of August in 1994. Write her birth date in month/day/year form.

Write the rule and the next three numbers of each counting sequence:

19. *(3)* 12, 15, 18, ______, ______, ______, ...

20. *(3)* 28, 35, 42, ______, ______, ______, ...

21. *(1)*
$$\begin{array}{r} 5 \\ 8 \\ 7 \\ 6 \\ 4 \\ +\ 3 \\ \hline \end{array}$$

22. *(1)*
$$\begin{array}{r} 9 \\ 7 \\ 6 \\ 4 \\ 8 \\ +\ 7 \\ \hline \end{array}$$

23. *(1)*
$$\begin{array}{r} 2 \\ 5 \\ 7 \\ 3 \\ 5 \\ +\ 4 \\ \hline \end{array}$$

24. *(1)* Show six ways to add 5, 6, and 7.

25. *(6)* Write two addition facts and two subtraction facts using 7, 8, and 15.

26. *(6)* If 7 + ♦ = 15, then which of the following is *not* true?

A. ♦ − 7 = 15

B. 15 − 7 = ♦

C. 15 − ♦ = 7

D. ♦ + 7 = 15

LESSON

9

Adding with Regrouping

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Nineteen is one less than 20. When adding 19 to a number, we may mentally add 20 and then think of the number that is one less than the sum.

a. 36	**b.** 36	**c.** 47	**d.** 47	**e.** 24	**f.** 24
+ 20	+ 19	+ 20	+ 19	+ 20	+ 19

Patterns:

The days of the week repeat. Seven days before Saturday was Saturday, and seven days after Saturday is Saturday again. What day is ten days after Saturday? What day was ten days before Saturday? What day is seventy days after Saturday?

NEW CONCEPT

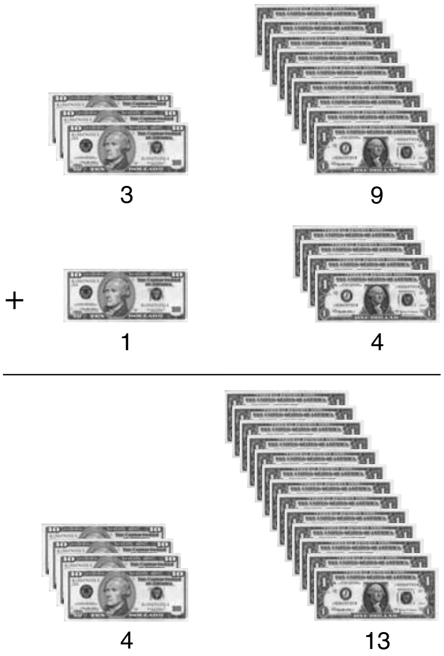
Karyn had $39. She earned $14 more by raking leaves. How much money does Karyn now have?

We may use $10 bills and $1 bills to add $14 to $39.

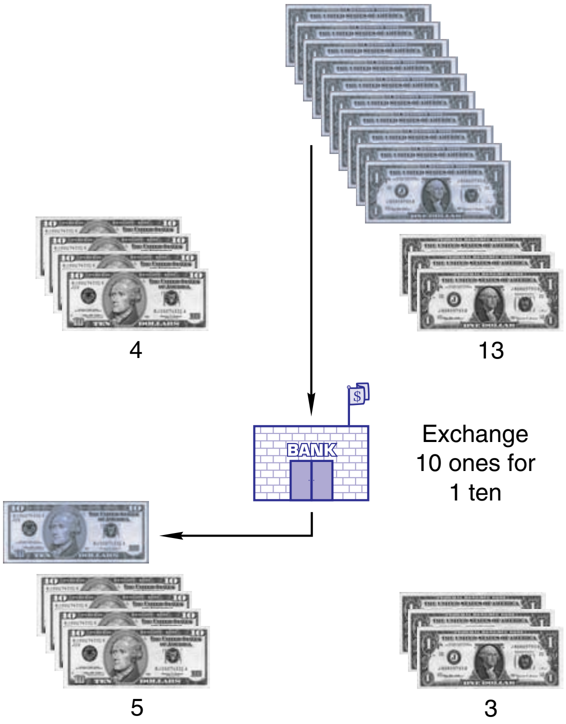
Karyn had $39.

She earned $14.

Now she has …



Since there are more than ten bills in the right-hand column, we exchange ten of the $1 bills for one $10 bill.



Now we have 5 tens and 3 ones, which is $53.

We use a similar method when we add numbers with pencil and paper. To add 14 to 39, we add the ones and get 13.

Add ones.

$$\begin{array}{r} 3\ \ 9 \\ +\ 1\ \ 4 \\ \hline \textcircled{13} \end{array} \longleftarrow \text{1 ten and 3 ones}$$

Thirteen ones is the same as 1 ten and 3 ones. We write the 3 in the ones place and add the 1 ten to the other tens. We show this by writing a 1 either above the column of tens or below it. Then we add the tens.

Add ones.
Add tens.

$$\text{1 above} \longrightarrow \begin{array}{r} {\scriptstyle 1}\ \ \\ 39 \\ +\ 14 \\ \hline 53 \end{array}$$

Add ones.
Add tens.

$$\begin{array}{r} 39 \\ +\ 14 \\ \text{1 below} \longrightarrow {\scriptstyle 1}\ \ \\ \hline 53 \end{array}$$

LESSON PRACTICE

Practice set Solve each problem using money manipulatives. Then add using pencil and paper:

a. $\begin{array}{r} \$36 \\ +\ \$29 \\ \hline \end{array}$ **b.** $\begin{array}{r} \$47 \\ +\ \$\ \ 8 \\ \hline \end{array}$ **c.** $\begin{array}{r} \$57 \\ +\ \$13 \\ \hline \end{array}$

Use pencil and paper to add:

d. 68 + 24 **e.** \$59 + \$8 **f.** 46 + 25

MIXED PRACTICE

Problem set Use digits to write each number:

1. (7) six hundred thirteen

2. (7) nine hundred one

3. (7) Use words to write 941.

Find each missing addend:

4. (2) $\begin{array}{r} 2 \\ 4 \\ +\ F \\ \hline 11 \end{array}$ **5.** (2) $\begin{array}{r} 5 \\ G \\ +\ 2 \\ \hline 13 \end{array}$ **6.** (2) $\begin{array}{r} H \\ 4 \\ +\ 7 \\ \hline 15 \end{array}$ **7.** (2) $\begin{array}{r} 2 \\ 7 \\ +\ N \\ \hline 16 \end{array}$

8. (9) $\begin{array}{r} 33 \\ +\ \ 8 \\ \hline \end{array}$ **9.** (9) $\begin{array}{r} \$47 \\ +\ \$18 \\ \hline \end{array}$ **10.** (9) $\begin{array}{r} 27 \\ +\ 69 \\ \hline \end{array}$ **11.** (9) $\begin{array}{r} \$49 \\ +\ \$25 \\ \hline \end{array}$

12. (6) $\begin{array}{r} 17 \\ -\ \ 8 \\ \hline \end{array}$ **13.** (6) $\begin{array}{r} 12 \\ -\ \ 6 \\ \hline \end{array}$ **14.** (6) $\begin{array}{r} 9 \\ -\ 7 \\ \hline \end{array}$ **15.** (6) $\begin{array}{r} 13 \\ -\ \ 6 \\ \hline \end{array}$

16. (1) What is the name for the answer when we add?

17. (6) What is the name for the answer when we subtract?

18. (5) Which month is two months after the twelfth month?

Write the rule and the next three numbers of each counting sequence:

19. (3) 30, 36, 42, ______, ______, ______, …

20. (3) 28, 35, 42, ______, ______, ______, …

21. Which digit is in the hundreds place in 843?
(4)

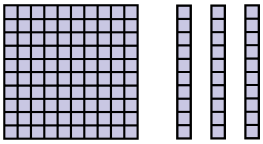
22. 28 + 6
(9)

23. $47 + $28
(9)

24. 35 + 27
(9)

25. Mike bought pants for $28 and a shirt for $17. Altogether, how much did the pants and shirt cost? Write a number sentence for this problem.
(1, 9)

26. What number does this model stand for?
(7)



A. 31
B. 13
C. 103
D. 130

LESSON

10 Even Numbers • Odd Numbers

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add 9 or 19 to a number:

a. 28 + 9	**b.** 36 + 19	**c.** 43 + 9
d. 25 + 19	**e.** 56 + 9	**f.** 45 + 19

Problem Solving:

Terrell has a total of ten coins in his left and right pockets. He has four more coins in his right pocket than in his left pocket. How many coins does Terrell have in each pocket?

NEW CONCEPTS

Even numbers

The numbers we say when we count by twos are **even numbers.** Notice that every even number ends with either 2, 4, 6, 8, or 0.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, …

The list of even numbers goes on and on. We do not begin with zero when we count by twos. However, the number 0 is an even number.

Example 1 Which one of these numbers is an even number?

463 285 456

Solution We can tell whether a number is even by looking at the last digit. **A number is an even number if the last digit is even.** The last digits of these numbers are 3, 5, and 6. Of these, the only even digit is 6, so the even number is **456.**

Odd numbers

If a whole number is not an even number, then it is an **odd number.** We can make a list of odd numbers by beginning with the number 1. Then we add two to get the next odd number, add two more to get the next odd number, and so on. The sequence of odd numbers is

1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, …

Example 2 Use the digits 2, 7, and 6 to write two three-digit odd numbers.

Solution Since any number that ends with either 2 or 6 is even, both numbers must end with 7.

267 **627**

Example 3 List the five three-digit odd numbers that have a 7 in the hundreds place and a 5 in the tens place.

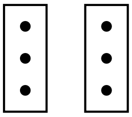
Solution The first two digits are 7 and 5.

$$\underline{7}\quad\underline{5}\quad\underline{\ \ }$$

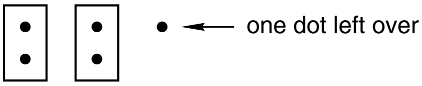
For the number to be odd, the last digit must be either 1, 3, 5, 7, or 9. So the five numbers are

751, 753, 755, 757, and **759**

An even number of objects can be separated into two equal groups. Six is an even number. Here we show six dots separated into two equal groups:



If we try to separate an odd number of objects into two equal groups, there will be one extra object. Five is an odd number. Five dots will not separate into two equal groups, because one dot is left over.



Example 4 The same number of boys and girls were in the classroom. Which of these numbers could be the total number of students in the classroom?

A. 25 B. 26 C. 27

Solution An even number of students can be divided into two equal groups. Since there are an equal number of boys and girls, there must be an even number of students in the classroom. The only even number among the choices is **B. 26.**

LESSON PRACTICE

Practice set Write "even" or "odd" for each number:

a. 563 **b.** 328 **c.** 99 **d.** 0

e. List the five three-digit even numbers that have a 6 in the hundreds place and a 3 in the tens place.

MIXED PRACTICE

Problem set Use digits to write each number:

1. (7) five hundred forty-two

2. (7) six hundred nineteen

3. (6) The numbers 4, 7, and 11 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

Use words to write each number:

4. (7) 903

5. (7) 746

6. (10) List the five three-digit odd numbers that have a 5 in the hundreds place and a 0 in the tens place.

Find each missing addend:

7. (2)
$$\begin{array}{r} 4 \\ N \\ +\ 3 \\ \hline 14 \end{array}$$

8. (2)
$$\begin{array}{r} P \\ 4 \\ +\ 2 \\ \hline 13 \end{array}$$

9. (2)
$$\begin{array}{r} 5 \\ Q \\ +\ 7 \\ \hline 14 \end{array}$$

10. (2)
$$\begin{array}{r} R \\ 3 \\ +\ 2 \\ \hline 11 \end{array}$$

11. (6)
$$\begin{array}{r} 15 \\ -\ 7 \\ \hline \end{array}$$

12. (6)
$$\begin{array}{r} 14 \\ -\ 7 \\ \hline \end{array}$$

13. (6)
$$\begin{array}{r} 17 \\ -\ 8 \\ \hline \end{array}$$

14. (6)
$$\begin{array}{r} 11 \\ -\ 6 \\ \hline \end{array}$$

15. (9)
$$\begin{array}{r} \$25 \\ +\ \$38 \\ \hline \end{array}$$

16. (9)
$$\begin{array}{r} \$19 \\ +\ \$34 \\ \hline \end{array}$$

17. (9)
$$\begin{array}{r} 42 \\ +\ 8 \\ \hline \end{array}$$

18. (9)
$$\begin{array}{r} 17 \\ +\ 49 \\ \hline \end{array}$$

Write the rule and the next three numbers of this counting sequence:

19. (3) 18, 21, 24, ______, ______, ______, ...

20. (3, 5) What is the eighth number in this counting sequence?

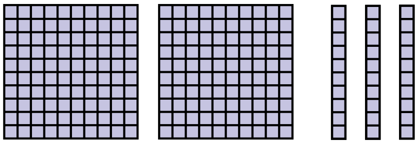
6, 12, 18, 24, ...

21. *(1, 8)* If John has \$6 in a piggy bank, \$12 in his wallet, and \$20 in his drawer, how much money does John have in all three places? Write a number sentence for this problem.

22. *(1)* $2 + 3 + 5 + 7 + 8 + 4 + 5$

23. *(5)* Write today's date in month/day/year form.

24. *(7)* Use words to write the number shown by this model:



25. *(10)* What number is the largest two-digit even number?

26. *(6)* If $\Delta + 4 = 12$, then which of these is not true?

A. $4 + \Delta = 12$

B. $12 - \Delta = 4$

C. $12 + 4 = \Delta$

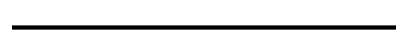
D. $12 - 4 = \Delta$

INVESTIGATION 1

Focus on

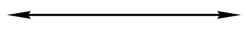
Number Lines

When we "draw a line" with a pencil, we are actually drawing a **line segment.** A line segment is part of a line.



Line segment

A **line** continues in opposite directions without end. To illustrate a line, we draw an arrowhead at each end of a line segment. The arrowheads show that the line continues.

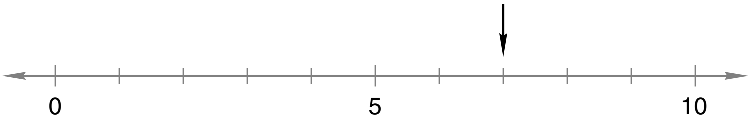


Line

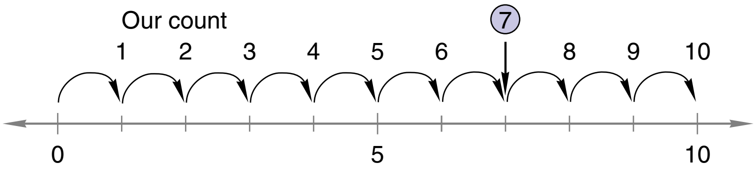
To make a **number line,** we begin by drawing a line. Next, we put **tick marks** on the line, keeping an equal distance between the marks.

Then we label the marks with numbers. On some number lines every mark is labeled. On other number lines only some of the marks are labeled. The labels on a number line tell us how far the marks are from zero.

Example 1 To what number is the arrow pointing?



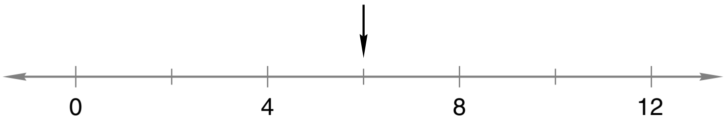
Solution If we count by ones from zero, we see that our count matches the numbers labeled on the number line. So we know that the distance from one tick mark to the next tick mark is 1.



We find that the arrow points to the number **7.**

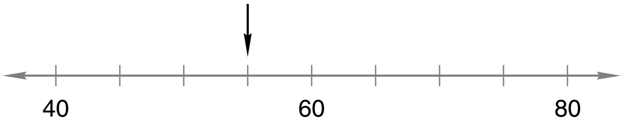
On some number lines the distance from one tick mark to the next is not 1. We may need to count by twos or by fives or by tens or by some other number to find the distance between tick marks.

Example 2 To what number is the arrow pointing?

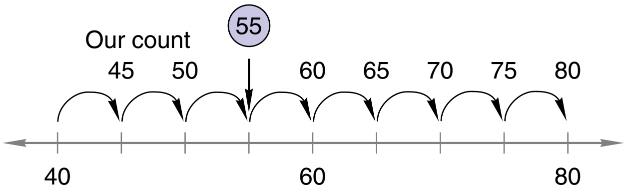


Solution If we count by ones from tick mark to tick mark, our count does not match the numbers labeled on the number line. We try counting by twos and find that our count does match the number line. So the distance from one tick mark to the next tick mark on this number line is 2. The arrow points to a mark that is one mark to the right of 4 and one mark to the left of 8. The number that is two more than 4 and two less than 8 is **6.**

Example 3 To what number is the arrow pointing?



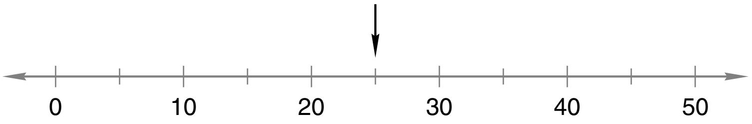
Solution Zero is not shown on this number line, so we will start our count at 40. Counting by ones from tick mark to tick mark does not fit the pattern. Neither does counting by twos. Counting by fives does fit the pattern.



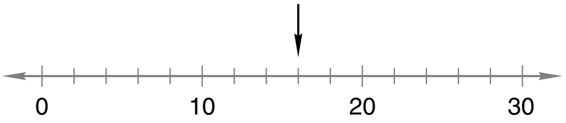
We find that the arrow points to the number **55.**

To what number is each arrow pointing in problems 1–4?

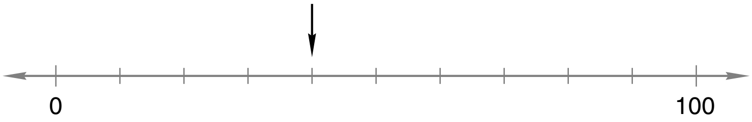
1.



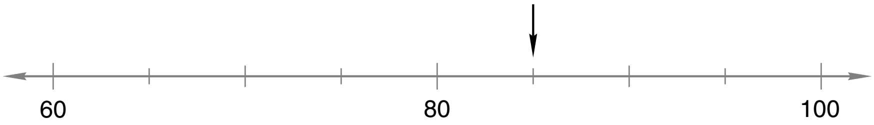
2.



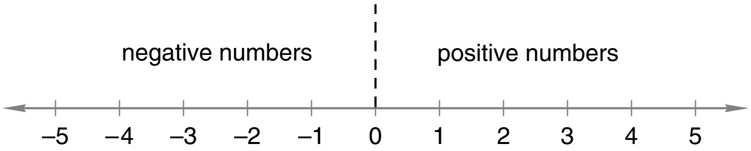
3.



4.



Numbers greater than zero are called **positive numbers.** A number line may also show numbers less than zero. Numbers less than zero are called **negative numbers.** Zero is neither positive nor negative. To write a negative number using digits, we place a negative sign (minus sign) to the left of the digit.



Example 4 (a) Use words to write –10.

(b) Use digits to write negative twelve.

Solution (a) **negative ten**

(b) **–12**

Example 5 Write the next four numbers in each counting sequence:

(a) …, 10, 8, 6, 4, ______, ______, ______, ______, …

(b) …, 9, 7, 5, 3, ______, ______, ______, ______, …

Solution Even and odd numbers may be negative or positive.

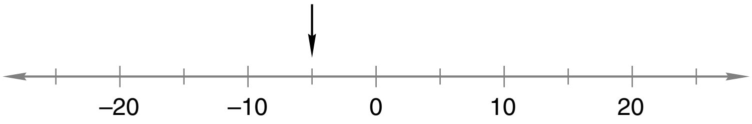
(a) This is a sequence of even numbers. We count down by twos and write the next four even numbers. Notice that zero is even.

…, 10, 8, 6, 4, **2**, **0**, **–2**, **–4**, …

(b) This is a sequence of odd numbers. We count down by twos and write the next four odd numbers.

…, 9, 7, 5, 3, **1**, **–1**, **–3**, **–5**, …

Example 6 To what number is the arrow pointing?



Solution Counting by fives fits the pattern. The arrow points to a number that is five less than zero, which is **–5.**

5. Write the number that is fifteen less than zero

(a) using digits.

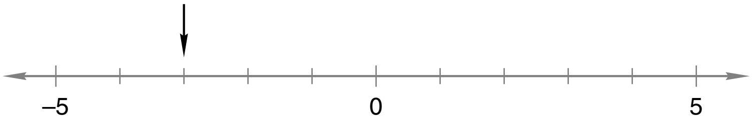
(b) using words.

6. Write the next four numbers in this counting sequence:

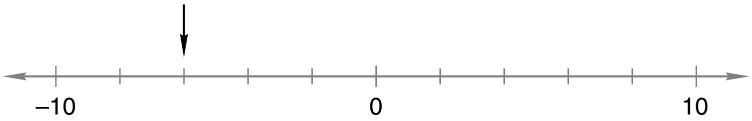
…, 20, 15, 10, 5, ______, ______, ______, ______, …

To what number is each arrow pointing in problems 7 and 8?

7.



8.



A number line can help us **compare** two numbers. When we compare two numbers, we decide whether one of the numbers is **greater than, equal to,** or **less than** the other number.

To show the comparison for two numbers that are not equal, we may use the greater than/less than symbols:

$$> \qquad <$$

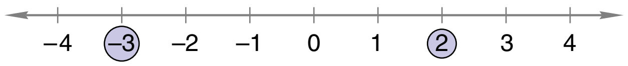
The symbol points to the smaller number. We read from left to right. If the pointed end comes first, we say "is less than."

$3 < 4$ "Three is less than four."

If the open end comes first, we say "is greater than."

$4 > 3$ "Four is greater than three."

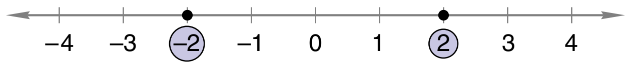
A number line is usually drawn so that the numbers become greater and greater as we move to the right. When comparing two numbers, we might think about their positions on the number line. To compare 2 and –3, for example, we see that 2 is to the right of –3. So we say that 2 is greater than –3.



$$2 > -3$$

Example 7 Compare: 2 ○ –2

Solution The numbers 2 and –2 are not equal. On a number line we see that 2 is greater than –2.



We replace the circle with the proper comparison symbol and write

$$\mathbf{2 > -2}$$

Example 8 (a) Use words to write the comparison $5 > -10$.

(b) Use digits and a comparison sign to write "Negative three is less than negative two."

Solution (a) **Five is greater than negative ten.**

(b) $\mathbf{-3 < -2}$

Compare:

9. –3 ○ 1

10. 3 ○ 2

11. 2 + 3 ○ 3 + 2

12. –4 ○ –5

13. Use words to write the comparison $-1 < 0$.

14. Use digits and a comparison symbol to write "Negative two is greater than negative three."

Example 9 Here we show the comparison "Five is greater than three":

$$5 > 3$$

Rewrite the comparison with 3 on the left and 5 on the right. Then use words to state the comparison.

Solution The numbers are not equal. So if we reverse the order of the numbers, we must also reverse the comparison symbol.

$$\mathbf{3 < 5}$$

This comparison shows that **three is less than five.**

Rewrite each comparison below by reversing the order of the terms being compared.

15. $-1 < 1$

16. $2 + 2 = 4$

17. $0 > -2$

18. $1 + 2 < 4$

LESSON

11

Addition Stories with Missing Addends

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add a number ending in 9 to another number:

a. $\begin{array}{r} 28 \\ +\ 30 \\ \hline \end{array}$ **b.** $\begin{array}{r} 28 \\ +\ 29 \\ \hline \end{array}$ **c.** $\begin{array}{r} 37 \\ +\ 50 \\ \hline \end{array}$ **d.** $\begin{array}{r} 37 \\ +\ 49 \\ \hline \end{array}$ **e.** $\begin{array}{r} 56 \\ +\ 40 \\ \hline \end{array}$ **f.** $\begin{array}{r} 56 \\ +\ 39 \\ \hline \end{array}$

Problem Solving:

The class's math books were placed neatly on the shelf in two stacks. Marla saw the stacks and knew without counting that there was an even number of books. How did she know?

NEW CONCEPT

In the "some and some more" problems we have worked so far, both the "some" number and the "some more" number were given in the problem. We added the numbers to find the total.

In this lesson we will practice story problems in which the total is given and an addend is missing. We solve these problems just like arithmetic problems that have a missing addend—we subtract to find the missing number.

Example 1 Walter had 8 marbles. Then Lamont gave him some more marbles. Walter has 17 marbles now. How many marbles did Lamont give him?

Solution **If we can recognize the pattern, we can solve the problem.** Walter had some marbles. Then he received some more marbles. This problem is a "some and some more" story, so it has an addition pattern. We know the "some" number. We know the total number. We put these numbers into the pattern.

PATTERN: Some + some more = total

PROBLEM: 8 marbles + M marbles = 17 marbles

We see that one of the addends is missing. One way to find the missing number is to ask an addition question.

"Eight plus what number equals seventeen?"

$$8 + M = 17$$

Another way is to ask a subtraction question.

"Seventeen minus eight equals what number?"

$$17 - 8 = M$$

Both questions have the same answer, nine. Lamont gave Walter **9 marbles.**

Example 2 Jamie had some pies. Then Frank gave her 5 more pies. Now Jamie has 12 pies. How many pies did Jamie have at first?

Solution This is a "some and some more" story problem. We fill in the pattern.

$$\begin{array}{lcr} \text{Some} & \qquad & N \text{ pies} \\ \underline{+\ \text{Some more}} & & \underline{+\ \ 5 \text{ pies}} \\ \text{Total} & & 12 \text{ pies} \end{array}$$

Finding the answer is easy now. We can find the missing number by asking an addition question or by asking a subtraction question.

"Five added to what number equals twelve?" (7)

"Twelve minus five equals what number?" (7)

Seven is the answer to either question. At first Jamie had **7 pies.**

LESSON PRACTICE

Practice set For each problem, write an addition pattern. Then work the problem.

a. Lucille had 4 marigolds. Lola gave her some more marigolds. Now Lucille has 12 marigolds. How many marigolds did Lola give Lucille?

b. Sid had some agates. Then he found 8 more agates. Now he has 15 agates. How many agates did he have at first?

MIXED PRACTICE

Problem set

1. *(1)* Carmela saw 4 horses at the fair. Then she saw 13 horses on a farm. How many horses did Carmela see in all?

2. *(11)* Talitha read 6 pages before lunch. After lunch she read some more. If Talitha read 13 pages in all, how many pages did she read after lunch?

3. *(7)* Use digits to write the number six hundred forty-two.

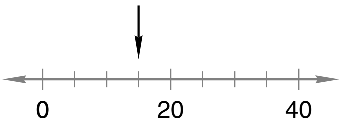
4. *(Inv. 1)* Use digits and symbols to write this comparison: "Negative twelve is less than zero."

5. *(Inv. 1)* Compare: $-2 \bigcirc 2$

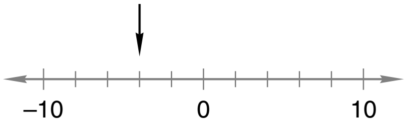
6. *(10)* List the five three-digit odd numbers that have a 5 in the hundreds place and a 7 in the tens place.

7. *(Inv. 1)* To what number is each arrow pointing?

(a)



(b)



8. *(10)* The books were put into two stacks so that an equal number of books was in each stack. Was the total number of books an odd number or an even number?

9. *(2)* $\begin{array}{r} 5 \\ B \\ +\ 7 \\ \hline 18 \end{array}$

10. *(2)* $\begin{array}{r} N \\ 5 \\ +\ 3 \\ \hline 15 \end{array}$

11. *(2)* $\begin{array}{r} 7 \\ A \\ +\ 4 \\ \hline 12 \end{array}$

12. *(2)* $\begin{array}{r} M \\ 2 \\ +\ 8 \\ \hline 14 \end{array}$

13. *(6)* $\begin{array}{r} 12 \\ -\ \ 3 \\ \hline \end{array}$

14. *(6)* $\begin{array}{r} 14 \\ -\ \ 7 \\ \hline \end{array}$

15. *(6)* $\begin{array}{r} 12 \\ -\ \ 8 \\ \hline \end{array}$

16. *(6)* $\begin{array}{r} 13 \\ -\ \ 6 \\ \hline \end{array}$

17. *(9)* $\begin{array}{r} 74 \\ +\ 18 \\ \hline \end{array}$

18. *(9)* $\begin{array}{r} 93 \\ +\ 39 \\ \hline \end{array}$

19. *(9)* $\begin{array}{r} 28 \\ +\ 45 \\ \hline \end{array}$

20. *(9)* $\begin{array}{r} 28 \\ +\ 47 \\ \hline \end{array}$

Write the next three numbers in each counting sequence:

21. *(Inv. 1)* …, 12, 9, 6, _____, _____, _____, …

22. *(3)* …, 30, 36, 42, _____, _____, _____, …

23. *(6)* The numbers 5, 9, and 14 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

24. *(1)* $4 + 3 + 5 + 8 + 7 + 6 + 2$

25. *(1)* Show six ways to add 7, 8, and 9.

26. *(1)* If $3 + ▲ = 7$ and if $■ = 5$, then $▲ + ■$ equals which of the following?

A. 4   B. 5   C. 8   D. 9

LESSON

12 Missing Numbers in Subtraction

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

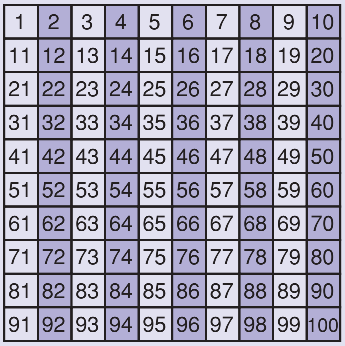
Mental Math:

Add a number ending in 9 to another number:

a. 52 + 29 **b.** 63 + 9 **c.** 14 + 39
d. 26 + 49 **e.** 57 + 19 **f.** 32 + 59

Patterns:

This "hundred number chart" lists the whole numbers from 1 to 100. The shaded squares on this chart contain even numbers. On another chart, shade the squares that contain the numbers we say when we count by threes from 3 to 99.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

NEW CONCEPT

Since Lesson 1 we have practiced finding missing numbers in addition problems. In this lesson we will practice finding missing numbers in subtraction problems.

Remember that we "subtract down" to find the bottom number and "add up" to find the top number.

SUBTRACT DOWN
Nine minus six
equals three.

$$\downarrow \quad \begin{array}{r} 9 \\ -\ 6 \\ \hline 3 \end{array} \quad \uparrow$$

ADD UP
Three plus six
equals nine.

We may use either "subtracting down" or "adding up" to find the missing number in a subtraction problem.

Example 1 Find the missing number:

$$\begin{array}{r} 14 \\ -\ N \\ \hline 6 \end{array}$$

Solution We may either "subtract down" or "add up." Which way seems easier?

SUBTRACT DOWN		**ADD UP**
Fourteen minus what number equals six?	↓ $\begin{array}{r} 14 \\ -\ N \\ \hline 6 \end{array}$ ↑	Six plus what number equals fourteen?

Often it is easier to find a missing number in a subtraction problem by "adding up." If we add 8 to 6, we get 14. So the missing number is **8.** We can check our answer by replacing N with 8 in the original problem.

$$\begin{array}{r} 14 \\ -\ 8 \\ \hline 6 \end{array} \quad \text{check}$$

Since $14 - 8 = 6$, we know our answer is correct.

Example 2 Find the missing number: $\begin{array}{r} B \\ -\ 5 \\ \hline 7 \end{array}$

Solution Try both "subtracting down" and "adding up."

SUBTRACT DOWN		**ADD UP**
What number minus five equals seven?	↓ $\begin{array}{r} B \\ -\ 5 \\ \hline 7 \end{array}$ ↑	Seven plus five equals what number?

Since 7 plus 5 is 12, the missing number must be **12.** We replace B with 12 in the original problem to check our answer.

$$\begin{array}{r} 12 \\ -\ 5 \\ \hline 7 \end{array} \quad \text{check}$$

LESSON PRACTICE

Practice set Find each missing number. Check your answers.

a. $\begin{array}{r} 14 \\ -\ N \\ \hline 6 \end{array}$	**b.** $\begin{array}{r} N \\ -\ 5 \\ \hline 2 \end{array}$	**c.** $\begin{array}{r} 9 \\ -\ N \\ \hline 2 \end{array}$	**d.** $\begin{array}{r} N \\ -\ 7 \\ \hline 5 \end{array}$

MIXED PRACTICE

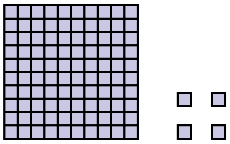
Problem set

1. *(11)* Laura found nine acorns in the forest. Then she found some more acorns in her backyard. If Laura found seventeen acorns in all, how many acorns did she find in the backyard?

2. *(1, 9)* At first thirty-five butterflies were flying about. Later, twenty-seven more butterflies began to fly about. In all, how many butterflies were flying about?

3. *(7)* Use digits to write the number seven hundred fifteen.

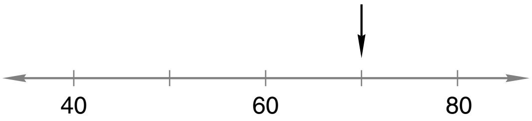
4. *(7)* Use words to write the number shown by this model:



5. *(5)* Nathan's little sister was born on the seventh day of June in 2002. Write her birth date in month/day/year form.

6. *(4)* Write the largest three-digit number that has a 6 in the ones place and a 4 in the tens place.

7. *(Inv. 1)* To what number is the arrow pointing?



8. *(2)* $$\begin{array}{r} 5 \\ N \\ +\ 6 \\ \hline 15 \end{array}$$

9. *(2)* $$\begin{array}{r} A \\ 2 \\ +\ 5 \\ \hline 15 \end{array}$$

10. *(2)* $$\begin{array}{r} 7 \\ 2 \\ +\ N \\ \hline 15 \end{array}$$

11. *(2)* $$\begin{array}{r} 4 \\ A \\ +\ 2 \\ \hline 15 \end{array}$$

12. *(12)* $$\begin{array}{r} N \\ -\ 6 \\ \hline 8 \end{array}$$

13. *(6)* $$\begin{array}{r} 16 \\ -\ 8 \\ \hline \end{array}$$

14. *(6)* $$\begin{array}{r} 14 \\ -\ 7 \\ \hline \end{array}$$

15. *(12)* $$\begin{array}{r} 12 \\ -\ A \\ \hline 7 \end{array}$$

16. *(12)* $$\begin{array}{r} B \\ -\ 6 \\ \hline 6 \end{array}$$

17. *(12)* $$\begin{array}{r} 13 \\ -\ C \\ \hline 8 \end{array}$$

18. *(9)* $$\begin{array}{r} \$48 \\ +\ \$16 \\ \hline \end{array}$$

19. *(9)* $$\begin{array}{r} \$37 \\ +\ \$14 \\ \hline \end{array}$$

Write the next three numbers in each counting sequence:

20. …, 28, 35, 42, _____, _____, _____, …
(3)

21. …, 18, 21, 24, _____, _____, _____, …
(3)

22. How many cents is nine nickels? Count by fives.
(3)

23. Compare: $-3 \bigcirc -5$
(Inv. 1)

24. Write the number that is eleven less than zero
(Inv. 1)

(a) using words.

(b) using digits.

25. $7 + 3 + 8 + 5 + 4 + 3 + 2$
(1)

26. "Five subtracted from N" can be written as which of the following?
(6)

A. $5 - N$ B. $N - 5$ C. $5 + N$ D. $N + 5$

LESSON

13

Adding Three-Digit Numbers

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Review:

a. 30 + 60
b. 74 + 19
c. 46 + 9
d. 63 + 29
e. 42 + 50
f. 16 + 39

Problem Solving:

There were more than 20 but fewer than 30 math books on the shelf. Todd arranged the books into two equal stacks, and then he rearranged the books into three equal stacks. Use these clues to find how many math books were on the shelf.

NEW CONCEPT

Esmerelda and Denise were playing a game. Esmerelda had $675. Denise landed on Esmerelda's property, so she paid Esmerelda $175 for rent. How much money does Esmerelda have now?

We can use bills to add $175 to $675. The sum is 7 hundreds, 14 tens, and 10 ones.

We can exchange 10 ones for 1 ten and 10 tens for 1 hundred, giving us 8 hundreds, 5 tens, and no ones. Thus Esmerelda has $850.

We can also use pencil and paper to solve this problem. First we add the ones and regroup. Then we add the tens and regroup. As a final step we add the hundreds.

Add ones.
Add tens.
Add hundreds.

$$\begin{array}{r} \$675 \\ +\ \$175 \\ {\scriptstyle 1\,1} \\ \hline \$850 \end{array}$$

Show regrouping either above or below.

Example Add:

$$\begin{array}{r} 456 \\ +\ 374 \\ \hline \end{array}$$

Solution We begin by adding the digits in the ones column, and we move one column at a time to the left. We write the first digit of two-digit answers either above or below the next place's column. The sum is **830.**

$$\begin{array}{r} {\scriptstyle 1\,1\ } \\ 456 \\ +\ 374 \\ \hline 830 \end{array}$$

LESSON PRACTICE

Practice set Add:

a. $\begin{array}{r} \$579 \\ +\ \$186 \\ \hline \end{array}$ **b.** $\begin{array}{r} 408 \\ +\ 243 \\ \hline \end{array}$ **c.** $\begin{array}{r} \$498 \\ +\ \$\ \ 89 \\ \hline \end{array}$

d. $458 + $336 **e.** 56 + 569

MIXED PRACTICE

Problem set

1. (1, 9) Seventy-seven students ran in circles and waved their arms. Nineteen students watched in amazement. How many students were there in all?

2. (11) Five of the twelve children at the party were girls. How many boys were at the party?

3. (7) Use words to write the number 913.

4. (7) Use digits to write the number seven hundred forty-three.

5. (Inv. 1) Use digits and symbols to write this comparison: "Seventy-five is greater than negative eighty."

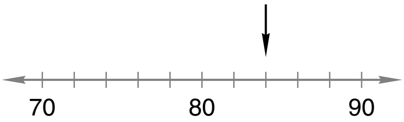
6. *(Inv. 1)* Compare:

(a) 413 ○ 314 (b) −4 ○ 3

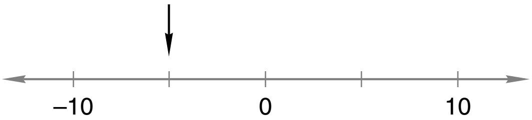
7. *(6)* The numbers 7, 9, and 16 form a fact family. Write two addition facts and two subtraction facts using these three numbers.

8. *(Inv. 1)* To what number is each arrow pointing?

(a)



(b)



9. *(13)* $\begin{array}{r} \$475 \\ +\ \$332 \\ \hline \end{array}$

10. *(13)* $\begin{array}{r} \$714 \\ +\ \$226 \\ \hline \end{array}$

11. *(13)* $\begin{array}{r} 743 \\ +\ 187 \\ \hline \end{array}$

12. *(13)* $\begin{array}{r} 576 \\ +\ 228 \\ \hline \end{array}$

13. *(2)* $\begin{array}{r} 8 \\ 5 \\ +\ K \\ \hline 17 \end{array}$

14. *(2)* $\begin{array}{r} 4 \\ N \\ +\ 6 \\ \hline 15 \end{array}$

15. *(2)* $\begin{array}{r} 9 \\ A \\ +\ 6 \\ \hline 17 \end{array}$

16. *(2)* $\begin{array}{r} N \\ 3 \\ +\ 7 \\ \hline 16 \end{array}$

17. *(12)* $\begin{array}{r} 8 \\ -\ N \\ \hline 2 \end{array}$

18. *(6)* $\begin{array}{r} 17 \\ -\ 8 \\ \hline \end{array}$

19. *(6)* $\begin{array}{r} 13 \\ -\ 7 \\ \hline \end{array}$

20. *(12)* $\begin{array}{r} N \\ -\ 8 \\ \hline 7 \end{array}$

21. *(12)* $\begin{array}{r} 14 \\ -\ N \\ \hline 6 \end{array}$

22. *(12)* $\begin{array}{r} 16 \\ -\ A \\ \hline 9 \end{array}$

23. *(12)* $\begin{array}{r} N \\ -\ 9 \\ \hline 7 \end{array}$

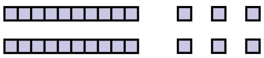
24. *(9)* $\begin{array}{r} \$49 \\ +\ \$76 \\ \hline \end{array}$

25. *(3, Inv. 1)* Write the next three numbers in each counting sequence:

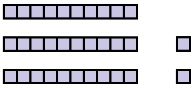
(a) …, 28, 35, 42, _____, _____, _____, …

(b) …, 15, 10, 5, _____, _____, _____, …

26. *(7)* What number shows the total if these sets are put together?



and



A. 26 B. 32 C. 58 D. 13

LESSON 14

Subtracting Two-Digit and Three-Digit Numbers • Missing Two-Digit Addends

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add a number ending in two zeros to another number:

a. 300 + 400 **b.** 600 + 300 **c.** 250 + 300

Review:

d. 63 + 29 **e.** 54 + 19 **f.** 28 + 49

Patterns:

On a hundred number chart, shade the squares that contain the numbers we say when we count by fours from 4 to 100. Which of the shaded squares contain even numbers?

NEW CONCEPTS

Subtracting two-digit and three-digit numbers

Kim had $37. She spent $23 to buy a game. How much money did Kim have then?

We will use bills to illustrate this problem.

Kim had $37.

She spent $23.

Then she had ...

The picture above shows that Kim had 3 tens and 7 ones and that she took away 2 tens and 3 ones. We see that she had 1 ten and 4 ones left over, which is $14.

The problem is a subtraction problem. With pencil and paper, we solve the problem this way:

First subtract ones.
Then subtract tens.

$$\begin{array}{r} 37 \\ -\ 23 \\ \hline 14 \end{array}$$

Example 1 Subtract: 85 − 32

Solution We read this problem as "eighty-five minus thirty-two." This means that 32 is subtracted from 85. We can write the problem and its answer like this:

$$\begin{array}{r} 85 \\ -\ 32 \\ \hline \mathbf{53} \end{array}$$

Example 2 Subtract 123 from 365.

Solution The numbers in a subtraction problem follow a specific order. This problem means, "start with 365 and subtract 123." We write the problem and its answer like this:

$$\begin{array}{r} 365 \\ -\ 123 \\ \hline \mathbf{242} \end{array}$$

Missing two-digit addends

The missing addend in this problem has two digits. We can find the missing addend one digit at a time.

ones column
tens column

$$\begin{array}{r} 56 \\ +\ \_\,\_ \\ \hline 98 \end{array}$$

Six plus what number is eight? (2)
Five plus what number is nine? (4)

The missing digits are 4 and 2. So the missing addend is 42.

Example 3 Find the missing addend:

$$\begin{array}{r} 36 \\ +\ W \\ \hline 87 \end{array}$$

Solution The letter W stands for a two-digit number. We first find the missing digit in the ones place. Then we find the missing digit in the tens place.

$$\begin{array}{r} 36 \\ +\ W \\ \hline 87 \end{array}$$

Six plus what number is seven? (1)
Three plus what number is eight? (5)

The missing addend is **51.**

We check our answer by replacing W with 51 in the original problem.

$$\begin{array}{r} 36 \\ +\ W \\ \hline 87 \end{array} \qquad \begin{array}{r} 36 \\ +\ 51 \\ \hline 87 \end{array} \quad \text{check}$$

Example 4 Find the missing addend: $M + 17 = 49$

Solution We want to find the number that combines with 17 to total 49. The missing addend contains two digits. We will find the digits one at a time.

$$\begin{array}{r} M \\ +\ 17 \\ \hline 49 \end{array}$$

Two plus seven is nine.
Three plus one is four.

We find that the missing number is **32.** We check our answer.

$$M + 17 = 49$$

$$32 + 17 = 49 \quad \text{check}$$

LESSON PRACTICE

Practice set Solve problems **a** and **b** using money manipulatives. Then subtract using pencil and paper.

a. \$485 – \$242

b. \$56 – \$33

c. Subtract 53 from 97.

d. Subtract twenty-three from fifty-four.

Find the missing addend in each problem:

e. $\begin{array}{r} 24 \\ +\ Q \\ \hline 65 \end{array}$

f. $\begin{array}{r} M \\ +\ 31 \\ \hline 67 \end{array}$

g. $36 + W = 99$

h. $Y + 45 = 99$

MIXED PRACTICE

Problem set

1. *(1)* Forty-two red surfboards were on the first wave. Seventeen red surfboards were on the second wave. How many red surfboards were on the first two waves?

2. *(11)* Mariabella saw four green grasshoppers in the first hour. In the second hour she saw some more green grasshoppers. She saw eleven green grasshoppers in all. How many green grasshoppers did she see in the second hour?

3. *(10)* Use the digits 1, 2, and 3 once each to write an even number less than 200.

4. *(6)* Use the numbers 9, 7, and 2 to write two addition facts and two subtraction facts.

5. *(14)* Subtract seven hundred thirteen from eight hundred twenty-four.

6. *(Inv. 1)* Compare:

(a) 704 ◯ 407 (b) −3 ◯ −5

7. *(5)* What is the total number of days in the first two months of a common year?

8. *(Inv. 1)* To what number is the arrow pointing?

9. *(13)*
$$\begin{array}{r} \$346 \\ +\ \$298 \\ \hline \end{array}$$

10. *(13)*
$$\begin{array}{r} 499 \\ +\ 275 \\ \hline \end{array}$$

11. *(13)*
$$\begin{array}{r} \$421 \\ +\ \$389 \\ \hline \end{array}$$

12. *(13)*
$$\begin{array}{r} 506 \\ +\ 210 \\ \hline \end{array}$$

13. *(14)*
$$\begin{array}{r} \$438 \\ -\ \$206 \\ \hline \end{array}$$

14. *(12)*
$$\begin{array}{r} 17 \\ -\ A \\ \hline 9 \end{array}$$

15. *(1)*
$$\begin{array}{r} 7 \\ +\ B \\ \hline 14 \end{array}$$

16. *(12)*
$$\begin{array}{r} 5 \\ -\ C \\ \hline 2 \end{array}$$

17. *(1)*
$$\begin{array}{r} 8 \\ +\ D \\ \hline 15 \end{array}$$

18. *(12)*
$$\begin{array}{r} 15 \\ -\ K \\ \hline 9 \end{array}$$

19. *(2)*
$$\begin{array}{r} 3 \\ N \\ +\ 2 \\ \hline 13 \end{array}$$

20. *(14)*
$$\begin{array}{r} 476 \\ -\ 252 \\ \hline \end{array}$$

21. *(14)*
$$\begin{array}{r} 47 \\ -\ 16 \\ \hline \end{array}$$

22. *(14)*
$$\begin{array}{r} 28 \\ -\ 13 \\ \hline \end{array}$$

23. *(14)*
$$\begin{array}{r} 75 \\ +\ \ T \\ \hline 87 \end{array}$$

24. *(14)*
$$\begin{array}{r} 24 \\ +\ \ E \\ \hline 67 \end{array}$$

25. *(3, Inv. 1)* Write the next three numbers in each counting sequence:

(a) …, 81, 72, 63, _____, _____, _____, …

(b) …, 12, 8, 4, _____, _____, _____, …

26. *(12)* If $\square - 7 = 2$, then which of these is not true?

A. $7 - \square = 2$

B. $\square - 2 = 7$

C. $2 + 7 = \square$

D. $\square = 7 + 2$

LESSON

15

Subtracting Two-Digit Numbers with Regrouping

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add a number ending in two zeros to another number:

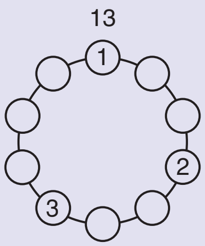
a. 400 + 500 **b.** 600 + 320 **c.** 254 + 100

Review:

d. 64 + 29 **e.** 39 + 25 **f.** 19 + 27

Patterns:

Copy this design of ten circles on your paper, following the same pattern as described in Lesson 5. Then, outside each circle, write the sum of the numbers in that circle and the two circles on either side. For example, the number outside of circle 1 should be 13.



NEW CONCEPT

Roberto had $53. He spent $24 to buy a jacket. Then how much money did Roberto have?

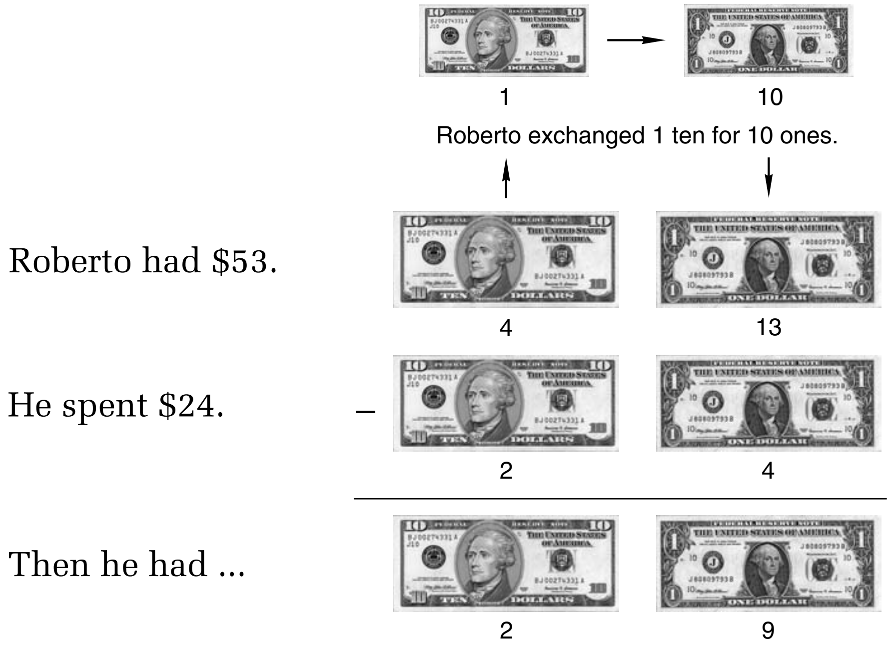
We will use pictures of bills to help us understand this problem.

Roberto had $53.

He spent $24.

Then he had ...

The picture above shows that Roberto had 5 tens and 3 ones and that he took away 2 tens and 4 ones. We see that Roberto had enough tens but not enough ones. To get more ones, Roberto traded 1 ten for 10 ones.



After trading 1 ten for 10 ones, Roberto had 4 tens and 13 ones. Then he was able to take 2 tens and 4 ones from his money to pay for the jacket. The purchase left him with 2 tens and 9 ones, which is $29.

Trading 1 ten for 10 ones is an example of **regrouping,** or **exchanging.** (In subtraction, this process may also be called **borrowing.**) We often need to regroup when we subtract using pencil and paper.

Example Find the difference: 56 − 29

Solution We write the first number on top.

$$\begin{array}{r} 56 \\ -\ 29 \\ \hline ? \end{array}$$

We understand that 56 means “50 and 6” and that 29 means “20 and 9.” Since 6 is less than 9, we need to regroup before we can subtract. We take 10 from 50 and add it to the 6. This makes "50 and 6" into "40 and 16," which is still equal to 56.

$$\begin{array}{r} \overset{40}{\cancel{50}} \overset{\curvearrowright}{\text{ and }} {}^{1}6 \\ -\ 20 \text{ and } 9 \\ \hline 20 \text{ and } 7 \end{array}$$

We subtract and get "20 and 7," which is **27.** This is how we usually show the regrouping:

$$\begin{array}{r} \overset{4}{\cancel{5}}\,{}^{1}6 \\ -\ 2\ 9 \\ \hline 2\ 7 \end{array}$$

LESSON PRACTICE

Practice set Use money manipulatives or draw pictures to show each subtraction:

a. $\begin{array}{r} \$53 \\ -\ \$29 \\ \hline \end{array}$ **b.** $\begin{array}{r} \$56 \\ -\ \$27 \\ \hline \end{array}$ **c.** $\begin{array}{r} \$42 \\ -\ \$24 \\ \hline \end{array}$ **d.** $\begin{array}{r} \$60 \\ -\ \$27 \\ \hline \end{array}$

Use pencil and paper to find each difference:

e. 63 − 36

f. 40 − 13

g. 72 − 24

h. 24 − 18

MIXED PRACTICE

Problem set

1. *(1, 13)* Jimmy found six hundred eighteen acorns under one tree. He found one hundred seventeen acorns under another tree. How many acorns did Jimmy find in all?

2. *(11, 14)* On the first day Richard the Lion-Hearted had sixteen knights. On the second day some more knights arrived, giving him a total of seventy-six knights. How many knights arrived on the second day?

3. *(10)* Use the digits 3, 6, and 7 once each to write an even number less than 400.

4. *(7)* Use words to write the number 605.

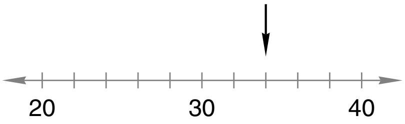
5. *(10)* The smallest two-digit odd number is 11. What is the smallest two-digit even number?

6. (Inv. 1) Compare:

(a) 75 ◯ 57 (b) 5 + 7 ◯ 4 + 8

7. (14) Subtract 245 from 375.

8. (Inv. 1) To what number is the arrow pointing?



9. (13) $\begin{array}{r}\$426\\ +\ \$298\\ \hline\end{array}$

10. (13) $\begin{array}{r}\$278\\ +\ \$456\\ \hline\end{array}$

11. (13) $\begin{array}{r}721\\ +\ 189\\ \hline\end{array}$

12. (13) $\begin{array}{r}409\\ +\ 198\\ \hline\end{array}$

13. (1) $\begin{array}{r}D\\ +\ 7\\ \hline 12\end{array}$

14. (12) $\begin{array}{r}18\\ -\ A\\ \hline 9\end{array}$

15. (14) $\begin{array}{r}38\\ +\ B\\ \hline 59\end{array}$

16. (12) $\begin{array}{r}C\\ -\ 4\\ \hline 1\end{array}$

17. (14) $\begin{array}{r}\$456\\ -\ \$120\\ \hline\end{array}$

18. (15) $\begin{array}{r}\$54\\ -\ \$27\\ \hline\end{array}$

19. (15) $\begin{array}{r}46\\ -\ 28\\ \hline\end{array}$

20. (15) $\begin{array}{r}35\\ -\ 16\\ \hline\end{array}$

21. (5) What is the total number of days in the last two months of the year?

22. (6) The numbers 5, 6, and 11 form a fact family. Write four addition/subtraction facts using these three numbers.

23. (1) 3 + 6 + 7 + 5 + 4 + 8

Write the next three numbers in each counting sequence:

24. (3) …, 72, 63, 54, _____, _____, _____, …

25. (Inv. 1) …, –7, –14, –21, _____, _____, _____, …

26. (1) If $\square = 6$ and if $\square + \Delta = 10$, then Δ equals which of the following?

A. 3 B. 4 C. 5 D. 6

LESSON

16

Expanded Form • More on Missing Numbers in Subtraction

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add three numbers:

a. 30 + 40 + 20 **b.** 300 + 400 + 200 **c.** 3 + 4 + 2

Review:

d. 36 + 19 **e.** 39 + 27 **f.** 44 + 29

Patterns:

The **multiples** of five are the numbers we say when we count by five: 5, 10, 15, 20, and so on. Shade the squares on a hundred number chart that contain a multiple of 5. Which of the shaded squares contain even numbers?

NEW CONCEPTS

Expanded form

The number 365 means "3 hundreds and 6 tens and 5 ones." We can write this as

$$300 + 60 + 5$$

This is the **expanded form** of 365.

Example 1 Write 275 in expanded form.

Solution **200 + 70 + 5**

Example 2 Write 407 in expanded form.

Solution There are no tens. We write the following: **400 + 7**

More on missing numbers in subtraction

We have found missing numbers in subtraction problems by "subtracting down" or "adding up." We can use these methods when subtracting numbers with one, two, or more digits.

SUBTRACT DOWN

$$\begin{array}{r} 56 \\ -\ W \\ \hline 14 \end{array} \Bigg\downarrow$$

Six minus what number is four? (2)
Five minus what number is one? (4)

We find that the missing number is 42.

Add Up

$$\begin{array}{r} N \\ -\;36 \\ \hline 43 \end{array} \;\Bigg\uparrow$$

Three plus six is nine.
Four plus three is seven.

We find that the missing number is 79.

Example 3 Find the missing number: $\begin{array}{r} 64 \\ -\;W \\ \hline 31 \end{array}$

Solution We may find the missing number one digit at a time by "subtracting down" or "adding up."

$$\begin{array}{r} 64 \\ -\;W \\ \hline 31 \end{array} \;\Bigg\downarrow$$

Four minus what number is one? (3)
Six minus what number is three? (3)

or

$$\begin{array}{r} 64 \\ -\;W \\ \hline 31 \end{array} \;\Bigg\uparrow$$

One plus what number is four? (3)
Three plus what number is six? (3)

We find that the missing number is **33.** We check our work by using 33 in place of W in the original problem.

$$\begin{array}{r} 64 \\ -\;W \\ \hline 31 \end{array} \qquad \begin{array}{r} 64 \\ -\;33 \\ \hline 31 \end{array} \;\text{check}$$

LESSON PRACTICE

Practice set*[†] Write each number in expanded form:

a. 86 **b.** 325 **c.** 507

Find each missing number:

d. $\begin{array}{r} 36 \\ -\;P \\ \hline 21 \end{array}$ **e.** $\begin{array}{r} 47 \\ -\;Q \\ \hline 24 \end{array}$ **f.** $\begin{array}{r} M \\ -\;22 \\ \hline 16 \end{array}$

g. $W - 32 = 43$ **h.** $43 - X = 32$

[†] The asterisk after "Practice set" indicates that additional practice problems intended for remediation are available in the appendix.

MIXED PRACTICE

Problem set

1. *(11, 14)* Twenty-three horses grazed in the pasture. The rest of the horses were in the corral. If there were eighty-nine horses in all, how many horses were in the corral?

2. *(1, 13)* Three hundred seventy-five students stood silently in the hall. The other one hundred seven students in the hall were shouting and jumping up and down. Altogether, how many students were in the hall?

3. *(6)* Use the numbers 22, 33, and 55 to write two addition facts and two subtraction facts.

4. *(16)* Write 782 in expanded form.

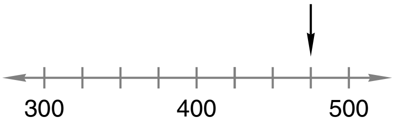
5. *(10)* The largest three-digit odd number is 999. What is the smallest three-digit even number?

6. *(Inv. 1)* Compare:

(a) 918 ◯ 819 (b) −7 ◯ −5

7. *(3)* How many days are in 6 weeks? Count by sevens.

8. *(Inv. 1)* To what number is the arrow pointing?



9. *(13)*
$$\begin{array}{r} \$576 \\ +\ \$128 \\ \hline \end{array}$$

10. *(13)*
$$\begin{array}{r} \$243 \\ +\ \$578 \\ \hline \end{array}$$

11. *(13)*
$$\begin{array}{r} 186 \\ +\ 285 \\ \hline \end{array}$$

12. *(13)*
$$\begin{array}{r} 329 \\ +\ 186 \\ \hline \end{array}$$

13. *(14)*
$$\begin{array}{r} D \\ +\ 12 \\ \hline 17 \end{array}$$

14. *(12)*
$$\begin{array}{r} 17 \\ -\ A \\ \hline 9 \end{array}$$

15. *(1)*
$$\begin{array}{r} 8 \\ +\ B \\ \hline 14 \end{array}$$

16. *(12)*
$$\begin{array}{r} C \\ -\ 7 \\ \hline 2 \end{array}$$

17. *(15)*
$$\begin{array}{r} 25 \\ -\ 19 \\ \hline \end{array}$$

18. *(15)*
$$\begin{array}{r} 42 \\ -\ 28 \\ \hline \end{array}$$

19. *(15)*
$$\begin{array}{r} 46 \\ -\ 18 \\ \hline \end{array}$$

20. *(15)*
$$\begin{array}{r} 42 \\ -\ 16 \\ \hline \end{array}$$

21. *(16)*
$$\begin{array}{r} 68 \\ -\ D \\ \hline 34 \end{array}$$

22. *(16)*
$$\begin{array}{r} B \\ -\ 34 \\ \hline 15 \end{array}$$

23. *(16)*
$$\begin{array}{r} 62 \\ -\ H \\ \hline 21 \end{array}$$

24. *(16)*
$$\begin{array}{r} L \\ -\ 46 \\ \hline 32 \end{array}$$

25. Write the next three numbers in each counting sequence:
(3, Inv. 1)

(a) ..., 16, 20, 24, _____, _____, _____, ...

(b) ..., 16, 12, 8, _____, _____, _____, ...

26. If $N - 3 = 6$, then which of these number sentences is not true?
(6)

A. $6 + 3 = N$

B. $3 + 6 = N$

C. $6 - 3 = N$

D. $N - 6 = 3$

LESSON

17

Adding Columns of Numbers with Regrouping

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add three numbers:

a. 200 + 300 + 400

b. 240 + 200 + 100

c. 36 + 20 + 9

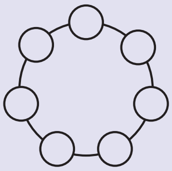
d. 45 + 10 + 29

e. 56 + 20 + 19

f. 24 + 39 + 10

Patterns:

Create a design of numbered circles like those in Lessons 5 and 15, but use seven circles instead of ten. Use the pattern "1, skip, skip, 2, skip, skip, 3, …" to number the circles, starting with the circle at top. Outside each circle, write the sum of the numbers in that circle and the two circles on either side. Describe the pattern to a classmate or write a description of the pattern.



NEW CONCEPT

We have practiced solving addition problems in which we regrouped 10 ones as 1 ten. But sometimes the sum of the digits in the ones column is 20 or more. When this happens, we move a group of two, three, or more tens to the tens column.

Example 1 Add: 28 + 16 + 39 + 29

Solution We arrange the numbers vertically and then add the ones. Their sum is 32, which is 3 tens plus 2 ones. We record the 2 in the ones place and write the 3 either above or below the tens column. Then we finish adding.

$$\begin{array}{rr} \text{3 above} \rightarrow & 3 \\ & 28 \\ & 16 \\ & 39 \\ & +\ 29 \\ \hline & \mathbf{112} \end{array} \qquad \begin{array}{rr} & 28 \\ & 16 \\ & 39 \\ & +\ 29 \\ \text{3 below} \rightarrow & 3 \\ \hline & \mathbf{112} \end{array}$$

Example 2 Add: $227 + 88 + 6$

Solution We line up the last digits of the numbers. Then we add the digits in the ones column and get 21.

$$\begin{array}{r} 227 \\ 88 \\ +\quad 6 \\ \hline \textcircled{21} \end{array}$$

The number 21 is 2 tens plus 1 one. We record the 1 in the ones place and write the 2 in the tens column. Then we add the tens and get 12 tens.

$$\begin{array}{r} \overset{2}{2}\,\overset{}{2}7 \\ 88 \\ +\quad 6 \\ \hline \textcircled{12}1 \end{array}$$

We record the 2 in the tens place and write the 1, which is 1 hundred, in the hundreds column. Then we finish adding.

$$\begin{array}{r} \overset{1}{2}\,\overset{2}{2}\,7 \\ 88 \\ +\quad 6 \\ \hline \mathbf{321} \end{array}$$

LESSON PRACTICE

Practice set* Add:

a. $\begin{array}{r} 47 \\ 29 \\ 46 \\ +\ 95 \\ \hline \end{array}$ **b.** $\begin{array}{r} 28 \\ 47 \\ +\ 65 \\ \hline \end{array}$ **c.** $\begin{array}{r} 38 \\ 22 \\ 31 \\ +\ 46 \\ \hline \end{array}$ **d.** $\begin{array}{r} 438 \\ 76 \\ +\quad 5 \\ \hline \end{array}$

e. $15 + 24 + 11 + 25 + 36$

MIXED PRACTICE

Problem set

1. (11) One doctor put in twenty-four stitches. A second doctor put in some more stitches. There were seventy-five stitches in all. How many stitches did the second doctor put in?

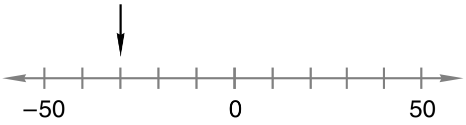
2. (1, 13) Four hundred seven roses were in front. Three hundred sixty-two roses were in back. How many roses were there in all?

3. Use the digits 9, 2, and 8 once each to write an even number less than 300.
(10)

4. Write 813 in expanded form. Then use words to write the number.
(7, 16)

5. The largest two-digit even number is 98. What is the smallest two-digit odd number?
(10)

6. To what number is the arrow pointing?
(Inv. 1)



7. *(17)*
$$\begin{array}{r} 294 \\ 312 \\ + \quad 5 \\ \hline \end{array}$$

8. *(13)*
$$\begin{array}{r} \$189 \\ + \ \$298 \\ \hline \end{array}$$

9. *(13)*
$$\begin{array}{r} \$378 \\ + \ \$496 \\ \hline \end{array}$$

10. *(13)*
$$\begin{array}{r} 109 \\ + \ 486 \\ \hline \end{array}$$

11. $14 + 28 + 35 + 16 + 227$
(17)

12. $14 - A = 7$ *(12)*

13. $8 + B = 14$ *(1)*

14. $C - 13 = 5$ *(16)*

15. *(12)*
$$\begin{array}{r} 11 \\ - \ D \\ \hline 9 \end{array}$$

16. *(12)*
$$\begin{array}{r} E \\ - \ 5 \\ \hline 8 \end{array}$$

17. *(15)*
$$\begin{array}{r} 38 \\ - \ 29 \\ \hline \end{array}$$

18. *(15)*
$$\begin{array}{r} 57 \\ - \ 38 \\ \hline \end{array}$$

19. *(14)*
$$\begin{array}{r} 34 \\ + \ B \\ \hline 86 \end{array}$$

20. *(16)*
$$\begin{array}{r} 48 \\ - \ C \\ \hline 25 \end{array}$$

21. *(16)*
$$\begin{array}{r} D \\ - \ 46 \\ \hline 12 \end{array}$$

22. *(16)*
$$\begin{array}{r} Y \\ - \ 15 \\ \hline 24 \end{array}$$

Write the next three numbers in each counting sequence:

23. ..., 48, 44, 40, ______, ______, ______, ...
(3)

24. ..., 12, 15, 18, ______, ______, ______, ...
(3)

25. The numbers 6, 9, and 15 form a fact family. Write four addition/subtraction facts using these three numbers.
(6)

26. Nancy is thinking of two numbers whose sum is 10 and whose difference is 2. What are the two numbers?
(1, 6)

A. 2 and 8
B. 3 and 7
C. 6 and 4
D. 2 and 10

LESSON

18 Reading Scales

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

a. 250 + 300 + 100 **b.** 20 + 36 + 19 **c.** 76 + 9 + 9

d. 64 + 9 + 10 **e.** 27 + 19 + 20 **f.** 427 + 200

Patterns:

On this hundred number chart we began circling the multiples of three. We drew an "X" on the multiples of four. Notice that the number 12 has both a circle and an X. On another chart, finish the pattern. Then shade the boxes that have numbers with both a circle and an X.

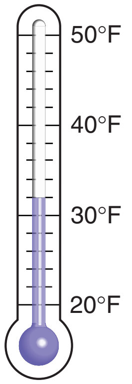
1	2	③	~~4~~	5	⑥	7	~~8~~	⑨	10
11	~~⑫~~	13	14	⑮	~~16~~	17	⑱	19	~~20~~
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

NEW CONCEPT

A **scale** is a type of number line often used for measuring. Scales are found on rulers, gauges, thermometers, speedometers, and many other instruments. To read a scale, we first determine the distance between the marks on the scale. Then we can find the values of all the marks on the scale.

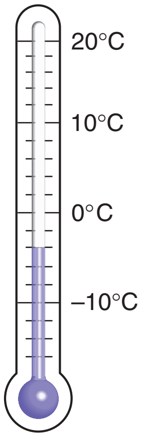
We use a thermometer to measure temperature. Temperature is usually measured in degrees **Fahrenheit** (°F) or in degrees **Celsius** (°C). On many thermometers the distance between the tick marks is two degrees.

Example 1 What temperature is shown on this Fahrenheit thermometer?



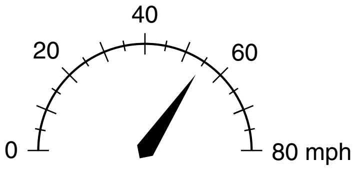
Solution There are five spaces between 30° and 40° on this scale, so each space cannot equal one degree. If we try counting by twos, we find that our count matches the scale. We count up by twos from 30° and find that the temperature is **32°F.** Water freezes at 32°F.

Example 2 What temperature is shown on this Celsius thermometer?



Solution Most of the world uses the Celsius scale to measure temperature. On this thermometer we see that the tick marks are also two degrees apart. If we count down by twos from zero, we find that the temperature shown is four degrees below zero, which we write as **–4°C.** Water freezes at 0°C, so –4°C is below freezing.

Example 3 This speedometer shows speed in miles per hour (mph). How fast is the car with this speedometer traveling?

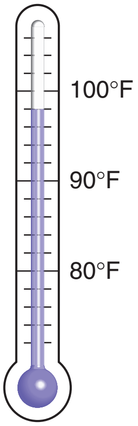


Solution By trying different counts on the scale, we find that each space equals five. If we count up by fives from 40, we see that the needle points to 55. So the car is traveling at a speed of **55 mph.**

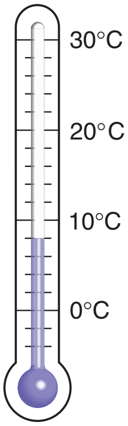
LESSON PRACTICE

Practice set What measurement is shown on each of these scales? Include correct units.

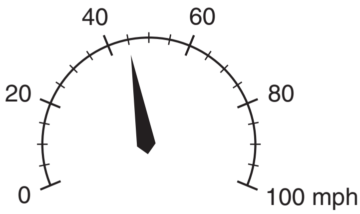
a.



b.



c.



MIXED PRACTICE

Problem set

1. (11, 14) Tomas ran to the fence and back in 58 seconds. If it took Tomas 21 seconds to run to the fence, how many seconds did it take him to run back from the fence?

2. (1, 13) Two hundred ninety-seven boys and three hundred fifteen girls attend Madison School. How many children attend Madison School? Write a number sentence for this problem.

3. (6) Use the numbers 8, 17, and 9 to write two addition facts and two subtraction facts.

4. (4) The tens digit is 4. The ones digit is 9. The number is between 200 and 300. What is the number?

5. (3, 5) What is the eighth number in this counting sequence?

4, 8, 12, 16, …

6. (Inv. 1) To what number is the arrow pointing?

7. (13)
$$\begin{array}{r} \$392 \\ +\ \$278 \\ \hline \end{array}$$

8. (13)
$$\begin{array}{r} \$439 \\ +\ \$339 \\ \hline \end{array}$$

9. (13)
$$\begin{array}{r} 774 \\ +\ 174 \\ \hline \end{array}$$

10. (13)
$$\begin{array}{r} 389 \\ +\ 398 \\ \hline \end{array}$$

11. (17)
$$\begin{array}{r} 13 \\ 25 \\ 46 \\ 25 \\ +\ 29 \\ \hline \end{array}$$

12. (16)
$$\begin{array}{r} 18 \\ -\ A \\ \hline 12 \end{array}$$

13. (1)
$$\begin{array}{r} 8 \\ +\ B \\ \hline 16 \end{array}$$

14. (12)
$$\begin{array}{r} C \\ -\ 5 \\ \hline 3 \end{array}$$

15. (15)
$$\begin{array}{r} 62 \\ -\ 48 \\ \hline \end{array}$$

16. (15)
$$\begin{array}{r} 82 \\ -\ 58 \\ \hline \end{array}$$

17. (17)
$$\begin{array}{r} 28 \\ 36 \\ 57 \\ +\ 47 \\ \hline \end{array}$$

18. (16)
$$\begin{array}{r} 35 \\ -\ Y \\ \hline 14 \end{array}$$

19. (14)
$$\begin{array}{r} 45 \\ +\ P \\ \hline 55 \end{array}$$

20. (16)
$$\begin{array}{r} 75 \\ -\ L \\ \hline 42 \end{array}$$

21. (16)
$$\begin{array}{r} C \\ -\ 47 \\ \hline 31 \end{array}$$

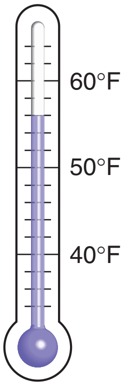
22. (14)
$$\begin{array}{r} E \\ +\ 15 \\ \hline 37 \end{array}$$

23. Write 498 in expanded form.
(16)

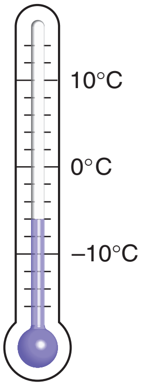
24. Compare:
(Inv. 1)
(a) 423 ○ 432 (b) 3 ○ −3

25. What temperature is shown on each thermometer?
(18)

(a)



(b)



26. Which of these numbers is an odd number greater than 750?
(10)

A. 846 B. 864 C. 903 D. 309

LESSON 19

Reading Time from a Clock

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Add a number ending in two zeros to a two-digit number:

a. 27 + 100 **b.** 63 + 200 **c.** 28 + 20 + 300

d. 36 + 9 + 200 **e.** 45 + 19 + 100 **f.** 48 + 29 + 300

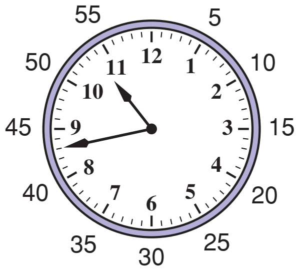
g. What number should be added to each of these numbers for the total to be 10: 2, 5, 6, 3, 1?

Problem Solving:

Habib had four coins in his pocket totaling 25¢. What coins did Habib have in his pocket?

NEW CONCEPT

The scale on a clock is actually two scales in one. One scale marks hours and is usually numbered. The other scale marks minutes and seconds and is usually not numbered. We have numbered the scale for minutes and seconds outside this clock. Notice that on this scale we count by fives to go from one big mark to the next. So counting by fives can help us find the number of minutes before or after the hour.

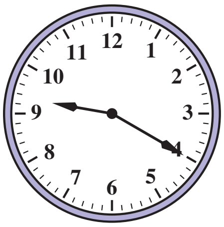


To tell time, we read the position of the short hand on the hour scale and the position of the long hand on the minute scale. If the clock also has a hand for seconds, we can read its position on the minute scale, which is also the second scale.

To write the time of day, we write the hour followed by a colon. Then we write two digits to show the number of minutes after the hour. We use the abbreviations **a.m.** for the

12 hours before noon and **p.m.** for the 12 hours after noon. This form is referred to as *digital form.* Noon is written as 12:00 p.m.; midnight is 12:00 a.m.

Example 1 If it is evening, what time is shown by the clock?



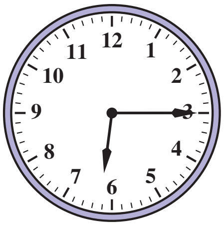
Solution Since the short hand is between the 9 and the 10, we know it is after 9 p.m. and before 10 p.m. For the long hand, we count 5, 10, 15, 20 minutes after 9:00 p.m. The clock shows **9:20 p.m.**

Sixty minutes is one hour, so thirty minutes is half an hour. So if the time is 7:30, we might say that the time is "half past seven." Fifteen minutes is a quarter of an hour. At 6:15 we might say that the time is a "quarter after six."

7:30

"Half past seven"

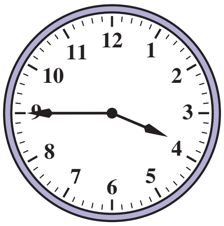
6:15



"A quarter after six"

Sometimes, when it is getting close to the next hour, we say how many minutes it is until the next hour. When the time is 5:50, we might say, "It is ten minutes to six." When it is 3:45, we might say, "It is a quarter to four."

3:45



"A quarter to four"

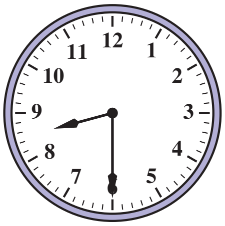
Example 2 Use digital form to show what time it is at a quarter to eight in the evening.

Solution A quarter to eight is 15 minutes before eight. In the evening, this time is **7:45 p.m.**

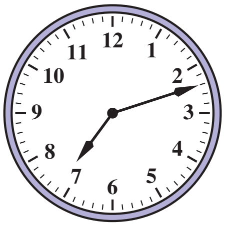
LESSON PRACTICE

Practice set If it is morning, what time is shown by each clock?

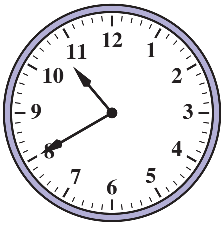
a.



b.



c.



d. Use digital form to show what time it is at ten minutes to nine in the evening.

e. How many hours equal a whole day?

f. How many minutes equal an hour?

g. How many seconds equal a minute?

MIXED PRACTICE

Problem set

1. *(11)* On the first day Sarah sharpened fifty-one pencils. She sharpened some more pencils on the second day. She sharpened seventy-six pencils in all. How many pencils did she sharpen on the second day?

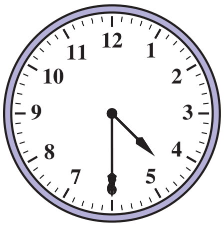
2. *(11, 14)* Twelve of the twenty-seven children in Room 9 are boys. How many girls are in Room 9?

3. *(6)* If $A + B = 9$, then what is the other addition fact for A, B, and 9? What are the two subtraction facts for A, B, and 9?

4. *(7, 16)* Write 905 in expanded form. Then use words to write the number.

5. *(Inv. 1)* Use digits and symbols to write this comparison: "One hundred twenty is greater than one hundred twelve."

6. *(19)* This clock shows that it is half past four. It is afternoon. Write the time shown in digital form.



7. *(18)* Water freezes at 32° on the Fahrenheit scale. At what temperature on the Celsius scale does water freeze?

8. *(13)* $\begin{array}{r} \$468 \\ +\ \$293 \\ \hline \end{array}$

9. *(13)* $\begin{array}{r} 468 \\ +\ 185 \\ \hline \end{array}$

10. *(13)* $\begin{array}{r} \$187 \\ +\ \$698 \\ \hline \end{array}$

11. *(12)* $\begin{array}{r} 14 \\ -\ A \\ \hline 7 \end{array}$

12. *(1)* $\begin{array}{r} 8 \\ +\ B \\ \hline 16 \end{array}$

13. *(12)* $\begin{array}{r} C \\ -\ 8 \\ \hline 7 \end{array}$

14. *(12)* $\begin{array}{r} 14 \\ -\ D \\ \hline 9 \end{array}$

15. *(15)* $\begin{array}{r} 74 \\ -\ 58 \\ \hline \end{array}$

16. *(15)* $\begin{array}{r} \$44 \\ -\ \$28 \\ \hline \end{array}$

17. *(15)* $\begin{array}{r} 23 \\ -\ 18 \\ \hline \end{array}$

18. *(15)* $\begin{array}{r} \$62 \\ -\ \$43 \\ \hline \end{array}$

19. *(17)* $\begin{array}{r} 25 \\ 28 \\ 46 \\ +\ 88 \\ \hline \end{array}$

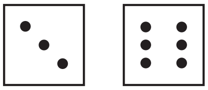
20. *(16)* $\begin{array}{r} 45 \\ -\ P \\ \hline 21 \end{array}$

21. *(14)* $\begin{array}{r} 13 \\ +\ B \\ \hline 37 \end{array}$

22. *(16)* $\begin{array}{r} F \\ -\ 45 \\ \hline 32 \end{array}$

23. *(3)* How many quarters are equal to four dollars? Count by fours.

24. *(1)* Write a number sentence for this picture:



25. *(3, Inv. 1)* Write the next three numbers in each counting sequence:

(a) …, 8, 16, 24, ______, ______, ______, …

(b) …, 8, 6, 4, ______, ______, ______, …

26. *(12)* If $9 - \Delta = 4$, then which of these is not true?

A. $9 - 4 = \Delta$ B. $\Delta - 4 = 9$

C. $4 + \Delta = 9$ D. $\Delta + 4 = 9$

LESSON

20

Rounding Numbers to the Nearest Ten • Rounding Money to the Nearest Dollar

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

a. 56 + 400
b. 154 + 200
c. 54 + 29
d. 35 + 9 + 200
e. 48 + 19 + 200
f. 400 + 39 + 38
g. What number should be added to each of these numbers for the total to be 10: 9, 7, 5, 4, 8?

Patterns:

The multiples of six are 6, 12, 18, and so on. On a hundred number chart, shade the squares that contain a multiple of six. Which of the shaded numbers are also a multiple of five?

NEW CONCEPTS

Rounding numbers to the nearest ten

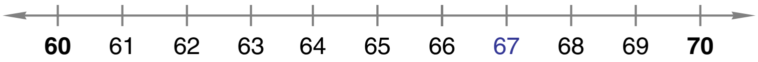
One of the sentences below uses an **exact number.** The other sentence uses a **rounded number.** Can you tell which sentence uses the rounded number?

The radio cost about $70.

The radio cost $68.47.

The first sentence uses the rounded number. Rounded numbers usually end with a zero. We often use rounded numbers in place of exact numbers because they are easy to understand and work with.

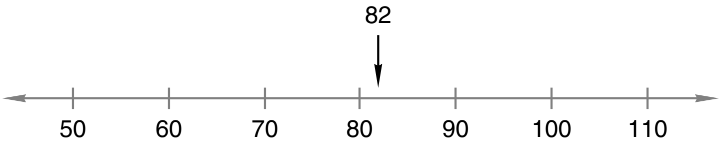
To round an exact number to the nearest ten, we choose the closest number that ends in zero. A number line can help us understand rounding. We will use the number line below to help us round 67 to the nearest ten.



We see that 67 is between 60 and 70. Since 67 is closer to 70 than it is to 60, we say that 67 is "about 70." When we say this, we have rounded 67 to the nearest ten.

Example 1 Round 82 to the nearest ten.

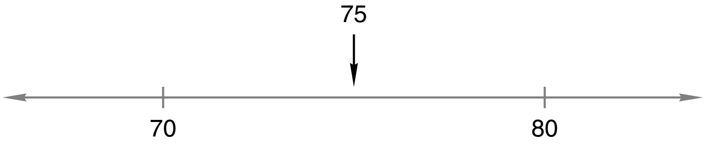
Solution Rounding to the nearest ten means rounding to a number we would say when counting by tens (10, 20, 30, 40, and so on). We will use a number line marked off in tens to picture this problem.



We see that 82 is between 80 and 90. Since 82 is closer to 80 than it is to 90, we round 82 to **80.**

Example 2 Round 75 to the nearest ten.

Solution Seventy-five is halfway between 70 and 80.



If the number we are rounding is halfway between round numbers, we round up to the next round number. So 75 rounds to **80.**

Rounding money to the nearest dollar

To round dollars and cents to the nearest dollar, we look closely at the number of cents. For example, to determine whether $7.89 is closer to $7 or to $8, we ask ourselves whether 89 cents is more than or less than half a dollar. Half a dollar is 50 cents. Since 89 cents is more than half a dollar, $7.89 is closer to $8 than $7. To round money amounts to the nearest dollar, we round up if the number of cents is 50 or more. We round down if the number of cents is less than 50.

Example 3 Round each amount of money to the nearest dollar:

(a) $6.49 (b) $12.95 (c) $19.75

Solution (a) The number of cents is less than 50. We round down to **$6.**

(b) The number of cents is more than 50. We round up to **$13.**

(c) The number of cents is more than 50. We round up to the next dollar, which is **$20.**

LESSON PRACTICE

Practice set Round each number to the nearest ten. For each problem, draw a number line to show your work.

a. 78 **b.** 43 **c.** 61 **d.** 45

Round each amount of money to the nearest dollar:

e. $14.29 **f.** $8.95 **g.** $21.45 **h.** $29.89

MIXED PRACTICE

Problem set

1. *(11, 14)* Martine gathered a "whole bunch" of eggs one day. She gathered twenty-one eggs on the second day. If she gathered seventy-two eggs in all, how many were from the "whole bunch"?

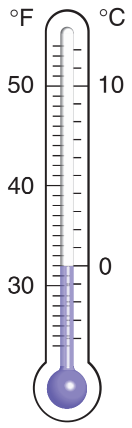
2. *(1, 13)* Four hundred seventy-six children stood quietly in one line. Three hundred ninety-seven children stood quietly in another line. Altogether, how many children stood quietly in line?

3. *(4)* The ones digit is 5. The tens digit is 6. The number is between 600 and 700. What is the number?

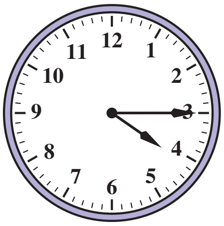
4. *(7, 16)* Write 509 in expanded form. Then use words to write the number.

5. *(Inv. 1)* Use digits and symbols to write this comparison: "Negative twenty is less than ten."

6. *(18)* This thermometer shows the temperature on both the Fahrenheit and Celsius scales. Write the temperature shown in degrees Fahrenheit and in degrees Celsius.



7. (19) It is a quarter after four in the afternoon. Write the time shown in digital form.



8. (20) Round each number to the nearest ten:

(a) 47 (b) 74

9. (13) $\begin{array}{r} \$476 \\ +\ \$285 \\ \hline \end{array}$

10. (13) $\begin{array}{r} \$185 \\ +\ \$499 \\ \hline \end{array}$

11. (13) $\begin{array}{r} 568 \\ +\ 397 \\ \hline \end{array}$

12. (13) $\begin{array}{r} 478 \\ +\ 196 \\ \hline \end{array}$

13. (12) $\begin{array}{r} 17 \\ -\ A \\ \hline 9 \end{array}$

14. (12) $\begin{array}{r} 14 \\ -\ B \\ \hline 14 \end{array}$

15. (12) $\begin{array}{r} 13 \\ -\ C \\ \hline 6 \end{array}$

16. (15) $\begin{array}{r} \$35 \\ -\ \$28 \\ \hline \end{array}$

17. (15) $\begin{array}{r} 23 \\ -\ 15 \\ \hline \end{array}$

18. (15) $\begin{array}{r} 63 \\ -\ 36 \\ \hline \end{array}$

19. (15) $\begin{array}{r} 74 \\ -\ 59 \\ \hline \end{array}$

20. (14) $\begin{array}{r} M \\ +\ 22 \\ \hline 45 \end{array}$

21. (16) $\begin{array}{r} K \\ -\ 15 \\ \hline 32 \end{array}$

22. (16) $\begin{array}{r} 47 \\ -\ K \\ \hline 34 \end{array}$

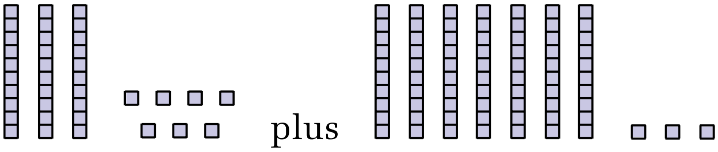
23. (17) $\begin{array}{r} 28 \\ 36 \\ 44 \\ +\ 58 \\ \hline \end{array}$

24. (17) $\begin{array}{r} 49 \\ 28 \\ 32 \\ +\ 55 \\ \hline \end{array}$

25. (20) Round each amount of money to the nearest dollar:

(a) $25.67 (b) $14.42

26. (7, 9) Which number sentence describes this model?



A. 307 + 703 = 1010

B. 37 + 73 = 100

C. 37 + 73 = 110

D. 37 + 73 = 1010

INVESTIGATION 2

Focus on

Units of Length • Perimeter

Units of length

A ruler is a tool used to measure length. In your desk you might have an **inch** ruler. Many inch rulers are one **foot** long. Twelve inches equals one foot. You might also have a yardstick in your classroom. A **yard** is three feet, which is 36 inches. A **mile** is a much larger unit of length. One mile is 5280 feet. Inches, feet, yards, and miles are units of length in the **U.S. Customary System.**

U.S. Customary Units of Length

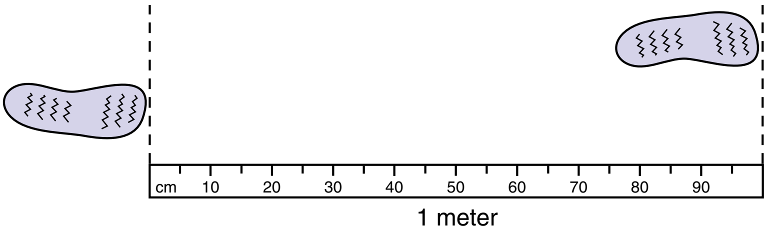
Abbreviations		Equivalents
inch	in.	12 in. = 1 ft
foot	ft	3 ft = 1 yd
yard	yd	36 in. = 1 yd
mile	mi	5280 ft = 1 mi

The **metric system** is the system of measurement used by most of the world and is especially important in science. The basic unit of length in the metric system is the **meter.** You might have a meterstick in your classroom.

1. Compare a yardstick and a meterstick. Which is longer?

2. Hayes ran 100 yards. Jones ran 100 meters. Who ran farther?

If you take a BIG step, you move about one meter. To get a feel for a meter, place a meterstick on the floor and practice taking a step one meter long.



3. Estimate the length of your classroom in meters by taking one-meter steps along the length of the classroom.

In your desk you might have a **centimeter** ruler. A centimeter is a small part of a meter. One hundred centimeters equals one meter (just as 100 *cents* equals one dollar).

4. How many centimeters equal one meter?

5. Compare an inch ruler and a centimeter ruler. Which is longer, an inch or a centimeter?

6. A ruler that is one foot long is about how many centimeters long?

7. Use an inch ruler to measure the length of a sheet of paper. About how many inches long is it?

8. Use a centimeter ruler to measure the length of your paper. About how many centimeters long is it?

9. Use inch and centimeter rulers to measure this picture of a pencil. The pencil is about

(a) how many inches long?

(b) how many centimeters long?

10. Use your rulers to measure a dollar bill. A dollar bill is about

(a) how many inches long?

(b) how many centimeters long?

Centimeter rulers and metersticks sometimes have small marks between the centimeter marks. The small marks are one **millimeter** apart. A dime is about one millimeter thick. Ten millimeters equals one centimeter, and 1000 millimeters equals a meter. We will learn more about millimeters in a later lesson.

To measure long distances, we can use **kilometers.** A kilometer is 1000 meters, which is a little more than half a mile.

Metric Units of Length

Abbreviations	
millimeter	mm
centimeter	cm
meter	m
kilometer	km

Equivalents

10 mm = 1 cm
1000 mm = 1 m
100 cm = 1 m
1000 m = 1 km

11. About how many BIG steps would a person take to walk a kilometer?

12. A mile is about 1609 meters. Which is longer, a mile or a kilometer?

13. How many millimeters equal one meter?

14. This key is about
  (a) how many inches long?
  (b) how many centimeters long?
  (c) how many millimeters long?

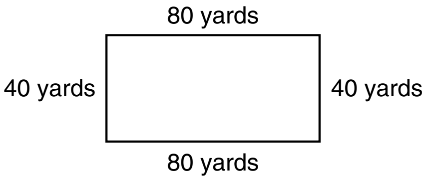
15. This rectangle is
  (a) how many centimeters long?
  (b) how many centimeters wide?

16. If an ant started at one corner of the rectangle above and crawled along all four sides back to the starting point, how many centimeters would it crawl?

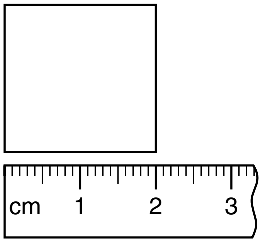
Perimeter

The distance around a shape is its **perimeter.** To find the perimeter of a shape, we add the lengths of all of its sides.

17. Keisha ran the perimeter of the block. How far did Keisha run?

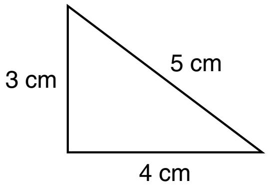


18. What is the perimeter of this square?



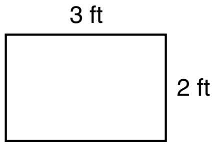
19. What is the perimeter of a square with sides 10 in. long?

20. Find the perimeter of this triangle.



21. (a) What is the length of this rectangle?

(b) What is the width of this rectangle?



(c) What is the perimeter of this rectangle?

22. Farmer McDonald's cows graze in a grassy field surrounded by a wire fence. Which best represents the perimeter of the field, the grassy field or the wire fence?

23. A glass mirror on Amanda's wall is surrounded by a wooden frame. Which best represents the perimeter of the mirror, the glass mirror or the wooden frame?

24. Estimate the perimeter of your classroom in meters by taking one-meter steps along the edges of the classroom.

LESSON 21

Triangles, Rectangles, Squares, and Circles

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

a. 44 + 32
b. 57 + 20
c. 57 + 19
d. 32 + 43 + 100
e. 58 + 31 + 200
f. 56 + 29 + 100
g. What number should be added to each of these numbers for the total to be 10: 7, 2, 9, 5, 6?

Patterns:

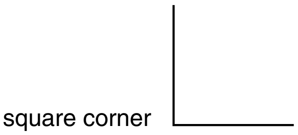
The multiples of seven are 7, 14, 21, and so on. On a hundred number chart, shade the squares that contain a multiple of seven. Which of the shaded squares contain an even number that is a multiple of five?

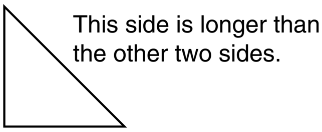
NEW CONCEPT

In this lesson we will practice drawing triangles, rectangles, squares, and circles.

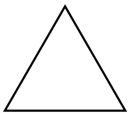
Example 1 Draw a triangle whose sides all have the same length.

Solution You may need to practice on scratch paper to understand how to draw this triangle. A triangle has three sides, but those sides can be positioned many different ways. If you start with a "square corner," the third side will be too long.



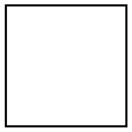


A triangle whose sides are the same length looks like this:



Example 2 Draw a rectangle whose sides all have the same length.

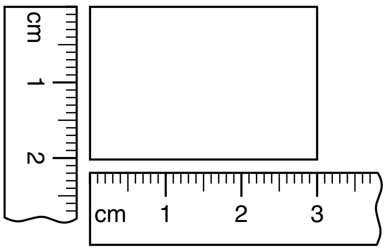
Solution A rectangle has four sides and square corners. It does not have to be longer than it is wide. A rectangle whose sides are the same length looks like this:



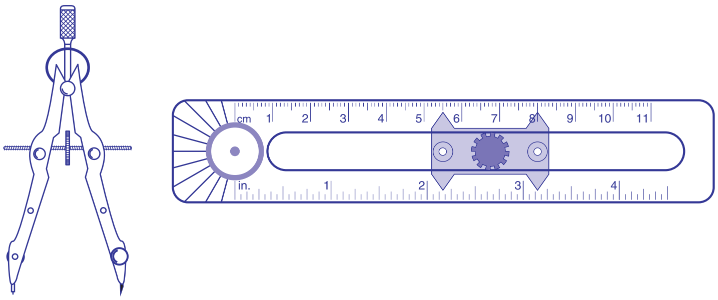
This figure looks like a square because it *is* a square. It is also a rectangle. **A square is a special kind of rectangle.**

Example 3 Draw a rectangle that is 3 cm long and 2 cm wide.

Solution We use a centimeter ruler to help us make the drawing.



To draw circles, we can use a tool called a **compass.** Below we show two types of compasses:

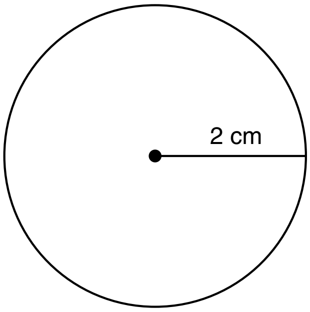


There are two points on a compass: a pivot point and a pencil point. We swing the pencil point around the pivot point to draw a circle. The distance between the two points is the **radius** of the circle.

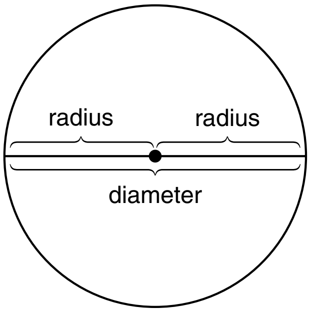
The radius of a circle is the distance from the **center** of the circle to the circle. The plural of *radius* is **radii.**

Example 4 Draw a circle with a radius of 2 cm.

Solution Set the compass so that the radius is 2 cm. Place the pivot point; then swing the pencil point of the compass around it to draw the circle.



The **diameter** of a circle is the distance across the circle through the center. As the diagram below illustrates, the diameter of a circle equals two radii.



Example 5 If the radius of a circle is 2 cm, then what is the diameter of the circle?

Solution Since the diameter of a circle equals two radii, the diameter of a circle with a 2-cm radius is **4 cm.**

LESSON PRACTICE

Practice set

a. Draw a triangle with two sides that are the same length.

b. Draw a rectangle that is about twice as long as it is wide.

c. Use a compass to draw a circle with a radius of 1 inch.

d. What is the diameter of a circle that has a 3-cm radius?

e. What is another name for a rectangle whose length is equal to its width?

MIXED PRACTICE

Problem set

1. *(1, 13)* Hiroshi had four hundred seventeen marbles. Harry had two hundred twenty-two marbles. How many marbles did Hiroshi and Harry have in all?

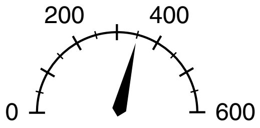
2. *(11, 14)* Tisha put forty jacks into a pile. After Jane added all of her jacks there were seventy-two jacks in the pile. How many jacks did Jane put in?

3. *(4)* The ones digit is 5. The number is greater than 640 and less than 650. What is the number?

4. *(16)* Write seven hundred fifty-three in expanded form.

5. *(6)* If $x + y = 10$, then what is the other addition fact for x, y, and 10? What are the two subtraction facts for x, y, and 10?

6. *(18)* The needle is pointing to what number on this scale?



7. *(Inv. 2)* Use a centimeter ruler to measure this rectangle.

(a) What is the length?

(b) What is the width?

(c) What is the perimeter?

8. *(13)*
$$\begin{array}{r} 493 \\ +\ 278 \\ \hline \end{array}$$

9. *(13)*
$$\begin{array}{r} \$486 \\ +\ \$378 \\ \hline \end{array}$$

10. *(13)*
$$\begin{array}{r} \$524 \\ +\ \$109 \\ \hline \end{array}$$

11. *(Inv. 2, 21)* Draw a triangle. Make each side 2 cm long. What is the perimeter of the triangle?

12. *(Inv. 2, 21)* Draw a square with sides 2 inches long. What is the perimeter of the square?

13. (12)
$$\begin{array}{r} 17 \\ -\ A \\ \hline 9 \end{array}$$

14. (15)
$$\begin{array}{r} 45 \\ -\ 29 \\ \hline \end{array}$$

15. (12)
$$\begin{array}{r} 15 \\ -\ B \\ \hline 6 \end{array}$$

16. (15)
$$\begin{array}{r} 62 \\ -\ 45 \\ \hline \end{array}$$

17. (14)
$$\begin{array}{r} 24 \\ +\ D \\ \hline 45 \end{array}$$

18. (16)
$$\begin{array}{r} 14 \\ -\ B \\ \hline 2 \end{array}$$

19. (16)
$$\begin{array}{r} Y \\ -\ 36 \\ \hline 53 \end{array}$$

20. (16)
$$\begin{array}{r} 75 \\ -\ P \\ \hline 45 \end{array}$$

21. (17)
$$\begin{array}{r} 46 \\ 35 \\ 27 \\ +\ 39 \\ \hline \end{array}$$

22. (17)
$$\begin{array}{r} 14 \\ 28 \\ 77 \\ +\ 23 \\ \hline \end{array}$$

23. (17)
$$\begin{array}{r} 14 \\ 23 \\ 38 \\ +\ 64 \\ \hline \end{array}$$

24. (17)
$$\begin{array}{r} 15 \\ 24 \\ 36 \\ +\ 99 \\ \hline \end{array}$$

25. (3, Inv. 1) Write the next three numbers in each counting sequence:

(a) …, 28, 35, 42, _____, _____, _____, …

(b) …, 40, 30, 20, _____, _____, _____, …

26. (21) Alba drew a circle with a radius of 4 cm. What was the diameter of the circle?

A. 8 in. B. 2 in. C. 8 cm D. 2 cm

LESSON

22

Naming Fractions • Adding Dollars and Cents

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

a. 63 + 21
b. 45 + 23
c. 65 + 30
d. 48 + 19 + 200
e. 36 + 29 + 30
f. 130 + 200 + 300
g. What number should be added to each of these numbers for the total to be 10: 8, 4, 3, 9, 5?

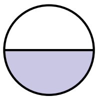
Problem Solving:

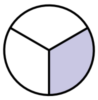
The hour hand moves around the face of a clock once in twelve hours. How many times does the hour hand move around the face of the clock in a week?

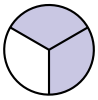
NEW CONCEPTS

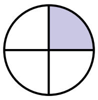
Naming fractions

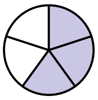
Part of a whole can be named with a **fraction.** A fraction is written with two numbers. The bottom number of a fraction is called the **denominator.** The denominator tells how many equal parts are in the whole. The top number of a fraction is called the **numerator.** The numerator tells how many of the parts are being counted. When naming a fraction, we name the numerator first; then we name the denominator using its ordinal number.[†] Some fractions and their names are shown below.

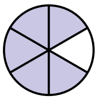

$\frac{1}{2}$ one half

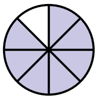

$\frac{1}{3}$ one third

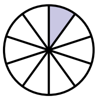

$\frac{2}{3}$ two thirds


$\frac{1}{4}$ one fourth


$\frac{3}{5}$ three fifths

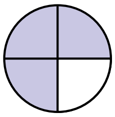

$\frac{5}{6}$ five sixths


$\frac{7}{8}$ seven eighths


$\frac{1}{10}$ one tenth

[†] Exception: We use the word *half* (instead of *second*) for a denominator of 2. Also, we may choose to use the word *quarter* to name a denominator of 4.

Example 1 What fraction of the circle is shaded?



Solution There are four equal parts and three are shaded. Therefore, the fraction of the circle that is shaded is three fourths, which we write as

$$\mathbf{\frac{3}{4}}$$

Example 2 A dime is what fraction of a dollar?

Solution Ten dimes equal one dollar, so one dime is $\mathbf{\frac{1}{10}}$ of a dollar.

Example 3 Three quarters are what fraction of a dollar?

Solution Four quarters equal a dollar, so each quarter is $\frac{1}{4}$ of a dollar. Three quarters are $\mathbf{\frac{3}{4}}$ of a dollar.

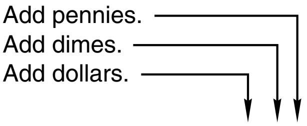
Adding dollars and cents

We add dollars and cents the same way we add whole numbers. The dot, called a **decimal point,** separates dollars from cents. To add dollars to dollars and cents to cents, we align the decimal points. We remember to write the dollar sign and the decimal point in the sum.

Example 4 Add:

$$\begin{array}{r} \$3.56 \\ +\ \$2.75 \\ \hline \end{array}$$

Solution First we add the pennies, then we add the dimes, and then we add the dollars. Since ten pennies equal a dime and ten dimes equal a dollar, we regroup when the total in any column is ten or more.

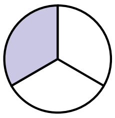


$$\begin{array}{r} \$3.56 \\ +\ \$2.75 \\ {\scriptstyle 1\ 1\ \ } \\ \hline \mathbf{\$6.31} \end{array}$$

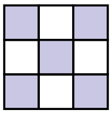
LESSON PRACTICE

Practice set What fraction of each shape is shaded?

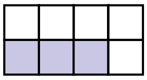
a.



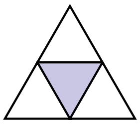
b.



c.



d.



e. A quarter is what fraction of a dollar?

f. A nickel is what fraction of a dollar?

g. Three dimes are what fraction of a dollar?

Add:

h.
$$\begin{array}{r} \$2.75 \\ +\ \$2.75 \\ \hline \end{array}$$

i.
$$\begin{array}{r} \$3.65 \\ +\ \$4.28 \\ \hline \end{array}$$

MIXED PRACTICE

Problem set

1. *(1)* The first four odd numbers are 1, 3, 5, and 7. What is their sum?

2. *(1, 9)* James was 49 inches tall at the beginning of summer. He grew 2 inches over the summer. How tall was James at the end of summer?

3. *(10)* Use the digits 1, 2, and 3 once each to write an odd number less than 200.

Write the next three numbers in each counting sequence:

4. *(3)* …, 80, 72, 64, ______, ______, ______, …

5. *(3)* …, 60, 54, 48, ______, ______, ______, …

6. *(Inv. 2, 21)* Draw a square with sides 3 cm long. What is the perimeter of the square?

7. *(Inv. 2)* A yardstick is how many feet long?

8. *(4)* What is the place value of the 9 in 891?

9. *(7, 16)* Write 106 in expanded form. Then use words to write the number.

10. *(6)* Use the numbers 6, 9, and 15 to write two addition facts and two subtraction facts.

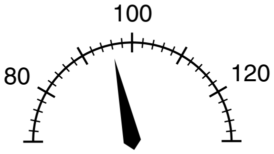
11. *(Inv. 1)* Use digits and symbols to write that eighteen is greater than negative twenty.

12. *(20)* (a) Round 28 to the nearest ten.

(b) Round $5.95 to the nearest dollar.

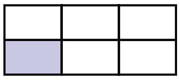
13. *(Inv. 2)* A bicycle is about how many meters long?

14. *(18)* The needle is pointing to what number on this scale?



15. *(21)* Draw a circle that has a diameter of 2 centimeters. What is the radius of the circle?

16. *(22)* What fraction of this rectangle is shaded?



17. *(Inv. 2)* The door was two meters tall. Two meters is how many centimeters?

18. *(15)* $51 - 43$

19. *(15)* $70 - 44$

20. *(15)* $37 - 9$

21. *(22)* $\$8.79 + \$0.64$

22. *(22)* $\$5.75 + \$2.75$

23. *(14)*
$$\begin{array}{r} N \\ +\ 13 \\ \hline 17 \end{array}$$

24. *(16)*
$$\begin{array}{r} X \\ -\ 42 \\ \hline 27 \end{array}$$

25. *(16)*
$$\begin{array}{r} 37 \\ -\ P \\ \hline 14 \end{array}$$

26. *(6)* A number sentence such as $20 + N = 60$ can be called an **equation.** If this equation is true, then which of the following equations is not true?

A. $60 - 20 = N$

B. $60 - N = 20$

C. $N - 20 = 60$

D. $N + 20 = 60$

LESSON

23

Lines, Segments, Rays, and Angles

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add hundreds, then tens, and then ones:

a. $\begin{array}{r} 320 \\ +\ 256 \\ \hline \end{array}$ **b.** $\begin{array}{r} 645 \\ +\ 32 \\ \hline \end{array}$ **c.** $\begin{array}{r} 145 \\ +\ 250 \\ \hline \end{array}$ **d.** $\begin{array}{r} 632 \\ +\ 55 \\ \hline \end{array}$ **e.** $\begin{array}{r} 86 \\ +\ 210 \\ \hline \end{array}$ **f.** $\begin{array}{r} 360 \\ 25 \\ +\ 214 \\ \hline \end{array}$

g. What number should be added to each of these numbers for the total to be 10: 2, 6, 7, 1, 5?

Patterns:

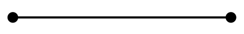
On a hundred number chart, shade the squares that contain a multiple of 9. Then write the numbers in the shaded squares from 9 to 90 in a column. What patterns can you find in the column of numbers?

NEW CONCEPT

A **line** goes on and on. When we draw a line, we include an arrowhead on each end to show that the line continues in both directions.

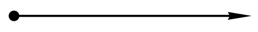
Line

Part of a line is a **line segment,** or just *segment.* When we draw a segment, we do not include arrowheads. We can, however, use dots to show the **endpoints** of the segment.



Segment

A **ray** is sometimes called a *half line.* A ray begins at a point and continues in one direction without end. When we draw a ray, we include an arrowhead on one end.



Ray

Example 1 Write "line," "segment," or "ray" to describe each of these physical models:

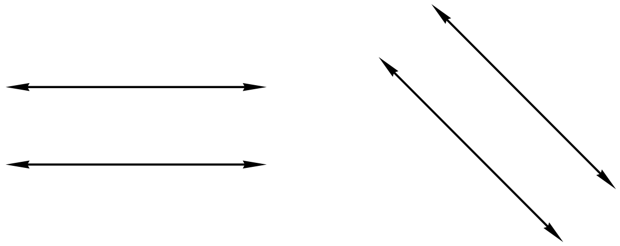
(a) a beam of starlight

(b) a ruler

Solution (a) A beam of starlight begins at a "point," the star, and continues across space. This is an example of a **ray.**

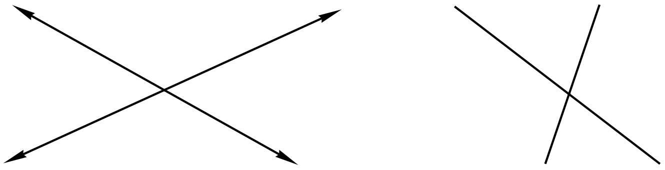
(b) A ruler has two endpoints, so it is best described as an example of a **segment.**

Lines and segments that go in the same direction and stay the same distance apart are **parallel.**



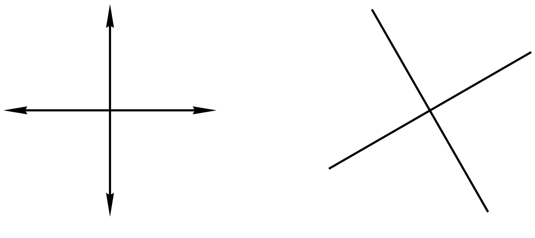
Pairs of parallel lines and segments

When lines or segments cross, we say they **intersect.**



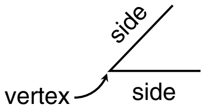
Pairs of intersecting lines and segments

Intersecting lines or segments that form "square corners" are **perpendicular.**

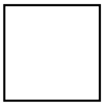


Pairs of perpendicular lines and segments

Angles are formed where lines or segments intersect or where two or more rays or segments begin. An angle has a **vertex** and two sides. The vertex is the point where the two sides meet (the "corner").



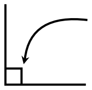
An angle is named by how “open” it is. An angle like the corner of a square is called a **right angle.**



Square

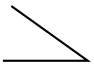
Right angles

To show that an angle is a right angle, we can draw a small square in the corner of the right angle.

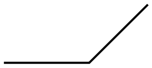


This mark shows that the angle is a right angle.

Angles that are smaller than right angles are called **acute angles.** Some people remember this by saying, “a cute little angle.” Angles that are larger than right angles are **obtuse angles.**



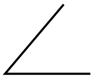
Acute angle



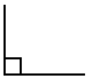
Obtuse angle

Example 2 Describe each of these figures as an *acute, obtuse,* or *right angle.*

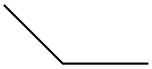
(a)



(b)



(c)



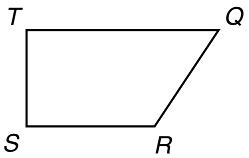
Solution (a) The angle is smaller than a right angle, so it is an **acute angle.**

(b) The angle makes a square corner, so it is a **right angle.**

(c) The angle is larger than a right angle, so it is an **obtuse angle.**

The figure in the following example has four angles. We can name each angle by the letter at the vertex of the angle. The four angles in the figure are angle *Q,* angle *R,* angle *S,* and angle *T.*

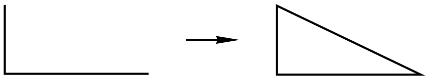
Example 3 Describe each of the four angles in this figure as acute, right, or obtuse.



Solution **Angle *Q* is acute. Angle *R* is obtuse. Angles *S* and *T* are right angles.**

Example 4 Draw a triangle that has one right angle.

Solution We begin by drawing two line segments that form a right angle. Then we draw the third side.



Notice that the other two angles are acute angles.

Activity: *Real-World Segments and Angles*

1. Look for examples of the following figures in your classroom. List the examples on the board.
   (a) parallel segments
   (b) perpendicular segments
   (c) right angles
   (d) acute angles
   (e) obtuse angles

2. Bend your arm so that the angle at the elbow is an acute angle, then a right angle, then an obtuse angle. Bend your leg so that the angle at the knee is an acute angle, then a right angle, then an obtuse angle.

LESSON PRACTICE

Practice set

a. Draw two segments that intersect but are not perpendicular.

b. Draw two lines that are perpendicular.

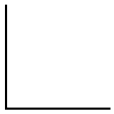
c. Draw a ray.

d. Are the rails of a train track parallel or perpendicular?

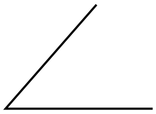
e. A triangle has how many angles?

f. Which of these angles does not look like a right angle?

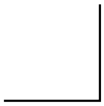
A.



B.



C.



MIXED PRACTICE

Problem set

1. *(1, 9)* Twenty-eight children were in the first line. Forty-two children were in the second line. Altogether, how many children were in both lines?

2. *(11, 14)* Tina knew that there were 28 books in the two stacks. Tina counted 12 books in the first stack. Then she figured out how many books were in the second stack. How many books were in the second stack?

3. *(10)* Use the digits 1, 2, and 3 once each to write an odd number greater than 300.

4. *(3)* Write the next three numbers in each counting sequence:

(a) …, 40, 36, 32, _____, _____, _____, …

(b) …, 30, 27, 24, _____, _____, _____, …

5. *(6)* Use the numbers 15, 16, and 31 to write two addition facts and two subtraction facts.

6. *(Inv. 1)* Use digits and a comparison symbol to write that six hundred thirty-eight is less than six hundred eighty-three.

7. *(20)* (a) Round 92 to the nearest ten.

(b) Round $19.67 to the nearest dollar.

8. *(Inv. 2, 21)* The diameter of a nickel is 2 centimeters. If 10 nickels are placed in a row, how long will the row be? Count by twos.

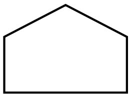
9. *(Inv. 2)* Use a centimeter ruler to measure this rectangle:

(a) What is the length?

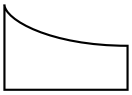
(b) What is the width?

(c) What is the perimeter?

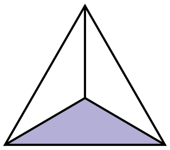
10. *(23)* Which of these shapes has four right angles?

A. 

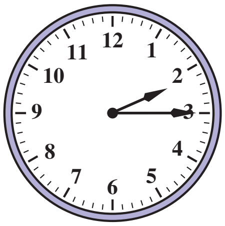
B. 

C. 

11. *(22)* What fraction of this triangle is shaded?



12. *(19)* It is afternoon. What time is shown on this clock?



13. *(15)*
$$\begin{array}{r} \$83 \\ -\ \$27 \\ \hline \end{array}$$

14. *(15)*
$$\begin{array}{r} 42 \\ -\ 27 \\ \hline \end{array}$$

15. *(15)*
$$\begin{array}{r} 72 \\ -\ 36 \\ \hline \end{array}$$

16. *(22)*
$$\begin{array}{r} \$4.28 \\ +\ \$1.96 \\ \hline \end{array}$$

17. *(22)*
$$\begin{array}{r} \$4.36 \\ +\ \$2.95 \\ \hline \end{array}$$

18. *(14)*
$$\begin{array}{r} 57 \\ +\ K \\ \hline 88 \end{array}$$

19. *(16)*
$$\begin{array}{r} 67 \\ -\ B \\ \hline 16 \end{array}$$

20. *(16)*
$$\begin{array}{r} K \\ -\ 22 \\ \hline 22 \end{array}$$

21. *(15)* $42 - 7$

22. *(15)* $55 - 48$

23. *(14)* $31 - 20$

24. *(17)* $25 + 25 + 25 + 25$

25. *(22)* (a) How many nickels equal one dollar?

(b) One nickel is what fraction of a dollar?

(c) Seven nickels are what fraction of a dollar?

26. *(6)* If $26 + M = 63$, then which of these equations is not true?

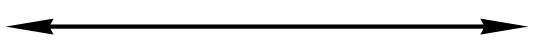
A. $M + 26 = 63$

B. $M - 63 = 26$

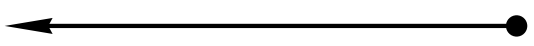
C. $63 - M = 26$

D. $63 - 26 = M$

27. *(23)* Which of these figures illustrates a ray?

A. 

B. 

C. 

LESSON

24

More About Missing Numbers in Addition and Subtraction

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add hundreds, then tens, and then ones:

a. $365 + 321$
b. $650 + 45$
c. $40 + 300 + 25$
d. $500 + 40 + 16$
e. $300 + 50 + 12$
f. $400 + 80 + 11$
g. Seven can be split into $3 + 4$. If seven is split into $2 + \square$, what number is represented by $\square$?

Problem Solving:

The pair of numbers 1 and 8 have the sum of 9. List three more pairs of counting numbers that have a sum of 9.

NEW CONCEPT

We have seen that the three numbers in an addition or subtraction fact form three other facts as well. If we know that $N + 5 = 14$, then we know these four facts:

$$\begin{array}{r} N \\ +\ \ 5 \\ \hline 14 \end{array} \qquad \begin{array}{r} 5 \\ +\ N \\ \hline 14 \end{array} \qquad \begin{array}{r} 14 \\ -\ N \\ \hline 5 \end{array} \qquad \begin{array}{r} 14 \\ -\ \ 5 \\ \hline N \end{array}$$

Notice that the last of these facts, $14 - 5 = N$, shows us how to find N. We subtract 5 from 14 to find that N equals 9.

Example 1 Write another addition fact and two subtraction facts using the numbers in this equation:

$$36 + M = 54$$

Which fact shows how to find M?

Solution We arrange the numbers to write three facts. Notice that the sum, 54, becomes the first number of both subtraction facts.

$$\boldsymbol{M + 36 = 54 \qquad 54 - M = 36 \qquad 54 - 36 = M}$$

The fact that shows how to find M is

$$\boldsymbol{54 - 36 = M}$$

Example 2 Write another subtraction fact and two addition facts using the numbers in this equation:

$$72 - W = 47$$

Which fact shows how to find W?

Solution Notice that the first number of a subtraction fact remains the first number of the second subtraction fact.

$$\mathbf{72 - 47 = W}$$

Also notice that the first number of a subtraction fact is the sum when the numbers are arranged to form an addition fact.

$$\mathbf{47 + W = 72} \qquad \mathbf{W + 47 = 72}$$

The fact that shows how to find W is

$$\mathbf{72 - 47 = W}$$

Example 3 Find the missing number: $R + 36 = 54$

Solution We can form another addition fact and two subtraction facts using these numbers.

$$36 + R = 54 \qquad 54 - R = 36 \qquad 54 - 36 = R$$

The last fact, $54 - 36 = R$, shows us how to find R. We subtract 36 from 54 and get **18.**

Example 4 Find the missing number: $T - 29 = 57$

Solution We can write the first number of a subtraction equation as the sum of an addition equation.

$$57 + 29 = T$$

Thus, T equals **86.**

LESSON PRACTICE

Practice set Find each missing number:

a. $23 + M = 42$

b. $Q + 17 = 45$

c. $53 - W = 28$

d. $N - 26 = 68$

e. $36 + Y = 63$

f. $62 - A = 26$

MIXED PRACTICE

Problem set

1. (Inv. 2) Rafael placed two 1-foot rulers end to end. What was the total length of the two rulers in inches?

2. (11, 24) There were 47 apples in the big tree. There was a total of 82 apples in the big tree and in the little tree. How many apples were in the little tree?

3. (10) All the students lined up in two equal rows. Which could not be the total number of students?

A. 36 B. 45 C. 60

4. (3) Find the missing numbers in this counting sequence:

…, 9, 18, _____, _____, 45, _____, …

5. (3, 5) Find the sixth number in this counting sequence:

7, 14, 21, …

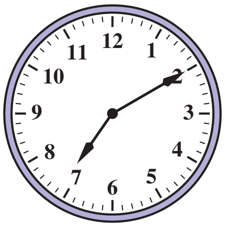
6. (Inv. 1) Compare: $15 - 9 \bigcirc 13 - 8$

7. (20) (a) Round 77 to the nearest ten.

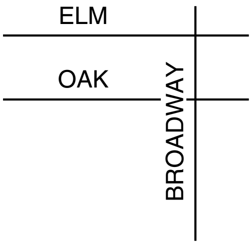
(b) Round $29.39 to the nearest dollar.

8. (Inv. 2) A professional basketball player might be about how many meters tall?

9. (19) It is morning. What time is shown on this clock?



10. (23) Which street is parallel to Elm?



11. (22) (a) How many dimes equal one dollar?

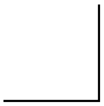
(b) One dime is what fraction of a dollar?

(c) Nine dimes are what fraction of a dollar?

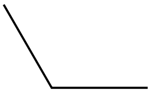
12. *(Inv. 2, 21)* Draw a rectangle that is 5 centimeters long and 2 centimeters wide. What is the perimeter?

13. *(23)* Name each type of angle shown below.

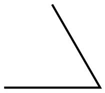
(a)



(b)



(c)



14. *(15)* $\begin{array}{r} \$31 \\ - \ \$14 \\ \hline \end{array}$

15. *(13)* $\begin{array}{r} \$468 \\ + \ \$247 \\ \hline \end{array}$

16. *(14)* $\begin{array}{r} 57 \\ - \ 37 \\ \hline \end{array}$

17. *(22)* $\begin{array}{r} \$4.97 \\ + \ \$2.58 \\ \hline \end{array}$

18. *(24)* $36 - C = 19$

19. *(24)* $B + 65 = 82$

20. *(24)* $87 + D = 93$

21. *(24)* $N - 32 = 19$

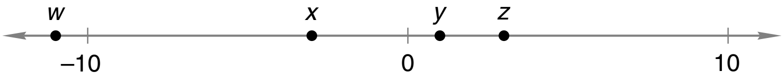
22. *(14)* $48 - 28$

23. *(15)* $41 - 32$

24. *(15)* $76 - 58$

25. *(17)* $416 + 35 + 27 + 43 + 5$

26. *(Inv. 1)* Which point on this number line could represent –3?



A. point *w* B. point *x* C. point *y* D. point *z*

27. *(23)* Describe how a segment is different from a line.

LESSON

25 Subtraction Stories

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add hundreds, then tens, and then ones:

a. 340 + 50 + 200 **b.** 200 + 50 + 432 **c.** 560 + 200 + 25

Review:

d. 56 + 19 + 200 **e.** 48 + 39 + 100 **f.** 36 + 9

g. Complete each split: 6 = 2 + □ 6 = 3 + □

Problem Solving:

If the sun rose at 5:00 a.m. and set at 7:00 p.m., how many hours of sunlight were there?

NEW CONCEPT

We have practiced "some and some more" story problems. "Some and some more" stories have an addition pattern.

In this lesson we will begin practicing story problems that have a subtraction pattern. One type of story with a subtraction pattern is a **"some went away"** story. Read this "some went away" story:

> *John had 7 marbles. Then he lost 3 marbles.*
> *He has 4 marbles left.*

We can write the information from this story in a subtraction pattern like this:

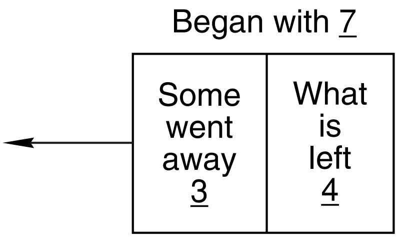
Pattern	Problem
Some	7 marbles
− Some went away	− 3 marbles
What is left	4 marbles

We can also write the pattern sideways.

Pattern: Some − some went away = what is left

Problem: 7 marbles − 3 marbles = 4 marbles

In a “some went away” story there are three numbers. Any one of the numbers could be missing. We write the numbers in a subtraction pattern and then find the missing number. A diagram may help us understand the action in a “some went away” story.



Example 1 Jimmy had some marbles. Then he lost 15 marbles. Now he has 22 marbles left. How many marbles did Jimmy have in the beginning?

Solution Jimmy lost some marbles. This story has a subtraction pattern. We are told how many marbles “went away” and how many marbles are left. To find how many marbles Jimmy had in the beginning, we write the numbers in a subtraction pattern and use a letter for the missing number.

Pattern	Problem
Some	M marbles
− Some went away	− 15 marbles
What is left	22 marbles

We can find the missing number in this subtraction problem by adding.

$$\begin{array}{r} 22 \text{ marbles} \\ +\ 15 \text{ marbles} \\ \hline 37 \text{ marbles} \end{array}$$

Jimmy had **37 marbles** in the beginning. Now we check the answer.

$$\begin{array}{rl} 37 \text{ marbles} & \\ -\ 15 \text{ marbles} & \\ \hline 22 \text{ marbles} & \text{check} \end{array}$$

Example 2 Celia had 42 marbles. She lost some marbles. She has 29 marbles left. How many marbles did Celia lose?

Solution Celia lost some marbles. This story has a subtraction pattern, and we want to find the number that went away. We write the numbers in the pattern.

Pattern	**Problem**
Some	42 marbles
− Some went away	− M marbles
What is left	29 marbles

To find the missing number, we subtract.

$$\begin{array}{r} 42 \\ -\ 29 \\ \hline 13 \end{array}$$

We find that Celia lost **13 marbles.** Now let's see whether 13 marbles makes the pattern correct.

$$\begin{array}{r} 42 \text{ marbles} \\ -\ 13 \text{ marbles} \\ \hline 29 \text{ marbles} \end{array} \quad \text{check}$$

Example 3 Fatima had 65 marbles. Then she lost 13 marbles. How many marbles does Fatima have left?

Solution Again we have a subtraction story. We write the numbers in a subtraction pattern and then find the missing number. This time, we practice writing the pattern sideways.

Pattern: Some − some went away = what is left

Problem: 65 marbles − 13 marbles = M marbles

To find the missing number, we simply subtract.

65 marbles − 13 marbles = 52 marbles

We find that Fatima has **52 marbles** left.

LESSON PRACTICE

Practice set For each problem, write a subtraction pattern. Then answer the question.

a. Marko had 42 marbles. Then he lost some marbles. Now he has 26 marbles. How many marbles did Marko lose?

b. Tamika lost 42 marbles. Now she has 26 marbles. How many marbles did Tamika have in the beginning?

c. Barbara had 75 cents. Then she spent 27 cents. How many cents does Barbara have now?

MIXED PRACTICE

Problem set

1. (25) Micky had 75 rocks. Then she lost some rocks. Now she has 27 rocks. How many rocks did Micky lose? Write a subtraction pattern and solve the problem.

2. (25) Sixty-three birds sat in the tree. Then fourteen birds flew away. How many birds remained in the tree? Write a subtraction pattern and solve the problem.

3. (25) There were many cats in the alley at noon. Seventy-five cats ran away. Forty-seven cats remained. How many cats were in the alley at noon? Write a subtraction pattern and solve the problem.

4. (5) There are 12 months in a whole year. How many months are in half of a year?

5. (3, Inv. 1) Find the missing numbers in each counting sequence:

(a) …, 5, 10, _____, _____, 25, _____, …

(b) …, 5, 0, _____, _____, –15, _____, …

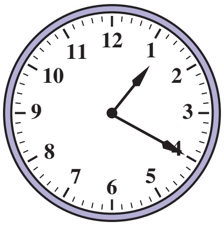
6. (Inv. 1) Use digits and a comparison symbol to write that seven hundred sixty-two is less than eight hundred twenty-six.

7. (20) (a) Round 78 to the nearest ten.

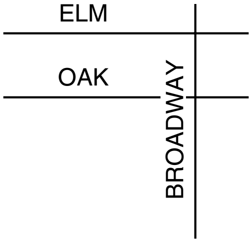
(b) Round $7.80 to the nearest dollar.

8. (21) If the diameter of a wheel on Joshua's bike is 20 inches, then what is the radius of the wheel?

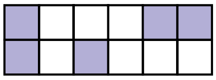
9. (19) It is afternoon. What time is shown on this clock?



10. (23) Which street is perpendicular to Elm?

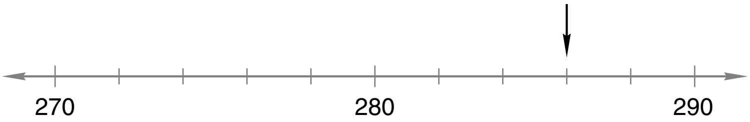


11. What fraction of this shape is shaded?
(22)



12. Draw a square whose sides are 4 cm long. What is the perimeter of the square?
(Inv. 2, 21)

13. To what number is the arrow pointing?
(Inv. 1)



14. *(15)*
$$\begin{array}{r} \$52 \\ -\ \$14 \\ \hline \end{array}$$

15. *(13)*
$$\begin{array}{r} 476 \\ +\ 177 \\ \hline \end{array}$$

16. *(15)*
$$\begin{array}{r} 62 \\ -\ 38 \\ \hline \end{array}$$

17. *(22)*
$$\begin{array}{r} \$4.97 \\ +\ \$2.03 \\ \hline \end{array}$$

18. *(24)*
$$\begin{array}{r} 36 \\ -\ G \\ \hline 18 \end{array}$$

19. *(24)*
$$\begin{array}{r} 55 \\ +\ B \\ \hline 87 \end{array}$$

20. *(24)*
$$\begin{array}{r} D \\ -\ 23 \\ \hline 58 \end{array}$$

21. *(24)*
$$\begin{array}{r} Y \\ +\ 14 \\ \hline 32 \end{array}$$

22. 42 − 37
(15)

23. 52 − 22
(14)

24. 73 − 59
(15)

25. 900 + 90 + 9
(17)

26. Which of these is not equivalent to one meter?
(Inv. 2)

A. 1000 mm　　B. 100 cm　　C. 1000 km

27. Describe how a ray is different from a segment.
(23)

LESSON 26

Drawing Pictures of Fractions

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add from the left and then regroup ones. For example, 35 + 26 is 50 plus 11, which is 61.

a. $\begin{array}{r} 55 \\ +\ 25 \\ \hline \end{array}$ **b.** $\begin{array}{r} 36 \\ +\ 26 \\ \hline \end{array}$ **c.** $\begin{array}{r} 48 \\ +\ 22 \\ \hline \end{array}$ **d.** $\begin{array}{r} 37 \\ +\ 45 \\ \hline \end{array}$ **e.** $\begin{array}{r} 235 \\ +\ 145 \\ \hline \end{array}$ **f.** $\begin{array}{r} 156 \\ +\ 326 \\ \hline \end{array}$

g. Complete each split: 8 = 1 + ☐ 8 = 3 + ☐

Problem Solving:

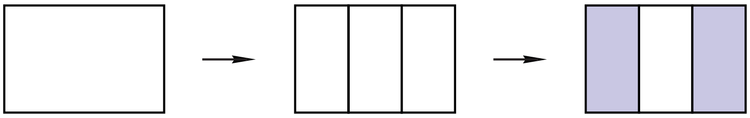
Jennifer has three coins in her left pocket that total 65¢. What coins does Jennifer have in her left pocket?

NEW CONCEPT

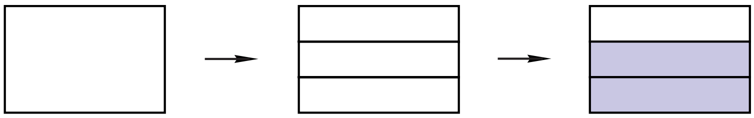
We can understand fractions better if we learn to draw pictures that represent fractions.

Example 1 Draw a rectangle and shade two thirds of it.

Solution On the left, we draw a rectangle. Then we divide the rectangle into three equal parts. As a final step, we shade any two of the equal parts.

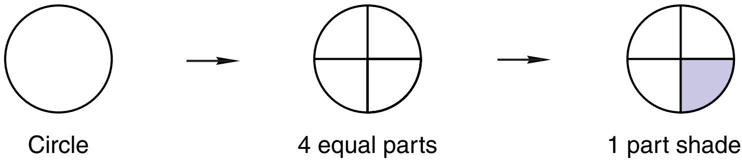


There are other ways to divide the rectangle into three equal parts. Here is another way we could shade two thirds of the rectangle:



Example 2 Draw a circle and shade one fourth of it.

Solution First we draw a circle. Then we divide the circle into four equal parts. Then we shade any one of the parts.



LESSON PRACTICE

Practice set

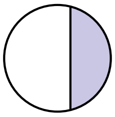
a. Draw a square and shade one half of it.

b. Draw a rectangle and shade one third of it.

c. Draw a circle and shade three fourths of it.

d. Draw a circle and shade two thirds of it.

e. Is one half of this circle shaded? Why or why not?



MIXED PRACTICE

Problem set

1. *(25)* Mary had 42 pebbles. She threw some into the lake. Then she had 27 pebbles left. How many pebbles did Mary throw into the lake? Write a subtraction pattern and solve the problem.

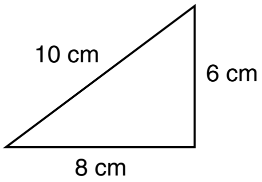
2. *(25)* Demosthenes had a bag of pebbles when the sun came up. He put 17 pebbles in his mouth. Then there were 46 pebbles left in the bag. How many pebbles were in the bag when the sun came up? Write a subtraction pattern and solve the problem.

3. *(11, 13)* Franklin saw one hundred twelve stars. Eleanor looked the other way and saw some more stars. If they saw three hundred seventeen stars in all, how many did Eleanor see? Write an addition pattern and solve the problem.

4. *(10)* Use the digits 4, 5, and 6 once each to write an even number less than 500.

5. *(26)* Draw a square and shade three fourths of it.

6. *(Inv. 2)* What is the perimeter of this triangle?



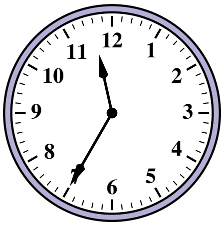
7. *(Inv. 1)* Use digits and symbols to show that negative twenty is less than negative twelve.

8. *(20)* (a) Round 19 to the nearest ten.

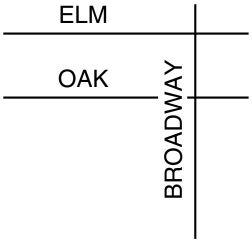
(b) Round $10.90 to the nearest dollar.

9. *(Inv. 2)* One meter equals how many centimeters?

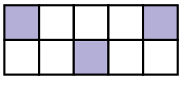
10. *(19)* It is before noon. What time is shown on this clock?



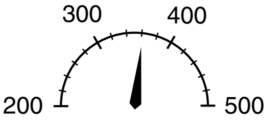
11. *(23)* Which street makes a right angle with Oak?



12. *(22)* What fraction of this figure is shaded?



13. *(18)* This scale shows weight in pounds. What number of pounds is the needle pointing to?



14. *(24)*
$$\begin{array}{r} Y \\ +\ 63 \\ \hline 81 \end{array}$$

15. *(13)*
$$\begin{array}{r} \$486 \\ +\ \$277 \\ \hline \end{array}$$

16. *(15)*
$$\begin{array}{r} \$68 \\ -\ \$39 \\ \hline \end{array}$$

17. *(22)*
$$\begin{array}{r} \$5.97 \\ +\ \$2.38 \\ \hline \end{array}$$

18. *(24)* $N + 42 = 71$

19. *(24)* $87 - N = 65$

20. *(24)* $27 + C = 48$

21. *(24)* $E - 14 = 28$

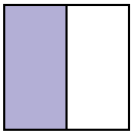
22. *(15)* $42 - 29$

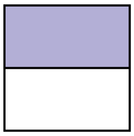
23. *(14)* $77 - 37$

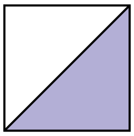
24. *(15)* $41 - 19$

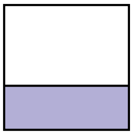
25. *(17)* $4 + 7 + 15 + 21 + 5 + 4 + 3$

26. *(26)* In which figure is $\frac{1}{2}$ not shaded?

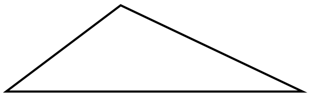
A. 

B. 

C. 

D. 

27. *(23)* Is the largest angle of this triangle acute, right, or obtuse?



LESSON

27

Multiplication as Repeated Addition • Elapsed Time

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Add hundreds, then tens, and then ones; regroup the ones:

a. 25 + 36 **b.** 147 + 225 **c.** 30 + 25 + 26

d. 356 + 26 **e.** 46 + 10 + 28 **f.** 350 + 35 + 7

g. Complete each split: 9 = 3 + ☐ 9 = 4 + ☐

Problem Solving:

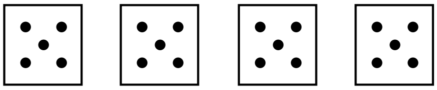
The two-digit numbers 18 and 81 are written with digits whose sum is nine. On your paper, list in order the two-digit numbers from 18 to 81 whose digits have a sum of nine.

18, ___, ___, ___, ___, ___, ___, 81

NEW CONCEPTS

Multiplication as repeated addition

Suppose we want to find the total number of dots shown on these four dot cubes:



One way we can find the total number of dots is to count the dots one by one. Another way is to recognize that there are 5 dots in each group and that there are four groups. We can find the answer by adding four 5's.

$$5 + 5 + 5 + 5 = 20$$

We can also use **multiplication** to show that we want to add 5 four times.

$$4 \times 5 = 20 \quad \text{or} \quad \begin{array}{r} 5 \\ \times\ 4 \\ \hline 20 \end{array}$$

If we find the answer this way, we are multiplying. We call the × a **multiplication sign.** We read 4 × 5 as "four times five."

Example 1 Change this addition problem to a multiplication problem:

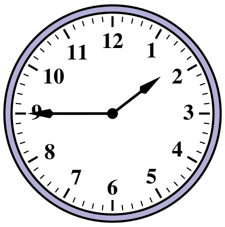
$$6 + 6 + 6 + 6 + 6$$

Solution We see five 6's. We can change this addition problem to a multiplication problem by writing either

$$\mathbf{5 \times 6} \quad \text{or} \quad \begin{array}{r} \mathbf{6} \\ \underline{\times\ \mathbf{5}} \end{array}$$

Elapsed time The amount of time between two different clock times is called **elapsed time.** We can count forward or backward on a clock to solve elapsed-time problems.

Example 2 If it is afternoon, what time will it be in 3 hours and 20 minutes?

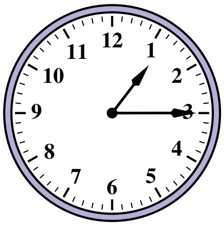


Solution First we count forward on the clock face 20 minutes. From that point, we count forward 3 hours.

Step 1: Counting forward 20 minutes from 1:45 p.m. makes it 2:05 p.m.

Step 2: Counting forward 3 hours from 2:05 p.m. makes it **5:05 p.m.**

Example 3 If it is afternoon, what time was it 4 hours and 25 minutes ago?



Solution First we count back the number of minutes. Then we count back the number of hours.

Step 1: Counting back 25 minutes from 1:15 p.m. makes it 12:50 p.m.

Step 2: Counting back 4 hours from 12:50 p.m. makes it **8:50 a.m.**

LESSON PRACTICE

Practice set Change each addition problem to a multiplication problem:

a. 3 + 3 + 3 + 3 **b.** 9 + 9 + 9

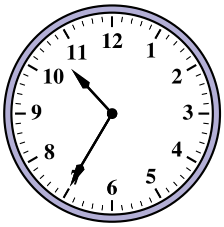
c. 7 + 7 + 7 + 7 + 7 + 7

d. 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5

Use the clock to answer problems **e** and **f.**

e. If it is morning, what time will it be in 2 hours and 25 minutes?

f. If it is morning, what time was it 6 hours and 30 minutes ago?



MIXED PRACTICE

Problem set

1. *(25)* Just before high noon Adriana saw seventy-eight kittens playing in the field. At high noon she saw only forty-two kittens playing in the field. How many kittens had left the field by high noon? Write a subtraction pattern and solve the problem.

2. *(Inv. 2, 21)* If each side of a square floor tile is one foot long, then

(a) each side is how many inches long?

(b) the perimeter of the tile is how many inches?

3. *(10)* List the even numbers between 31 and 39.

Find the next three numbers in each counting sequence:

4. *(3)* …, 12, 15, 18, ______, ______, ______, …

5. *(3)* …, 12, 24, 36, ______, ______, ______, …

6. *(16)* Write 265 in expanded form.

7. *(Inv. 1)* Use words to write –19.

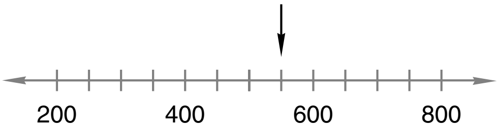
8. *(20)* (a) Round 63 to the nearest ten.

(b) Round $6.30 to the nearest dollar.

9. *(Inv. 1)* Compare:

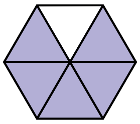
(a) 392 ○ 329 (b) –15 ○ –20

10. *(Inv. 1)* To what number is the arrow pointing?

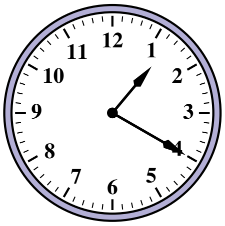


11. (21, 26) Draw a square with sides 2 centimeters long. Then shade one fourth of the square.

12. (22) What fraction of this figure is shaded?



13. (27) It is afternoon. What time will it be 3 hours from now?



14. (15)
$$\begin{array}{r} \$67 \\ -\ \$29 \\ \hline \end{array}$$

15. (13)
$$\begin{array}{r} 483 \\ +\ 378 \\ \hline \end{array}$$

16. (15)
$$\begin{array}{r} 71 \\ -\ 39 \\ \hline \end{array}$$

17. (22)
$$\begin{array}{r} \$5.88 \\ +\ \$2.39 \\ \hline \end{array}$$

18. (24)
$$\begin{array}{r} D \\ +\ 19 \\ \hline 36 \end{array}$$

19. (24)
$$\begin{array}{r} 66 \\ +\ \ F \\ \hline 87 \end{array}$$

20. (24)
$$\begin{array}{r} 87 \\ -\ \ R \\ \hline 67 \end{array}$$

21. (24)
$$\begin{array}{r} B \\ -\ 14 \\ \hline 27 \end{array}$$

22. (14) 400 − 300

23. (14) 663 − 363

24. (27) Change this addition problem to a multiplication problem:

$$9 + 9 + 9 + 9$$

25. (22) (a) How many pennies equal one dollar?

(b) A penny is what fraction of a dollar?

(c) Eleven pennies are what fraction of a dollar?

26. (1) If $\square = 3$ and $\Delta = 4$, then what does $\square + \Delta + \square$ equal?

A. 343 B. 7 C. 10 D. 11

27. (23) Draw a dot on your paper to represent a point, and from that point draw two perpendicular rays.

LESSON 28

Multiplication Table

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

a. 54 + 36 **b.** 54 + 19 **c.** 54 + 120

d. 350 + 30 + 200 **e.** 210 + 25 + 35 **f.** 48 + 29

g. Complete each split: 5 = 1 + ☐ 5 = 3 + ☐

Problem Solving:

At 12:00 the hands of the clock point in the same direction. At 6:00 the hands point in opposite directions. At what hours do the hands of a clock form right angles?

NEW CONCEPT

Here we show sequences for counting by ones and twos:

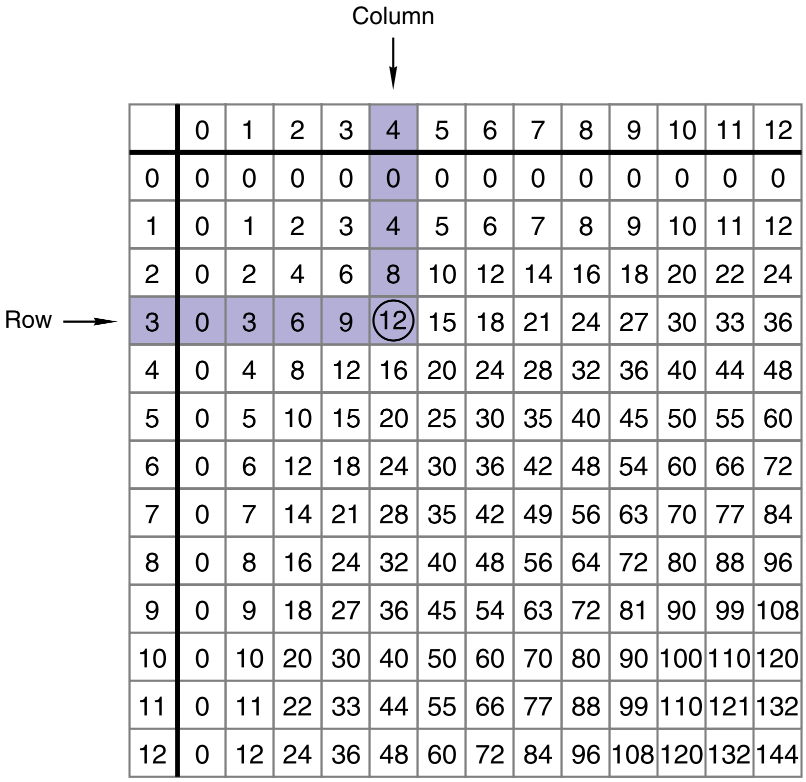
Ones:	1	2	3	4	5	6	7	8	9	10	11	12
Twos:	2	4	6	8	10	12	14	16	18	20	22	24

These sequences—and those for threes and fours and so on through twelves—appear in this **multiplication table:**

Multiplication Table

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

From a multiplication table we can find the answer to problems such as 3 × 4 by using rows and columns. Rows run left to right, and columns run top to bottom. We start by finding the row that begins with 3 and the column that begins with 4. Then we look for the number where the row and column meet.



	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	⑫	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

Each of the two numbers multiplied is called a **factor.** The answer to a multiplication problem is called a **product.** In this problem, 3 and 4 are factors, and 12 is the product. Now look at the row that begins with 4 and the column that begins with 3. We see that the product of 4 and 3 is also 12. Changing the order of factors does not change the product. This is true for any two numbers that are multiplied and is called the **commutative property of multiplication.**

Here are two more properties of multiplication we can see in the multiplication table. Notice that the product of zero and any number is zero. This is called the **property of zero for multiplication.** Also notice that the product of 1 and any other factor is the other factor. This is called the **identity property of multiplication.**

The three properties we have looked at are summarized in this table. The letters M and N can be any two numbers. Later, we will learn about two other properties of multiplication.

Properties of Multiplication

Commutative property	$M \times N = N \times M$
Identity property	$1 \times N = N$
Zero property	$0 \times N = 0$

LESSON PRACTICE

Practice set Use the multiplication table to find each product:

a. $\begin{array}{r} 9 \\ \times\ 3 \\ \hline \end{array}$ **b.** $\begin{array}{r} 3 \\ \times\ 9 \\ \hline \end{array}$ **c.** $\begin{array}{r} 6 \\ \times\ 4 \\ \hline \end{array}$ **d.** $\begin{array}{r} 4 \\ \times\ 6 \\ \hline \end{array}$

e. $\begin{array}{r} 7 \\ \times\ 8 \\ \hline \end{array}$ **f.** $\begin{array}{r} 8 \\ \times\ 7 \\ \hline \end{array}$ **g.** $\begin{array}{r} 5 \\ \times\ 8 \\ \hline \end{array}$ **h.** $\begin{array}{r} 8 \\ \times\ 5 \\ \hline \end{array}$

i. $\begin{array}{r} 10 \\ \times\ 10 \\ \hline \end{array}$ **j.** $\begin{array}{r} 10 \\ \times\ 8 \\ \hline \end{array}$ **k.** $\begin{array}{r} 11 \\ \times\ 9 \\ \hline \end{array}$ **l.** $\begin{array}{r} 12 \\ \times\ 12 \\ \hline \end{array}$

m. Which property of multiplication is shown below?

$$12 \times 11 = 11 \times 12$$

n. Use the zero property of multiplication to find the product:

$$0 \times 25$$

o. Use the identity property of multiplication to find the product:

$$1 \times 25$$

MIXED PRACTICE

Problem set

1. (1, 17) Hansel ate seventy-two pieces of gingerbread. Gretel ate forty-two pieces of gingerbread. How many pieces of gingerbread did they eat in all?

2. (11, 24) Sherri needs \$35 to buy a baseball glove. She has saved \$18. How much more money does she need?

3. *(Inv. 2, 21)* Draw a rectangle that is 4 cm long and 3 cm wide. What is the perimeter of the rectangle?

Find the missing numbers in each counting sequence:

4. *(3)* …, 12, _____, _____, 30, 36, _____, …

5. *(3)* …, 36, _____, _____, 24, 20, _____, …

6. *(27, 28)* Change this addition problem to a multiplication problem. Then find the product on the multiplication table shown in this lesson.

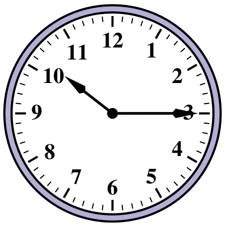
$$6 + 6 + 6 + 6 + 6 + 6 + 6$$

7. *(20)* (a) Round 28 to the nearest ten.

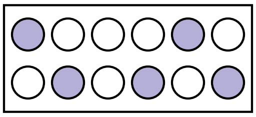
(b) Round $12.29 to the nearest dollar.

8. *(Inv. 2, 23)* A *right triangle* has one right angle. Draw a right triangle. Draw the two perpendicular sides 3 cm long and 4 cm long.

9. *(27)* It is morning. What time will it be 10 minutes from now?

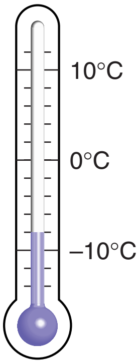


10. *(22)* What fraction of this group is shaded?



11. *(7, 16)* Write 417 in expanded form. Then use words to write the number.

12. *(18)* What temperature is shown on this thermometer?



13. *(15)* $\begin{array}{r} 76 \\ -\ 29 \\ \hline \end{array}$

14. *(13)* $\begin{array}{r} \$286 \\ +\ \$388 \\ \hline \end{array}$

15. *(15)* $\begin{array}{r} \$73 \\ -\ \$39 \\ \hline \end{array}$

16. *(22)* $\begin{array}{r} \$5.87 \\ +\ \$2.43 \\ \hline \end{array}$

17. $46 - C = 19$ *(24)*

18. $N + 48 = 87$ *(24)*

19. $29 + Y = 57$ *(24)*

20. $D - 14 = 37$ *(24)*

21. $78 - 43$ *(14)*

22. $77 - 17$ *(14)*

23. $53 - 19$ *(15)*

24. Use the multiplication table to find each product: *(28)*

(a) 8×11 (b) 7×10 (c) 5×12

25. Compare: 1 yard ○ 1 meter *(Inv. 1, Inv. 2)*

26. Which of the following shows 3 ones and 4 hundreds? *(4)*

A. 304 B. 403 C. 4003 D. 3400

27. The product of 9 and 3 is 27. How many times does this product appear in this lesson's multiplication table? What property of multiplication does this show? *(28)*

LESSON

29 Multiplication Facts (0's, 1's, 2's, 5's)

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

We can split numbers to help us add. Adding 35 and 8, we may notice that 35 needs 5 more to make 40, and that 8 splits into 5 + 3. So to add 35 and 8, we could add 35 + 5 + 3.

a. 35 + 7	**b.** 26 + 8	**c.** 38 + 5
d. 47 + 6	**e.** 68 + 7	**f.** 45 + 8

Problem Solving:

Hope has seven coins in her right pocket. None of the coins are dollar or half-dollar coins. What is the lowest possible value of all seven coins? What is the highest possible value of all seven coins?

NEW CONCEPT

We will begin memorizing the basic multiplication facts. Eighty-eight of the facts in the multiplication table shown in Lesson 28 have 0, 1, 2, or 5 as one of the factors. These facts are easy to learn.

Zero times any number equals zero.

$0 \times 5 = 0$ $\quad 5 \times 0 = 0$ $\quad 7 \times 0 = 0$ $\quad 0 \times 7 = 0$

One times any number equals the number.

$1 \times 5 = 5$ $\quad 5 \times 1 = 5$ $\quad 7 \times 1 = 7$ $\quad 1 \times 7 = 7$

Two times any number doubles the number.

$2 \times 5 = 10$ $\quad 2 \times 7 = 14$ $\quad 2 \times 6 = 12$ $\quad 2 \times 8 = 16$

Five times any number equals a number that ends in zero or in five.

$5 \times 1 = 5$ $\quad 5 \times 3 = 15$ $\quad 5 \times 7 = 35$ $\quad 5 \times 8 = 40$

Until we have memorized the facts, we can find multiples of 2 by counting by twos. So 6 × 2 is the sixth number we say when counting by twos: 2, 4, 6, 8, 10, 12. We can find multiples of 5 by counting by fives. The sixth number we say when counting by fives is 30, so 6 × 5 = 30. **However, counting is not a substitute for memorizing the facts.**

LESSON PRACTICE

Practice set Take Facts Practice Test C (Multiplication Facts: 0’s, 1’s, 2’s, 5’s).

MIXED PRACTICE

Problem set

1. (25) Ninety-two blackbirds squawked noisily in the tree. Then some flew away. Twenty-four blackbirds remained. How many blackbirds flew away? Write a subtraction pattern and solve the problem.

2. (11, 24) Robill collected 42 seashells. Then Buray collected some seashells. They collected 83 seashells in all. How many seashells did Buray collect?

3. (Inv. 2, 21) Conner estimated that the radius of one of the circles on the playground was 2 yards. If Conner was correct, then

(a) the radius was how many feet?

(b) the diameter was how many feet?

Find the missing numbers in each counting sequence:

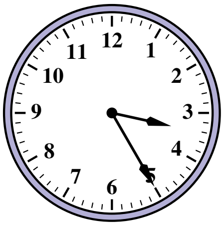
4. (3) …, 8, _____, _____, 32, 40, _____, …

5. (3) …, 14, _____, _____, 35, 42, …

6. (10) Use the digits 4, 5, and 6 once each to write a three-digit odd number less than 640.

7. (Inv. 1) Use digits and a comparison symbol to write that two hundred nine is greater than one hundred ninety.

8. (27) It is afternoon. What time will it be in 6 hours?

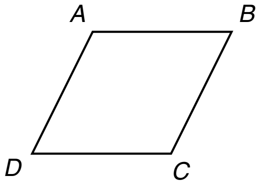


9. (21, 26) Draw a rectangle 3 cm long and 1 cm wide. Then shade two thirds of it.

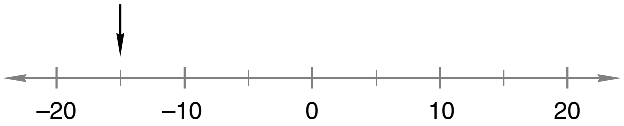
10. (28, 29) Find each product:

(a) 2 × 8 (b) 5 × 7 (c) 2 × 7 (d) 5 × 8

11. *(23)* In this figure, what type of angle is angle A?



12. *(Inv. 1)* To what number is the arrow pointing?



13. *(18)* At what temperature does water freeze

(a) on the Fahrenheit scale?

(b) on the Celsius scale?

14. *(15)* $\begin{array}{r} \$83 \\ -\ \$19 \\ \hline \end{array}$

15. *(13)* $\begin{array}{r} \$286 \\ +\ \$387 \\ \hline \end{array}$

16. *(15)* $\begin{array}{r} 72 \\ -\ 38 \\ \hline \end{array}$

17. *(22)* $\begin{array}{r} \$5.87 \\ +\ \$2.79 \\ \hline \end{array}$

18. *(24)* $\begin{array}{r} 19 \\ +\ Q \\ \hline 46 \end{array}$

19. *(24)* $\begin{array}{r} 88 \\ -\ N \\ \hline 37 \end{array}$

20. *(24)* $\begin{array}{r} 88 \\ -\ M \\ \hline 47 \end{array}$

21. *(24)* $\begin{array}{r} G \\ +\ 14 \\ \hline 47 \end{array}$

22. *(14)* $870 - 470$

23. *(14)* $525 - 521$

24. *(27, 28)* Change this addition problem to a multiplication problem. Then find the product on the multiplication table.

$$8 + 8 + 8$$

25. *(1)* $1 + 9 + 2 + 8 + 3 + 7 + 4 + 6 + 5 + 10$

26. *(28)* Which of these does not equal 24?

A. 3×8 B. 4×6 C. 2×12 D. 8×4

27. *(28)* Name the property of multiplication shown by each of these examples:

(a) $0 \times 50 = 0$

(b) $9 \times 6 = 6 \times 9$

(c) $1 \times 75 = 75$

LESSON

30

Subtracting Three-Digit Numbers with Regrouping

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Practice splitting the second number to add:

a. 36 + 8 **b.** 48 + 6 **c.** 47 + 9

Review:

d. 67 + 19 + 100 **e.** 350 + 40 + 200 **f.** 38 + 45 + 200

Patterns:

In some sequences the count from one number to the next increases. In the sequence below, from 1 to 4 is 3, from 4 to 9 is 5, and from 9 to 16 is 7. (Notice that the increase itself forms a sequence.) Continue this sequence to the tenth term, which is 100.

1, 4, 9, 16, …

NEW CONCEPT

We have already learned how to subtract three-digit numbers without regrouping. In this lesson we will subtract three-digit numbers with regrouping.

Example 1 Find the difference: $365 – $187

Solution We write the first number on top. We line up the last digits. We cannot subtract 7 ones from 5 ones.

$$\begin{array}{r} \$365 \\ -\ \$187 \\ \hline ? \end{array}$$

We exchange 1 ten for 10 ones. Now there are 5 tens and 15 ones. We can subtract 7 ones from 15 ones to get 8 ones.

$$\begin{array}{r} \$3\,\overset{5}{\cancel{6}}\,{}^{1}5 \\ -\ \$1\,8\,7 \\ \hline 8 \end{array}$$

We cannot subtract 8 tens from 5 tens, so we exchange 1 hundred for 10 tens. Now there are 2 hundreds and 15 tens, and we can continue subtracting.

$$\begin{array}{r} \$\overset{2}{\cancel{3}}\,\overset{{}^{1}5}{\cancel{6}}\,{}^{1}5 \\ -\ \$1\,8\,7 \\ \hline 7\,8 \end{array}$$

We subtract 1 hundred from 2 hundreds to finish. The difference is **$178.**

$$\begin{array}{r} \$\overset{2}{\cancel{3}}\,\overset{{}^{1}5}{\cancel{6}}\,{}^{1}5 \\ -\ \$1\,8\,7 \\ \hline \$1\,7\,8 \end{array}$$

Example 2 Subtract:

$$\begin{array}{r} \$4.10 \\ -\ \$1.12 \\ \hline \end{array}$$

Solution We subtract pennies, then dimes, and then dollars. We remember to align the decimal points.

$$\begin{array}{r} \$4.\overset{0}{\cancel{1}}\,{}^{1}0 \\ -\ \$1.1\,2 \\ \hline 8 \end{array} \longrightarrow \begin{array}{r} \$\overset{3}{\cancel{4}}.\overset{{}^{1}0}{\cancel{1}}\,{}^{1}0 \\ -\ \$1.1\,2 \\ \hline .9\,8 \end{array} \longrightarrow \begin{array}{r} \$\overset{3}{\cancel{4}}.\overset{{}^{1}0}{\cancel{1}}\,{}^{1}0 \\ -\ \$1.1\,2 \\ \hline \mathbf{\$2.9\,8} \end{array}$$

LESSON PRACTICE

Practice set* Subtract:

a. $\begin{array}{r} \$365 \\ -\ \$287 \\ \hline \end{array}$ **b.** $\begin{array}{r} \$4.30 \\ -\ \$1.18 \\ \hline \end{array}$ **c.** $\begin{array}{r} 563 \\ -\ 356 \\ \hline \end{array}$

d. 240 − 65 **e.** 459 − 176 **f.** 157 − 98

MIXED PRACTICE

Problem set

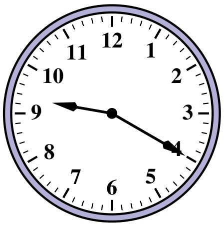
1. (25) The room was full of students when the bell rang. Then forty-seven students left the room. Twenty-two students remained. How many students were there when the bell rang? Write a subtraction pattern and solve the problem.

2. (11, 24) Fifty-six children peered through the window of the pet shop. After the store owners brought the puppies out, there were seventy-three children peering through the window. How many children came to the window after the puppies were brought out?

3. (10) A nickel is worth 5¢. Gilbert has an even number of nickels in his pocket. Which of the following **could not be** the value of his nickels?

A. 45¢ B. 70¢ C. 20¢

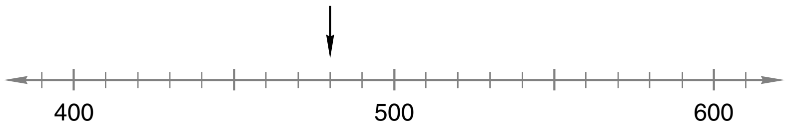
4. (27) It is morning. What time will it be in 15 minutes?



5. *(3)* What is the sixth number in this counting sequence?

6, 12, 18, …

6. *(Inv. 1)* To what number is the arrow pointing?



7. *(21, 26)* Use a compass to draw a circle with a radius of 1 inch. Then shade one fourth of the circle.

8. *(7, 16)* Write 843 in expanded form. Then use words to write the number.

9. *(28, 29)* Multiply:

(a) 6×8 (b) 4×2 (c) 4×5 (d) 6×10

10. *(6)* Write two addition facts and two subtraction facts using the numbers 10, 20, and 30.

11. *(Inv. 2)* Use a centimeter ruler to measure the rectangle below.

(a) How long is the rectangle?

(b) How wide is the rectangle?

(c) What is the perimeter of the rectangle?

12. *(23)* What type of angle is each angle of a rectangle?

13. *(30)* $\begin{array}{r} 746 \\ -\ 295 \\ \hline \end{array}$ **14.** *(22)* $\begin{array}{r} \$3.86 \\ +\ \$2.78 \\ \hline \end{array}$ **15.** *(15)* $\begin{array}{r} 61 \\ -\ 48 \\ \hline \end{array}$ **16.** *(30)* $\begin{array}{r} \$4.86 \\ -\ \$2.75 \\ \hline \end{array}$

17. *(24)* $51 + M = 70$ **18.** *(24)* $86 - A = 43$

19. *(24)* $25 + Y = 36$ **20.** *(24)* $Q - 24 = 37$

21. *(20)* (a) Round 89 to the nearest ten.

(b) Round \$8.90 to the nearest dollar.

22. (17) 25¢ + 25¢ + 25¢ + 25¢

23. (20, 22) There are 100 cents in a dollar. How many cents are in half of a dollar?

24. (27, 28) Change this addition problem to a multiplication problem. Then find the product on the multiplication table.

$$7 + 7 + 7 + 7 + 7 + 7 + 7$$

25. (1) $4 + 3 + 8 + 4 + 2 + 5 + 7$

26. (6) Which of these sets of numbers is not an addition/subtraction fact family?

A. 1, 2, 3 B. 2, 3, 5 C. 2, 4, 6 D. 3, 4, 5

27. (28) Find each product on the multiplication table:

(a) 10×10 (b) 11×11 (c) 12×12

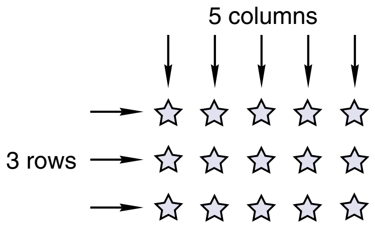
INVESTIGATION 3

Focus on

Multiplication Patterns • Area • Squares and Square Roots

Multiplication patterns

One model of multiplication is a rectangular **array.** Here we see an array of 15 stars arranged in three rows and five columns. This array shows that 3 times 5 equals 15. This array also shows that 3 and 5 are both factors of 15.



Refer to this array of X's to answer problems 1–4 below.

X X X X
X X X X
X X X X

1. How many rows are in the array?

2. How many columns are in the array?

3. How many X's are in the array?

4. What multiplication fact is illustrated by the array?

Some numbers of objects can be arranged in more than one array. In problems 5–7 we will work with an array of 12 X's that is different from the array we discussed above.

5. Draw an array of 12 X's arranged in two rows.

6. How many columns of X's are in the array you drew?

7. What multiplication fact is illustrated by the array you drew?

Below we show an array of 10 X's.

X X X X X
X X X X X

8. Which two factors of 10 are shown by this array?

9. Can you draw a rectangular array of ten X's with three rows?

10. Can you draw a rectangular array of ten X's with four rows?

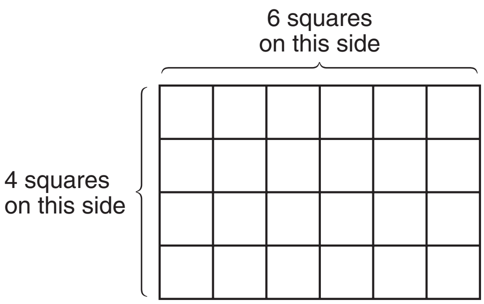
11. Can you draw a rectangular array of ten X's with five rows?

12. Draw an array of X's arranged in three rows and six columns. Then write the multiplication fact illustrated by the array.

13. The chairs in a room were arranged in six rows, with four chairs in each row. Draw an array that shows this arrangement, and write the multiplication fact illustrated by the array.

Area

Another model of multiplication is the **area** model. The area model is like an array of connected squares. This model shows that $4 \times 6 = 24$:



Use 1-cm grid paper to work problems 14–16, 20, and 23–25 below.

14. Outline a 4-cm-by-6-cm rectangle like the one shown above. How many small squares are in the rectangle?

15. Outline a 3-cm-by-8-cm rectangle. How many small squares are in the rectangle? What multiplication fact is illustrated by the rectangle?

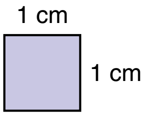
16. Outline another rectangle that is made up of 24 squares. Make this rectangle 2 cm wide. How long is the rectangle? What multiplication fact is illustrated by the rectangle?

With your finger, trace around the edges of a sheet of paper. As your finger moves around the paper, it traces the perimeter of the paper. Now use the palm of your hand to rub over the surface of the paper. As you do this, your hand sweeps over the *area* of the paper. The area is the amount of surface within the perimeter (boundary) of a flat figure.

17. Use your finger to trace the perimeter of your desktop.

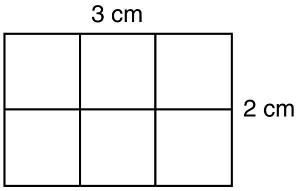
18. Use the palm of your hand to sweep over the area of your desktop.

We measure the area of a shape by counting the number of squares of a certain size that are needed to cover its surface. Here is a square centimeter:



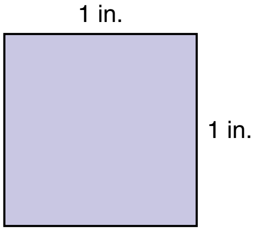
one square centimeter
(1 sq. cm)

19. How many square centimeters cover the area of this rectangle?



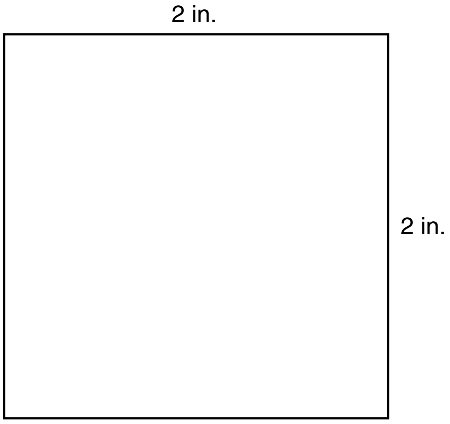
20. On 1-cm grid paper, outline a 4-cm-by-3-cm rectangle. What is the area of the rectangle?

Here is a square inch:



one square inch
(1 sq. in.)

21. How many square inches are needed to cover the rectangle below?



22. Use your ruler to draw a rectangle 3 in. long and 3 in. wide. What is the area of the rectangle?

Squares and square roots

Some rectangles are squares. A square is a rectangle whose length and width are equal.

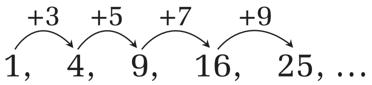
23. On 1-cm grid paper, outline four squares, one each with the following unit measurements: 1 by 1, 2 by 2, 3 by 3, and 4 by 4. Write the multiplication fact for each square.

We say that we "square a number" when we multiply a number by itself. If we square 3, we get 9 because $3 \times 3 = 9$. Likewise, 4 squared is 16 because 4×4 is 16.

24. What number do we get if we square 6? Outline a square on grid paper to show the result.

25. What number equals 7 squared? Outline a square on grid paper to illustrate the answer.

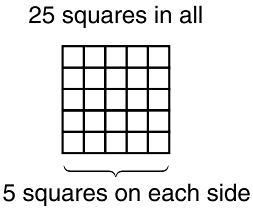
The numbers 1, 4, 9, 16, 25, and so on form a sequence of **square numbers,** or **perfect squares.** Notice that the increase from one term to the next term forms a sequence of odd numbers.



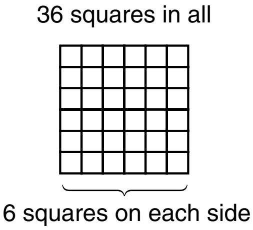
26. Find the next five terms in the sequence of square numbers above.

27. Look back at the multiplication table in Lesson 28. What pattern do the square numbers make in the table?

To find the **square root** of a number, we find a number that, when multiplied by itself, equals the original number. The square root of 25 is 5 because $5 \times 5 = 25$. The square root of 36 is 6. A square drawn on grid paper can help us understand the idea of square roots. When searching for a square root, we know the number of small squares in all, and we are looking for the length of a side.



The square root of 25 is 5.



The square root of 36 is 6.

We indicate the square root of a number by using a square root symbol.

$$\sqrt{}$$

Square root symbol

We read the symbol as "the square root of." To read

$$\sqrt{25} = 5$$

we say, "The square root of twenty-five equals five."

28. (a) What number equals 9 squared?

(b) What is the square root of 9?

29. Find each square root:

(a) $\sqrt{4}$ (b) $\sqrt{16}$ (c) $\sqrt{64}$

30. If the area of a square is 49 square centimeters, how long is each side of the square?

LESSON

31

Word Problems About Comparing

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Practice splitting the second number to add:

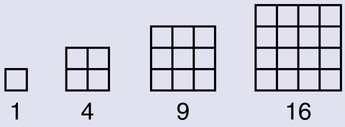
a. 57 + 8 **b.** 78 + 6 **c.** 49 + 4

Review:

d. 300 + 520 + 70 **e.** 63 + 19 + 200 **f.** 354 + 220 + 18

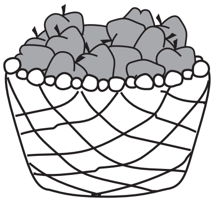
Patterns:

Here we show four squares. The smallest is made up of 1 small square. The next three squares are made up of 4, 9, and 16 small squares. Draw the next two squares in the pattern.

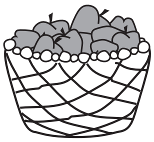


NEW CONCEPT

There are 43 apples in the large basket.



There are 19 apples in the small basket.



When we compare the number of apples in the two baskets, we see that 43 is **greater than** 19. To find **how much greater** 43 is than 19, we subtract.

Larger amount	43
− Smaller amount	− 19
Difference	24

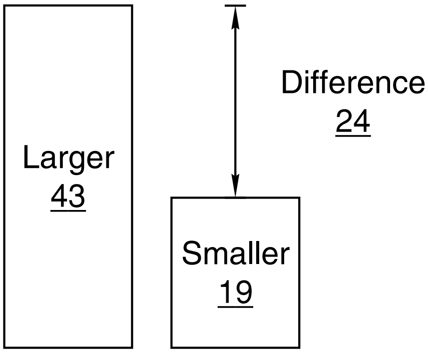
As we think about this story, we realize that it is not a "some went away" story, because nothing went away. This is a different kind of story. In this story we are **comparing** two numbers. One way to compare two numbers is to subtract to find their difference. We subtract the smaller number from the larger number. Here we show two ways to write the subtraction pattern:

$$\begin{array}{r} \text{Larger} \\ -\ \text{Smaller} \\ \hline \text{Difference} \end{array}$$

$$\text{Larger} - \text{smaller} = \text{difference}$$

The difference tells us "how many more." It also tells us "how many fewer." There are **24 more** apples in the large basket than there are in the small basket. We can say this comparison another way. There are **24 fewer** apples in the small basket than there are in the large basket.

Here we show a way to diagram a "larger-smaller-difference" story. In the diagram we have used the numbers from the apple story above.



Example 1 Forty-two apples is how many more than 13 apples?

Solution To find "how many more," we use a subtraction pattern. Here we are comparing the two numbers 42 and 13.

$$\begin{array}{rcr} \textbf{PATTERN} & \qquad & \textbf{PROBLEM} \\ \text{Larger} & & 42 \text{ apples} \\ -\ \text{Smaller} & & -\ 13 \text{ apples} \\ \hline \text{Difference} & & 29 \text{ apples} \end{array}$$

Forty-two apples is **29 apples** more than 13 apples.

Example 2 Seventeen apples is how many fewer than 63 apples?

Solution We are asked to find “how many fewer.” The pattern is the same as the pattern for finding “how many more.” We use a subtraction pattern to compare the numbers.

PATTERN	PROBLEM
Larger	63 apples
− Smaller	− 17 apples
Difference	46 apples

Seventeen apples is **46 apples** fewer than 63 apples.

Example 3 Seventeen is how much less than 42?

Solution Problems about numbers that ask “how much *less*” or “how much *greater*” also have a subtraction pattern. This time we will show the pattern sideways:

PATTERN: Larger − smaller = difference

PROBLEM: 42 − 17 = 25

Seventeen is **25** less than 42.

LESSON PRACTICE

Practice set Write a subtraction pattern for each problem. Then answer the question.

a. Forty-three is how much greater than twenty-seven?

b. Mary has 42 peanuts. Frank has 22 peanuts. How many fewer peanuts does Frank have?

c. Cesar had 53 shells. Juanita had 95 shells. How many more shells did Juanita have?

MIXED PRACTICE

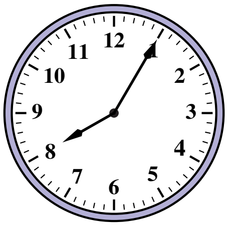
Problem set

1. *(25)* There were 43 parrots in the tree. Some flew away. Then there were 27 parrots in the tree. How many parrots flew away? Write a subtraction pattern and solve the problem.

2. *(31)* One hundred fifty is how much greater than twenty-three? Write a subtraction pattern and solve the problem.

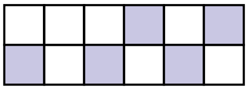
3. *(31)* Twenty-three apples is how many fewer than seventy-five apples? Write a subtraction pattern and solve the problem.

4. *(27)* It is evening. What time will it be 3 hours from now?



5. *(7, 16)* Write 412 in expanded form. Then use words to write the number.

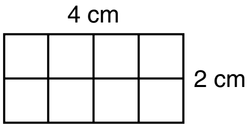
6. *(22)* What fraction of this figure is shaded?



7. *(Inv. 2, Inv. 3)* The rectangle shown at right is 4 cm long and 2 cm wide.

(a) What is the perimeter?

(b) What is the area?



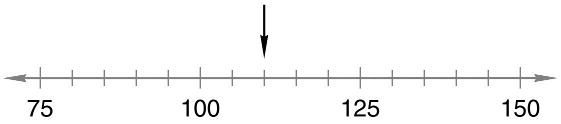
8. *(28, 29)* Multiply:

(a) 2×5 (b) 5×7 (c) 2×7 (d) 4×11

9. *(6)* Write two addition facts and two subtraction facts using the numbers 20, 30, and 50.

10. *(18)* What temperature is five degrees below zero on the Celsius scale?

11. *(13)* To what number is the arrow pointing?



12. *(28, 29)* Multiply:

(a) 5×8 (b) 2×8 (c) 5×9

13. *(22)* (a) How many quarters equal one dollar?

(b) A quarter is what fraction of a dollar?

(c) Three quarters are what fraction of a dollar?

14. *(Inv. 1)* Use digits and symbols to write this comparison: “Three hundred nine is less than three hundred ninety.”

15. *(31)* Three hundred nine is how much less than 390?

16. *(30)*
$$\begin{array}{r} \$4.22 \\ -\ \$2.95 \\ \hline \end{array}$$

17. *(30)*
$$\begin{array}{r} 909 \\ -\ \ 27 \\ \hline \end{array}$$

18. *(30)*
$$\begin{array}{r} \$422 \\ -\ \$144 \\ \hline \end{array}$$

19. *(30)*
$$\begin{array}{r} 703 \\ -\ 471 \\ \hline \end{array}$$

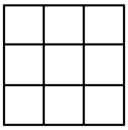
20. *(22)*
$$\begin{array}{r} \$4.86 \\ +\ \$2.95 \\ \hline \end{array}$$

21. *(30)*
$$\begin{array}{r} 370 \\ -\ 209 \\ \hline \end{array}$$

22. *(24)*
$$\begin{array}{r} 22 \\ +\ N \\ \hline 37 \end{array}$$

23. *(24)*
$$\begin{array}{r} 76 \\ -\ C \\ \hline 28 \end{array}$$

24. *(Inv. 3)* What multiplication fact is illustrated by this square?



25. *(Inv. 3)* Find each square root:

(a) $\sqrt{9}$ (b) $\sqrt{25}$

26. *(Inv. 3)* Which of these does not equal 9?

A. 3 squared

B. $\sqrt{81}$

C. $\sqrt{18}$

D. $\sqrt{25} + \sqrt{16}$

27. *(28, Inv. 3)* Multiply:

(a) 1×1 (b) 5×5 (c) 8×8 (d) 9×9

LESSON

32 Multiplication Facts (9's)

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Practice splitting the second number to add:

a. 49 + 6 **b.** 65 + 8 **c.** 38 + 8

Review:

d. 920 + 38 + 7 **e.** 57 + 29 + 100 **f.** 350 + 40 + 500

Problem Solving:

Tom has seven coins in his right pocket. He does not have any dollar or half-dollar coins. Tom has at least one penny, one nickel, one dime, and one quarter, but he has no more than two coins of any type. What are the possible values of all seven coins? (There are four possibilities.)

NEW CONCEPT

We can more easily learn the 9's multiplication facts by recognizing the patterns in the facts. In the 9's facts below, notice that the first digit of each product is one less than the number that is multiplied by nine. Also notice that the two digits of each product add up to nine.

$9 \times 2 = 18$ $(1 + 8 = 9)$

$9 \times 3 = 27$ $(2 + 7 = 9)$

$9 \times 4 = 36$ $(3 + 6 = 9)$

$9 \times 5 = 45$ $(4 + 5 = 9)$

$9 \times 6 = 54$ $(5 + 4 = 9)$

$9 \times 7 = 63$ $(6 + 3 = 9)$

$9 \times 8 = 72$ $(7 + 2 = 9)$

$9 \times 9 = 81$ $(8 + 1 = 9)$

$9 \times 10 = 90$ $(9 + 0 = 9)$

These two patterns can help us quickly multiply by nine.

Example 1 What is the **first digit** of each product?

(a) $\begin{array}{r} 9 \\ \times\ 6 \\ \hline \underline{?}\ \underline{\ \ } \end{array}$ (b) $\begin{array}{r} 3 \\ \times\ 9 \\ \hline \underline{?}\ \underline{\ \ } \end{array}$ (c) $\begin{array}{r} 9 \\ \times\ 7 \\ \hline \underline{?}\ \underline{\ \ } \end{array}$ (d) $\begin{array}{r} 4 \\ \times\ 9 \\ \hline \underline{?}\ \underline{\ \ } \end{array}$ (e) $\begin{array}{r} 9 \\ \times\ 8 \\ \hline \underline{?}\ \underline{\ \ } \end{array}$

Solution The first digit is one less than the number multiplied by nine.

(a) $\begin{array}{r} 9 \\ \times\ 6 \\ \hline \mathbf{5}\ \underline{\ \ } \end{array}$ (b) $\begin{array}{r} 3 \\ \times\ 9 \\ \hline \mathbf{2}\ \underline{\ \ } \end{array}$ (c) $\begin{array}{r} 9 \\ \times\ 7 \\ \hline \mathbf{6}\ \underline{\ \ } \end{array}$ (d) $\begin{array}{r} 4 \\ \times\ 9 \\ \hline \mathbf{3}\ \underline{\ \ } \end{array}$ (e) $\begin{array}{r} 9 \\ \times\ 8 \\ \hline \mathbf{7}\ \underline{\ \ } \end{array}$

Example 2 Complete each two-digit number so that the sum of the digits is nine:

(a) 3 __ (b) 6 __ (c) 4 __ (d) 5 __

(e) 8 __ (f) 1 __ (g) 2 __ (h) 7 __

Solution (a) **36** (b) **63** (c) **45** (d) **54**

(e) **81** (f) **18** (g) **27** (h) **72**

LESSON PRACTICE

Practice set Find the product for each multiplication fact. Remember, the first digit is one less than the number multiplied, and the two digits add up to nine.

a. $\begin{array}{r} 9 \\ \times\ 6 \\ \hline \end{array}$ **b.** $\begin{array}{r} 5 \\ \times\ 9 \\ \hline \end{array}$ **c.** $\begin{array}{r} 9 \\ \times\ 8 \\ \hline \end{array}$ **d.** $\begin{array}{r} 3 \\ \times\ 9 \\ \hline \end{array}$

e. $\begin{array}{r} 9 \\ \times\ 4 \\ \hline \end{array}$ **f.** $\begin{array}{r} 7 \\ \times\ 9 \\ \hline \end{array}$ **g.** $\begin{array}{r} 9 \\ \times\ 2 \\ \hline \end{array}$ **h.** $\begin{array}{r} 9 \\ \times\ 9 \\ \hline \end{array}$

MIXED PRACTICE

Problem set

1. *(25)* There are two hundred fifteen pages in the book. Hannah has read eighty-six pages. How many more pages are left to read? Write a subtraction pattern and solve the problem.

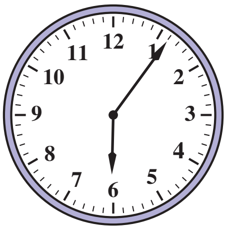
2. *(10)* Use the digits 7, 8, and 9 once each to make an even number greater than 800.

3. *(Inv. 1)* Use digits and a comparison symbol to show that four hundred eighty-five is less than six hundred ninety.

4. *(3, Inv. 3)* This is a sequence of square numbers. What are the next three numbers in the sequence?

1, 4, 9, 16, _____, _____, _____, …

5. (19) It is morning. What time is shown on this clock?



6. (27, 28) Change this addition problem to a multiplication problem. Then find the product on the multiplication table.

$$6 + 6 + 6 + 6 + 6 + 6 + 6$$

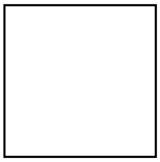
7. (7, 16) Write 729 in expanded form. Then use words to write the number.

8. (20) (a) Round 66 to the nearest ten.

(b) Round $6.60 to the nearest dollar.

9. (Inv. 2) (a) Each side of this square is how many centimeters long?

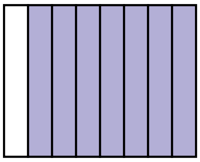
(b) What is the perimeter of the square?



10. (23) Which two uppercase letters are formed with only two perpendicular line segments?

11. (24) $62 - W = 38$

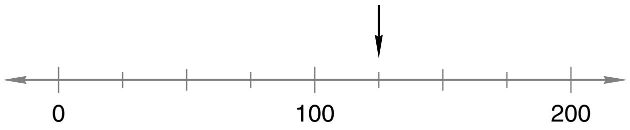
12. (22) What fraction of this rectangle is shaded?



13. (Inv. 3) Draw an array of X's to show the multiplication 5×5.

14. (10) Is the value of three nickels and two dimes an even number of cents or an odd number of cents?

15. (Inv. 1) To what number is the arrow pointing?

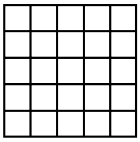


Multiply:

16. *(32)* (a) 9×6 (b) 9×8 (c) 9×4 (d) 9×10

17. *(Inv. 3)* (a) 6×6 (b) 4×4 (c) 7×7 (d) 10×10

18. *(Inv. 3)* What multiplication fact is illustrated by this square?



19. *(Inv. 3)* $\sqrt{81}$

20. *(30)* $\$3.60 - \$1.37$

21. *(30)* $413 - 380$

22. *(30)* $875 - 218$

23. *(Inv. 1)* Compare: $47 + 36$ ◯ $57 + 26$

24. *(Inv. 3, 31)* Five squared is how much more than the square root of 25?

25. *(Inv. 3)* This rectangle is 5 cm long and 2 cm wide. What is the area of the rectangle?

26. *(25, Inv. 3)* Jacob saw an array of freshly baked cookies on a cookie sheet. There were four rows of cookies with four cookies in each row. How many cookies will be left on the sheet if he takes one cookie?

A. 3 B. 7 C. 12 D. 15

27. *(28, Inv. 3)* Which property of multiplication does this story illustrate?

> *Twenty-four desks were arranged in 4 rows with 6 desks in each row. Then they were moved into 6 rows with 4 desks in each row.*

LESSON

33

Writing Numbers Through Hundred Millions, Part 1

WARM-UP

Facts Practice: Multiplication Facts: 0's, 1's, 2's, 5's (Test C)

Mental Math:

Subtract numbers ending in one or two zeros:

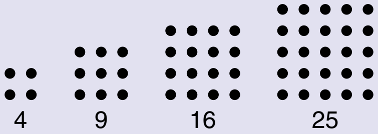
a. 60 − 40
b. 80 − 30
c. 800 − 300

Review:

d. 67 + 7
e. 67 + 19 + 100
f. 340 + 35 + 115

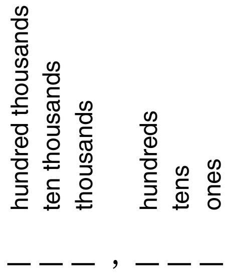
Patterns:

These dots are arranged in square patterns of 2 rows of 2, 3 rows of 3, and so on. Copy these patterns and continue the sequence to 7 rows of 7.



NEW CONCEPT

Recall that the places in a three-digit number are the ones place, the tens place, and the hundreds place. The three places to the left of the hundreds place are the thousands place, the ten-thousands place, and the hundred-thousands place.



In order to make the numbers easier to read, we can use commas when writing numbers equal to or greater than one thousand.[†] To read a whole number with four, five, or six digits,

---

[†] *Note:* Four-digit whole numbers are often written without a comma. In this book we will typically not use a comma to express a four-digit whole number. However, we will use commas to express any whole number with more than four digits.

we read the number to the left of the comma, say "thousand" at the comma, and then read the number after the comma.

4,507	is read	four **thousand,** five hundred seven
34,507	is read	thirty-four **thousand,** five hundred seven
234,507	is read	two hundred thirty-four **thousand,** five hundred seven

When we write a number in words, we place a comma after the word *thousand,* as shown above.

Example 1 Use words to write 123456.

Solution To make the number easier to read, we insert a comma three places from the right-hand end of the number.

123,456

Then we write the number that is to the left of the comma.

one hundred twenty-three

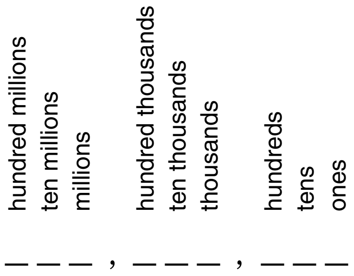
Next we write "thousand" followed by a comma.

one hundred twenty-three thousand,

Finally, we write the number that is to the right of the comma.

one hundred twenty-three thousand, four hundred fifty-six

To write a whole number with seven, eight, or nine digits, we use another comma to indicate millions.



To read a whole number with seven, eight, or nine digits, we first read the digits to the left of the millions comma and say "million" at the comma. Then we read the next three digits and say "thousand" at the next comma. We finish by reading the remaining digits.

15,000,000	is read	fifteen **million**
2,500,000	is read	two **million,** five hundred thousand
1,258,300	is read	one **million,** two hundred fifty-eight thousand, three hundred

Example 2 Use words to write 12345678.

Solution Counting from the right, we place a comma every three digits.

12,345,678

Next we write the part of the number to the left of the millions comma.

twelve million

Since there are more digits to read, we place a comma after the word *million.* Then we write the part of the number up to the thousands comma.

twelve million, three hundred forty-five thousand

Since there are still more digits to read, we place a comma after the word *thousand* and write the rest of the number.

twelve million, three hundred forty-five thousand, six hundred seventy-eight

Example 3 Write 75,634 in expanded form.

Solution The 7 is in the ten-thousands place. It has a value of 70,000. So we write

70,000 + 5000 + 600 + 30 + 4

Example 4 Which digit in 12,345,678 is in the hundred-thousands place?

Solution The digit **3** is in the hundred-thousands place.

Example 5 Compare: 1,510,000 ○ 1,501,000

Solution We compare the numbers place-by-place, beginning with the greatest place value (millions).

1,510,000 > 1,501,000

LESSON PRACTICE

Practice set As a class, read aloud the following numbers:

a. 125,000

b. 435,000,000

c. 12,500

d. 25,375,000

e. 4875

f. 9,250,625

Use words to write the numbers in problems **g–j.**

g. 2750

h. 14,518

i. 16,000,000

j. 3,500,000

k. Write 5280 in expanded form.

l. Write 2040 in expanded form.

m. Which digit in 7,284,359 is in the ten-thousands place?

n. Which digit in 98,765,432 is in the millions place?

o. Compare: 2,760,000 ○ 2,670,000

p. Arrange these important years in aerospace history in chronological order (from earliest to latest):

1969, 1903, 1957, 1927

MIXED PRACTICE

Problem set

1. *(31)* When Keisha looked the first time, she saw 211 rabbits frolicking in the glen. When she looked the second time, there were 272 rabbits frolicking in the glen. How many more rabbits did Keisha see the second time? Write a subtraction pattern and solve the problem.

2. *(16, 33)* Write the number 3425 in expanded form. Then use words to write the number.

3. *(23)* Draw two parallel lines. Then draw a perpendicular line that makes right angles where it intersects the parallel lines.

4. *(Inv. 3, 31)* The square root of 49 is how much less than four squared?

5. *(Inv. 2, Inv. 3)* On 1-cm grid paper, outline a 2-cm-by-6-cm rectangle.

(a) What is the perimeter of the rectangle?

(b) What is the area of the rectangle?

6. *(33)* Place commas in 1250000. Then use words to write the number.

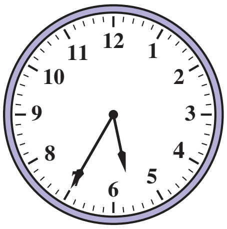
7. *(3)* What are the next four numbers in this counting sequence?

..., 230, 240, 250, 260, _____, _____, _____, _____, ...

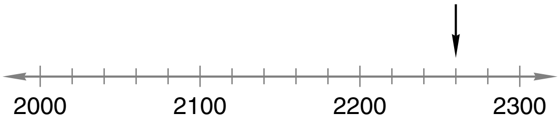
8. *(33)* Which digit in 123,456,789 is in the ten-millions place?

9. *(Inv. 1, Inv. 3)* Compare: $9 \times 4 \bigcirc \sqrt{36}$

10. *(27)* It is evening. What time will it be 2 hours and 25 minutes from now?



11. *(Inv. 1)* To what number is the arrow pointing?



Multiply:

12. *(29, Inv. 3)* (a) 5×8 (b) 4×4 (c) 8×8 (d) 12×12

13. *(29, 32)* (a) 9×3 (b) 9×4 (c) 9×5 (d) 9×0

14. *(6)* Write two addition facts and two subtraction facts using the numbers 40, 60, and 100.

15. *(27)* Change this addition problem to a multiplication problem:

$$20 + 20 + 20 + 20 + 20$$

16. *(30)*
$$\begin{array}{r} \$7.37 \\ -\ \$2.68 \\ \hline \end{array}$$

17. *(30)*
$$\begin{array}{r} 921 \\ -\ \ 58 \\ \hline \end{array}$$

18. *(13)*
$$\begin{array}{r} 464 \\ +\ 247 \\ \hline \end{array}$$

19. *(24)*
$$\begin{array}{r} 329 \\ +\ \ \ Z \\ \hline 547 \end{array}$$

20. *(22)*
$$\begin{array}{r} \$4.88 \\ +\ \$2.69 \\ \hline \end{array}$$

21. *(24)*
$$\begin{array}{r} 555 \\ -\ \ \ C \\ \hline 222 \end{array}$$

22. *(5)* Judy's birth date is 5/27/58. In which month was she born?

23. *(21)* Draw a circle with a radius of 1 inch. What is the diameter of the circle?

24. *(17)*
$$\begin{array}{r} 4 \\ 8 \\ 12 \\ 16 \\ 14 \\ 28 \\ +\ 37 \\ \hline \end{array}$$

25. *(17)*
$$\begin{array}{r} 5 \\ 8 \\ 7 \\ 14 \\ 6 \\ 21 \\ +\ 15 \\ \hline \end{array}$$

26. *(33)* Compare: 3,025,000 ◯ 3,250,000

27. *(Inv. 3)* Write the next four perfect squares in this sequence:

1, 4, 9, 16, 25, 36, ______, ______, ______, ______, …

LESSON

34

Writing Numbers Through Hundred Millions, Part 2

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Subtract numbers ending in one or two zeros:

a. 600 − 300 **b.** 65 − 30 **c.** 650 − 300

Review:

d. 58 + 4 + 100 **e.** 36 + 29 + 200 **f.** 520 + 36 + 126

Problem Solving:

Tom has seven coins in his right pocket. He does not have any dollar or half-dollar coins. Tom has at least one penny, one nickel, one dime, and one quarter, but he has no more than two coins of any type. Although Tom has an odd number of coins, their total value is an even number of cents. What is the total value of the coins?

NEW CONCEPT

In Lesson 33 we used words to write numbers through hundred millions. In this lesson we will use digits to write numbers through hundred millions.

Example 1 Use digits to write eight hundred ninety-five thousand, two hundred seventy.

Solution It is a good idea to read the entire number before we begin writing it. We see the word *thousand,* so we know to place a thousands comma after the digits that tell how many thousands.

__ __ __, __ __ __

We read the part of the number before the word *thousand* and write this number in front of the comma. For "eight hundred ninety-five thousand" we write

895, __ __ __

Now, to the right of the comma, we write the last part of the number, "two hundred seventy."

895,270

When writing numbers, we must always follow a comma with at least three digits. Sometimes it is necessary to use one or more zeros in order to get the correct number of digits after a comma.

Example 2 Use digits to write one hundred thirty-five million.

Solution We see the word *million,* so we use this form:

__ __ __, __ __ __, __ __ __

In front of the word *million,* we read "one hundred thirty-five," so we write

135, __ __ __, __ __ __

There is nothing written after the word *million*—no thousands, no hundreds, no tens, no ones. However, we need to have three digits after the millions comma and three digits after the thousands comma, so we write six zeros.

135,000,000

Example 3 Use digits to write seven thousand, twenty-five.

Solution For "seven thousand," we use this form:

7, __ __ __

After the word *thousand,* we read "twenty-five." It would not be correct to write

7,25 NOT CORRECT

We need to write three digits after the thousands comma because there are three whole-number places after the thousands place: hundreds, tens, and ones. Since there are no hundreds, we put a zero in the hundreds place.

7,025 CORRECT

Example 4 Use digits to write two million, three hundred thousand.

Solution We see the word *million,* so we use this form:

__ __ __, __ __ __, __ __ __

In front of the word *million,* we read "two," so we write

2, __ __ __, __ __ __

Next we read "three hundred thousand," so we write

2,300, __ __ __

Now we fill the three places after the thousands comma with zeros.

2,300,000

LESSON PRACTICE

Practice set* Use digits to write each number:

a. one hundred twenty-one thousand, three hundred forty

b. twelve thousand, five hundred seven

c. five thousand, seventy-five

d. twenty-five million

e. twelve million, five hundred thousand

f. two hundred eighty million

MIXED PRACTICE

Problem set

1. (31) Four hundred sixty-five is how much greater than twenty-four? Write a subtraction pattern and solve the problem.

2. (31) Marcie had four hundred twenty marbles. Robert had one hundred twenty-three marbles. How many fewer marbles did Robert have? Write a subtraction pattern and solve the problem.

3. (Inv. 2, Inv. 3) On 1-cm grid paper, outline a square that is 4 cm on each side.

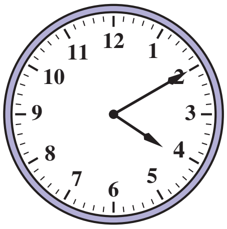
(a) What is the perimeter of the square?

(b) What is the area of the square?

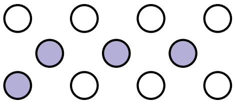
4. (16, 33) Write the number 25,463 in expanded form.

5. (21) Draw a circle that has a diameter of 4 centimeters. What is the radius of the circle?

6. (27) It is afternoon. What time will it be in four and a half hours?



7. (22) What fraction of the circles is shaded?



8. *(27, 29)* Change this addition problem to a multiplication problem. Then find the product.

$$8 + 8 + 8 + 8 + 8$$

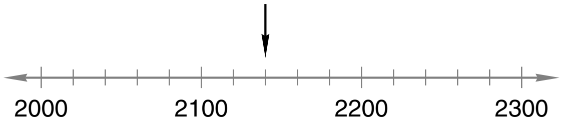
9. *(20)* Round 76 to the nearest ten. Round 59 to the nearest ten. Then add the rounded numbers.

10. *(Inv. 1, 34)* Compare:

(a) 3 ◯ −4

(b) two million ◯ 200,000

11. *(Inv. 1)* To what number is the arrow pointing?



Multiply:

12. *(29, Inv. 3)* (a) 5×7 (b) 6×6 (c) 9×9 (d) 10×10

13. *(29, 32)* (a) 3×9 (b) 9×7 (c) 8×9 (d) 9×1

14. *(33)* Use words to write 3,500,000.

15. *(34)* Use digits to write seven hundred fifty thousand.

16. *(30)*
$$\begin{array}{r} 535 \\ -\ 268 \\ \hline \end{array}$$

17. *(30)*
$$\begin{array}{r} 908 \\ -\ \ 43 \\ \hline \end{array}$$

18. *(30)*
$$\begin{array}{r} \$471 \\ -\ \$346 \\ \hline \end{array}$$

19. *(24)* $C + 329 = 715$

20. *(24)* $C - 127 = 398$

21. *(21)* If the radius of a circle is 12 inches, then the diameter of the circle is how many feet?

22. *(Inv. 3, 31)* Five squared is how much more than $5 + 5$?

23. *(6, 10)* Select two odd numbers and one even number that form an addition/subtraction fact family. Then use the numbers to write two addition facts and two subtraction facts.

24. *(Inv. 3)* $\sqrt{9} + \sqrt{16}$

25. (23) Draw a triangle that has one obtuse angle.

26. (33) Which digit in 3,756,289 is in the thousands place?

A. 3 B. 7 C. 5 D. 6

27. (33) In the year 2000 the four most populous U.S. states and their populations were:

California	33,871,648
Florida	15,982,378
New York	18,976,457
Texas	20,851,820

These states are listed in alphabetical order. Arrange the list on your paper so that the states and their populations are in order of population, beginning with the greatest population.

LESSON 35

Naming Mixed Numbers • Two Forms of Money

WARM-UP

Facts Practice: Multiplication Facts: 0's, 1's, 2's, 5's (Test C)

Mental Math:

Subtract numbers ending in one or two zeros:

a. 750 − 200 **b.** 86 − 50 **c.** 245 − 200

Review:

d. 78 + 7 + 10 **e.** 43 + 9 + 110 **f.** 630 + 45 + 210

Patterns:

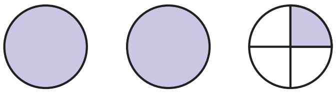
The pattern of the sequence below is 1 × 1, 2 × 2, 3 × 3, …. Use a multiplication table to help you continue this sequence of square numbers up to 100.

1, 4, 9, 16, ___, ___, ___, ___, ___, 100

NEW CONCEPTS

Naming mixed numbers A **mixed number** is a whole number combined with a fraction. The mixed number $3\frac{1}{2}$ is read "three and one half."

Example 1 How many circles are shaded?



Solution Two whole circles are shaded, and one fourth of another circle is shaded. The total number of shaded circles is two and one fourth, which we write as

$$\mathbf{2\frac{1}{4}}$$

Example 2 Use words to write $21\frac{1}{2}$.

Solution We use the word *and* when naming mixed numbers.

twenty-one and one half

Example 3 Use words to write $7\frac{21}{100}$.

Solution **seven and twenty-one hundredths**

Two forms of money

We can show amounts of money by using a number and a cent sign (¢). We put a cent sign behind a number to tell how many cents there are.

324¢ 20¢ 4¢

We can also use a dollar sign ($) to show amounts of money. We put the dollar sign in front of the money amount, and we use a decimal point and two places to the right of the decimal point to show the number of cents. The money amounts below are the same as the ones above, but they are expressed with a dollar sign and decimal point rather than a cent sign.

$3.24 $0.20 $0.04

Example 4 Write fifteen dollars and twenty-five cents using a dollar sign.

Solution When we use a dollar sign and need to show cents, we put a decimal point between dollars and cents.

$15.25

Example 5 Use words to write $30.76.

Solution We write the number of dollars, then "and," and then the number of cents.

thirty dollars and seventy-six cents

Example 6 Use a dollar sign and decimal point to write seven cents.

Solution To show cents with a dollar sign, we use a decimal point and two places to the right of the decimal point. For seven cents, we have only one digit, so we put a zero between the seven and the decimal point. The dollar sign goes in front of the decimal point.

$.07

We usually write another zero in front of the decimal point to show that there are no dollars.

$0.07

Example 7 Gracie has one quarter, one dime, and one nickel. Write how much money she has using a cent sign. Then write the same amount using a dollar sign and decimal point.

Solution First we find how many cents Gracie has. A quarter is twenty-five cents, a dime is ten cents, and a nickel is five cents.

25¢ + 10¢ + 5¢ = **40¢**

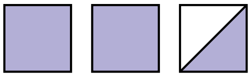
Now we write forty cents using a dollar sign and decimal point.

$0.40

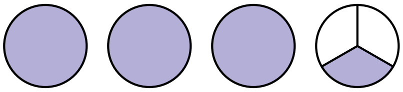
LESSON PRACTICE

Practice set What mixed numbers are illustrated by the shaded pictures?

a.



b.



Use words to write each mixed number:

c. $12\frac{3}{4}$

d. $2\frac{7}{10}$

e. $6\frac{9}{100}$

Write each amount with a cent sign instead of a dollar sign:

f. $0.17

g. $0.05

Write each amount with a dollar sign instead of a cent sign:

h. 8¢

i. 30¢

j. Write the value of two quarters, two dimes, and one nickel with a dollar sign. Then use a cent sign to write this amount again.

Use words to write each amount of money:

k. $12.25

l. $20.05

MIXED PRACTICE

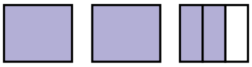
Problem set

1. *(31)* The king saw two hundred seventy peasants. The queen saw one hundred fifty-five peasants. How many more peasants did the king see? Write a subtraction pattern and solve the problem.

2. *(Inv. 2)* Every morning Mario runs around the block. The block is 300 yards long and 100 yards wide. How many yards does Mario run when he runs around the block?

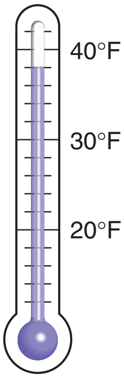
3. *(1, 17)* Ninety-seven oranges were in the first bunch, fifty-seven oranges were in the second bunch, and forty-eight oranges were in the third bunch. How many oranges were in all three bunches?

4. *(35)* What mixed number is pictured in this figure?

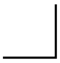


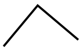
5. *(35)* Jimbo had four dollars and sixty-five cents. Use a dollar sign and a decimal point to write this amount. Then write this amount using a cent sign.

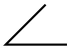
6. *(18)* What temperature is shown on this thermometer?

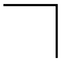


7. *(23)* Which of these angles does not look like a right angle?

A. 

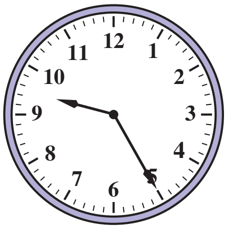
B. 

C. 

D. 

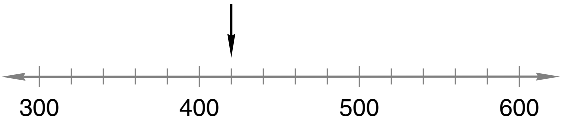
8. *(Inv. 3, 31)* The square root of 81 is how much less than seven squared?

9. *(27)* It is evening. What time will it be 2 hours and 20 minutes from now?



10. *(35)* Use words to write $2\frac{3}{10}$.

11. *(Inv. 1)* To what number is the arrow pointing?



12. Use words to write \$1.43.
(35)

Multiply:

13. (a) 6×9 (b) 4×9 (c) 3×9 (d) 10×9
(32)

14. (a) 6×6 (b) 7×7 (c) 8×8 (d) 1×1
(Inv. 3)

15. $\sqrt{25} - \sqrt{16}$
(Inv. 3)

16. Draw a rectangle that is 3 cm long and 3 cm wide. Divide the rectangle into thirds and shade $\frac{2}{3}$ of it.
(21, 26)

17. *(30)*
$$\begin{array}{r} \$6.05 \\ -\ \$2.53 \\ \hline \end{array}$$

18. *(24)*
$$\begin{array}{r} 489 \\ +\ \ Z \\ \hline 766 \end{array}$$

19. *(22)*
$$\begin{array}{r} \$5.32 \\ +\ \$3.44 \\ \hline \end{array}$$

20. *(24)*
$$\begin{array}{r} C \\ +\ 294 \\ \hline 870 \end{array}$$

21. *(30)*
$$\begin{array}{r} 423 \\ -\ 245 \\ \hline \end{array}$$

22. *(24)*
$$\begin{array}{r} 670 \\ -\ \ Z \\ \hline 352 \end{array}$$

23. Use digits to write two hundred fifty million.
(34)

24. What are the next three numbers in this counting sequence?
(3)

…, 3400, 3500, 3600, 3700, _____, _____, _____, …

25. (a) Round 77 to the nearest ten.
(20)
(b) Round \$6.82 to the nearest dollar.

26. If $7 + \square = 10$, then which of the following equals $7 - \square$?
(1, 6)

A. 3 B. 4 C. 7 D. 10

27. Compare:
(33, 35)
(a) thirty thousand ○ 13,000
(b) 74¢ ○ \$0.74

LESSON

36 Fractions of a Dollar

WARM-UP

Facts Practice: Multiplication Facts: 0's, 1's, 2's, 5's (Test C)

Mental Math:

Subtract numbers ending in one or two zeros:

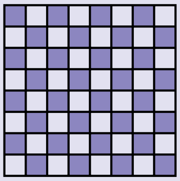
a. 840 − 200 **b.** 840 − 20 **c.** 845 − 220

Review:

d. 75 + 7 + 200 **e.** 36 + 39 + 10 **f.** 300 + 620 + 50

Problem Solving:

A checkerboard has 64 small squares. There are 8 squares along each side. If a square checkerboard had only 36 small squares, then how many squares would there be along each side?



NEW CONCEPT

Since Lesson 22 we have used coins as fractions of a dollar. Because 100 pennies equals one dollar, each penny is $\frac{1}{100}$ of a dollar. Likewise, since 20 nickels equals a dollar, each nickel is $\frac{1}{20}$ of a dollar. So we may describe part of a dollar by using a fraction or by using a dollar sign and decimal point.

Example 1 (a) Three pennies are what fraction of a dollar?

(b) Write the value of three pennies using a dollar sign and a decimal point.

Solution (a) One penny is $\frac{1}{100}$ of a dollar, so three pennies are $\mathbf{\frac{3}{100}}$ of a dollar.

(b) The value of three pennies can also be written as **$0.03.**

Example 2 (a) Which coin equals one fourth of a dollar?

(b) Write $\frac{1}{4}$ of a dollar using a dollar sign and a decimal point.

Solution (a) Since four quarters equal a dollar, a **quarter** is one fourth of a dollar. (The term *one quarter* means "one fourth.")

(b) A quarter of a dollar is **$0.25.**

Example 3 (a) Three dimes are what fraction of a dollar?

(b) Write the value of three dimes using a dollar sign and a decimal point.

Solution (a) Each dime is $\frac{1}{10}$ of a dollar, so three dimes are $\mathbf{\frac{3}{10}}$ of a dollar.

(b) The value of three dimes is 30 cents, which we can write as **$0.30.** So $\frac{3}{10}$ of a dollar is $0.30.

Example 4 Compare: $\frac{1}{20}$ of a dollar ○ $\frac{1}{2}$ of a dollar

Solution A nickel is $\frac{1}{20}$ of a dollar and is less than $\frac{1}{2}$ of a dollar.

$$\mathbf{\frac{1}{20} \text{ of a dollar} < \frac{1}{2} \text{ of a dollar}}$$

LESSON PRACTICE

Practice set **a.** Write the value of three quarters using a dollar sign and a decimal point. Then write three quarters as a fraction of a dollar.

b. What fraction of a dollar is three nickels? Write the value of three nickels using a dollar sign and a decimal point.

c. Fifty pennies are what fraction of a dollar? Write the value of 50 pennies using a dollar sign and a decimal point.

d. Compare: $\frac{1}{10}$ of a dollar ○ $\frac{1}{4}$ of a dollar

e. Compare: $\frac{1}{2}$ of a dollar ○ $0.25

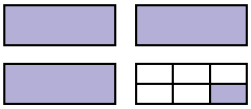
MIXED PRACTICE

Problem set **1.** *(31)* Quinh is 49 inches tall. His dad is 70 inches tall. Quinh is how many inches shorter than his dad?

2. *(25)* Smith went into the store with $36.49. He bought a book and left the store with $11.80. How much money did Smith spend in the store?

3. (25) Beth answered eleven of the twenty-five questions at school. She answered the rest of the questions as homework. How many questions did Beth answer as homework?

4. (35) Write the number of shaded rectangles shown as a mixed number.



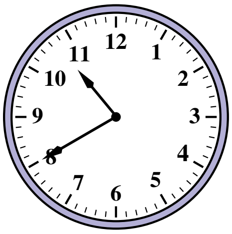
5. (23) Which letter below has no right angles?

T H E N

6. (33) Use words to write 2,700,000.

7. (34) Use digits to write eighty-two thousand, five hundred.

8. (27) It is morning. What time will it be 5 hours and 20 minutes from now?



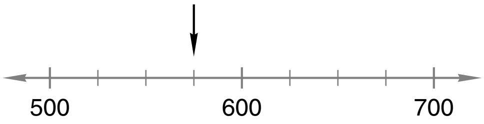
9. (27) Change this addition problem to a multiplication problem:

$$4 + 4 + 4 + 4 + 4 + 4 + 4 + 4$$

10. (20) (a) Round 176 to the nearest ten.

(b) Round $17.60 to the nearest dollar.

11. (Inv. 1) To what number is the arrow pointing?



Multiply:

12. (29) (a) 2 × 8 (b) 5 × 6 (c) 4 × 5

13. (Inv. 3) (a) 3 × 3 (b) 5 × 5 (c) 9 × 9

14. (32) (a) 9 × 7 (b) 9 × 4 (c) 9 × 8

15. *(Inv. 3)* $\sqrt{36} + \sqrt{49}$

16. *(30)* $\begin{array}{r} \$7.32 \\ -\ \$3.45 \\ \hline \end{array}$

17. *(22)* $\begin{array}{r} \$4.89 \\ +\ \$2.57 \\ \hline \end{array}$

18. *(30)* $\begin{array}{r} 464 \\ -\ 238 \\ \hline \end{array}$

19. *(13)* $\begin{array}{r} 548 \\ +\ 999 \\ \hline \end{array}$

20. *(24)* $\begin{array}{r} 487 \\ +\quad Z \\ \hline 721 \end{array}$

21. *(24)* $\begin{array}{r} 250 \\ -\quad C \\ \hline 122 \end{array}$

22. *(24)* $C - 338 = 238$

23. *(24)* $87 - B = 54$

24. *(33)* Which digit in 8,367,254 is in the ten-thousands place?

25. *(36)* (a) Seven dimes are what fraction of a dollar?

(b) Write the value of seven dimes using a dollar sign and a decimal point.

26. *(Inv. 3)* If a rectangle is 5 in. long and 4 in. wide, then its area is

A. 9 in. B. 18 in. C. 20 sq. in. D. 18 sq. in.

27. *(Inv. 1, 36)* Compare:

(a) –12 ○ –21

(b) $\frac{1}{4}$ of a dollar ○ \$0.25

LESSON

37 Reading Fractions and Mixed Numbers from a Number Line

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, Squares (Test D)

Mental Math:

Subtract numbers ending in one or two zeros:

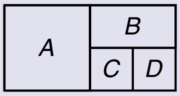
a. 780 − 200 **b.** 870 − 230 **c.** 458 − 30

Review:

d. 58 + 6 **e.** 157 + 19 **f.** 435 + 35 + 200

Problem Solving:

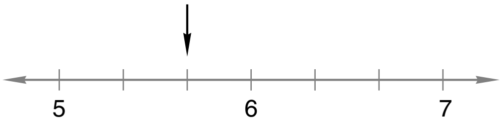
The rectangle shown is divided into four areas, *A, B, C,* and *D.* Area *C* is the same size as Area *D.* Areas *C* and *D* together are the same size as Area *B.* Areas *B, C,* and *D* together are the same size as Area *A.* What fraction of the whole rectangle is each area?



NEW CONCEPT

To name mixed numbers on a number line, we first count the number of **segments** between consecutive whole numbers. If there are four segments between the whole numbers, each segment equals $\frac{1}{4}$. If there are six segments between the whole numbers, each segment equals $\frac{1}{6}$.

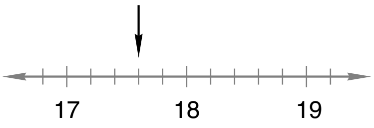
Example 1 To what number is the arrow pointing?



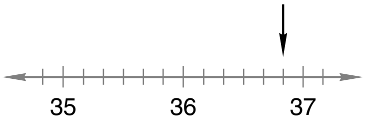
Solution There are three segments between 5 and 6. Each segment equals $\frac{1}{3}$. The arrow points to $\mathbf{5\frac{2}{3}}$.

Example 2 To what number is each arrow pointing?

(a)



(b)

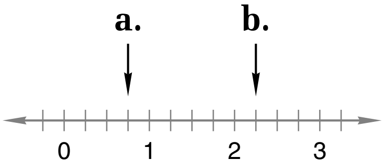


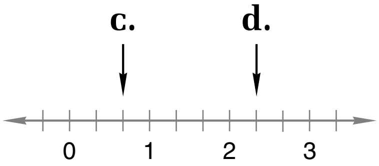
Solution (a) There are five segments between 17 and 18. Each segment equals $\frac{1}{5}$. The arrow points to $\mathbf{17\frac{3}{5}}$.

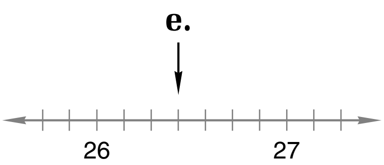
(b) There are six segments between 36 and 37. Each segment equals $\frac{1}{6}$. The arrow points to $\mathbf{36\frac{5}{6}}$.

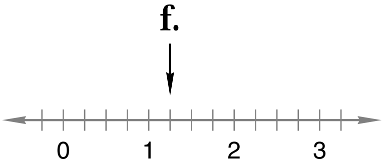
LESSON PRACTICE

Practice set* Name each fraction or mixed number marked by the arrows below:









MIXED PRACTICE

Problem set

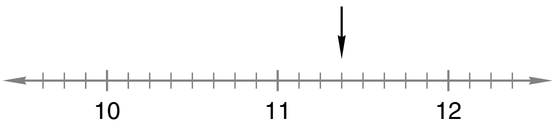
1. (31) On the way to school Ted saw four hundred twenty-seven petunia blossoms. Karen saw seven hundred fifteen petunia blossoms. How many more petunia blossoms did Karen see?

2. (11, 24) Circe had two hundred seventy-five pigs. After Odysseus arrived, Circe had two hundred ninety-seven pigs. How many more pigs did Circe have after Odysseus arrived?

3. (33, 34) Use digits to write four hundred seventy-five thousand, three hundred forty-two. Then circle the digit in the ten-thousands place.

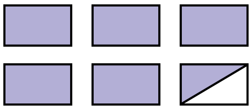
4. (Inv. 3) Hilda wants to put square floor tiles that measure one foot on each side in a room that is 9 feet long and 9 feet wide. How many floor tiles will Hilda need?

5. (37) To what mixed number is the arrow pointing?



6. *(Inv. 2, 21)* Draw a rectangle whose length is 5 cm and whose width is 3 cm. What is the perimeter of the rectangle?

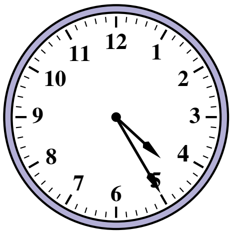
7. *(35)* What mixed number is shown by the shaded rectangles?



8. *(35)* Use words to write $12\frac{3}{10}$.

9. *(16, 33)* Write 7026 in expanded form. Then use words to write the number.

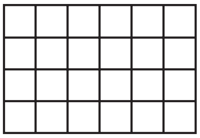
10. *(27)* It is early morning. What time will it be 2 hours and 35 minutes from now?



11. *(36)* (a) Three quarters are what fraction of a dollar?

(b) Write the value of three quarters using a dollar sign and a decimal point.

12. *(Inv. 3)* What multiplication fact is illustrated by this rectangle?



Multiply:

13. *(29, 32)* (a) 9×6 (b) 9×5 (c) 9×0

14. *(Inv. 3)* (a) 10×10 (b) 7×7 (c) 8×8

15. *(29)* (a) 5×7 (b) 6×5 (c) 2×8

16. *(Inv. 3)* $\sqrt{81} + \sqrt{49}$

17. *(30)* $6.63 − $3.55

18. *(22)* $4.99 + $2.88

19. *(24)* $A - 247 = 321$

20. *(24)* $Z + 296 = 531$

21. *(24)* $523 - Z = 145$

22. *(17)* $28 + 46 + 48 + 64 + 32 + 344$

23. *(3)* What are the next three numbers in this counting sequence?

…, 450, 460, 470, 480, _____, _____, _____, …

24. *(Inv. 2, 21)* If the diameter of a circle is one foot, then the radius of the circle is how many inches?

25. *(33, 36)* Compare:

(a) $\frac{1}{4}$ of a dollar ○ $\frac{1}{2}$ of a dollar

(b) 101,010 ○ 110,000

26. *(Inv. 2)* One yard does not equal which of the following?

A. 36 in.
B. 3 ft
C. 1 m
D. 2 ft + 12 in.

27. *(33)* In the year 2000 the four least populous U.S. states and their populations were:

Alaska	626,932
North Dakota	642,200
Vermont	608,827
Wyoming	493,782

Arrange these states and their populations in order of the size of the population, beginning with the smallest population.

LESSON
38
Multiplication Facts (Memory Group)

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, Squares (Test D)

Mental Math:

Add dollars to another amount of money:

a. \$3.45 + \$1.00
b. \$5.75 + \$2.00
c. \$0.85 + \$2.00

Review:

d. 365 − 120
e. 45 + 8 + 120
f. 56 + 19 + 200

Problem Solving:

We can make a dollar with two coins—two half-dollars. We can make a dollar with three coins—a half-dollar and two quarters. We can make a dollar with four coins—four quarters. What coins do we need to make a dollar with five coins?

NEW CONCEPT

There are only ten multiplication facts from 0 × 0 through 9 × 9 that we have not practiced. We call these facts the **memory group.**

$3 \times 4 = 12$
$3 \times 6 = 18$
$3 \times 7 = 21$
$3 \times 8 = 24$
$4 \times 6 = 24$
$4 \times 7 = 28$
$4 \times 8 = 32$
$6 \times 7 = 42$
$6 \times 8 = 48$
$7 \times 8 = 56$

Multiplication facts should be practiced by doing **timed, written tests** on a daily basis. A suggested goal is to complete a 100-fact written test in 4 minutes with no more than three errors. You should continue to practice often in order to memorize the facts.

LESSON PRACTICE

Practice set Brainstorm ways to recall the ten memory-group facts. Then take Test F (Multiplication Facts: Memory Group).

MIXED PRACTICE

Problem set

1. (31) There were two hundred twenty toys in the first pile. There were four hundred five toys in the second pile. How many more toys were in the second pile?

2. (34) Five hundred seventy-five thousand, five hundred forty-two people lived in the city. Use digits to write that number of people.

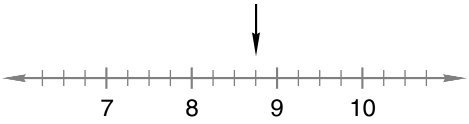
3. (16, 33) Write 2503 in expanded form. Then use words to write the number.

4. (Inv. 2, Inv. 3) On 1-cm grid paper, draw a rectangle 6 cm long and 4 cm wide.

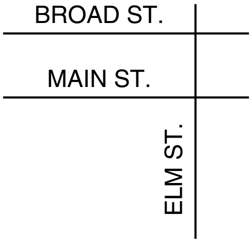
(a) What is the perimeter of the rectangle?

(b) What is the area of the rectangle?

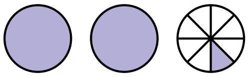
5. (37) To what mixed number is the arrow pointing?



6. (23) Which street is parallel to Broad Street?



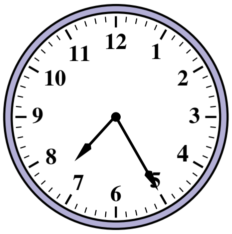
7. (35) What mixed number is shown by the shaded circles?



8. (20) (a) Round 624 to the nearest ten.

(b) Round $6.24 to the nearest dollar.

9. (27) It is morning. What time will it be 5 hours and 15 minutes from now?

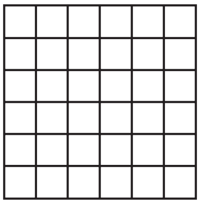


10. (36) (a) A fifty-cent coin is what fraction of a dollar?

(b) Write the value of a fifty-cent coin using a dollar sign and a decimal point.

11. *(35)* Use words to write $2\frac{11}{100}$.

12. *(Inv. 3)* This square illustrates six squared. What multiplication fact is illustrated by the square?



Multiply:

13. *(38)* (a) 3×4 (b) 3×6 (c) 3×8

14. *(38)* (a) 4×6 (b) 4×7 (c) 4×8

15. *(38)* (a) 6×7 (b) 6×8 (c) 7×8

16. *(36)* Compare: $\frac{1}{10}$ of a dollar ◯ $\frac{1}{2}$ of a dollar

17. *(30)* $\begin{array}{r} \$7.23 \\ -\ \$2.54 \\ \hline \end{array}$

18. *(22)* $\begin{array}{r} \$5.42 \\ +\ \$2.69 \\ \hline \end{array}$

19. *(30)* $\begin{array}{r} 943 \\ -\ 276 \\ \hline \end{array}$

20. *(24)* $Z - 581 = 222$

21. *(24)* $C + 843 = 960$

22. *(Inv. 2, 21)* If the radius of a circle is 100 cm, then the diameter of the circle is how many meters?

23. *(17, Inv. 3)* $28 + 36 + 78 + \sqrt{49}$

24. *(17)* $\begin{array}{r} 14 \\ 18 \\ 6 \\ 4 \\ 18 \\ +\ 15 \\ \hline \end{array}$

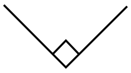
25. *(17)* $\begin{array}{r} 29 \\ 5 \\ 13 \\ 27 \\ 63 \\ +\ 76 \\ \hline \end{array}$

26. *(33)* Which digit in 457,326,180 is in the hundred-thousands place?

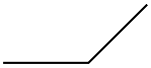
A. 1 B. 6 C. 4 D. 3

27. *(23)* Describe each angle as *acute, right,* or *obtuse:*

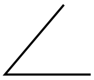
(a)



(b)



(c)



LESSON

39

Reading an Inch Scale to the Nearest Fourth

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, 9's, Squares (Test E)

Mental Math:

To add 99¢ or 98¢ or 95¢ to another amount of money, add a dollar; then subtract 1¢ or 2¢ or 5¢.

a. \$3.45 + \$0.99 **b.** \$5.75 + \$0.98 **c.** \$0.85 + \$0.95

Review:

d. 438 − 20 **e.** 58 + 6 + 200 **f.** 78 + 9 + 300

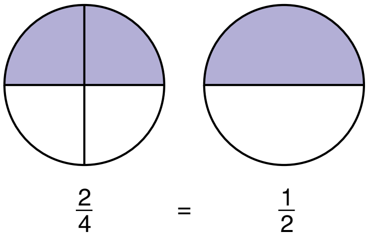
Problem Solving:

Cantara's mom cut an orange in half. Then she cut each half in half. Cantara ate three of the orange slices. What fraction of the orange did Cantara eat?

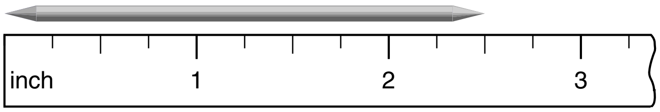
NEW CONCEPT

To measure lengths in inches, we use an inch scale. Inch scales are found on rulers and on tape measures. An inch scale often has tick marks between the inch marks. These tick marks let us read the inch scale to the nearest half inch, quarter inch, or eighth inch. In this lesson we will practice reading to the nearest quarter inch. Remember, one quarter inch is the same as one fourth inch.

When reading inch scales, keep in mind that $\frac{2}{4}$ equals $\frac{1}{2}$. The two circles below show this equivalence. You can recall this relationship by remembering that two quarters equal half of a dollar.



Example How long is the toothpick to the nearest quarter inch?



Solution The toothpick is 2 inches plus a fraction. It is closest to $2\frac{2}{4}$ inches. Instead of writing $\frac{2}{4}$, we write $\frac{1}{2}$. So the toothpick is $2\frac{1}{2}$ inches long. We abbreviate this length as $\mathbf{2\frac{1}{2}}$ **in.**

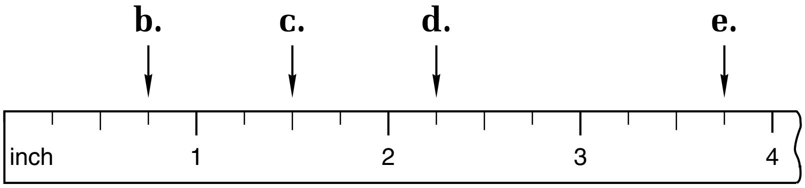
Now use your own inch ruler to measure the drawing of the toothpick.

LESSON PRACTICE

Practice set

a. Draw a picture that shows that $\frac{2}{4}$ equals $\frac{1}{2}$.

Name each point marked by an arrow on this inch scale:



f. Measure the length and width of your notebook paper.

MIXED PRACTICE

Problem set

1. *(31)* Ann is twelve years old. Ann's mother is thirty-five years old. Ann's mother is how many years older than Ann?

2. *(34)* Four hundred sixty-eight thousand, five hundred two boxes were in the warehouse. Use digits to write that number of boxes.

3. *(16, 33)* Write the number 3905 in expanded form. Then use words to write the number.

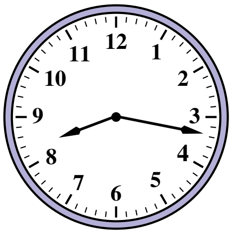
4. *(1, 10)* Tyrone smashed two hundred forty-three soda pop cans with his right foot and smashed three hundred sixty-four soda pop cans with his left foot. Was the total number of smashed cans an even number or an odd number?

5. *(35)* Use words to write $100\frac{1}{100}$.

6. *(Inv. 1)* Use digits and symbols to show that negative nineteen is greater than negative ninety.

7. *(35)* Use a dollar sign and a decimal point to write the value of two dollars, one quarter, two dimes, and three nickels.

8. *(27)* It is morning. What time will it be 10 minutes from now?

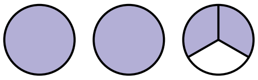


9. *(36)* (a) Nine dimes are what fraction of a dollar?

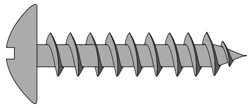
(b) Write the value of nine dimes using a dollar sign and a decimal point.

10. *(Inv. 2)* Brad lives about 1 kilometer from school. One kilometer is how many meters?

11. *(35)* How many of these circles are shaded?



12. *(39)* Use a ruler to find the length of this screw to the nearest quarter inch:



Multiply:

13. *(38)* (a) 4×3 (b) 8×3 (c) 8×4

14. *(38)* (a) 6×3 (b) 6×4 (c) 7×6

15. *(38)* (a) 7×3 (b) 7×4 (c) 8×6

16. *(Inv. 3)* $\sqrt{64} - \sqrt{36}$

17. *(22)* $\begin{array}{r} \$4.86 \\ + \ \$2.47 \\ \hline \end{array}$

18. *(30)* $\begin{array}{r} \$4.86 \\ - \ \$2.47 \\ \hline \end{array}$

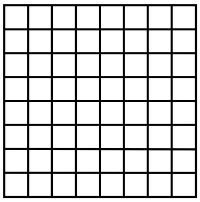
19. *(13)* $\begin{array}{r} 293 \\ + \ 678 \\ \hline \end{array}$

20. *(30)* $\begin{array}{r} 893 \\ - \ 678 \\ \hline \end{array}$

21. *(24)* $\begin{array}{r} 463 \\ - \quad Y \\ \hline 411 \end{array}$

22. *(24)* $\begin{array}{r} 463 \\ + \quad Q \\ \hline 527 \end{array}$

23. *(Inv. 3)* This rectangle illustrates eight squared. What multiplication fact is illustrated by the rectangle?



24. Write the next three numbers in this counting sequence:
(3)

…, 470, 480, 490, 500, _____, _____, _____, …

25. Draw a triangle that has three acute angles.
(23)

26. Which of these does not equal 9 + 9?
(27, Inv. 3, 38)

A. 2 × 9
B. 9 × 2
C. 3 × 6
D. nine squared

27. A realtor was writing an advertisement about houses for sale in town. The realtor wanted to list the houses in order from most expensive to least expensive. Here is a list of the asking prices of five houses. Arrange the prices from most expensive to least expensive.
(33)

$385,900
$189,000
$1,280,000
$476,000
$299,000

LESSON

40 Capacity

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, Squares (Test D)

Mental Math:

Practice adding 99¢, 98¢, or 95¢ to money amounts:

a. \$5.85 + \$0.99 **b.** \$8.63 + \$0.98 **c.** \$4.98 + \$0.95

Review:

d. 574 − 200 **e.** 77 + 6 + 110 **f.** 460 + 300 + 24

Problem Solving:

The two hands of a clock are together at noon. The next time the hands of a clock are together is about how many minutes later?

NEW CONCEPT

Liquids such as milk, juice, paint, and gasoline are measured in the U.S. Customary System in **fluid ounces, cups, pints, quarts,** or **gallons.** This table shows the abbreviations for each of these units:

ABBREVIATIONS FOR
U.S. LIQUID MEASURES

fluid ounce	fl oz
cup	c
pint	pt
quart	qt
gallon	gal

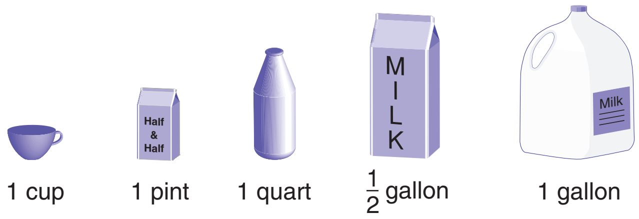
The quantity of liquid a container can hold is the **capacity** of the container.

Activity: *Measuring Capacity*

Materials needed:

- empty, clean plastic or paper containers of the following sizes (with labels that show the container's size): 1 gallon, 1 half gallon, 1 quart, 1 pint, 1 cup, and 1 liter (or 2 liters)
- supply of water
- funnel

Place five liquid containers (gallon, half gallon, quart, pint, and cup) on a table or desk. Arrange the containers in order from smallest to largest.



Have students estimate the number of cups of liquid needed to fill a 1-pint container. Then have them estimate the number of pints needed to fill the 1-quart container, and so on. After students estimate, fill each container with water using the next-smaller container. Answer the following questions:

a. How many cups of liquid equal a pint?

b. How many pints of liquid equal a quart?

c. How many quarts of liquid equal a half gallon?

d. How many half gallons of liquid equal a gallon?

e. How many quarters equal a dollar?

f. How many quarts of liquid equal a gallon?

g. Copy and complete this table of U.S. Customary liquid measures. Notice that 8 fluid ounces equals 1 cup.

U.S. LIQUID MEASURE

8 fl oz = 1 c
__ c = 1 pt
__ pt = 1 qt
__ qt = 1 gal

Liquids are also measured in **liters** (abbreviation, L). A liter is a metric unit of measure. Compare a one-liter container to a one-quart container (or compare a two-liter container to a half-gallon container). Which container looks larger? Use a full liter (or two-liter) container to fill a quart (or half-gallon) container. Then complete these comparisons:

h. Compare: 1 quart ○ 1 liter

i. Compare: $\frac{1}{2}$ gallon ○ 2 liters

To measure small amounts of liquid, we may use **milliliters** (mL). Droppers used for liquid medicine usually hold one or two milliliters of liquid. One thousand milliliters equals one liter.

METRIC LIQUID MEASURE

1000 mL = 1 L

j. A full 2-liter bottle of liquid contains how many milliliters of liquid?

Inspect the labels of the liquid containers used in the activity. Liquid containers often list two measures of the quantity of liquid the containers hold. For example, the label on a one-gallon milk bottle may read

1 gal (3.78 L)

The measure 3.78 L means $3\frac{78}{100}$ liters. The number 3.78 is a **decimal number.** Decimal numbers are often used in measurement, especially in metric measurement. The number 3.78 has a whole-number part, the 3, and a fraction part, the .78. So 3.78 L means "more than three liters but a little less than four liters," just as $3.78 means "more than three dollars but not quite four dollars." We read 3.78 as "three and seventy-eight hundredths." We will learn more about decimal numbers in Investigation 4.

MIXED PRACTICE

Problem set

1. (31) A group of quail is called a *covey.* A group of cows is called a *herd.* A group of fish is called a *school.* There are twenty-five fish in the small school. There are one hundred twelve fish in the big school. How many fewer fish are in the small school?

2. (25) A 36-inch yardstick was divided into two pieces. One piece was 12 inches long. How many inches long was the other piece?

3. (1, 17) Mrs. Green mailed forty-seven postcards from Paris. Her husband mailed sixty-two postcards from Paris. Her son mailed seventy-five postcards from Paris. In all, how many postcards did the Greens mail from Paris?

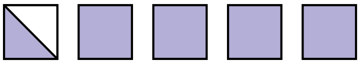
4. *(16, 33)* Write the number 7,500,000 in expanded form. Then use words to write the number.

5. *(33)* Which digit in 27,384,509 is in the thousands place?

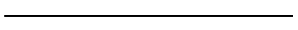
6. *(35)* Use a dollar sign and a decimal point to write the value of three dollars, two quarters, one dime, and two nickels. Then write that amount of money using words.

7. *(40)* A gallon of milk is how many quarts of milk?

8. *(35)* How many squares are shaded?



9. *(39)* Use a ruler to find the length of the line segment below to the nearest quarter inch.



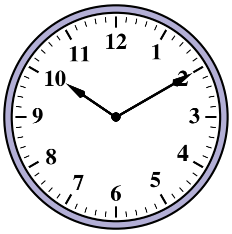
10. *(40)* Printed on the label of the milk container were these words and numbers:

1 gal (3.78 L)

Use this information to compare the following:

1 gallon ○ 3 liters

11. *(27)* It is evening. What time will it be 1 hour and 50 minutes from now?



12. *(23)* In problem 11 what type of angle is formed by the hands of the clock?

A. acute B. right C. obtuse

13. *(Inv. 1, 36)* Compare:

(a) −29 ○ −32 (b) \$0.75 ○ $\frac{3}{4}$ of a dollar

14. *(21)* Draw a circle with a diameter of 2 centimeters. What is the radius of the circle?

Multiply:

15. (a) 6 × 6 (b) 7 × 7 (c) 8 × 8
(Inv. 3)

16. (a) 7 × 9 (b) 6 × 9 (c) 9 × 9
(32)

17. (a) 7 × 8 (b) 6 × 7 (c) 8 × 4
(38)

18. \$4.98 + \$7.65
(22)

19. $M - \$6.70 = \$3.30$
(24)

20. $416 - Z = 179$
(24)

21. $536 + Z = 721$
(24)

22. $\sqrt{1} + \sqrt{4} + \sqrt{9}$
(Inv. 3)

23. Draw an array of X's to show 3 × 7.
(Inv. 3)

24. Use words to write $10\frac{1}{10}$.
(35)

25. (a) Two quarters are what fraction of a dollar?
(36)
(b) Write the value of two quarters using a dollar sign and a decimal point.

26. A rectangle has an area of 24 square inches. Which of these could be the length and width of the rectangle?
(Inv. 3)

A. 6 in. by 6 in.
B. 12 in. by 12 in.
C. 8 in. by 4 in.
D. 8 in. by 3 in.

27. Robert measured the width of his notebook paper and said that the paper was $8\frac{2}{4}$ inches wide. What is another way to write $8\frac{2}{4}$?
(39)

INVESTIGATION 4

Focus on

Decimal Numbers

Note: This investigation is divided into three parts. Plan on taking more than one class period to cover this investigation.

Part 1 Activity: *Using Money Manipulatives and a Calculator to Display Decimal Numbers*

Materials needed:

- Activity Masters 7 and 8 (1 copy of each master per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- $1-bill manipulatives (cut and used in Lesson 4) for each student
- calculator for each student or group of students
- overhead calculator
- zip-top plastic bags to store manipulatives

Preparation:

Use a paper cutter to separate the dime and penny manipulatives on Activity Masters 7 and 8. Distribute manipulatives.

Mr. Deci wants to have some work done around the house and is willing to pay his children to do the work. Mr. Deci uses only $1 bills, dimes, and pennies, and he always makes payments starting with the largest denomination and moving to the lowest denomination.

Todd and Jessie are paid $5 for washing the car. They share the money equally.

1. Using money manipulatives, divide $5 into two equal parts. (You will need to use some dimes.)

2. How much money does each child receive?

3. How many dollars, dimes, and pennies does each receive?

4. Use words to name the amount of money each receives.

Using arithmetic we can split $5 into two equal parts by dividing $5 by 2. We will use a calculator to perform the division. First we press C to clear the calculator. Since there is no dollar sign on a calculator, we enter $5 by just pressing 5, and we keep in mind that we are working with dollars. Next we press the division key, which looks like this: ÷. Then we press 2. Before pressing = to display the answer, predict the number that will be displayed as the answer. After making your prediction, press =.

5. What number is displayed?

6. What does the displayed number mean for this problem?

7. Why is there a zero missing in the display?

8. How do the digits in 2.5 relate to the bills and coins the children are paid?

> *Todd and Jessie agree to rake the leaves for $2.50 and to split the pay equally.*

9. Use money manipulatives to divide $2.50 into two equal parts. (You will need to use some pennies.)

10. How much money will each child receive?

11. How many dollars, dimes, and pennies is that?

12. Use words to name the amount of money each will receive.

We can split $2.50 into two equal parts by dividing $2.50 by 2. We will do this with a calculator.

13. What key do we press before we enter the numbers? Why?

14. What keys do we press to enter $2.50?

15. Do we enter the 0 of $2.50?

16. Now what keys do we press to find the answer?

17. What answer is displayed?

18. What does the displayed number mean for this problem?

19. How do the digits in 1.25 relate to the bills and coins the children were paid?

> *Todd and Jessie agree to sweep the driveway and sidewalks for $1.25 and to split the pay equally.*

20. Use money manipulatives to divide $1.25 as equally as possible into two parts.

21. How much money will each child receive?

22. Explain why the money cannot be divided equally.

There is no coin that has less value than a penny, but there is a name for a tenth of a penny. One tenth of a penny is a *mill.*

23. Suppose Todd and Jessie could trade in one penny for ten mills. Then they could divide the ten mills between themselves. How many mills would each child receive?

24. Again suppose mills could be used. How many dimes, pennies, and mills would each child receive if $1.25 were divided equally?

Now we will use a calculator to divide $1.25 by 2.

25. Before dividing, predict the number that will be displayed on the calculator after the division.

26. What keys do we press to perform the division?

27. What answer is displayed?

28. What does the display mean for this problem?

29. Why are there three places after the decimal point?

30. How do the digits in 0.625 relate to coins and mills?

For additional exercises that use money to represent decimal place value, refer to Appendix Topic A.

Part 2 Naming Decimal Numbers

Fractions and decimals are two ways to describe parts of a whole. When we write a fraction, we show both a numerator and a denominator. When we write a decimal number, the denominator is not shown but is indicated by the number of places to the right of the decimal point (the number of decimal places). Look at these examples:

one decimal place	two decimal places	three decimal places
$0.1 = \frac{1}{10}$	$0.12 = \frac{12}{100}$	$0.123 = \frac{123}{1000}$

To name a decimal number, we name the numerator shown by the digits and then we name the denominator indicated by the number of decimal places.

As a class, read each of these numbers:

31. $\frac{75}{100}$

32. 0.75

33. $\frac{50}{100}$

34. 0.50

35. $\frac{7}{100}$

36. 0.07

37. 0.05

38. 0.03

39. 0.30

40. 0.21

41. $\frac{3}{10}$

42. 0.3

43. $\frac{7}{10}$

44. 0.7

45. 0.9

46. 0.09

47. $\frac{1}{1000}$

48. 0.001

49. $\frac{21}{1000}$

50. 0.021

51. $\frac{321}{1000}$

52. 0.321

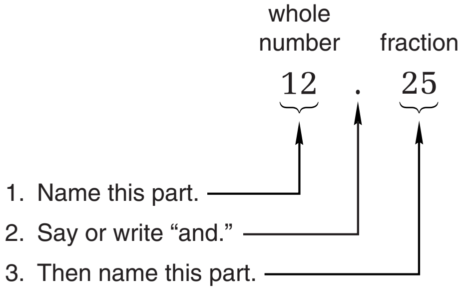
53. 0.020

54. 0.002

55. 0.02

56. 0.2

A decimal number greater than 1 has one or more digits other than 0 to the left of the decimal point; 12.25, for example. To name 12.25, we mentally split it at the decimal point and name the whole-number part and fraction part separately.



Result: **twelve and twenty-five hundredths**

As a class, read each of these numbers. Then use words to write each number on your paper.

57. 10.75

58. 12.5

59. 6.42

60. 10.1

61. 1.125

62. 2.05

Use digits to write each of these decimal numbers:

63. one and three tenths

64. two and twenty-five hundredths

65. three and twelve hundredths

66. four and five tenths

67. five and four hundredths

68. fifteen hundredths

69. five tenths

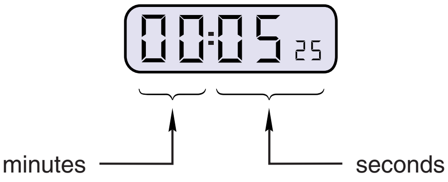
70. five hundredths

Activity: *Decimal Numbers on Stopwatch Displays*

Materials needed:

- stopwatch with digital display

Use a stopwatch to generate decimal numbers. Here we show a typical stopwatch display:



This display shows that 5.25 seconds passed between starting and stopping the watch.

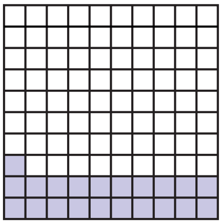
Perform the activities in **a** and **b.** Vary the activities as desired.

a. Have students start and then stop the stopwatch as quickly as possible. Record each generated time on the board, and have students read the times aloud. Who stopped the watch in the quickest time?

b. Have students test time-estimating skills by starting the stopwatch and then, without looking, stopping the watch five seconds later. Read each generated time and have the class write each generated time with digits.

Part 3 Using Decimals to Name Part of a Square

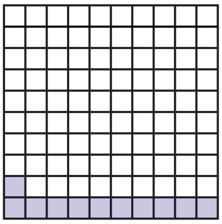
We have used dimes, pennies, and mills to represent decimal numbers. We can also use base ten blocks or parts of a shaded square.



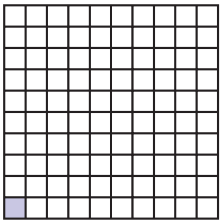
On the right is one whole square. It is divided into 100 equal parts, and 21 parts are shaded. The shaded part of the square can be named as the decimal number twenty-one hundredths (0.21) or as the fraction twenty-one hundredths $\left(\frac{21}{100}\right)$.

Each of these squares is divided into 100 equal parts. Name the shaded part of each square as a decimal number and as a fraction:

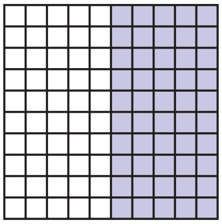
71.



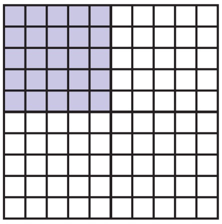
72.



73.

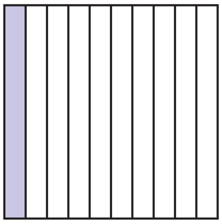


74.



Notice in problem 73 that half of the square is shaded. We see that the fraction $\frac{50}{100}$ equals $\frac{1}{2}$. The decimal number 0.50 also equals $\frac{1}{2}$, just as \$0.50 equals $\frac{1}{2}$ of a dollar. In problem 74 we see that a fourth of the square is shaded. The decimal number 0.25 equals $\frac{1}{4}$, just as \$0.25 equals $\frac{1}{4}$ of a dollar.

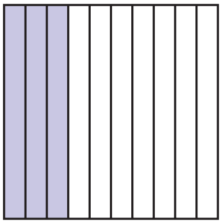
The square at right is divided into ten equal parts. One tenth of the square is shaded. We may write one tenth as a fraction $\left(\frac{1}{10}\right)$ or as a decimal number (0.1).



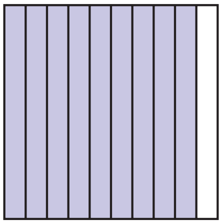
$\frac{1}{10} = 0.1$

Name the shaded part of each square as a decimal number and as a fraction:

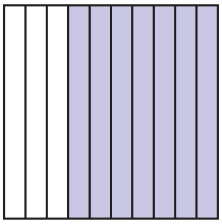
75.



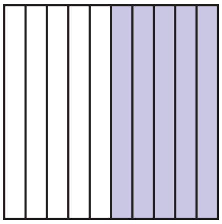
76.



77.



78.



Notice in problem 78 that half of the square is shaded. We see that $\frac{5}{10}$ equals $\frac{1}{2}$, just as $\frac{50}{100}$ equals $\frac{1}{2}$. The decimal number 0.5 also equals $\frac{1}{2}$, just as 0.50 equals $\frac{1}{2}$.

$$\frac{1}{2} = \frac{5}{10} = \frac{50}{100}$$

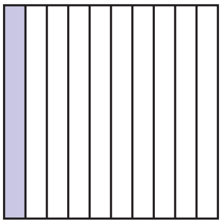
$$\frac{1}{2} = 0.5 = 0.50$$

79. Which of the following numbers does *not* equal one half?

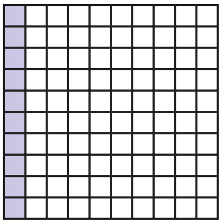
A. $\frac{5}{10}$ B. 0.5 C. $\frac{50}{100}$ D. 0.05

Replace each circle with the correct comparison symbol:

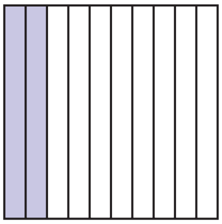
80.



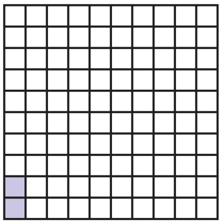
0.1 ○ 0.10



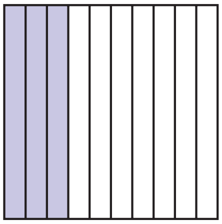
81.



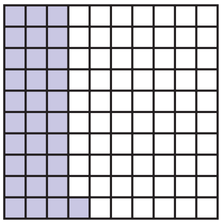
0.2 ○ 0.02



82.



0.3 ○ 0.31



LESSON

41 Subtracting Across Zero • Missing Factors

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, 9's, Squares (Test E)

Mental Math:

Practice adding money amounts ending in 99¢, 98¢, or 95¢:

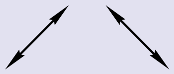
a. \$4.65 + \$2.99 **b.** \$3.86 + \$1.95 **c.** \$6.24 + \$2.98

Review:

d. 520 − 120 **e.** 350 + 400 + 35 **f.** 37 + 29 + 220

Problem Solving:

We can quickly add or subtract some numbers on a calendar. On a calendar select a number from the middle of the month. If we move straight up from that number one row, we subtract 7. If we move straight down one row, we add 7. We can add or subtract two other numbers if we move diagonally. Which numbers do we add or subtract when we move one row in these directions?



NEW CONCEPTS

Subtracting across zero

In the problem below we must regroup twice before we can subtract the ones digits.

$$\begin{array}{r} \$405 \\ -\ \$126 \\ \hline \end{array}$$

We cannot exchange a ten for ones because there are no tens. So the first step is to exchange 1 hundred for 10 tens.

$$\begin{array}{r} \$\overset{3}{\cancel{4}}\,{}^{1}0\,5 \\ -\ \$1\,2\,6 \\ \hline \end{array}$$

Now we have 10 tens, and we can exchange 1 of the tens for 10 ones.

$$\begin{array}{r} \$\overset{3}{\cancel{4}}\,\overset{9}{\cancel{{}^{1}0}}\,{}^{1}5 \\ -\ \$1\,2\,6 \\ \hline \end{array}$$

Now we subtract.

$$\begin{array}{r} \$\overset{3}{\cancel{4}}\,\overset{9}{\cancel{{}^{1}0}}\,{}^{1}5 \\ -\ \$1\,2\,6 \\ \hline \$2\,7\,9 \end{array}$$

We can perform this regrouping in one step by looking at the numbers a little differently. We can think of the 4 and 0 as 40 ten-dollar bills (4 hundreds equals 40 tens).

$$\$\overbrace{4\,0}^{\text{40 tens}}\,5$$

If we exchange one of the ten-dollar bills, then we will have 39 ten-dollar bills.

$$\begin{array}{r} \$\overset{3\ 9}{\cancel{4\,0}}\,{}^{1}5 \\ -\ \$1\,2\,6 \\ \hline \$2\,7\,9 \end{array}$$

Example 1 Tom had \$3.00 and spent \$1.23. How much money did he have left?

Solution We change 3 dollars to 2 dollars and 10 dimes. Then we change 10 dimes to 9 dimes and 10 pennies.

$$\begin{array}{r} \$3.00 \\ -\ \$1.23 \\ \hline \end{array} \longrightarrow \begin{array}{r} \$\overset{2}{\cancel{3}}.{}^{1}0\,0 \\ -\ \$1.2\,3 \\ \hline \end{array} \longrightarrow \begin{array}{r} \$\overset{2}{\cancel{3}}.\overset{9}{\cancel{{}^{1}0}}\,{}^{1}0 \\ -\ \$1.2\,3 \\ \hline \mathbf{\$1.7\,7} \end{array}$$

We can also think of \$3 as 30 dimes. Then we exchange 1 dime for 10 pennies.

$$\begin{array}{r} \$3.00 \\ -\ \$1.23 \\ \hline \end{array} \longrightarrow \begin{array}{r} \$\overset{2\ 9}{\cancel{3.0}}\,{}^{1}0 \\ -\ \$1.\,2\,3 \\ \hline \mathbf{\$1.\,7\,7} \end{array}$$

We check our answer by adding.

$$\begin{array}{r} \$1.23 \\ +\ \$1.77 \\ \hline \$3.00 \end{array} \quad \text{check}$$

Missing factors

Recall that numbers that are multiplied are called *factors* and the answer is called the *product.*

Factor × factor = product

If we know one factor and the product, we can find the other factor.

Example 2 Find the missing factors:

(a) $5N = 40$ (b) $A \times 4 = 36$

Solution (a) The expression $5N$ means "$5 \times N$." Since $5 \times 8 = 40$, the missing factor is **8.**

(b) Since $9 \times 4 = 36$, the missing factor is **9.**

LESSON PRACTICE

Practice set* Subtract:

a. $\begin{array}{r} \$3.00 \\ -\ \$1.32 \\ \hline \end{array}$ **b.** $\begin{array}{r} \$405 \\ -\ \$156 \\ \hline \end{array}$ **c.** $\begin{array}{r} 201 \\ -\ 102 \\ \hline \end{array}$

d. \$4.00 − \$0.86 **e.** \$304 − \$128 **f.** 703 − 198

Find the missing factor in each problem:

g. $8W = 32$ **h.** $p \times 3 = 12$

i. $5m = 30$ **j.** $Q \times 4 = 16$

MIXED PRACTICE

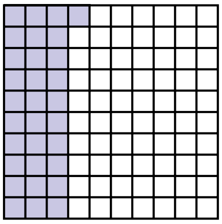
Problem set

1. (Inv. 4) The large square represents 1. Write the shaded part of the square

(a) as a fraction.

(b) as a decimal number.

(c) using words.



2. (35) Takeshi had a dime, a quarter, and a penny. Write this amount using a dollar sign and a decimal point.

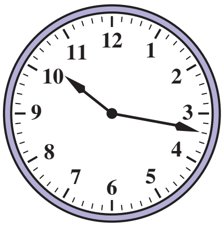
3. (40) Donna opened a 1-gallon container of milk and poured 1 quarter of milk into a pitcher. Then how many quarts of milk were left in the 1-gallon container?

4. (3) Find the next three numbers in this counting sequence:

…, 4200, 4300, 4400, _____, _____, _____, …

5. *(Inv. 4)* Use digits and a comparison symbol to show that the decimal number five tenths equals the fraction one half.

6. *(27)* It is evening now. What time will it be 7 hours from now?



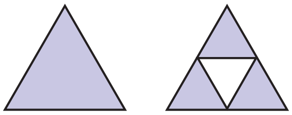
7. *(41)* Find the missing factor: $5w = 45$

8. *(Inv. 4)* The following was marked on the label of the juice container:

2 qt (1.89 L)

Use words to write 1.89 L.

9. *(35)* What mixed number is illustrated by these shaded triangles?



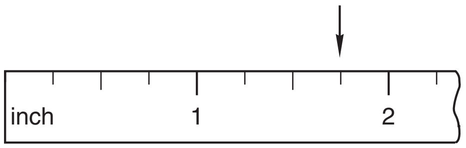
10. *(23)* Which letter below has no right angles?

F E Z L

11. *(27)* Rewrite this addition problem as a multiplication problem:

$\$1.25 + \$1.25 + \$1.25 + \$1.25$

12. *(39)* To what number is the arrow pointing on this inch scale?



13. *(Inv. 2)* A meterstick is how many centimeters long?

14. *(36)* (a) Five dimes are what fraction of a dollar?

(b) Write the value of five dimes using a dollar sign and a decimal point.

15. *(Inv. 4)* Compare:

(a) 0.5 ○ 0.50 (b) $\frac{1}{2}$ ○ $\frac{1}{4}$

Multiply:

16. *(38)* (a) 3×8 (b) 3×7 (c) 3×6

17. *(38)* (a) 4×8 (b) 4×7 (c) 4×6

18. *(41)*
$$\begin{array}{r} M \\ \times \ \ 8 \\ \hline 64 \end{array}$$

19. *(41)*
$$\begin{array}{r} 9 \\ \times \ N \\ \hline 54 \end{array}$$

20. *(24)*
$$\begin{array}{r} Z \\ +\ 179 \\ \hline 496 \end{array}$$

21. *(41)*
$$\begin{array}{r} \$3.00 \\ -\ \$1.84 \\ \hline \end{array}$$

22. *(41)*
$$\begin{array}{r} \$500 \\ -\ \$167 \\ \hline \end{array}$$

23. *(24)*
$$\begin{array}{r} W \\ -\ 297 \\ \hline 486 \end{array}$$

24. *(Inv. 1)* What are the next four numbers in this counting sequence?

…, 28, 21, 14, _____, _____, _____, _____, …

25. *(34)* Use digits to write one million, fifty thousand.

26. *(Inv. 3)* If the area of a square is 36 square inches, then how long is each side of the square?

A. 6 in. B. 9 in. C. 12 in. D. 18 in.

27. *(Inv. 4)* The distance from Ian's house to school is 1.4 miles. Write 1.4 with words.

LESSON 42

Multiplying Multiples of 10 and 100 • Rounding Numbers to the Nearest Hundred

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, 9's, Squares (Test E)

Mental Math:

Subtract without regrouping:

a. 563 − 242 **b.** \$5.75 − \$2.50 **c.** \$8.98 − \$0.72

Review:

d. \$4.85 + \$1.99 **e.** 48 + 7 + 20 **f.** 54 + 19 + 320

Problem Solving:

The hands of a clock are together at 12:00. The hands of a clock are not together at 6:30 because the hour hand is halfway between the 6 and the 7 at 6:30. The hands come together at about 6:33. Name nine more times that the hands of a clock come together. (Answers will be approximate.)

NEW CONCEPTS

Multiplying multiples of 10 and 100

The multiples of 10 are the numbers we say when we count by 10.

10, 20, 30, 40, 50, …

Likewise, the multiples of 100 are the numbers we say when we count by 100.

100, 200, 300, 400, 500, …

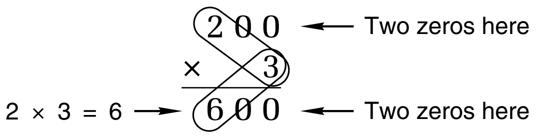
When multiplying by multiples of 10 and 100, we focus our attention on the first digit of the multiple.

Example 1 Find the product: 3 × 200

Solution We will show three ways:

$$\begin{array}{r} 200 \\ 200 \\ +\ 200 \\ \hline \mathbf{600} \end{array} \qquad \begin{array}{r} 2\text{ hundred} \\ \times\qquad\quad 3 \\ \hline \textbf{6 hundred} \end{array} \qquad \begin{array}{r} 200 \\ \times\quad 3 \\ \hline \mathbf{600} \end{array}$$

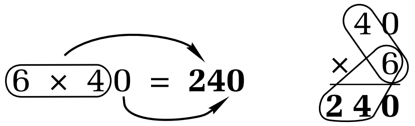
We will look closely at the method on the right.



By focusing on the first digit and counting the number of zeros, we can multiply by multiples of 10 and 100 mentally.

Example 2 Multiply: 6 × 40

Solution We will show two ways. We can find the product mentally, whether we think of horizontal multiplication or vertical multiplication.



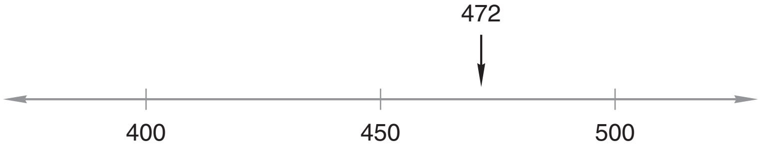
Rounding numbers to the nearest hundred

We have practiced rounding numbers to the nearest ten. Now we will learn to round numbers to the nearest hundred. To round a number to the nearest hundred, we choose the closest multiple of 100 (number ending in two zeros). A number line can help us understand rounding to the nearest hundred.

Example 3 (a) Round 472 to the nearest hundred.

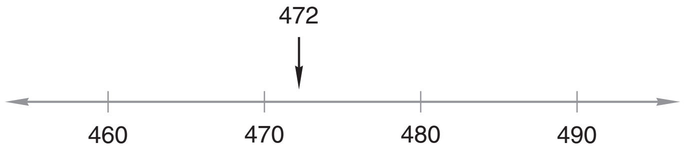
(b) Round 472 to the nearest ten.

Solution (a) The number 472 is between 400 and 500. Halfway between 400 and 500 is 450. Since 472 is greater than 450, it is closer to 500 than it is to 400. We see this on the number line below.



So 472 rounded to the nearest hundred is **500.**

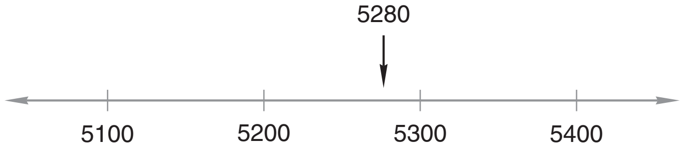
(b) Counting by tens, we find that 472 is between 470 and 480.



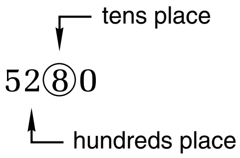
Since 472 is closer to 470 than it is to 480, we round 472 to **470.**

Example 4 Round 5280 to the nearest hundred.

Solution Counting by hundreds, we find that 5280 is between 5200 and 5300. It is closer to **5300** than it is to 5200.



We can also round to the nearest hundred by focusing on the digit in the tens place, that is, the digit just to the right of the hundreds place.



If the digit in the tens place is less than 5, the digit in the hundreds place does not change. If the digit in the tens place is 5 or more, we increase the digit in the hundreds place by one. Whether rounding up or rounding down, the digits to the right of the hundreds place become zeros.

Example 5 Round 362 and 385 to the nearest hundred. Then add the rounded numbers.

Solution The number 362 is closer to 400 than it is to 300. The number 385 is also closer to 400 than it is to 300. So both 362 and 385 round to **400.** Now we add.

$$400 + 400 = \mathbf{800}$$

LESSON PRACTICE

Practice set Find each product:

a. $\begin{array}{r} 50 \\ \times\ \ 7 \\ \hline \end{array}$ **b.** $\begin{array}{r} 600 \\ \times\ \ \ 3 \\ \hline \end{array}$ **c.** 7×40 **d.** 4×800

Round each number to the nearest hundred:

e. 813 **f.** 685 **g.** 427 **h.** 2573

i. Round 297 and 412 to the nearest hundred. Then add the rounded numbers.

j. Round 623 and 287 to the nearest hundred. Then subtract the smaller rounded number from the larger rounded number.

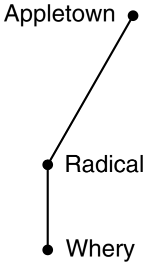
MIXED PRACTICE

Problem set

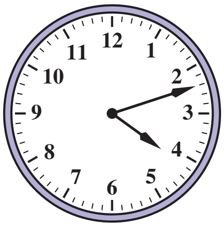
1. On 1-cm grid paper, draw a square with sides 5 cm long.
(Inv. 2, Inv. 3)
(a) What is the perimeter of the square?
(b) What is the area of the square?

2. Wilbur had sixty-seven grapes. He ate some grapes. Then he had thirty-eight grapes. How many grapes did Wilbur eat?
(25)

3. The distance from Whery to Radical is 42 km. The distance from Whery to Appletown through Radical is 126 km. How far is it from Radical to Appletown? Solve this problem using an addition pattern.
(11, 14)



4. It is afternoon. What time will it be in half an hour?
(27)

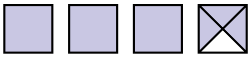


5. Write the next three numbers in this sequence of perfect squares:
(3, Inv. 3)

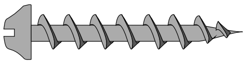
1, 4, 9, 16, 25, 36, 49, _____, _____, _____, …

6. (a) Round 673 to the nearest hundred.
(20, 42)
(b) Round 673 to the nearest ten.

7. How many squares are shaded?
(35)



8. (a) Find the length of this screw to the nearest quarter inch.
(Inv. 2, 39)
(b) Find the length of this screw to the nearest centimeter.

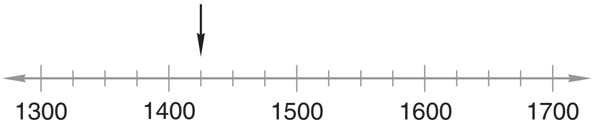


9. Rewrite this addition problem as a multiplication problem:
(27)

$2.50 + $2.50 + $2.50

10. Are the line segments in a plus sign parallel or perpendicular?
(23)

11. To what number is the arrow pointing?
(Inv. 1)



12. Use the digits 4, 7, and 8 once each to write an odd number greater than 500.
(10)

13. 6×80 *(42)*

14. 7×700 *(42)*

15. 9×80 *(42)*

16. 7×600 *(42)*

17. *(24)*
$$\begin{array}{r} Z \\ +\ 338 \\ \hline 507 \end{array}$$

18. *(41)*
$$\begin{array}{r} \$4.06 \\ -\ \$2.28 \\ \hline \end{array}$$

19. *(41)*
$$\begin{array}{r} W \\ \times\ \ 6 \\ \hline 42 \end{array}$$

20. $N - 422 = 305$ *(24)*

21. $55 + 555 + 378$ *(17)*

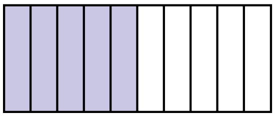
22. (a) Use words to write 5280.
(33)
(b) Which digit in 5280 is in the tens place?

23. (a) Ten nickels are what fraction of a dollar?
(36)
(b) Write the value of ten nickels using a dollar sign and a decimal point.

24. Compare:
(Inv. 4)
(a) $0.5 \bigcirc \frac{1}{2}$
(b) $\frac{1}{4} \bigcirc \frac{1}{10}$

25. What is the sum of three squared and four squared?
(Inv. 3)

26. Which of these numbers does not describe the shaded part of this rectangle?
(Inv. 4)



A. $\frac{5}{10}$
B. $\frac{1}{2}$
C. 5.0
D. 0.5

27. The decimal number 0.25 equals $\frac{1}{4}$. Write 0.25 with words.
(Inv. 4)

LESSON

43

Adding and Subtracting Decimal Numbers, Part 1

WARM-UP

Facts Practice: Multiplication Facts: 2's, 5's, 9's, Squares (Test E)

Mental Math:

Subtract a number ending in 5 from a number ending in zero:

a. 80 − 5

b. 80 − 25 (Subtract 20. Then subtract 5 more.)

Review:

c. \$6.23 + \$2.98 **d.** 340 + 26 + 216 **e.** 65 + 8 + 200

Patterns:

Counting by halves, we say, "one half, one, one and one half, two, ..." Count by halves from one half to ten. Then write this sequence on a piece of paper. What number is halfway between two and five?

NEW CONCEPT

To add or subtract money amounts written with a dollar sign, we add or subtract digits with the same place value. We line up the digits with the same place value by lining up the decimal points.

Example 1 (a) \$3.45 + \$0.75 (b) \$5.35 − \$2

Solution (a) First we line up the decimal points in order to line up places with the same place value. Then we add, remembering to write the dollar sign and the decimal point.

$$\begin{array}{r} \$3.45 \\ +\ \$0.75 \\ \hline \mathbf{\$4.20} \end{array}$$

(b) First we put a decimal point and two zeros behind the \$2.

\$2 means \$2.00

Now we line up the decimal points and subtract.

$$\begin{array}{r} \$5.35 \\ -\ \$2.00 \\ \hline \mathbf{\$3.35} \end{array}$$

Example 2 $\$3.75 + \$4 + 15¢$

Solution Before we add, we make sure that all the money amounts have the same form. We make these changes:

$$\begin{array}{rcl} \$4 & \longrightarrow & \$4.00 \\ 15¢ & \longrightarrow & \$0.15 \end{array}$$

Then we line up the decimal points and add.

$$\begin{array}{r} \$3.75 \\ \$4.00 \\ + \ \$0.15 \\ \hline \mathbf{\$7.90} \end{array}$$

We add or subtract decimal numbers that are not money amounts the same way. We line up the decimal points and then add or subtract.

Example 3 (a) $0.2 + 0.5$ (b) $3.47 - 3.41$

Solution (a) We line up the decimal points and add.

$$\begin{array}{r} 0.2 \\ + \ 0.5 \\ \hline \mathbf{0.7} \end{array}$$

(b) We line up the decimal points and subtract.

$$\begin{array}{r} 3.47 \\ - \ 3.41 \\ \hline \mathbf{0.06} \end{array}$$

Example 4 One gallon of milk is about 3.78 liters. Two gallons of milk is about how many liters?

Solution We add 3.78 liters to 3.78 liters to find about how many liters are in two gallons of milk.

$$\begin{array}{r} 3.78 \text{ L} \\ + \ 3.78 \text{ L} \\ \hline \mathbf{7.56 \text{ L}} \end{array}$$

LESSON PRACTICE

Practice set* Find each sum or difference:

a. $\$6.32 + \$5$

b. $\$3.25 - \$1.75$

c. $46¢ + 64¢$

d. $98¢ - 89¢$

e. $\$1.46 + 87¢$

f. $76¢ - \$0.05$

g. $3.47 + 3.41$

h. $0.75 - 0.50$

i. 0.50 + 1.75 **j.** 4.25 − 3.75

k. 5.6 + 5.6 **l.** 2.75 − 1.70

MIXED PRACTICE

Problem set

1. *(25, 41)* One hundred pennies are separated into two piles. In one pile there are thirty-five pennies. How many pennies are in the other pile?

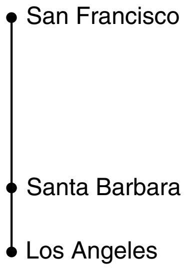
2. *(Inv. 2, Inv. 3)* Draw a rectangle that is 3 cm long and 3 cm wide.

(a) What is the perimeter of the rectangle?

(b) What is the area of the rectangle?

3. *(25, 43)* Pedro opened a 1-gallon bottle that held about 3.78 liters of milk. He poured about 1.50 liters of milk into a pitcher. About how many liters of milk were left in the bottle?

4. *(11, 41)* San Francisco is 400 miles north of Los Angeles. Santa Barbara is 110 miles north of Los Angeles. Sam drove from Los Angeles to Santa Barbara. How many miles does he still have to drive to reach San Francisco?



5. *(20, 42)* (a) Round 572 to the nearest hundred.

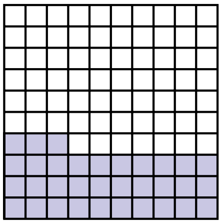
(b) Round 572 to the nearest ten.

6. *(Inv. 4)* Write the shaded part of this square

(a) as a fraction.

(b) as a decimal number.

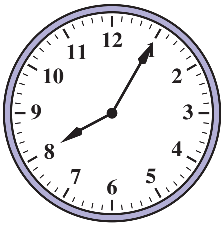
(c) using words.



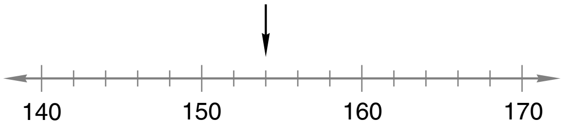
7. *(23)* Are the rails of a railroad track parallel or perpendicular?

8. *(26, Inv. 3)* Draw a square to show 3 × 3. Then shade two ninths of the square.

9. *(27)* It is morning. What time was it 2 hours ago?



10. *(Inv. 1)* To what number is the arrow pointing?



11. *(43)* 2.45 + 4.50

12. *(43)* \$3.25 − \$2.47

13. *(43)* \$2.15 + \$3 + 7¢

14. *(43)* 3.75 − 2.50

15. *(24)* $\begin{array}{r} 507 \\ -\ N \\ \hline 456 \end{array}$

16. *(24)* $\begin{array}{r} N \\ -\ 207 \\ \hline 423 \end{array}$

17. *(41)* $\begin{array}{r} \$5.00 \\ -\ \$3.79 \\ \hline \end{array}$

18. *(42)* 6 × 80

19. *(42)* 4 × 300

20. *(42)* 7 × 90

21. *(41)* $8N = 32$

22. *(Inv. 3)* $\sqrt{100}$

23. *(Inv. 2)* Draw a line segment 2 inches long. Then measure the line segment with a centimeter ruler. Two inches is about how many centimeters?

24. *(33)* The population of the city was about 1,080,000. Use words to write that number.

25. *(Inv. 2)* Which of these metric units would probably be used to describe the height of a tree?

A. millimeters
B. centimeters
C. meters
D. kilometers

26. *(40)* Sarah has a 2-liter bottle full of water and an empty half-gallon carton. If she pours water from the bottle into the carton, what will happen?

A. The bottle will be empty before the carton is full.
B. The carton will be full before the bottle is empty.
C. When the carton is full, the bottle will be empty.

27. *(33)* Here is a list of selling prices for five houses. Arrange the prices in order from highest selling price to lowest selling price.

\$179,500
\$248,000
\$219,900
\$315,000
\$232,000

LESSON 44

Multiplying Two-Digit Numbers, Part 1

WARM-UP

Facts Practice: Multiplication Facts: Memory Group (Test F)

Mental Math:

Subtract a number ending in 5 from a number ending in zero:

a. 70 − 5 **b.** 70 − 45 **c.** 370 − 125

Review:

d. $5.96 + $3.95 **e.** 76 + 9 + 200 **f.** 560 + 24 + 306

Vocabulary:

Copy these two patterns on a piece of paper. In each of the six boxes write either "factor" or "product."

$$\begin{array}{r} \boxed{} \\ \times\ \boxed{} \\ \hline \boxed{} \end{array}$$

$$\boxed{} \times \boxed{} = \boxed{}$$

NEW CONCEPT

If there are 21 children in each classroom, then how many children are in 3 classrooms?

Instead of finding 21 + 21 + 21, we will solve this problem by multiplying 21 by 3. Below we show two ways to do this. The first method is helpful when multiplying mentally. The second method is a quick way to multiply using pencil and paper.

Method 1:

Think: 21 is the same as 20 + 1

Multiply:
$$\begin{array}{r} 20 \\ \times\ \ 3 \\ \hline 60 \end{array} \quad \text{and} \quad \begin{array}{r} 1 \\ \times\ 3 \\ \hline 3 \end{array}$$

Add: 60 + 3 = 63

Method 2:

Multiply ones; then multiply tens.
$$\begin{array}{r} 21 \\ \times\ \ 3 \\ \hline 63 \end{array}$$

Example Multiply: 42×3

Solution We write 42 on top and 3 underneath, directly below the 2. We multiply 2 by 3 to get 6. Then we multiply 4 (for 40) by 3 to get 12. The product is 126.

$$\begin{array}{r} 4\boxed{2} \\ \times\ \ \boxed{3} \\ \hline 6 \end{array} \longrightarrow \begin{array}{r} \boxed{4}2 \\ \times\ \ \boxed{3} \\ \hline 126 \end{array} \longrightarrow \begin{array}{r} 42 \\ \times\ \ 3 \\ \hline \mathbf{126} \end{array}$$

LESSON PRACTICE

Practice set Find each product:

a. $\begin{array}{r} 31 \\ \times\ \ 2 \\ \hline \end{array}$ **b.** $\begin{array}{r} 31 \\ \times\ \ 4 \\ \hline \end{array}$ **c.** $\begin{array}{r} 42 \\ \times\ \ 4 \\ \hline \end{array}$

d. $\begin{array}{r} 30 \\ \times\ \ 2 \\ \hline \end{array}$ **e.** $\begin{array}{r} 30 \\ \times\ \ 4 \\ \hline \end{array}$ **f.** $\begin{array}{r} 24 \\ \times\ \ 0 \\ \hline \end{array}$

MIXED PRACTICE

Problem set

1. *(Inv. 4)* The 1-gallon container of milk held 3.78 L of milk. Use words to write 3.78 L.

2. *(Inv. 1, 34)* Juan compared two numbers. The first number was forty-two thousand, three hundred seventy-six. The second number was forty-two thousand, eleven. Use digits and a comparison symbol to show the comparison.

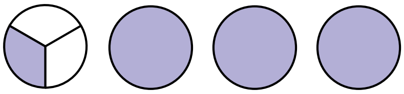
3. *(41, 43)* The ticket cost \$3.25. The man paid for the ticket with a \$5 bill. How much money should he get back?

4. *(Inv. 3, 31)* Nine squared is how much more than the square root of nine?

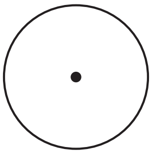
5. *(41)* Find the missing factor: $8M = 48$

6. *(40)* Eight fluid ounces of water is one cup of water. How many fluid ounces of water is a pint of water?

7. *(35)* How many circles are shaded?



8. *(21, 39)* Use an inch ruler to find the diameter of this circle:



9. *(Inv. 1, 42)* Compare:

(a) -5 ○ -2

(b) 4×60 ○ 3×80

10. *(41)* $\begin{array}{r} \$4.03 \\ -\ \$1.68 \\ \hline \end{array}$

11. *(43)* $\begin{array}{r} \$4.33 \\ +\ \$5.28 \\ \hline \end{array}$

12. *(43)* $\begin{array}{r} \$5.22 \\ -\ \$2.46 \\ \hline \end{array}$

13. *(41)* $\begin{array}{r} \$7.08 \\ -\ \$0.59 \\ \hline \end{array}$

14. *(44)* $\begin{array}{r} 21 \\ \times\ \ 6 \\ \hline \end{array}$

15. *(42)* $\begin{array}{r} 40 \\ \times\ \ 7 \\ \hline \end{array}$

16. *(44)* $\begin{array}{r} 73 \\ \times\ \ 2 \\ \hline \end{array}$

17. *(44)* $\begin{array}{r} 51 \\ \times\ \ 6 \\ \hline \end{array}$

18. *(43)* $2 + 47¢ + 21¢

19. *(43)* $8.7 - 1.2$

20. *(24)* $62 - N = 14$

21. *(24)* $N - 472 = 276$

22. *(27)* Write this addition problem as a multiplication problem:

$$2.1 + 2.1 + 2.1 + 2.1 + 2.1 + 2.1$$

23. *(33, 42)* (a) Which digit in 1760 is in the hundreds place?

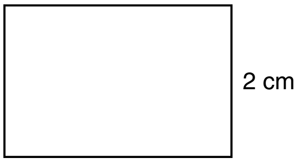
(b) Use words to write 1760.

(c) Round 1760 to the nearest hundred.

24. *(42)* Round 738 and 183 to the nearest hundred. Then add the rounded numbers.

25. *(Inv. 4, 43)* Add the decimal number one and fifty hundredths to three and twenty-five hundredths. What is the sum?

26. *(Inv. 3, 41)* If the area of this rectangle is 6 sq. cm, then the length of the rectangle is which of the following?



A. 3 cm

B. 4 cm

C. 10 cm

D. 12 cm

27. *(20, Inv. 4)* (a) Is $5.75 closer to $5 or to $6?

(b) Is 5.75 closer to 5 or to 6?

LESSON 45

Parentheses • Associative Property • Naming Lines and Segments

WARM-UP

Facts Practice: Multiplication Facts: Memory Group (Test F)

Mental Math:

Subtract a number ending in 5 from a number ending in zero:

a. \$0.80 − \$0.35 **b.** \$1.60 − \$0.25 **c.** \$4.50 − \$1.15

Review:

d. \$6.28 + \$0.99 **e.** 68 + 6 + 20 **f.** 43 + 29 + 310

Patterns:

This is the sequence of numbers we say when we count by fourths. Copy this sequence on your paper, and continue the sequence to the whole number 5.

$$\tfrac{1}{4}, \tfrac{1}{2}, \tfrac{3}{4}, 1, 1\tfrac{1}{4}, 1\tfrac{1}{2}, 1\tfrac{3}{4}, 2, \ldots$$

NEW CONCEPTS

Parentheses When parentheses are in an arithmetic problem, we work inside the parentheses first.

$$2 \times (3 + 4)$$

This expression means "2 times the sum of 3 and 4." We first add 3 and 4 and get 7. Then we multiply 2 by 7. The answer is 14.

Example 1 (3 × 4) + 5

Solution This expression means "add 5 to the product of 3 and 4." First we multiply 3 by 4 and get 12. Then we add 5 and 12.

$$12 + 5 = \mathbf{17}$$

Example 2 3 × (4 + 5)

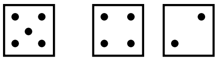
Solution This expression means "3 times the sum of 4 and 5." We add 4 and 5 and get 9. Then we multiply 9 by 3.

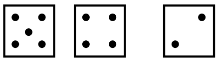
$$3 \times 9 = \mathbf{27}$$

Associative property

If three numbers are to be added, we start by adding two of the numbers. Then we add the third number. It does not matter which two numbers we add first—the sum will be the same.

$5 + (4 + 2) = 11$ $(5 + 4) + 2 = 11$





This property of addition is called the **associative property.**

Example 3 Compare: $3 + (4 + 5) \bigcirc (3 + 4) + 5$

Solution Both sides of the comparison equal 12.

$$3 + (4 + 5) \bigcirc (3 + 4) + 5$$

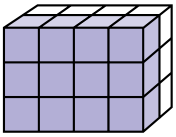
$$3 + 9 \bigcirc 7 + 5$$

$$12 \bigcirc 12$$

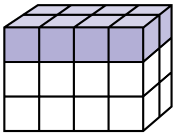
We replace the circle with an equal sign.

$$\mathbf{3 + (4 + 5) = (3 + 4) + 5}$$

The associative property also applies to multiplication. We will illustrate the associative property with a stack of blocks. On the left we see 12 blocks in front (3 × 4). There are also 12 blocks in back. So we can multiply 12 by 2 to find the total number of blocks.



$(3 \times 4) \times 2 = 24$



$3 \times (4 \times 2) = 24$

On the right we see 8 blocks on top (4 × 2). There are 3 layers of blocks. So we can multiply 8 by 3 to find the total number of blocks.

Example 4 Compare: $3 \times (2 \times 5) \bigcirc (3 \times 2) \times 5$

Solution Both sides of the comparison equal 30.

$$3 \times (2 \times 5) \bigcirc (3 \times 2) \times 5$$

$$3 \times 10 \bigcirc 6 \times 5$$

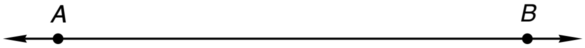
$$30 \bigcirc 30$$

We replace the circle with an equal sign.

$$\mathbf{3 \times (2 \times 5) = (3 \times 2) \times 5}$$

Naming lines and segments

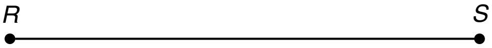
Recall that a line has no end. A line goes on and on in both directions. When we draw a line, we can use arrowheads to show that the line continues. One way to identify a line is to name two points on the line.



This is line *AB*. It is also line *BA*.

This line is named "line *AB*" or "line *BA*." We can use the symbols $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$ to write the name of this line. The small line above the letters *AB* and *BA* replaces the word *line*. To read $\overleftrightarrow{AB}$, we say, "line *AB*."

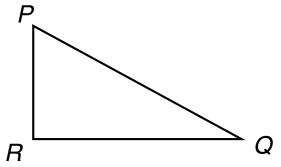
Recall that a segment is part of a line. A segment has two **endpoints.** We name a segment by naming its endpoints. Either letter may come first.



This is segment *RS*. It is also segment *SR*.

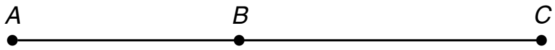
We may use the symbols $\overline{RS}$ or $\overline{SR}$ to write the name of this segment. The small segment over the letters replaces the word *segment*. To read $\overline{RS}$, we say, "segment *RS*."

Example 5 Which segment in this triangle appears to be the longest?



Solution Side *PQ* appears to be the longest side, so our answer is $\boldsymbol{\overline{PQ}}$ (or $\boldsymbol{\overline{QP}}$).

Example 6 The length of $\overline{AB}$ is 3 cm. The length of $\overline{BC}$ is 4 cm. What is the length of $\overline{AC}$?



Solution Two short segments can form a longer segment. From *A* to *B* is one segment; from *B* to *C* is a second segment. Together they form a third segment, segment *AC*. We are told the lengths of $\overline{AB}$ and $\overline{BC}$. If we add these lengths, their sum will equal the length of $\overline{AC}$.

$$3 \text{ cm} + 4 \text{ cm} = 7 \text{ cm}$$

The length of $\overline{AC}$ is **7 cm.**

LESSON PRACTICE

Practice set

a. $8 - (4 + 2)$

b. $(8 - 4) + 2$

c. $9 - (6 - 3)$

d. $(9 - 6) - 3$

e. $10 + (2 \times 3)$

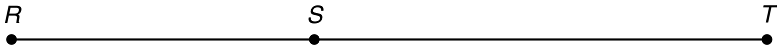
f. $3 \times (10 + 20)$

g. Compare: $2 + (3 + 4)$ ○ $(2 + 3) + 4$

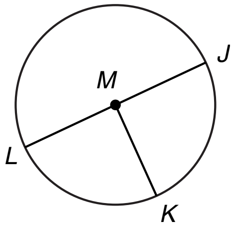
h. Compare: $3 \times (4 \times 5)$ ○ $(3 \times 4) \times 5$

i. What property of addition and multiplication is shown by the comparisons in problems **g** and **h?**

j. The length of $\overline{RS}$ is 4 cm. The length of $\overline{RT}$ is 10 cm. What is the length of $\overline{ST}$? (*Hint:* You will need to subtract.)



k. Which segment in this figure appears to be the diameter of the circle?



MIXED PRACTICE

Problem set

1. (6, 43) Use the numbers 0.5, 0.6, and 1.1 to write two addition facts and two subtraction facts.

2. (19) A whole hour is 60 minutes. How many minutes is half of an hour?

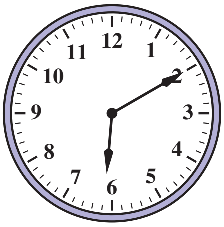
3. (31) The space shuttle orbited 155 miles above the earth. The weather balloon floated 15 miles above the earth. The space shuttle was how much higher than the weather balloon?

4. (41, 43) How much change should you get back if you give the clerk $5.00 for a box of cereal that costs $3.85?

5. (Inv. 4) Write 12.5 using words.

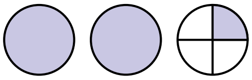
6. *(Inv. 1)* Use digits and symbols to show that negative sixteen is less than negative six.

7. *(27)* It is morning. What time was it 20 minutes ago?



8. *(16, 33)* Write 4060 in expanded form. Then use words to write the number.

9. *(35)* How many circles are shaded?



10. *(33, 36)* Compare:

(a) 2 quarters ○ half-dollar

(b) 2,100,000 ○ one million, two hundred thousand

11. *(41)* Find the missing factor: $6W = 42$

12. *(Inv. 2)* (a) Use an inch ruler to measure this line segment to the nearest inch.

(b) Use a centimeter ruler to measure this line segment to the nearest centimeter.

13. *(45)* Compare: $12 - (6 - 3)$ ○ $(12 - 6) - 3$

14. *(45)* Look at problem 13 and your answer to the problem. Does the associative property apply to subtraction? Why or why not?

15. *(43)* $\begin{array}{r} 4.07 \\ -\ 2.26 \\ \hline \end{array}$

16. *(41)* $\begin{array}{r} \$5.02 \\ -\ \$2.47 \\ \hline \end{array}$

17. *(43)* $\begin{array}{r} \$5.83 \\ -\ \$2.97 \\ \hline \end{array}$

18. *(43)* $\begin{array}{r} \$3.92 \\ +\ \$5.14 \\ \hline \end{array}$

19. *(44)* $\begin{array}{r} 42 \\ \times\ \ 3 \\ \hline \end{array}$

20. *(44)* $\begin{array}{r} 83 \\ \times\ \ 2 \\ \hline \end{array}$

21. *(42)* $\begin{array}{r} 40 \\ \times\ \ 4 \\ \hline \end{array}$

22. *(44)* $\begin{array}{r} 41 \\ \times\ \ 6 \\ \hline \end{array}$

23. *(43)* $2.75 + 50¢ + $3

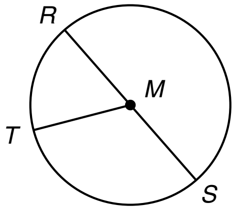
24. *(43)* 3.50 + 1.75

25. *(Inv. 2, Inv. 3)* Draw a rectangle that is 2 in. by 1 in.

(a) The perimeter of the rectangle is how many inches?

(b) The area of the rectangle is how many square inches?

26. *(21, 45)* Which of the following segments is not a radius of the circle?



A. $\overline{RS}$ B. $\overline{RM}$

C. $\overline{MT}$ D. $\overline{MS}$

27. *(31)* Irena finished the first problem in 34 seconds. She finished the second problem in 28 seconds. The first problem took how much longer to finish than the second problem?

LESSON

46 Division

WARM-UP

Facts Practice: Multiplication Facts: Memory Group (Test F)

Mental Math:

Subtract a number ending in 50 from a number ending in two zeros:

a. 300 − 50 **b.** \$4.00 − \$0.50 **c.** \$5.00 − \$1.50

Review:

d. \$7.90 + \$1.95 **e.** 536 + 45 **f.** 59 + 6 + 210

Problem Solving:

The digits 1, 2, 3, and 4, in order, can be written with an equal sign and a times sign to form a multiplication fact.

$$12 = 3 \times 4$$

Write another multiplication fact using four different digits written in order.

NEW CONCEPT

Remember that multiplication problems have three numbers. The multiplied numbers are **factors,** and the answer is the **product.**

$$\text{Factor} \times \text{factor} = \text{product}$$

If we know the two factors, we multiply to find the product. If the factors are 4 and 3, the product is 12.

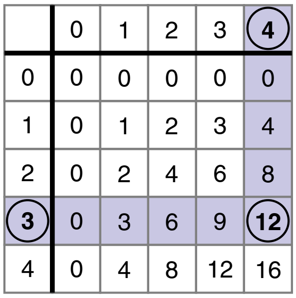
$$4 \times 3 = 12$$

If we know one factor and the product, we can find the other factor.

$$4 \times W = 12 \qquad N \times 3 = 12$$

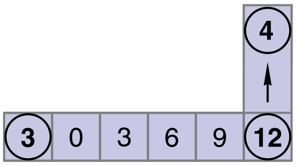
We can use **division** to find a missing factor. Division "undoes" a multiplication.

We know how to use a multiplication table to find the product of 3 and 4. We locate the proper row and column, and then find the product where they meet.



	0	1	2	3	④
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	6	8
③	0	3	6	9	⑫
4	0	4	8	12	16

We can also use a multiplication table to find a missing factor. If we know that one factor is 3 and the product is 12, we look across the row that starts with 3 until we see 12. Then we look up to the top of the column containing 12. There we find 4, which is the missing factor.



We write the numbers 3, 4, and 12 with a division box this way:

$$\begin{array}{r} 4 \\ 3\overline{)12} \end{array}$$

We say, "Twelve divided by three is four."

Example 1 Divide: $4\overline{)32}$

Solution We want to find the missing factor. We think, "Four times what number is thirty-two?" We find the missing factor using the multiplication table below. First we find the row beginning with 4. Then we follow this row across until we see 32. Then we look up this column to find that the answer is **8.**

Multiplication Table

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

Example 2 Divide: $2\overline{)18}$

Solution We search for the number that goes above the division box. We think, "Two times what number is eighteen?" We remember that $2 \times 9 = 18$, so the answer is **9.** We write "9" above the 18, like this:

$$\begin{array}{r} 9 \\ 2\overline{)18} \end{array}$$

LESSON PRACTICE

Practice set Divide:

a. $2\overline{)12}$ **b.** $3\overline{)21}$ **c.** $4\overline{)20}$ **d.** $5\overline{)30}$

e. $6\overline{)42}$ **f.** $7\overline{)28}$ **g.** $8\overline{)48}$ **h.** $9\overline{)36}$

MIXED PRACTICE

Problem set

1. *(11, 30)* Four hundred ninety-five oil drums were on the first train. Seven hundred sixty-two oil drums were on the first two trains combined. How many oil drums were on the second train?

2. *(Inv. 4, 43)* The decimal number three and seventy-eight hundredths is how much more than two and twelve hundredths?

3. *(1, 17)* Cyrus baled 82 bales of hay on the first day. He baled 92 bales of hay on the second day. He baled 78 bales of hay on the third day. How many bales of hay did he bale in all three days?

4. *(20, 42)* (a) Round 786 to the nearest hundred.

(b) Round 786 to the nearest ten.

5. *(35)* Draw and shade rectangles to show the number $2\frac{1}{3}$.

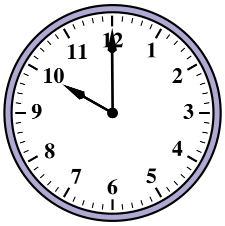
6. *(1, Inv. 3)* The first five odd numbers are 1, 3, 5, 7, and 9.

(a) What is their sum?

(b) What is the square root of their sum?

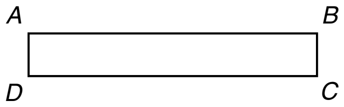
7. *(27)* It is morning. What time was it twelve hours ago?

8. *(23)* What type of angle is formed by the hands of this clock?



9. *(23, 39, 45)* (a) Use an inch ruler to find the length of this rectangle to the nearest quarter inch.

(b) Which segment is parallel to $\overline{AB}$?



10. *(Inv. 2)* Katy took two dozen BIG steps. About how many meters did she walk?

11. *(37)* To what mixed number is the arrow pointing?

12. *(45)* $64 + (9 \times 40)$

13. *(43)* $\$6.25 + 39¢ + \$3$

14. *(41)* $$\begin{array}{r} \$4.02 \\ -\ \$2.47 \\ \hline \end{array}$$

15. *(41)* $$\begin{array}{r} \$5.00 \\ -\ \$2.48 \\ \hline \end{array}$$

16. *(24, 43)* $$\begin{array}{r} N \\ +\ 2.5 \\ \hline 3.7 \end{array}$$

17. *(16, 43)* $$\begin{array}{r} 4.3 \\ -\ \ C \\ \hline 3.2 \end{array}$$

18. *(44)* $$\begin{array}{r} 42 \\ \times\ \ 3 \\ \hline \end{array}$$

19. *(44)* $$\begin{array}{r} 81 \\ \times\ \ 5 \\ \hline \end{array}$$

20. *(46)* $6\overline{)30}$

21. *(46)* $7\overline{)21}$

22. *(46)* $8\overline{)56}$

23. *(46)* $9\overline{)81}$

24. *(46)* $7\overline{)28}$

25. *(46)* $3\overline{)15}$

26. *(Inv. 2, Inv. 3)* Draw a rectangle 3 in. long and 1 in. wide.

(a) What is its perimeter?

(b) What is its area?

27. *(21)* Rosario noticed that the distance from the pole in the center of the tetherball circle to the painted circle was about six feet. What was the approximate radius of the tetherball circle?

A. 12 ft B. 4 yd C. 3 ft D. 2 yd

LESSON

47 Other Ways to Show Division

WARM-UP

Facts Practice: Multiplication Facts: Memory Group (Test F)

Mental Math:

Add hundreds, then tens, and then ones, regrouping tens:

a. 365 + 240 **b.** 456 + 252 **c.** 584 + 41

Review:

d. \$6.00 – \$1.50 **e.** \$4.56 + \$1.99 **f.** 47 + 29 + 100

Problem Solving:

Counting by fourths we say, "one fourth, one half, three fourths, one, ..." Count by fourths from one fourth to four. Write this sequence on a sheet of paper. Which number is between $2\frac{1}{2}$ and 3? Which number is halfway between 3 and 4?

NEW CONCEPT

We can show division in more than one way. Here we show "fifteen divided by three" three different ways:

$$3\overline{)15} \qquad 15 \div 3 \qquad \frac{15}{3}$$

The first way uses a division box. The second way uses a division sign. The third way uses a division bar.

Example 1 Use digits and division symbols to show "twenty-four divided by six" three ways.

Solution $\mathbf{6\overline{)24}} \qquad \mathbf{24 \div 6} \qquad \mathbf{\frac{24}{6}}$

Example 2 Solve:

(a) $28 \div 4$ (b) $\frac{27}{3}$

Solution (a) We read this as "twenty-eight divided by four." It means the same thing as $4\overline{)28}$.

$$28 \div 4 = \mathbf{7}$$

(b) We read this as "twenty-seven divided by three." It means the same thing as $3\overline{)27}$.

$$\frac{27}{3} = \mathbf{9}$$

A multiplication fact has three numbers. With these three numbers we can form one other multiplication fact and two division facts.[†] Together, all four facts form a multiplication and division fact family.

$$6 \times 4 = 24 \qquad 24 \div 4 = 6$$

$$4 \times 6 = 24 \qquad 24 \div 6 = 4$$

Example 3 Use the numbers 3, 5, and 15 to write two multiplication facts and two division facts.

Solution $\mathbf{3 \times 5 = 15} \qquad \mathbf{15 \div 5 = 3}$

$\mathbf{5 \times 3 = 15} \qquad \mathbf{15 \div 3 = 5}$

LESSON PRACTICE

Practice set Divide:

a. $49 \div 7$ **b.** $45 \div 9$ **c.** $40 \div 8$

d. $\frac{36}{6}$ **e.** $\frac{32}{8}$ **f.** $\frac{27}{3}$

Use digits and three different division symbols to show:

g. twenty-seven divided by nine

h. twenty-eight divided by seven

i. Use the numbers 12, 3, and 4 to write two multiplication facts and two division facts.

MIXED PRACTICE

Problem set

1. (31, 41) Brand A costs two dollars and forty-three cents. Brand B costs five dollars and seven cents. Brand B costs how much more than Brand A?

2. (47) The numbers 3, 4, and 12 form a multiplication and division fact family.

$$3 \times 4 = 12 \qquad 12 \div 4 = 3$$

$$4 \times 3 = 12 \qquad 12 \div 3 = 4$$

Write four multiplication/division facts using the numbers 4, 5, and 20.

3. (Inv. 4, 43) What is the sum of the decimal numbers two and three tenths and eight and nine tenths?

[†] This statement assumes that zero is not a factor and that the factors are different numbers.

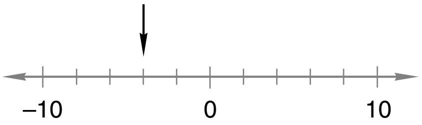
4. *(10)* Use the digits 1, 5, 6, and 8 once each to write an even number greater than 8420.

5. *(Inv. 4)* (a) Compare: $1\frac{1}{2} \bigcirc 1.75$

(b) Use words to write the greater of the two numbers you compared in part (a).

6. *(Inv. 3)* Chad will use square floor tiles that are one foot on each side to cover a hallway that is eight feet long and four feet wide. How many floor tiles will Chad need?

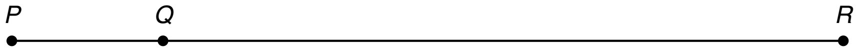
7. *(Inv. 1)* To what number is the arrow pointing?



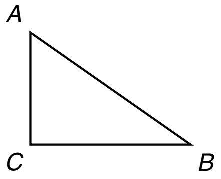
8. *(36)* (a) Five dimes are what fraction of a dollar?

(b) Write the value of five dimes using a dollar sign and a decimal point.

9. *(45)* The length of segment *PQ* is 2 cm. The length of segment *PR* is 11 cm. How long is segment *QR?*



10. *(23, 45)* Which segment in this triangle appears to be perpendicular to segment *AC?*



11. *(42)* Round 3296 to the nearest hundred.

12. *(33)* Use words to write 15,000,000.

13. *(Inv. 3, 45)* $95 - (7 \times \sqrt{64})$

14. *(43)* $2.53 + 45¢ + $3

15. *(24, 43)*
$$\begin{array}{r} N \\ -\ 5.1 \\ \hline 2.3 \end{array}$$

16. *(42)*
$$\begin{array}{r} 40 \\ \times\ \ 3 \\ \hline \end{array}$$

17. *(44)*
$$\begin{array}{r} 51 \\ \times\ \ 5 \\ \hline \end{array}$$

18. *(47)* $28 \div 7$

19. *(47)* $81 \div 9$

20. *(47)* $35 \div 7$

21. *(47)* $16 \div 4$

22. *(47)* $\frac{28}{4}$

23. *(47)* $\frac{42}{7}$

24. *(47)* $\frac{48}{8}$

25. *(47)* $\frac{45}{5}$

26. *(47)* Which of these does not show 24 divided by 4?

A. $24\overline{)4}$ B. $\frac{24}{4}$ C. $24 \div 4$ D. $4\overline{)24}$

27. *(20, Inv. 4)* (a) Is \$12.90 closer to \$12 or to \$13?

(b) Is 12.9 closer to 12 or to 13?

LESSON 48

Multiplying Two-Digit Numbers, Part 2

WARM-UP

Facts Practice: Multiplication Facts: Memory Group (Test F)

Mental Math:

Add hundreds, then tens, and then ones, regrouping tens:

a. 466 + 72 **b.** \$3.59 + \$2.50 **c.** 572 + 186

Review:

d. 400 + 160 + 30 **e.** \$4.60 + \$2.45 **f.** \$6.24 + \$2.98

Problem Solving:

The hands of a clock point in opposite directions at 6:00. They also point in opposite directions at about 12:33. Name nine more times the hands of a clock point in opposite directions. (Answers will be approximate.)

NEW CONCEPT

In Lesson 44 we practiced multiplying two-digit numbers. First we multiplied the digit in the ones place. Then we multiplied the digit in the tens place.

MULTIPLY ONES	MULTIPLY TENS
$\begin{array}{r} 12 \\ \times\ \ 4 \\ \hline 8 \end{array}$	$\begin{array}{r} 12 \\ \times\ \ 4 \\ \hline 48 \end{array}$

Often when we multiply the ones, the result is a two-digit number. When this happens, we do not write both digits below the line. Instead we write the second digit below the line in the ones column and **carry** the first digit above the tens column.

Seven times two is 14. We write the four and carry the one.

$$\begin{array}{r} \overset{1}{1}2 \\ \times\ \ 7 \\ \hline 4 \end{array}$$

Then we multiply the tens digit and **add** the digit that we carried above this column.

Seven times one is seven, plus one is eight.

$$\begin{array}{r} \overset{1}{1}2 \\ \times\ \ 7 \\ \hline 84 \end{array}$$

We can demonstrate this multiplication with $10 bills and $1 bills. To do this, we count out $12 seven times. We use one $10 bill and two $1 bills to make each set of $12. When we are finished, we have seven $10 bills and fourteen $1 bills.


7


14

We exchange ten $1 bills for one $10 bill. We add this bill to the stack of $10 bills, giving us a new total of eight $10 bills and four $1 bills.


8


4

Example Find the product: 8 × $64

Solution We write the two-digit number above the one-digit number. We think of $64 as 6 tens and 4 ones. We multiply 8 by 4 ones and get 32 ones ($32). We write the 2 of $32 below the line. The 3 of $32 is 3 tens, so we write "3" above the tens column.

$$\begin{array}{r} \overset{3}{\$6}4 \\ \times \quad 8 \\ \hline 2 \end{array}$$

Then we multiply 8 by 6 tens, which is 48 tens. We add the 3 tens to this and get 51 tens. We write "51" below the line. The product is **$512.**

$$\begin{array}{r} \overset{3}{\$6}4 \\ \times \quad 8 \\ \hline \$512 \end{array}$$

LESSON PRACTICE

Practice set* Find each product:

a. $\begin{array}{r} 16 \\ \times \quad 4 \\ \hline \end{array}$

b. $\begin{array}{r} 24 \\ \times \quad 3 \\ \hline \end{array}$

c. $\begin{array}{r} \$45 \\ \times \quad 6 \\ \hline \end{array}$

d. 53 × 7

e. 35 × 8

f. 64 × 9

g. Use money manipulatives to demonstrate this multiplication:

$14 × 3

MIXED PRACTICE

Problem set

1. Write four multiplication/division facts using the numbers 3, 5, and 15.
(47)

2. There were four hundred seventy-two birds in the first flock. There were one hundred forty-seven birds in the second flock. How many fewer birds were in the second flock?
(31)

3. Rae hiked forty-two miles. Then she hiked seventy-five more miles. How many miles did she hike in all?
(1, 17)

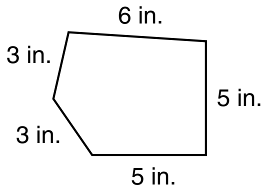
4. Use the digits 1, 3, 6, and 8 once each to write an odd number between 8000 and 8350.
(10)

5. Write 306,020 in expanded form. Then use words to write the number.
(16, 33)

6. Draw and shade circles to show the number $2\frac{1}{8}$.
(35)

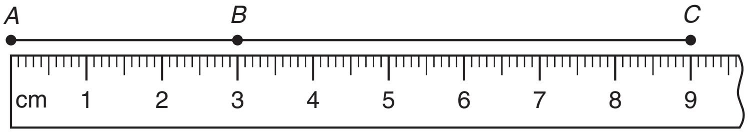
7. How many feet are in 1 mile?
(Inv. 2)

8. What is the perimeter of this figure?
(Inv. 2)



9. A meterstick broke into two pieces. If one piece was 54 cm long, how long was the other piece?
(Inv. 2)

10. Find the length of segment *BC.*
(45)



11. 100 + (4 × 50)
(42, 45)

12. \$3.25 + 37¢ + \$3
(43)

13. $\sqrt{4} \times \sqrt{9}$
(Inv. 3)

14. (48) $\begin{array}{r} 33 \\ \times\ \ 6 \\ \hline \end{array}$

15. (48) $\begin{array}{r} 24 \\ \times\ \ 5 \\ \hline \end{array}$

16. (42) $\begin{array}{r} 90 \\ \times\ \ 6 \\ \hline \end{array}$

17. (48) $\begin{array}{r} \$42 \\ \times\ \ \ 7 \\ \hline \end{array}$

18. (41) $\begin{array}{r} \$5.06 \\ -\ \$2.28 \\ \hline \end{array}$

19. (43) $\begin{array}{r} 1.45 \\ +\ 2.70 \\ \hline \end{array}$

20. (43) $\begin{array}{r} 3.25 \\ -\ 1.50 \\ \hline \end{array}$

21. (17) $\begin{array}{r} 14 \\ 28 \\ 45 \\ 36 \\ 92 \\ +\ 47 \\ \hline \end{array}$

22. (47) $28 \div 7$

23. (46) $5\overline{)35}$

24. (46) $6\overline{)54}$

25. (47) $\dfrac{63}{7}$

26. (Inv. 3) A rectangle has an area of 12 sq. in. Which of these could not be the length and width of the rectangle?

A. 4 in. by 3 in.

B. 6 in. by 2 in.

C. 12 in. by 1 in.

D. 4 in. by 2 in.

27. (45) Which property of multiplication is shown here?

$$5 \times (2 \times 7) = (5 \times 2) \times 7$$

LESSON

49 Stories About Equal Groups, Part 1

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Add hundreds, then tens, and then ones, regrouping tens and ones:

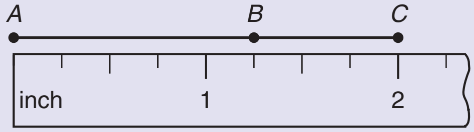
a. 258 + 154 **b.** \$367 + \$265 **c.** 587 + 354

Review:

d. 54 + 19 + 110 **e.** 620 + 40 + 115 **f.** 480 − 115

Problem Solving:

From point A to point B is $1\frac{1}{4}$ inches. How many inches is it from point B to point C?



NEW CONCEPT

We have found that some story problems have an addition pattern. The addition pattern has three numbers. If we know two of the numbers, we can find the third number.

$$\begin{array}{r} 5 \text{ marbles} \\ + \ 7 \text{ marbles} \\ \hline 12 \text{ marbles} \end{array}$$

Some story problems have a subtraction pattern. The subtraction pattern has three numbers. If we know two of the numbers, we can find the third number.

$$\begin{array}{r} 12 \text{ marbles} \\ - \quad 7 \text{ marbles} \\ \hline 5 \text{ marbles} \end{array}$$

Some story problems have a multiplication pattern. The multiplication pattern also has three numbers. If we know two of the numbers, we can find the third number.

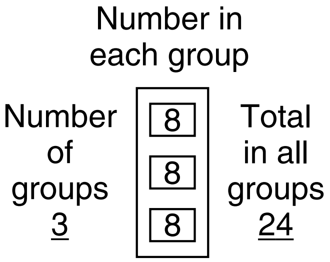
$$\begin{array}{l} \quad 8 \text{ marbles in each bag} \\ \times \ 3 \text{ bags} \\ \hline \ 24 \text{ marbles} \end{array}$$

Stories that have a multiplication pattern are often **"equal groups"** stories. Look at this pattern carefully:

Number **in** each group
× Number **of** groups
Total

Number of groups × number in each group = total

We multiply the number in each group by the number of groups to find the total. If we want to find the number of groups or the number in each group, we divide. Here is a diagram we can use for "equal groups" stories:



Example 1 Ted has 5 cans of tennis balls. There are 3 tennis balls in each can. How many tennis balls does Ted have?

Solution The words *in each* are a clue to this problem. The words *in each* usually mean that the problem is an "equal groups" problem.

We write the number and the words that go with *in each* on the first line. This is the number in each group. We write the number and word *5 cans* as the number of groups. To find the total, we multiply.

PATTERN	PROBLEM
Number **in** each group	3 tennis balls in each can
× Number **of** groups	× 5 cans
Total	**15 tennis balls**

Here we solve the problem sideways:

PATTERN:

Number of groups × number in each group = total

PROBLEM:

5 cans × 3 tennis balls in each can = 15 tennis balls

Example 2 Twelve eggs make a dozen. How many eggs make five dozen?

Solution There are twelve eggs in each dozen.

PATTERN:
Number of groups × number in each group = total

PROBLEM:
5 dozen × 12 eggs in each dozen = 60 eggs

It takes **60 eggs** to make five dozen.

LESSON PRACTICE

Practice set Solve each "equal groups" problem. Write a multiplication pattern for each problem.

a. There were 8 birds in each flock. There were 6 flocks. How many birds were there in all?

b. There are 6 people in each car. There are 9 cars. How many people are there in all?

c. Four dozen doughnuts is how many doughnuts?

MIXED PRACTICE

Problem set

1. *(49)* There were 8 boys in each row. There were 4 rows. How many boys were in all 4 rows? Write a multiplication pattern and solve the problem.

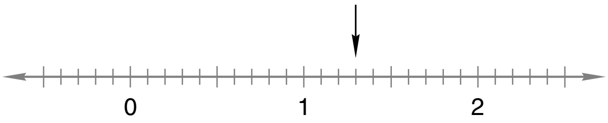
2. *(49)* There were 7 girls in each row. There were 9 rows. How many girls were in all 9 rows? Write a multiplication pattern and solve the problem.

3. *(47)* Write four multiplication/division facts using the numbers 5, 6, and 30.

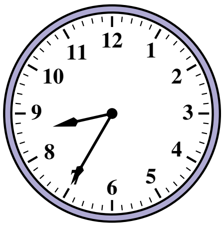
4. *(31)* The bigger animal weighed four hundred seventy-five pounds. The smaller animal weighed one hundred eleven pounds. How much more did the bigger animal weigh?

5. *(35)* Shade circles to show the number $2\frac{3}{4}$.

6. *(37)* To what number is the arrow pointing?



7. It is evening. What time will it be two and one half hours from now?
(27)

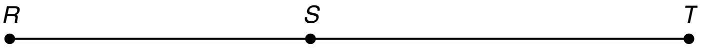


8. Draw a rectangle that is 4 cm by 2 cm and shade $\frac{7}{8}$ of it.
(21, 26)

9. Use digits to write three million, seven hundred fifty thousand. Which digit is in the hundred-thousands place?
(33, 34)

10. Use the decimal numbers 1.4, 0.7, and 2.1 to write two addition facts and two subtraction facts.
(6, 43)

11. The length of segment *RT* is 9 cm. The length of segment *ST* is 5 cm. What is the length of segment *RS?*
(45)



12. $\begin{array}{r} \$3.07 \\ -\ \$2.28 \\ \hline \end{array}$
(41)

13. $\begin{array}{r} 4.78 \\ -\ 3.90 \\ \hline \end{array}$
(43)

14. $\begin{array}{r} 7.07 \\ -\ \quad N \\ \hline 4.85 \end{array}$
(24, 43)

15. $\begin{array}{r} C \\ -\ 2.3 \\ \hline 4.8 \end{array}$
(16, 43)

16. $403 - (5 \times 80)$
(42, 45)

17. $(4 + 3) \times \sqrt{64}$
(Inv. 3, 45)

18. $6N = 30$
(41)

19. $(587 - 238) + 415$
(45)

20. $\begin{array}{r} 45 \\ \times\ \ 6 \\ \hline \end{array}$
(48)

21. $\begin{array}{r} 23 \\ \times\ \ 7 \\ \hline \end{array}$
(48)

22. $\begin{array}{r} \$34 \\ \times\ \ \ 8 \\ \hline \end{array}$
(48)

23. $56 \div 7$
(47)

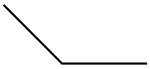
24. $64 \div 8$
(47)

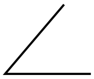
25. $\frac{45}{9}$
(47)

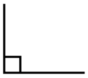
26. The radius of a circle is 3 ft. Which of the following is not the diameter of the circle?
(Inv. 2, 21)

A. 36 in. B. 6 ft C. 2 yd D. 72 in.

27. Which of these angles is acute?
(23)

A.


B.


C.


LESSON

50 Adding and Subtracting Decimal Numbers, Part 2

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Add hundreds, then tens, and then ones, regrouping tens and ones:

a. 589 + 46 **b.** 375 + 425 **c.** \$5.64 + \$1.46

Review:

d. \$389 + \$195 **e.** 76 + 9 + 10 **f.** 500 + 43 + 264

Problem Solving:

Name the next two members of this sequence:


,

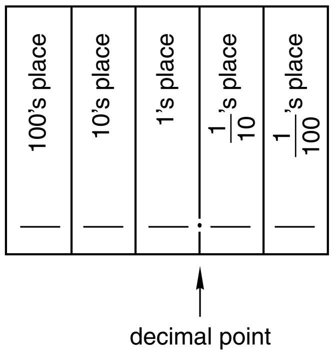
,

, …

NEW CONCEPT

We have added and subtracted decimal numbers by lining up the decimal points and adding or subtracting the digits in each column. We line up the decimal points to ensure that we are adding and subtracting digits with the same place value.

The chart below shows place values from hundreds to hundredths. We use the decimal point as a guide for finding the value of each place. To the left of the decimal point is the ones place, then the tens place, and then the hundreds place. To the right of the decimal point is the tenths $\left(\frac{1}{10}\right)$ place and then the hundredths $\left(\frac{1}{100}\right)$ place.



Example 1 Name the place value of the 3 in each number:

(a) 23.4 (b) 2.34 (c) 32.4 (d) 4.23

Solution (a) **ones** (b) **tenths**

(c) **tens** (d) **hundredths**

In this lesson we will begin adding and subtracting decimal numbers that do not have the same number of decimal places.

Example 2 Add: 3.75 + 12.5 + 2.47

Solution To add decimal numbers with pencil and paper, we focus on lining up the decimal points, not the last digits.

Line up decimal points.

$$\begin{array}{r@{.}l} \overset{1}{3} & \overset{1}{7}5 \\ 12 & 5 \\ +\quad 2 & 47 \\ \hline \mathbf{18} & \mathbf{72} \end{array} \quad \longleftarrow \text{Treat an "empty place" like a zero.}$$

Example 3 Subtract: 4.25 − 2.5

Solution We line up the decimal points and subtract.

Line up decimal points.

$$\begin{array}{r@{.}l} \overset{3}{\cancel{4}} & {}^{1}25 \\ -\quad 2 & 5 \\ \hline \mathbf{1} & \mathbf{75} \end{array} \quad \longleftarrow \text{Treat an "empty place" like a zero.}$$

LESSON PRACTICE

Practice set*

a. Which digit in 23.5 is in the tenths place?

b. Which digit in 245.67 is in the hundredths place?

c. Which digit in 12.5 is in the same place as the 7 in 3.75?

Find each sum or difference:

d. 4.35 + 2.6 **e.** 4.35 − 2.6

f. 12.1 + 3.25 **g.** 15.25 − 2.5

h. 0.75 + 0.5 **i.** 0.75 − 0.7

MIXED PRACTICE

Problem set

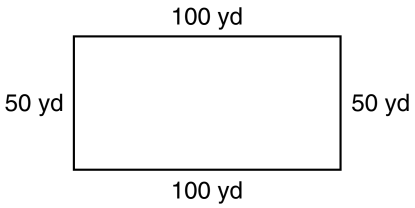
1. (49) Each of the 3 lifeboats carried 12 people. In all, how many people were in the 3 lifeboats? Write a multiplication pattern and solve the problem.

2. (22, 35) The tape cost \$6.98. The tax was 42¢. What was the total price?

3. (31) Sarah did six hundred twenty sit-ups. Ashanti did four hundred seventeen sit-ups. Sarah did how many more sit-ups than Ashanti?

4. (47) Use the numbers 4, 12, and 48 to write two multiplication facts and two division facts.

5. (Inv. 2) Justin ran the perimeter of the block. How far did Justin run? The measurements of the block are shown on the figure below.

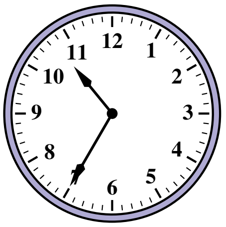


6. (Inv. 4) Justin ran around the block in 58.7 seconds. Write 58.7 with words.

7. (33, 34) Use digits to write twelve million, seven hundred fifty thousand. Which digit is in the hundred-thousands place?

8. (42) Round 783 and 217 to the nearest hundred. Then subtract the smaller rounded number from the larger rounded number.

9. (27) It is evening. What time will it be 9 hours and 30 minutes from now?



10. (27) Write this addition problem as a multiplication problem:

$$\$3.75 + \$3.75 + \$3.75 + \$3.75$$

11. $(4 \times 50) - \sqrt{36}$
(Inv. 3, 42, 45)

12. $3.6 + 4.35 + 4.2$
(50)

13. \$4.63 + \$2 + 47¢ + 65¢
(43)

14. *(48)*
$$\begin{array}{r} 43 \\ \times \quad 6 \\ \hline \end{array}$$

15. *(48)*
$$\begin{array}{r} 54 \\ \times \quad 8 \\ \hline \end{array}$$

16. *(48)*
$$\begin{array}{r} 37 \\ \times \quad 3 \\ \hline \end{array}$$

17. *(42, 48)*
$$\begin{array}{r} \$40 \\ \times \quad 4 \\ \hline \end{array}$$

18. $4.7 + 5.5 + 8.4 + 6.3 + 2.4 + 2.7$
(43)

19. \$5.00 − \$4.29
(41)

20. $7.03 - 4.2$
(50)

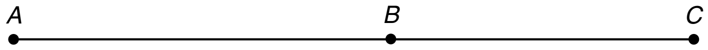
21. *(24, 43)*
$$\begin{array}{r} N \\ -\ 27.9 \\ \hline 48.4 \end{array}$$

22. *(24, 43)*
$$\begin{array}{r} 46.2 \\ +\quad C \\ \hline 52.9 \end{array}$$

23. $\dfrac{24}{3}$
(47)

24. $\dfrac{36}{9}$
(47)

25. The length of segment *AB* is 5 cm. The length of segment *BC* is 4 cm. What is the length of segment *AC*?
(45)



26. Draw and shade circles to show the number $3\frac{3}{8}$.
(35)

27. Compare: 1 minute ○ 58.7 seconds
(19, Inv. 4)

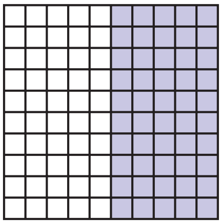
INVESTIGATION 5

Focus on

Percents

A part of a whole can be named with a fraction, with a decimal number, or with a **percent.**

$\frac{1}{2}$ of the square is shaded.
0.50 of the square is shaded.
50% of the square is shaded.



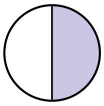
We read 50% as "fifty percent." A percent is a fraction with a denominator of 100. The percent sign (%) represents the denominator 100.

$$50\% \text{ means } \frac{50}{100}$$

Just as 50 cents is $\frac{1}{2}$ of a whole dollar, so 50 percent is $\frac{1}{2}$ of a whole. The close relationship between cents and percents can help us understand percents.

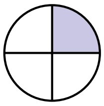
One half of a dollar is 50 cents.

One half is shaded.
50% is shaded.



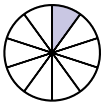
One fourth of a dollar is 25 cents.

One fourth is shaded.
25% is shaded.



One tenth of a dollar is 10 cents.

One tenth is shaded.
10% is shaded.



Naming percents of a dollar

1. A quarter is what fraction of a dollar?

2. A quarter is what percent of a dollar?

3. A dime is what fraction of a dollar?

4. A dime is what percent of a dollar?

5. A penny is what fraction of a dollar?

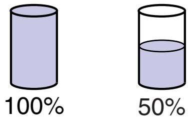
6. A penny is what percent of a dollar?

7. A nickel is what fraction of a dollar?

8. A nickel is what percent of a dollar?

Estimating percents of a whole

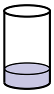
In the picture below the glass on the left is 100% full. The glass on the right is 50% full.



In problems 9–12 find the best choice for how full each glass is.

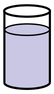
9. This glass is what percent full?

A. 20%
B. 40%
C. 60%
D. 80%



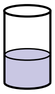
10. This glass is what percent full?

A. 25%
B. 50%
C. 75%
D. 100%



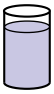
11. This glass is what percent full?

A. 20%
B. 40%
C. 60%
D. 80%



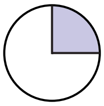
12. This glass is what percent full?

A. 20%
B. 40%
C. 60%
D. 80%



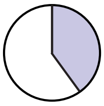
Finding the remaining percent of a whole

The parts of a whole total 100%. So if 25% of this circle is shaded, then 75% is not shaded.

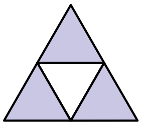


25% + 75% = 100%

13. If 40% of this circle is shaded, then what percent is not shaded?



14. Seventy-five percent of the figure is shaded. What percent is not shaded?



15. If 80% of the answers were correct, then what percent of the answers were not correct?

16. If the chance of rain is 10%, then what is the chance that it will not rain?

Comparing percents to one half

Complete each comparison in problems 17–19. State the reason for your answer.

17. Compare: 48% ○ $\frac{1}{2}$

18. Compare: 52% ○ $\frac{1}{2}$

19. Compare: 50% ○ $\frac{1}{3}$

20. Forty percent of the students in the class were boys. Were there more boys or girls in the class? Explain your answer.

Finding 50% of a number

To find one half of a number, we divide the number into two equal parts. Since 50% equals $\frac{1}{2}$, we find 50% of a number by dividing it into two equal parts. Answer these questions about 50% of a number, and describe how to find each answer.

21. How many eggs is 50% of a dozen?

22. How many minutes is 50% of an hour?

23. How much money is 50% of $10?

24. How many hours is 50% of a day?

Activity: *Percent*

Materials needed:

- Activity Master 9 (1 copy per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)

Distribute Activity Master 9. Have students complete problems 1–6 on the master (shading portions of shapes and then finding the percent that remains unshaded). Provide assistance as necessary.

LESSON

51

Adding Numbers with More Than Three Digits • Checking One-Digit Division

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Subtract a multiple of 10 from 100:

a. 100 − 40
b. 100 − 70
c. 100 − 20
d. Count by thousands from 1000 to 10,000.

Review:

e. 465 + 175
f. \$3.50 − \$1.35
g. 346 + 29
h. What number should be added to each of these numbers for the total to be 9: 6, 4, 7, 1?

Problem Solving:

On Christmas Day, 1995, Marta's brother turned eighteen months old. What was the date of her brother's birth?

NEW CONCEPTS

Adding numbers with more than three digits

When using pencil and paper to add numbers that have more than three digits, we add in the ones column first. Then we add in the tens column, the hundreds column, the thousands column, the ten-thousands column, and so forth. When the sum of the digits in a column is a two-digit number, we record the second digit below the line. We write the first digit above (or below) the column to the left.

Example 1 Add:

$$\begin{array}{r} 43{,}287 \\ +\ 68{,}595 \\ \hline \end{array}$$

Solution We add the digits in the ones column first. Then we add the digits in the other columns. When the sum is a two-digit number, we write the second digit below the line and the first digit above (or below) the column to the left.

$$\begin{array}{r} \overset{1}{4}3{,}\overset{1}{2}\overset{1}{8}7 \\ +\ 68{,}595 \\ \hline \mathbf{111{,}882} \end{array}$$

Example 2 Add: 456 + 1327 + 52 + 3624

Solution When we write the numbers in columns, we are careful to line up the last digit in each number. We add the digits one column at a time, starting from the right. In this example we show the carried numbers written below the columns.

$$\begin{array}{r} 456 \\ 1327 \\ 52 \\ +\ 3624 \\ {\scriptstyle 1\,1\,1\ } \\ \hline \mathbf{5459} \end{array}$$

Checking one-digit division

We can check a division answer by multiplying the numbers outside the division box:

$$\begin{array}{r} 4 \\ 3\overline{)12} \end{array} \longrightarrow \begin{array}{r} 4 \\ \times\ 3 \\ \hline 12 \end{array}\ \text{check}$$

We see that the product matches the number inside the division box. We usually show this by writing the product under the number in the division box.

$$\begin{array}{rl} 4 & \\ 3\overline{)12} & \longleftarrow \textbf{Step 1.}\ \text{Divide 12 by 3 and write "4."} \\ 12 & \longleftarrow \textbf{Step 2.}\ \text{Multiply 4 by 3 and write "12."} \end{array}$$

Example 3 Divide. Check the answer by multiplying.

(a) $3\overline{)18}$ (b) $4\overline{)32}$

Solution First we divide and write the answer above the box. Then we multiply and write the product below the box.

(a) $\begin{array}{r} \mathbf{6} \\ 3\overline{)18} \\ 18 \end{array}$ (b) $\begin{array}{r} \mathbf{8} \\ 4\overline{)32} \\ 32 \end{array}$

Practice using multiplication to check all your division answers in the problem sets.

LESSON PRACTICE

Practice set Add:

a. $\begin{array}{r} 4356 \\ +\ 5644 \\ \hline \end{array}$ **b.** $\begin{array}{r} 46{,}027 \\ +\ 39{,}682 \\ \hline \end{array}$ **c.** $\begin{array}{r} 360{,}147 \\ +\ 96{,}894 \\ \hline \end{array}$

d. 436 + 5714 + 88 **e.** 43,284 + 572 + 7635

Divide. Check each answer by multiplying.

f. $3\overline{)21}$ **g.** $7\overline{)42}$ **h.** $6\overline{)48}$

MIXED PRACTICE

Problem set

1. *(49)* In the P.E. class there were four teams. Each team had eight players. How many players were on all four teams? Write a multiplication pattern and solve the problem.

2. *(49)* There were 7 pancakes in each stack. There were 6 stacks of pancakes. How many pancakes were there in all? Write a multiplication pattern and solve the problem.

3. *(31, 43)* Luis ran the first lap in 63.4 seconds and the second lap in 65.3 seconds. Luis ran the first lap how much faster than the second lap?

4. *(47)* Write four multiplication/division facts using the numbers 6, 7, and 42.

5. *(Inv. 1, Inv. 3)* Compare: 1 + 3 + 5 + 7 + 9 ○ five squared

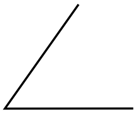
6. *(20, 42)* (a) Round 367 to the nearest hundred.

(b) Round 367 to the nearest ten.

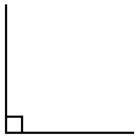
7. *(Inv. 5)* Draw a circle and shade 50% of it.

8. *(23)* Name each type of angle shown below:

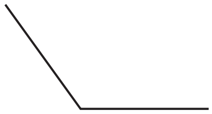
(a)



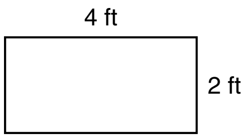
(b)



(c)



9. *(Inv. 2, Inv. 3)* A rectangle is shown at right.



(a) What is its length?

(b) What is its width?

(c) What is its perimeter?

(d) What is its area?

10. *(40, Inv. 4)* The 3-quart juice container held 2.84 L of juice. Use words to write 2.84 L.

11. *(50)* $15.24 + 18.5$

12. *(51)*
$$\begin{array}{r} 63{,}285 \\ +\ 97{,}642 \\ \hline \end{array}$$

13. *(41)*
$$\begin{array}{r} \$5.00 \\ -\ \$4.81 \\ \hline \end{array}$$

14. *(24, 43)*
$$\begin{array}{r} N \\ +\ 39.8 \\ \hline 61.4 \end{array}$$

15. *(48)*
$$\begin{array}{r} 85 \\ \times\ \ 5 \\ \hline \end{array}$$

16. *(48)*
$$\begin{array}{r} 37 \\ \times\ \ 7 \\ \hline \end{array}$$

17. *(42)*
$$\begin{array}{r} 40 \\ \times\ \ 8 \\ \hline \end{array}$$

18. *(41)*
$$\begin{array}{r} F \\ \times\ 8 \\ \hline 72 \end{array}$$

19. *(24, 43)*
$$\begin{array}{r} 47.8 \\ -\ \ \ C \\ \hline 20.3 \end{array}$$

20. *(51)*
$$\begin{array}{r} 462{,}586 \\ +\ \ 39{,}728 \\ \hline \end{array}$$

21. *(16, 43)*
$$\begin{array}{r} Z \\ -\ 4.78 \\ \hline 2.63 \end{array}$$

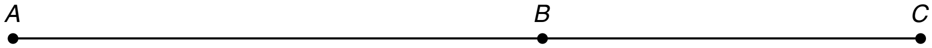
Divide. Check each answer by multiplying.

22. *(51)* $2\overline{)18}$

23. *(51)* $7\overline{)21}$

24. *(51)* $\frac{56}{8}$

25. *(45)* The length of $\overline{AB}$ is 7 cm. The length of $\overline{AC}$ is 12 cm. How long is $\overline{BC}$?



26. *(Inv. 5)* If half the students are boys, then what percent of the students are girls?

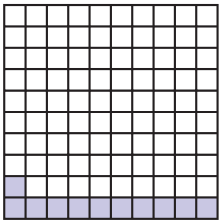
27. *(28, 41)* If $5N = 0$, then what does $6N$ equal?

28. *(Inv. 4, Inv. 5)*

(a) What fraction of the large square is shaded?

(b) What percent of the large square is shaded?

(c) The shaded part of the large square represents what decimal number?



LESSON

52

Subtracting Numbers with More Than Three Digits • Stories About Equal Groups, Part 2

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Subtract a multiple of 10 from a multiple of 100:

a. 200 − 30 **b.** 300 − 60 **c.** 400 − 90

Review:

d. \$2.48 + \$2.99 **e.** 384 + 167 **f.** 46 + 7 + 30

g. What number should be added to each of these numbers for the total to be 9: 8, 2, 5, 3?

Problem Solving:

A loop is worth five points, and a tip is worth three points. Sal made four loops and two tips. Cheryl made three loops and five tips. How many points did each person earn?

NEW CONCEPTS

Subtracting numbers with more than three digits

When using pencil and paper to subtract numbers with more than three digits, we begin by subtracting in the ones column. We regroup if necessary. Then we move one column to the left and subtract in the tens column, regrouping if necessary. Then we subtract in the hundreds column, the thousands column, the ten-thousands column, and so on. Sometimes we must subtract across several zeros.

Example 1 Subtract: 36,152 − 9,415

Solution We write the first number above the second number. We line up digits with the same place value. First we subtract in the ones column. Then we subtract in the other columns.

$$\begin{array}{r} \overset{2}{\cancel{3}}\,\overset{{}^{1}5}{\cancel{6}},{}^{1}1\,\overset{4}{\cancel{5}}\,{}^{1}2 \\ -\quad 9,4\,1\,5 \\ \hline \mathbf{26,737} \end{array}$$

Example 2 Subtract:

$$\begin{array}{r} \$5000 \\ -\ \$2386 \\ \hline \end{array}$$

Solution We need to find some ones for the ones place before we can subtract. We may do this in one step by thinking of the "500" in 5000 as 500 tens. We exchange one of these tens for ten ones, leaving 499 tens. Then we subtract.

$$\begin{array}{r} \$\overset{4}{\cancel{5}}\,\overset{9}{\cancel{0}}\,\overset{9}{\cancel{0}}\,{}^{1}0 \\ -\ \$2\,3\,8\,6 \\ \hline \mathbf{\$2\,6\,1\,4} \end{array}$$

Stories about equal groups, part 2

"Equal groups" stories have a multiplication pattern. If we know the number of groups and the number in each group, we multiply to find the total. However, if we know the total, then we need to *divide* to find the number of groups or the number in each group.

Example 3 Ted has 21 tennis balls in cans. There are 3 tennis balls in each can. How many cans does he have?

Solution There are two numbers in this problem. The words *in each* are a clue. They show us the number of objects in each group (3 tennis balls). The other number is 21. We need to decide whether this is the number of groups or the total. Altogether, Ted has 21 tennis balls. This is the total.

PATTERN	PROBLEM
Number **in** each group	3 tennis balls in each can
× Number **of** groups	× N cans
Total	21 tennis balls

Since we know the total, we divide the total by the number in each group to find the number of groups.

$$\begin{array}{r} 7 \\ 3\overline{)21} \\ 21 \end{array}$$

We check our answer by multiplying: 7 times 3 tennis balls is 21 tennis balls. Our answer is correct. Ted has **7 cans.**

Example 4 Ted has 5 cans of racquetballs. He has 40 racquetballs in all. If each can contains the same number of racquetballs, how many racquetballs are in each can?

Solution The words *in each* show us that this is an "equal groups" problem. However, we are not given an *in each* number.

Pattern:
Number of groups × number in each group = total

Problem:
5 cans × N racquetballs in each can = 40 racquetballs

To find the number in each can, we divide 40 by 5.

$$\begin{array}{r} 8 \\ 5\overline{)40} \\ 40 \end{array}$$

We see that 5 times 8 racquetballs equals 40 racquetballs, so our answer is correct. There are **8 racquetballs** in each can.

LESSON PRACTICE

Practice set* Subtract:

a. $\begin{array}{r} 4783 \\ -\ 2497 \\ \hline \end{array}$

b. $\begin{array}{r} 4000 \\ -\ \ 527 \\ \hline \end{array}$

c. $\begin{array}{r} \$20.00 \\ -\ \$12.25 \\ \hline \end{array}$

d. There were 35 people. There were 7 cars. The number of people in each car was the same. How many people were in each car? Write a multiplication pattern and solve the problem.

e. Thirty students were arranged in rows. Six students were in each row. How many rows were there? Write a multiplication pattern and solve the problem.

MIXED PRACTICE

Problem set

1. *(49)* There were 8 buses. Each bus could seat 60 students. How many students could ride in all the buses? Write a multiplication pattern and solve the problem.

2. *(52)* Each van could carry 9 students. There were 63 students. How many vans were needed to carry all of the students? Write a multiplication pattern and solve the problem.

3. *(52)* The coach separated 28 players into 4 equal teams. How many players were on each team? Write a multiplication pattern and solve the problem.

4. *(25)* There are 10 swimmers in the race. Only 3 can be awarded medals. How many swimmers will not win a medal?

5. *(31, 43)* Lindsey finished first in the 100-meter freestyle race with a time of 57.18 seconds. Tanya finished second with 58.26 seconds. Lindsey finished the race how many seconds sooner than Tanya?

6. *(47)* Write four multiplication/division facts using the numbers 7, 8, and 56.

7. *(Inv. 1, Inv. 3)* Compare: $1 + 2 + 3 + 4 \bigcirc \sqrt{100}$

8. *(3)* What are the next three numbers in this counting sequence?

…, 6000, 7000, 8000, _____, _____, _____, …

9. *(31)* There were two hundred sixty-seven apples in the first bin. There were four hundred sixty-five apples in the second bin. How many fewer apples were in the first bin?

10. *(50)* $8.49 + 7.3 + 6.15$

11. *(41)* $6N = 42$

12. *(51)*
$$\begin{array}{r} 47{,}586 \\ +\ 23{,}491 \\ \hline \end{array}$$

13. *(41)*
$$\begin{array}{r} \$5.00 \\ -\ \$3.26 \\ \hline \end{array}$$

14. *(24, 43)*
$$\begin{array}{r} N \\ +\ 25.8 \\ \hline 60.4 \end{array}$$

15. *(48)*
$$\begin{array}{r} 49 \\ \times\ \ 6 \\ \hline \end{array}$$

16. *(48)*
$$\begin{array}{r} 84 \\ \times\ \ 5 \\ \hline \end{array}$$

17. *(42)*
$$\begin{array}{r} 70 \\ \times\ \ 8 \\ \hline \end{array}$$

18. *(48)*
$$\begin{array}{r} 35 \\ \times\ \ 9 \\ \hline \end{array}$$

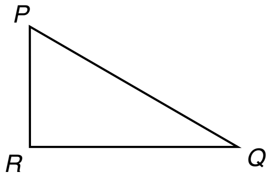
19. *(24, 41)*
$$\begin{array}{r} 400 \\ -\ \ N \\ \hline 256 \end{array}$$

20. *(52)*
$$\begin{array}{r} \$40.00 \\ -\ \$24.68 \\ \hline \end{array}$$

21. *(20, 42)* (a) Round 639 to the nearest hundred.

(b) Round 639 to the nearest ten.

22. *(23, 45)* Which side of this triangle appears to be perpendicular to $\overline{PR}$?

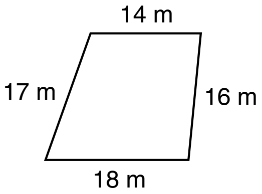


23. *(Inv. 5)* Compare: $49\% \bigcirc \frac{1}{2}$

24. *(51)* Divide. Check each answer by multiplying.

(a) $3\overline{)27}$ (b) $7\overline{)28}$ (c) $8\overline{)72}$

25. *(Inv. 2)* This figure has four sides, but it is not a rectangle. What is the perimeter of this figure?



26. *(20, Inv. 4)* (a) Is $24.10 closer to $24 or to $25?

(b) Is 24.1 closer to 24 or to 25?

27. *(1, 41)* If △ = □, which of these is not necessarily true?

A. △ + 2 = □ + 2

B. 2 × △ = 2 × □

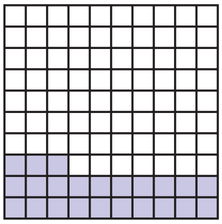
C. △ − 2 = □ − 2

D. 2 × △ = □ + 2

28. *(Inv. 4, Inv. 5)* (a) What fraction of the large square is shaded?

(b) What percent of the large square is shaded?

(c) The shaded part of the large square represents what decimal number?



LESSON

53

One-Digit Division with a Remainder

WARM-UP

Facts Practice: 90 Division Facts (Test I)

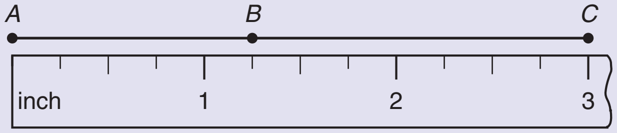
Mental Math:

Nine dimes plus ten pennies total one dollar. We can use this fact to find change back from a dollar. For example, if you pay a dollar for an item that costs 47¢, you should get back 53¢. Notice that the 4 of 47¢ and the 5 of 53¢ equal 9 dimes. The 7 and the 3 equal 10 pennies. Find the change back from a dollar for items with these prices:

a. 46¢ **b.** 64¢ **c.** 28¢ **d.** 52¢ **e.** 17¢ **f.** 85¢

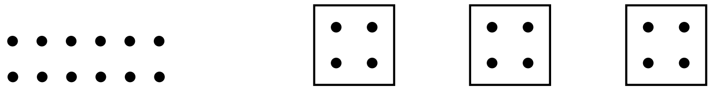
Problem Solving:

From point *A* to point *B* is $1\frac{1}{4}$ inches. From point *B* to point *C* is how many inches?

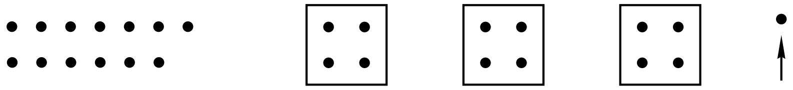


NEW CONCEPT

We can divide 12 objects into equal groups of four. Here we show 12 dots divided into three equal groups of four:



However, we cannot divide 13 dots into equal groups of four, because there is one dot too many. We call the extra dot the **remainder.**



We can show that 13 is to be divided into groups of four by writing

$$4\overline{)13}$$

As we look at this problem, we might wonder what to write for the answer. The answer is not exactly 3, because 3 × 4 is 12, which is less than 13. However, the answer cannot be 4, because 4 × 4 is 16, which is more than 13. Since we *can* make three groups of four, we write "3" for our answer. Then we multiply 3 by 4 and write "12" below the 13.

$$\begin{array}{rl} 3 & \longleftarrow \text{three groups} \\ 4\overline{)13} & \\ 12 & \end{array}$$

We see that 13 is more than 12. Now we find out how much is left over after making three groups of four. To do this, we subtract 12 from 13.

$$\begin{array}{rl} 3 & \longleftarrow \text{three groups} \\ 4\overline{)13} & \\ -\ 12 & \quad \text{subtract} \\ \hline 1 & \longleftarrow \text{1 left over (remainder)} \end{array}$$

There is one left over. The amount left over is the remainder. Using the letter R for *remainder,* we write the answer to the division problem as "3 R 1."

$$\begin{array}{r} 3 \text{ R } 1 \\ 4\overline{)13} \\ -\ 12 \\ \hline 1 \end{array}$$

Example 1 Divide: $3\overline{)16}$

Solution This problem tells us to divide 16 into groups of three. We can use a sketch to help us with the problem. Draw 16 dots and make groups of three dots.

We can make five groups of three. One dot is not in a group of three. We write "5" above the division box, as shown below.

$$\begin{array}{r} 5 \\ 3\overline{)16} \end{array}$$

Since three groups of five is 15, we write "15" below the 16. Then we subtract and find that the remainder is 1.

$$\begin{array}{rl} 5 & \\ 3\overline{)16} & \\ -\ 15 & \\ \hline 1 & \longleftarrow \text{remainder} \end{array}$$

We write the answer as **5 R 1.**

Example 2 Divide: 20 ÷ 6

Solution First we write the problem using a division box.

$$6\overline{)20}$$

We can draw 20 dots and make groups of six, or we can think, “What number times six is close to but not more than 20?” We might start by thinking, “Six times *four* equals 24”; but 24 is too much, so we think, “Six times *three* equals eighteen.” Eighteen is less than 20. We write “3” as shown below.

$$\begin{array}{r} 3 \\ 6\overline{)20} \end{array}$$

Next we multiply; then we subtract.

$$\begin{array}{rl} 3 & \\ 6\overline{)20} & \\ -\ 18 & \\ \hline 2 & \longleftarrow \text{remainder} \end{array}$$

The answer is **3 R 2.**

LESSON PRACTICE

Practice set*

a. Draw dots and make groups to show 14 ÷ 4. Write the answer shown by your sketch.

Divide. Write each answer with a remainder.

b. $3\overline{)17}$ **c.** $5\overline{)12}$ **d.** $4\overline{)23}$

e. 15 ÷ 2 **f.** 25 ÷ 6 **g.** 25 ÷ 3

MIXED PRACTICE

Problem set

1. (52) Eve had 56 washers. She wanted to put them into equal piles of 8 washers. How many piles would she have? Write a multiplication pattern and solve the problem.

2. (52) There were 42 children waiting for a ride. There were 7 cars available. If the same number rode in each car, how many children would be in each car? Write a multiplication pattern and solve the problem.

3. (47) Write four multiplication/division facts using the numbers 4, 7, and 28.

4. *(5)* Which months have exactly 30 days?

5. *(3)* Write the next three numbers in this counting sequence:

…, 16,000, 17,000, 18,000, ______, ______, ______, …

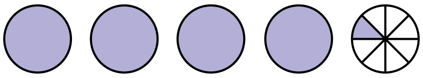
6. *(20, 42)* (a) Round 4728 to the nearest hundred.

(b) Round 4728 to the nearest ten.

7. *(19)* Write the time "a quarter after four in the afternoon" in digital form.

8. *(Inv. 2)* One side of a square is 4 feet long. What is the perimeter of the square?

9. *(35)* How many circles are shaded?



10. *(Inv. 3, 45)* $\sqrt{64} + (42 \div 6)$

11. *(43)* \$6.35 + \$12.49 + 42¢

12. *(52)* \$100.00 − \$59.88

13. *(52)* 51,438 − 47,495

14. *(42)*
$$\begin{array}{r} 60 \\ \times \quad 9 \\ \hline \end{array}$$

15. *(48)*
$$\begin{array}{r} 57 \\ \times \quad 4 \\ \hline \end{array}$$

Divide. Write each answer with a remainder.

16. *(53)* $25 \div 4$

17. *(53)* $22 \div 5$

18. *(53)* $6\overline{)39}$

19. *(53)* $7\overline{)30}$

20. *(48)*
$$\begin{array}{r} 46 \\ \times \quad 8 \\ \hline \end{array}$$

21. *(48)*
$$\begin{array}{r} 38 \\ \times \quad 7 \\ \hline \end{array}$$

22. *(24, 43)*
$$\begin{array}{r} Z \\ -\ 16.5 \\ \hline 40.2 \end{array}$$

23. *(50)* 6.75 + 4.5 + 12.5

24. *(34)* Use digits to write seven million, two hundred sixty thousand.

25. *(40, Inv. 4)* A half-gallon container holds about 1.89 L of fluid. Use words to write 1.89 L.

26. *(28)* Sam said, "I am thinking of two numbers. Their product is 6." The two numbers Sam was thinking of could not be

A. 1 and 6 B. 2 and 3 C. 3 and 2 D. 6 and 0

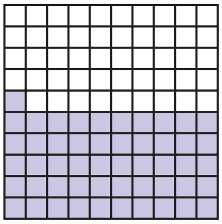
27. *(40, Inv. 5)* (a) A quarter is what percent of a dollar?

(b) A quart is what percent of a gallon?

28. *(Inv. 4, Inv. 5)* (a) What fraction of the large square is shaded?

(b) What percent of the large square is shaded?

(c) The shaded part of the large square represents what decimal number?



LESSON

54

The Calendar • Rounding Numbers to the Nearest Thousand

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find the change back from a dollar for items with these prices:

a. 41¢ **b.** 89¢ **c.** 19¢ **d.** 34¢ **e.** 62¢

Review:

f. 537 + 100 + 19 **g.** \$5.62 + \$3.98 **h.** 396 + 437

Problem Solving:

One way to make a dollar with seven coins is with two quarters and five dimes. Can you find three more ways to make a dollar with seven coins?

NEW CONCEPTS

The calendar

A **year** is the length of time it takes the Earth to travel around the Sun. A **day** is the length of time it takes the Earth to spin around once on its axis. It takes the Earth almost exactly $365\frac{1}{4}$ days to travel around the Sun. To make the number of days in every year a whole number, we have three years in a row that have 365 days each. These years are called **common years.** Then we have one year that has 366 days. A year with 366 days is called a **leap year.**[†]

A year is divided into 12 **months.** The month February has 28 days in common years and 29 days in leap years. Four months have 30 days each. All the rest have 31 days. If we know the four months that have 30 days, we can remember the number of days in the other months. The following jingle helps us remember which months have 30 days:

[†] Sometimes there are 7 years in a row without a leap year. This happens around "century years" that are **not** multiples of 400. For example, the 7-year span 1897–1903 contained no leap years, since 1900 is not a multiple of 400.

Thirty days hath September,
April, June, and November.
February has twenty-eight alone,
All the rest have thirty-one.
Excepting leap year,
That's when February's days are twenty-nine.

A **decade** is ten years. A **century** is one hundred years.

Example 1 How many days does December have?

Solution "Thirty days hath September, April, June, and November. February has twenty-eight alone" tells us that December does not have 30 days. December must have **31 days.**

Example 2 According to this **calendar,** May 10, 2014, is what day of the week?

MAY 2014

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Solution The letters across the top of the calendar stand for "Sunday," "Monday," "Tuesday," "Wednesday," "Thursday," "Friday," and "Saturday." We see that May 10 is a **Saturday,** the second Saturday of the month.

Example 3 How many years were there from 1620 to 1776?

Solution This is a problem about comparing two numbers (the years 1620 and 1776). To find the amount of time between two years, we subtract. Instead of thinking "larger-smaller-difference," we think of the words "later-earlier-difference." We subtract the earlier date from the later date. In this problem that means we subtract 1620 from 1776.

$$\begin{array}{r} 1776 \\ -\ 1620 \\ \hline 156 \end{array}$$

We find that there were **156 years** from 1620 to 1776.

Rounding numbers to the nearest thousand

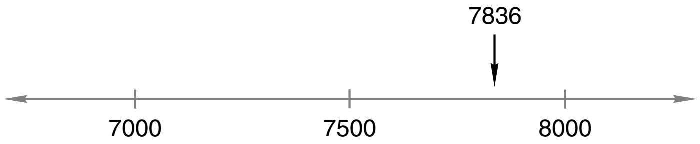
To round a number to the nearest thousand, we find the multiple of 1000 to which the number is closest. The multiples of 1000 are the numbers in this sequence:

1000, 2000, 3000, …

A number line can help us understand rounding.

Example 4 Round 7836 to the nearest thousand.

Solution We know that 7836 is more than 7000 but less than 8000. Halfway from 7000 to 8000 is 7500. Since 7836 is more than halfway from 7000 to 8000, it is nearer 8000.

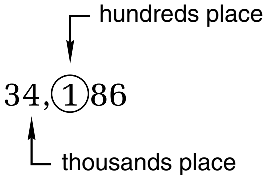


To the nearest thousand, 7836 rounds to **8000.**

Example 5 Round 34,186 to the nearest thousand.

Solution One way to round 34,186 is to see that 34,186 is between 34,000 and 35,000. Halfway from 34,000 to 35,000 is 34,500. Since 34,186 is less than halfway to 35,000, we know that 34,186 is nearer **34,000.**

Another way to round to the nearest thousand is to focus on the digit in the hundreds place.



If the digit in the hundreds place is 5 or more, we add 1 to the digit in the thousands place. If the digit in the hundreds place is 4 or less, we leave the thousands digit unchanged. In either case, all digits to the right of the thousands place become zeros. Here the digit in the hundreds place is 1, so 34,186 rounds down to 34,000.

Example 6 Round 5486 to the nearest

(a) thousand. (b) hundred. (c) ten.

Solution (a) **5000** (b) **5500** (c) **5490**

LESSON PRACTICE

Practice set

a. How many days are in a leap year?

b. According to the calendar in example 2, what is the date of the fourth Friday of the month?

c. How many years were there from 1918 to 1943?

d. A century is how many decades?

Round each number to the nearest thousand:

e. 6746 **f.** 5280 **g.** 12,327

h. 21,694 **i.** 9870 **j.** 27,462

k. Round 6472 to the nearest thousand, to the nearest hundred, and to the nearest ten.

MIXED PRACTICE

Problem set

1. *(52)* There were 7 students in each row. If there were 56 students in all, how many rows were there? Use a multiplication pattern to solve the problem.

2. *(49)* There were 7 nails in each board. If there were 42 boards, how many nails were there? Use a multiplication pattern to solve the problem.

3. *(54)* How many years is 5 decades?

4. *(54)* How many years were there from 1921 to 1938? Use a subtraction pattern to solve the problem.

5. *(54)* According to this calendar, what day of the week was December 25, 1957?

DECEMBER 1957

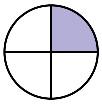
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

6. *(54)* Round 5236 to the nearest thousand. Round 6929 to the nearest thousand. Then add the rounded numbers.

7. *(Inv. 2, 21)* One side of a rectangle is 10 kilometers long. Another side is 20 kilometers long. Draw the rectangle and show the lengths of the sides. What is the perimeter of the rectangle?

8. *(22, Inv. 5)* (a) What fraction of this circle is shaded?

(b) What percent of this circle is shaded?



9. *(Inv. 1)* To what number is the arrow pointing?

10. *(35)* When Bryan emptied his bank, he found 17 pennies, 4 nickels, 5 dimes, and 2 quarters. What was the value of the coins in his bank?

11. *(51)*
$$\begin{array}{r} 794{,}150 \\ +\quad 9{,}863 \\ \hline \end{array}$$

12. *(51)*
$$\begin{array}{r} \$51{,}786 \\ +\ \$36{,}357 \\ \hline \end{array}$$

13. *(43)*
$$\begin{array}{r} 87.6 \\ 4.0 \\ 31.7 \\ 5.5 \\ 1.1 \\ +\quad 0.5 \\ \hline \end{array}$$

14. *(52)*
$$\begin{array}{r} \$20.00 \\ -\ \$18.47 \\ \hline \end{array}$$

15. *(52)*
$$\begin{array}{r} 41{,}315 \\ -\ 29{,}418 \\ \hline \end{array}$$

16. *(48)*
$$\begin{array}{r} 46 \\ \times\quad 7 \\ \hline \end{array}$$

17. *(48)*
$$\begin{array}{r} 54 \\ \times\quad 8 \\ \hline \end{array}$$

18. *(48)*
$$\begin{array}{r} 39 \\ \times\quad 9 \\ \hline \end{array}$$

19. *(42)*
$$\begin{array}{r} 40 \\ \times\quad 9 \\ \hline \end{array}$$

20. *(50)* $3.68 + 2.4 + 15.2$

21. *(41)* $4Y = 32$

22. *(53)* $43 \div 7$

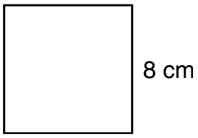
23. *(53)* $9\overline{)64}$

24. *(Inv. 1, Inv. 4)* One inch equals 2.54 cm. Use words to write 2.54 cm.

25. *(Inv. 2, Inv. 3)* The figure shown at right is a square.

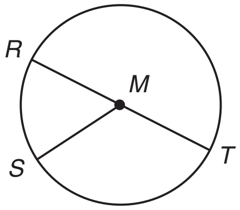
(a) What is its perimeter?

(b) What is its area?



26. *(21, 45)* This figure is a circle with its center at point *M*. Which of these segments is a diameter of the circle?

A. $\overline{MS}$ B. $\overline{RM}$ C. $\overline{RT}$ D. $\overline{TM}$



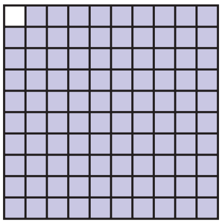
27. *(20, Inv. 4)* (a) Is $136.80 closer to $136 or to $137?

(b) Is 136.8 closer to 136 or to 137?

28. *(Inv. 4, Inv. 5)* (a) What fraction of the large square is shaded?

(b) What percent of the large square is shaded?

(c) The shaded part of the large square represents what decimal number?



LESSON

55 Multiples • Factors

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find the change back from a dollar for items with these prices:

a. 26¢ **b.** 92¢ **c.** 14¢ **d.** 76¢ **e.** 31¢

Review:

f. \$4.00 – \$0.50 **g.** 48 + 29 + 210 **h.** 300 + 260 + 40

Problem Solving:

Martin was thinking of a two-digit number. He gave this clue: "You say the number when you count by threes from three, by fours from four, and by fives from five." What was Martin's number?

NEW CONCEPTS

Multiples

If we multiply 4 by the numbers 1, 2, 3, 4, 5, 6, …, we get

4, 8, 12, 16, 20, 24, …

These numbers are **multiples** of 4. The multiples of 4 are the numbers we say if we count by fours, starting from 4.

The following numbers are the multiples of 6:

6, 12, 18, 24, 30, 36, …

The multiples of any counting number are the products we get when we multiply the number by 1, 2, 3, 4, 5, 6, ….

Example 1 List the first four multiples of 7.

Solution To find the first four multiples of 7, we multiply 7 by 1, then by 2, then by 3, and then by 4.

$$\begin{array}{r} 7 \\ \times\ 1 \\ \hline 7 \end{array} \qquad \begin{array}{r} 7 \\ \times\ 2 \\ \hline 14 \end{array} \qquad \begin{array}{r} 7 \\ \times\ 3 \\ \hline 21 \end{array} \qquad \begin{array}{r} 7 \\ \times\ 4 \\ \hline 28 \end{array}$$

The first four multiples of 7 are **7, 14, 21,** and **28.** The multiples of 7 are the numbers we say when we count by sevens.

Example 2 (a) What is the fourth multiple of 6?

(b) What is the third multiple of 8?

Solution (a) To find the fourth multiple of 6, we multiply 6 by 4. The fourth multiple of 6 is **24.**

(b) To find the third multiple of 8, we multiply 8 by 3. The third multiple of 8 is **24.**

Example 3 Twelve is a multiple of which whole numbers?

Solution A multiplication table can help us answer this question. We find 12 at each of these locations on a multiplication table:

1 × 12   12 × 1
2 × 6   6 × 2
3 × 4   4 × 3

So 12 is a multiple of **1, 2, 3, 4, 6,** and **12.**

Example 4 (a) What is the last digit of any multiple of 10?

(b) What two digits appear as the last digit of the multiples of 5?

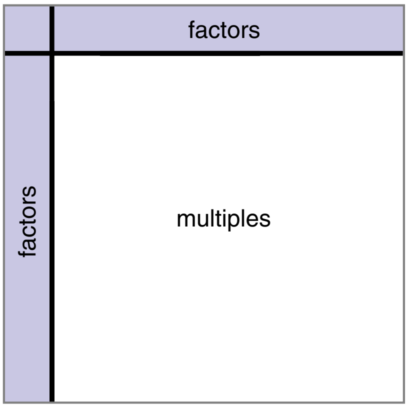
Solution (a) The last digit of any multiple of 10 is **zero.** Any whole number ending in zero can be divided by 10 without leaving a remainder.

(b) The last digit of a multiple of 5 is either **five** or **zero.** Any whole number ending in five or zero can be divided by 5 without leaving a remainder.

Factors

In example 3 we found that 12 is a multiple of 1, 2, 3, 4, 6, and 12. Each of these numbers is a **factor** of 12. On a multiplication table the factors are the numbers that can be multiplied to produce a multiple.

Multiplication Table



Example 5 List the four factors of 6.

Solution Six is the multiple. We are asked to find the factors. These whole-number multiplications produce 6:

1 × 6 6 × 1

2 × 3 3 × 2

So the factors of 6 are **1, 2, 3,** and **6.**

Example 6 List the factors of 9.

Solution These multiplications produce 9:

1 × 9 3 × 3 9 × 1

So the factors of 9 are **1, 3,** and **9.**

Example 7 List the factors of 7.

Solution We find 7 as a multiple on a multiplication table twice.

1 × 7 7 × 1

So 7 has only two factors, **1** and **7.**

LESSON PRACTICE

Practice set

a. List the first five multiples of 6.

b. List the third, fourth, and fifth multiples of 9.

c. What is the seventh multiple of 8?

d. What five digits appear as the last digit of the multiples of 2?

e. Ten is a multiple of which whole numbers?

f. List the factors of 8.

g. Two factors of 18 are 1 and 18. Find four more factors of 18.

h. List the factors of 5.

MIXED PRACTICE

Problem set

1. *(1, 43)* Rodric bought a toy for $1.85 and sold it for 75¢ more. For what price did he sell the toy?

2. *(25, 52)* Two thousand people entered the contest. Only seven will win prizes. How many entrants will not win prizes?

3. *(Inv. 5)* Sixty percent of the students in the class were boys. Were there more girls or more boys in the class?

4. (31, 52) Twenty-seven thousand people lived in the big town. Only eight thousand, four hundred people lived in the small town. How many more people lived in the big town?

5. (Inv. 2, Inv. 3) Draw a rectangle that is 4 cm long and 3 cm wide.

(a) What is the perimeter of the rectangle?

(b) What is the area of the rectangle?

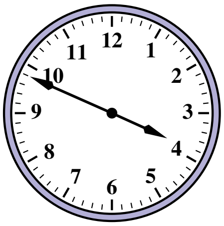
6. (55) Fiona found the third multiple of 4. Then she subtracted two from this number. What was her answer?

7. (55) Two factors of 15 are 1 and 15, because

$$1 \times 15 = 15$$

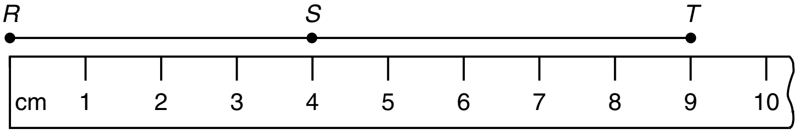
Find two more factors of 15.

8. (27) It is afternoon. What time was it 30 minutes ago?



9. (54) How many years were there from 1776 to 1789? Use a subtraction pattern to solve the problem.

10. (45) What is the length of $\overline{ST}$?



11. (43) $\begin{array}{r} 4.00 \\ -\ 2.22 \\ \hline \end{array}$

12. (43) $\begin{array}{r} 70.5 \\ -\ 42.3 \\ \hline \end{array}$

13. (51) $\begin{array}{r} \$45.87 \\ +\ \$23.64 \\ \hline \end{array}$

14. (52) $\begin{array}{r} \$25.42 \\ -\ \$\ 7.25 \\ \hline \end{array}$

15. (48) $\begin{array}{r} 64 \\ \times\ 5 \\ \hline \end{array}$

16. (42) $\begin{array}{r} 70 \\ \times\ 6 \\ \hline \end{array}$

17. (48) $\begin{array}{r} 89 \\ \times\ 4 \\ \hline \end{array}$

18. (48) $\begin{array}{r} 63 \\ \times\ 7 \\ \hline \end{array}$

19. (47) $\dfrac{63}{7}$

20. (53) $8\overline{)15}$

21. (50) $4.68 + 12.2 + 3.75$

22. (53) $33 \div 6$

23. (Inv. 3, 45) $\sqrt{64} \div (4 + 4)$

24. (27) Write this addition problem as a multiplication problem:

$$\$0.75 + \$0.75 + \$0.75 + \$0.75$$

25. (55) Which of these numbers can be divided by 5 without leaving a remainder? How can you tell just by looking?

A. 32 B. 35 C. 37 D. 41

26. (43) One inch equals 2.54 cm. How many centimeters long is a 2-inch segment?

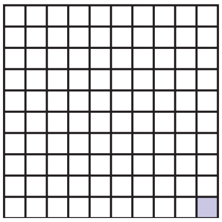
27. (20, Inv. 4) (a) Is \$2.54 closer to \$2 or to \$3?

(b) Is 2.54 closer to 2 or to 3?

28. (Inv. 4, Inv. 5) (a) What fraction of the large square is shaded?

(b) What percent of the large square is shaded?

(c) The shaded part of the large square represents what decimal number?



LESSON
56

Using Pictures to Compare Fractions

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Subtract cents from dollars:

a. \$1.00 − \$0.42 **b.** \$1.00 − \$0.67 **c.** \$2.00 − \$0.25

Review:

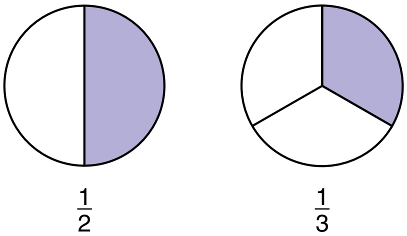
d. \$3.45 + \$4.65 **e.** 370 − 135 **f.** 76 + 19 + 100

Problem Solving:

Sarah paid a dollar for an item that cost 63 cents. If the cashier gives her back four coins, what coins should they be?

NEW CONCEPT

One way to compare fractions is to draw pictures of the fractions and then compare the pictures. To illustrate, we will draw pictures to compare $\frac{1}{2}$ and $\frac{1}{3}$. We begin by drawing two circles of the same size. Then we shade $\frac{1}{2}$ of one circle and $\frac{1}{3}$ of the other circle.



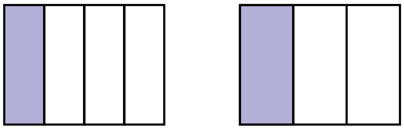
We see that $\frac{1}{2}$ of a circle is larger than $\frac{1}{3}$ of the same-size circle. So $\frac{1}{2}$ is greater than $\frac{1}{3}$.

$$\frac{1}{2} > \frac{1}{3}$$

When we draw figures to compare fractions, the figures should be **congruent.** Congruent figures have the same shape and size.

Example Compare: $\frac{1}{4}$ ○ $\frac{1}{3}$. Draw and shade two rectangles to show the comparison.

Solution We draw two congruent rectangles. We shade $\frac{1}{4}$ of one rectangle and $\frac{1}{3}$ of the other. We see that $\frac{1}{4}$ is slightly less than $\frac{1}{3}$.



$$\mathbf{\frac{1}{4} < \frac{1}{3}}$$

LESSON PRACTICE

Practice set Compare these fractions. Draw and shade a pair of congruent figures to illustrate each comparison.

a. $\frac{1}{2}$ ○ $\frac{2}{3}$ **b.** $\frac{1}{2}$ ○ $\frac{1}{4}$ **c.** $\frac{2}{5}$ ○ $\frac{1}{3}$

MIXED PRACTICE

Problem set

1. (52) James has fifty-six pies. Seven pies will fit on one tray. How many trays does he need to carry all of the pies? Use a multiplication pattern to solve the problem.

2. (40, Inv. 4, 43) One gallon is about 3.78 L. About how many liters is two gallons? Use words to write the answer.

3. (20) To estimate the sum of \$6.87 and \$5.92, Kent rounded each number to the nearest dollar before adding. Write the numbers Kent added and their sum.

4. (47) Write four multiplication/division facts using the numbers 3, 8, and 24.

5. (54) List the seven months of the year that have 31 days.

6. (Inv. 3, 55) Find the eighth multiple of six. Then add one. What is the square root of the answer?

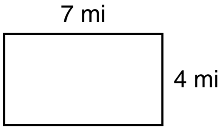
7. *(56)* Compare these fractions. Draw and shade two congruent rectangles to show the comparison.

$$\frac{1}{4} \bigcirc \frac{1}{6}$$

8. *(20, 42, 54)* Round 4873 to the nearest

(a) thousand. (b) hundred. (c) ten.

9. *(Inv. 2, Inv. 3)* A rectangle is shown at right.



(a) What is its perimeter?

(b) What is its area?

10. *(52)* $\begin{array}{r} \$10.00 \\ -\ \$\ \ 5.46 \\ \hline \end{array}$

11. *(52)* $\begin{array}{r} 36{,}024 \\ -\ 15{,}539 \\ \hline \end{array}$

12. *(51)* $\begin{array}{r} 43{,}675 \\ +\ 52{,}059 \\ \hline \end{array}$

13. *(48)* $\begin{array}{r} 73 \\ \times\ \ 9 \\ \hline \end{array}$

14. *(48)* $\begin{array}{r} 46 \\ \times\ \ 7 \\ \hline \end{array}$

15. *(48)* $\begin{array}{r} 84 \\ \times\ \ 6 \\ \hline \end{array}$

16. *(42)* $\begin{array}{r} 40 \\ \times\ \ 5 \\ \hline \end{array}$

17. *(53)* $7\overline{)48}$

18. *(47)* $\dfrac{63}{7}$

19. *(50)* $3.75 + 2.5 + 0.4$

20. *(50)* $42.25 - 7.5$

21. *(55)* Which of these numbers is a multiple of 10? How can you tell just by looking?

A. 35 B. 40 C. 45 D. 101

22. *(36, Inv. 5)* (a) A dime is what fraction of a dollar?

(b) A dime is what percent of a dollar?

23. *(33)* Washington School cost about $12,350,000 to build. Use words to write that amount of money.

24. *(55)* Two factors of 16 are 1 and 16, because

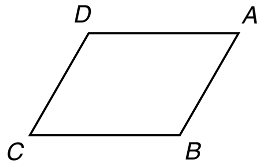
$$1 \times 16 = 16$$

Find three more factors of 16.

25. Refer to figure *ABCD* to answer (a) and (b).
(23, 45)

(a) Which segment appears to be parallel to $\overline{AB}$?

(b) Angle *B* is what type of angle?



26. Which of these numbers is a factor of 12?
(55)

A. 0 B. 6 C. 8 D. 24

27. Which of these numbers is a multiple of 12?
(55)

A. 0 B. 6 C. 8 D. 24

28. (a) A penny is what fraction of a dollar?
(36, Inv. 5)

(b) A penny is what percent of a dollar?

(c) Write the value of a penny as a decimal part of a dollar.

LESSON

57

Rate Word Problems

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Subtract dollars and cents from dollars:

a. \$1.00 − \$0.85 **b.** \$2.00 − \$0.63 **c.** \$5.00 − \$1.25

Review:

d. 340 + 500 + 32 **e.** \$5.47 + \$1.95 **f.** 400 − 30

Problem Solving:

In this addition problem some digits are missing. Copy this problem on your paper, and fill in the missing digits.

$$\begin{array}{r} 5\_3 \\ +\ 28\_ \\ \hline \_50 \end{array}$$

NEW CONCEPT

A **rate** shows a relationship between two different measurements. Here we relate the measurements "miles" and "hours":

The car went 30 miles per hour.

This statement tells us that the car's rate is 30 miles each hour. Each hour can be considered one "time group." We will see in the following examples that rate problems have the same pattern as "equal groups" problems.

Example 1 Liam drove the car 30 miles per hour for 4 hours. How far did Liam drive?

Solution This is a rate problem. A rate problem is about "equal groups."

We do not see the words *in each* in a rate problem, but there are words that mean *in each.* The words *miles per hour* in this problem mean "miles **in each** hour."

PATTERN	PROBLEM
Number **in each** time group	30 miles per hour
× Number **of** time groups	× 4 hours
Total	120 miles

Liam drove **120 miles.**

Example 2 Nalcomb earns 3 dollars a week for doing chores. How much money does he earn for doing 7 weeks of chores?

Solution This is a rate problem. A rate problem is an "equal groups" problem. The phrase *3 dollars a week* means "3 dollars **each** week."

PATTERN:
Number **of** groups × number **in each** group = total

PROBLEM:
7 weeks × 3 dollars per week = 21 dollars

Nalcomb earns **21 dollars** for doing 7 weeks of chores.

LESSON PRACTICE

Practice set

a. Kali drove 55 miles in one hour. At that rate, how far can she drive in 6 hours? Write a multiplication pattern and solve the problem.

b. Jeff swims 20 laps every day. How many laps will he swim in 1 week? Write a multiplication pattern and solve the problem.

MIXED PRACTICE

Problem set

1. *(57)* Marybeth could jump 42 times each minute. At that rate, how many times could she jump in 8 minutes? Use a multiplication pattern to solve the problem.

2. *(57)* Robo could run 7 miles in 1 hour. At that rate, how many miles could Robo run in 3 hours? Use a multiplication pattern to solve the problem.

3. *(47)* Write four multiplication/division facts using the numbers 8, 9, and 72.

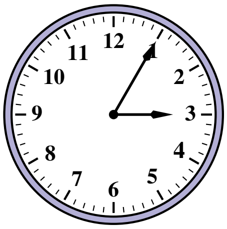
4. *(Inv. 3)* What is the sum of $\sqrt{36}$ and $\sqrt{64}$?

5. *(Inv. 5, 56)* Compare: $\frac{1}{3} \bigcirc 50\%$

6. *(42, 54)* (a) Round 5280 to the nearest thousand.

(b) Round 5280 to the nearest hundred.

7. *(27)* It is afternoon. What time was it 6 hours and 5 minutes ago?



8. *(55)* Find the fourth multiple of 6. Then find the third multiple of 8. What is the sum of these two multiples?

9. *(54)* How many years were there from 1492 until 1800? Use a subtraction pattern to solve the problem.

10. *(Inv. 2, Inv. 3)* A square has one side that is 7 inches long.

(a) What is the perimeter of the square?

(b) What is the area of the square?

11. *(52)*
$$\begin{array}{r} 70{,}003 \\ -\ 36{,}418 \\ \hline \end{array}$$

12. *(24, 43)*
$$\begin{array}{r} N \\ -\ 4.32 \\ \hline 2.57 \end{array}$$

13. *(43, 51)*
$$\begin{array}{r} \$861.34 \\ +\ \$764.87 \\ \hline \end{array}$$

14. *(48)*
$$\begin{array}{r} 93 \\ \times\ 5 \\ \hline \end{array}$$

15. *(48)*
$$\begin{array}{r} 84 \\ \times\ 6 \\ \hline \end{array}$$

16. *(48)*
$$\begin{array}{r} 77 \\ \times\ 7 \\ \hline \end{array}$$

17. *(42)*
$$\begin{array}{r} 80 \\ \times\ 8 \\ \hline \end{array}$$

18. *(47)* $\dfrac{56}{8}$

19. *(53)* $7\overline{)65}$

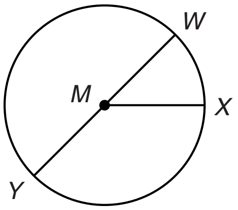
20. *(53)* $45 \div 6$

21. *(41)* $7N = 42$

22. *(50)* $1.75 + 17.5$

23. *(23, 45)* (a) Which segment in this figure is a diameter?

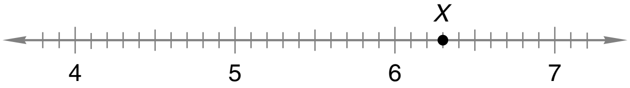
(b) Segments *MW* and *MX* form an angle. What type of angle is it?



24. *(56)* Compare these fractions. Draw and shade two congruent rectangles to show the comparison.

$$\frac{2}{3} \bigcirc \frac{3}{4}$$

25. Point *X* represents what number on this number line?
(37)



26. One inch is 2.54 centimeters. A segment that is 3 inches long is how many centimeters long?
(43)

27. Write this addition problem as a multiplication problem:
(27)

$$2.54 + 2.54 + 2.54$$

28. (a) Three pennies are what fraction of a dollar?
(36, Inv. 5)

(b) Three pennies are what percent of a dollar?

(c) Write the value of three pennies as a decimal part of a dollar.

LESSON

58 Multiplying Three-Digit Numbers

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Subtract dollars and cents from dollars:

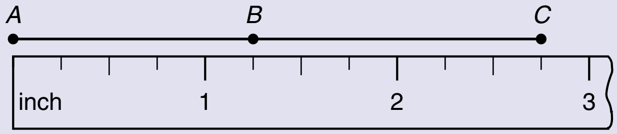
a. \$5.00 − \$2.25 **b.** \$5.00 − \$1.63 **c.** \$5.00 − \$3.35

Review:

d. 560 − 200 **e.** 35 + 49 + 110 **f.** \$6.58 + \$0.72

Problem Solving:

From point *A* to point *B* is $1\frac{1}{4}$ inches. From point *B* to point *C* is how many inches?



NEW CONCEPT

When we multiply a three-digit number using pencil and paper, we multiply the ones digit first. Then we multiply the tens digit. Then we multiply the hundreds digit.

Multiply the ones digit.		Multiply the tens digit.		Multiply the hundreds digit.
$\begin{array}{r}123\\ \times\ \ 3\\ \hline 9\end{array}$	$\longrightarrow$	$\begin{array}{r}123\\ \times\ \ 3\\ \hline 69\end{array}$	$\longrightarrow$	$\begin{array}{r}123\\ \times\ \ 3\\ \hline 369\end{array}$

In the problem below we get 18 when we multiply the ones digit. We write the 8 in the ones column and carry the 1 above the tens column. Then we multiply the tens digit.

Multiply the ones digit.		Multiply the tens digit.		Multiply the hundreds digit.
$\begin{array}{r}{\scriptstyle 1\ }\\ 456\\ \times\ \ 3\\ \hline 8\end{array}$	$\longrightarrow$	$\begin{array}{r}{\scriptstyle 1\,1\ }\\ 456\\ \times\ \ 3\\ \hline 68\end{array}$	$\longrightarrow$	$\begin{array}{r}{\scriptstyle 1\,1\ }\\ 456\\ \times\ \ 3\\ \hline 1368\end{array}$

Three times five is 15, plus one is 16. We write the 6 below the bar and carry the 1 above the hundreds column. Then we multiply the hundreds. Three times four is 12, plus one is 13. The product is 1368.

Example 1 Multiply: 654 × 7

Solution First we multiply the ones digit. Then we multiply the tens digit and then the hundreds digit. The first digit of any two-digit answer is carried to the next column.

$$\begin{array}{r} \overset{3}{6}\overset{2}{5}4 \\ \times \quad 7 \\ \hline \mathbf{4578} \end{array}$$

Example 2 Multiply:

$$\begin{array}{r} \$3.75 \\ \times \quad 3 \\ \hline \end{array}$$

Solution We first multiply the pennies. Three times five pennies is 15 pennies, which equals one dime and five pennies. We write the 5 below the bar and the 1 above the dimes.

$$\begin{array}{r} \$3.\overset{1}{7}5 \\ \times \quad 3 \\ \hline 5 \end{array}$$

Next we multiply the dimes. Three times seven dimes is 21 dimes. We add the one dime we carried to get a total of 22 dimes. Since 22 dimes equals two dollars and two dimes, we write a 2 below the bar and a 2 above the dollars.

$$\begin{array}{r} \$\overset{2}{3}.\overset{1}{7}5 \\ \times \quad 3 \\ \hline 25 \end{array}$$

Finally, we multiply the dollars. Three times three dollars is nine dollars. We add the two dollars we carried to get a total of 11 dollars. The product is **$11.25.**

$$\begin{array}{r} \$\overset{2}{3}.\overset{1}{7}5 \\ \times \quad 3 \\ \hline \$11.25 \end{array}$$

LESSON PRACTICE

Practice set* Multiply:

a. $\begin{array}{r} 234 \\ \times \quad 3 \\ \hline \end{array}$

b. $\begin{array}{r} \$340 \\ \times \quad 4 \\ \hline \end{array}$

c. $\begin{array}{r} \$4.25 \\ \times \quad 5 \\ \hline \end{array}$

d. Explain the steps of multiplying 5 by $4.25, using the words *dollars, dimes,* and *pennies* (as in example 2).

MIXED PRACTICE

Problem set

1. (57) Elizabeth pays \$7.50 every week for karate lessons. How much does she pay for 4 weeks of karate lessons? Use a multiplication pattern to solve the problem.

2. (49) It takes 4 apples to make 1 pie. How many apples does it take to make 5 pies? Use a multiplication pattern to solve the problem.

3. (27) Luis has to get up at 6 a.m. By what time should he go to bed in order to get 8 hours of sleep?

4. (40, Inv. 4) These measures were printed on a soda pop bottle:

2 L (2.11 qt)

(a) Use words to write 2.11 qt.

(b) Compare: 2 L ◯ 2 qt

5. (16, 33) Write 8402 in expanded form. Then use words to write the number.

6. (Inv. 3, 55) Find the fourth multiple of 7. Then find the sixth multiple of 6. Add these multiples. What is the square root of the answer?

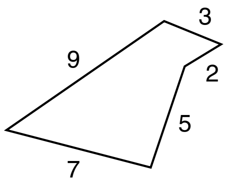
7. (54) According to this calendar, what is the date of the second Tuesday in September 2042?

SEPTEMBER 2042

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

8. (24) If $5 + N = 23$, then what number does $N - 5$ equal?

9. (Inv. 2) What is the perimeter of this figure? Measurements are in feet.



10. (56) Compare these fractions. Draw and shade two congruent circles to show the comparison.

$$\frac{1}{2} \bigcirc \frac{2}{4}$$

11. *(37)* To what mixed number is the arrow pointing?

12. *(Inv. 5)* Draw a rectangle and shade about 30% of it.

13. *(50)* 0.47 + 3.62 + 0.85 + 4.54

14. *(43, 51)* \$3 + \$4.39 + \$12.62

15. *(45, 50)* 36.47 − (3.5 + 12.6)

16. *(45, 52)* \$20.00 − (29¢ + \$7)

17. *(52)* 41,059 − 36,275

18. *(58)*
$$\begin{array}{r} 768 \\ \times \quad 3 \\ \hline \end{array}$$

19. *(58)*
$$\begin{array}{r} \$2.80 \\ \times \quad 4 \\ \hline \end{array}$$

20. *(24, 30)*
$$\begin{array}{r} 436 \\ - \quad Z \\ \hline 252 \end{array}$$

21. *(53)* $5\overline{)36}$

22. *(53)* $7\overline{)45}$

23. *(53)* $4\overline{)35}$

24. *(36, Inv. 5)* (a) A quarter is what fraction of a dollar?

(b) A quarter is what percent of a dollar?

25. *(55)* Two factors of 20 are 1 and 20, because

$$1 \times 20 = 20$$

Find four more factors of 20.

26. *(42, 54)* According to the census, the population of South Fork was 6781.

(a) Round 6781 to the nearest thousand.

(b) Round 6781 to the nearest hundred.

27. *(47)* If $4N = 24$, then which of these equations is not true?

A. $\dfrac{24}{4} = N$

B. $\dfrac{24}{N} = 4$

C. $2N = 12$

D. $4N = 6$

28. *(36, Inv. 5)* (a) Seven pennies are what fraction of a dollar?

(b) Seven pennies are what percent of a dollar?

(c) Write the value of seven pennies as a decimal part of a dollar.

LESSON

59 Estimating Arithmetic Answers

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Subtract dollars and cents from dollars:

a. \$5.00 − \$3.95 **b.** \$5.00 − \$1.39 **c.** \$10.00 − \$8.75

Review:

d. \$4.36 + \$2.98 **e.** 475 − 125 **f.** 46 + 320 + 200

Problem Solving:

Can you find three ways to make a dollar with eight coins?

NEW CONCEPT

We can **estimate** arithmetic answers by using rounded numbers instead of exact numbers to do the arithmetic. Estimating does not give us the exact answer, but it can give us an answer that is close to the exact answer. For some problems we encounter, an estimate is all that is necessary to solve the problem. When an exact answer is required, estimating is a way to find whether our exact answer is **reasonable.** Estimating is useful for many purposes. For example, it can help us to mentally track price totals when shopping for groceries.

Example 1 Estimate the sum of 396 and 512.

Solution To estimate, first we change the exact numbers to round numbers. We round 396 to 400 and 512 to 500. Then we find the estimated sum by adding 400 and 500.

$$\begin{array}{r} 400 \\ +\ 500 \\ \hline 900 \end{array}$$

The estimated sum of 396 and 512 is **900.** The exact sum of 396 and 512 is 908. The estimated answer is not equal to the exact answer but it is close.

Example 2 Estimate the product of 72 and 5.

Solution We round the two-digit number, but we generally do not round a one-digit number when estimating. The estimated product of 72 and 5 is **350.**

$$\begin{array}{r} 70 \\ \times\ \ 5 \\ \hline 350 \end{array}$$

The exact product of 72 and 5 is 360. The estimated product is a little less than the exact answer, 360, because 72 was rounded down to 70 for the estimate.

Example 3 To estimate 7 × 365, Bill multiplied 7 by 400. Was Bill's estimate more than, equal to, or less than the actual product of 7 and 365?

Solution Bill's estimate was **more than the actual product** of 7 and 365 because he rounded 365 up to 400 before multiplying.

Example 4 Estimate the answer to $43 \div 8$.

Solution To estimate division answers, we want to use numbers that divide easily. So we change the problem slightly. We keep the number we are dividing by, which is 8, and we change the number that is being divided, which is 43. We change 43 to a nearby number that can be divided easily by 8, such as 40 or 48. Using 40, the estimated answer is **5.** Using 48, the estimated answer is **6.** Since 43 is between 40 and 48, the exact answer is more than 5 but less than 6. That is, the exact answer is 5 plus a remainder.

LESSON PRACTICE

Practice set Estimate the answer to each arithmetic problem. Then find the exact answer.

a. $59 + 68 + 81$

b. $607 + 891$

c. $585 - 294$

d. $82 - 39$

e. 59×6

f. 397×4

g. $42 \div 5$

h. $29 \div 7$

i. Dixie estimated the product of 5 and 5280 by multiplying 5 by 5000. Was Dixie's estimate more than, equal to, or less than the actual product? Why?

MIXED PRACTICE

Problem set

1. *(49)* There were forty-two apples in each big basket. There were seven big baskets. Altogether, how many apples were in the seven big baskets? Use a multiplication pattern to solve the problem.

2. *(52)* There were forty-eight pears in all. Six pears were in each box. How many boxes were there? Use a multiplication pattern to solve the problem.

3. *(Inv. 2, Inv. 4)* One mile is about 1.61 km.

(a) Use words to write 1.61 km.

(b) Compare: 1 mi ○ 1 km

4. *(59)* Estimate the product of 5 and 193 by rounding 193 to the nearest hundred before multiplying.

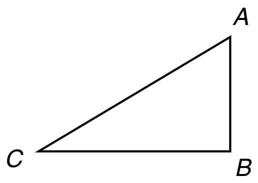
5. *(Inv. 3, Inv. 5)* Compare: 50% of 16 ○ $\sqrt{16}$

6. *(55)* Subtract the third multiple of four from the second multiple of six. What is the difference?

7. *(54)* How many years were there from 1492 to 1701? Use a subtraction pattern to solve the problem.

8. *(23, 45)* (a) Which angle in this figure appears to be a right angle?

(b) Which segment in this figure does not appear to be perpendicular to $\overline{AB}$?



9. *(56)* Compare these fractions. Draw and shade two congruent rectangles to show the comparison.

$$\frac{2}{5} \bigcirc \frac{1}{4}$$

10. *(57)* Janine could pack 40 packages in 1 hour. At that rate, how many packages could she pack in 5 hours? Use a multiplication pattern to solve the problem.

11. *(34)* Use digits to write fifteen million, two hundred ten thousand.

12. *(Inv. 2, 21)* One side of a rectangle is 2 miles long. Another side is 3 miles long. Draw the rectangle and show the length of each side. What is the perimeter of the rectangle?

13. *(43, 51)*
$$\begin{array}{r} \$37.75 \\ +\ \$45.95 \\ \hline \end{array}$$

14. *(51)*
$$\begin{array}{r} 43{,}793 \\ +\ 76{,}860 \\ \hline \end{array}$$

15. *(50)*
$$\begin{array}{r} 48.0 \\ 9.7 \\ 12.6 \\ 5.3 \\ +\ 236.2 \\ \hline \end{array}$$

16. *(52)*
$$\begin{array}{r} \$50.00 \\ -\ \$42.87 \\ \hline \end{array}$$

17. *(52)*
$$\begin{array}{r} 43{,}793 \\ -\ 26{,}860 \\ \hline \end{array}$$

18. *(58)* 483×4

19. *(58)* 360×4

20. *(58)* 207×8

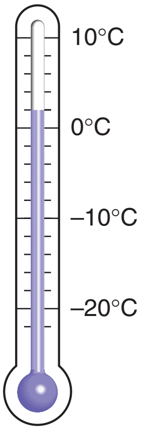
21. *(53)* $8\overline{)43}$

22. *(53)* $5\overline{)43}$

23. *(53)* $7\overline{)43}$

24. *(18)* (a) At 3 p.m. the thermometer showed this temperature. What was the temperature at 3 p.m.?

(b) From 3 p.m. to 6 p.m., the temperature dropped 4 degrees. What was the temperature at 6 p.m.?



25. *(Inv. 2, 23)* Use a ruler to draw a line segment 4 in. long. Then draw a parallel segment 10 cm long.

26. *(43)* One inch is 2.54 cm. A segment that is 4 in. long is how many centimeters long?

27. *(Inv. 2, 43)* Compare: 4 inches ◯ 10 centimeters

28. *(36, Inv. 5)* (a) Nine pennies are what fraction of a dollar?

(b) Nine pennies are what percent of a dollar?

(c) Write the value of nine pennies as a decimal part of a dollar.

LESSON

60

Rate Problems with a Given Total

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Subtract dollars and cents from dollars:

a. \$5.00 − \$3.89 **b.** \$10.00 − \$7.25 **c.** \$10.00 − \$8.67

Review:

d. 126 + 49 **e.** \$5.95 + \$3.76 **f.** 480 − 225

Problem Solving:

The question below is written in code. In the code 1 is A, 2 is B, 3 is C, and so on. After you decode the question, write the answer using the same code.

23-8-1-20 4-1-25 9-19 20-8-9-19?

NEW CONCEPT

Rate problems involving time consist of three quantities: a rate, an amount of time, and a total. If we know two of the quantities in a rate problem, we can find the third. We have practiced problems in which we were given the rate and the amount of time. We multiplied to find the total. In this lesson we will practice problems in which we are given the total. We will divide to find either the rate or the amount of time.

Example 1 Stanley can read 2 pages in 1 minute. How long will it take him to read 18 pages?

Solution This is a rate problem. A rate problem is an "equal groups" problem.

We are told that Stanley can read 2 pages in 1 minute. This means the rate is 2 pages each minute. The total number of pages is 18. We are asked for the amount of time.

PATTERN	PROBLEM
Number **in each** time group	2 pages each minute
× Number **of** time groups	× N minutes
Total	18 pages

Now we find the missing number. **To find the first or second number in an "equal groups" pattern, we divide.**

$$\begin{array}{r} 9 \\ 2\overline{)18} \\ 18 \end{array}$$

It will take Stanley **9 minutes** to read 18 pages.

Example 2 Rebecca rode her bike 24 miles in 3 hours. Rebecca's average riding rate was how many miles per hour?

Solution We are given the total distance Rebecca rode (24 miles) and the amount of time it took her (3 hours). We are asked for the average number of miles Rebecca rode in each hour.

PATTERN	PROBLEM
Number **in each** time group	M miles each hour
× Number **of** time groups	× 3 hours
Total	24 miles

To find the missing factor, we divide.

$$24 \div 3 = 8$$

Rebecca's average riding rate was **8 miles per hour.** Rebecca actually may have ridden more than 8 miles during one hour and less than 8 miles during another hour, but her *average* rate was 8 miles per hour.

LESSON PRACTICE

Practice set

a. Miguel can sharpen 5 pencils in a minute. How long will it take Miguel to sharpen 40 pencils?

b. The troop hiked 12 miles in 4 hours. The troop's average rate was how many miles per hour?

c. Alexis was paid $40 for 5 hours of work. How much money was Alexis paid for each hour of work?

MIXED PRACTICE

Problem set

1. *(Inv. 5)* Fifty percent of an hour is how many minutes?

2. *(1, 33, 51)* There were two hundred fourteen parrots, seven hundred fifty-two crows, and two thousand, forty-two blue jays. How many birds were there in all?

3. *(52)* Letha could make four burritos with one pound of beans. How many pounds of beans would she need to make a dozen burritos?

4. *(57)* Harry could paint 12 signs in 1 hour. At that rate, how many signs could he paint in 3 hours?

5. *(59)* Round each number to the nearest hundred. Then add to estimate the sum of 286 and 415.

6. *(55)* Which of these numbers is not a multiple of 2? How can you tell just by looking?

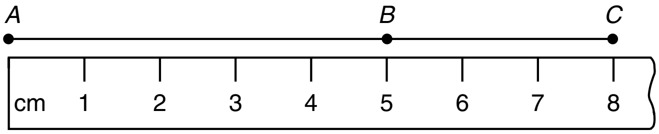
A. 23 B. 24 C. 32 D. 46

7. *(19)* Write the time "a quarter to seven in the morning" in digital form.

8. *(41)* $3N = 3 \times 5$

9. *(31)* The product of 6 and 7 is how much greater than the sum of 6 and 7?

10. *(45)* What is the length of segment *BC?*



11. *(45, 47)* Compare: $(32 \div 8) \div 2 \bigcirc 32 \div (8 \div 2)$

12. *(43)* $6.49 + $12 + $7.59 + 8¢

13. *(50)* $6.5 + 4.75 + 11.3$ **14.** *(50)* $12.56 - 4.3$

15. *(58)* $\begin{array}{r} 350 \\ \times \quad 5 \\ \hline \end{array}$ **16.** *(58)* $\begin{array}{r} 204 \\ \times \quad 7 \\ \hline \end{array}$ **17.** *(58)* $\begin{array}{r} 463 \\ \times \quad 6 \\ \hline \end{array}$

18. *(53)* $4\overline{)37}$ **19.** *(53)* $6\overline{)39}$ **20.** *(53)* $3\overline{)28}$

21. *(36, Inv. 5)* (a) A nickel is what fraction of a dollar?

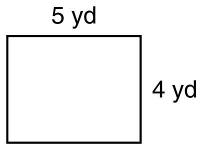
(b) A nickel is what percent of a dollar?

22. *(Inv. 3, 55)* Perfect squares have an odd number of factors. The numbers 9 and 25 are perfect squares. The three factors of 9 are 1, 3, and 9. What are the three factors of 25?

23. *(Inv. 5)* Compare: 5% ◯ $\frac{1}{2}$

24. *(Inv. 2, Inv. 3)* (a) Find the perimeter of this rectangle.

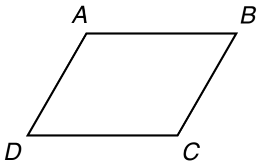
(b) Find the area of this rectangle.



25. *(23)* Refer to figure *ABCD* to answer (a) and (b).

(a) What type of angle are angles *A* and *C?*

(b) What type of angle are angles *B* and *D?*



26. *(24)* If $N + 10 = 25$, then which of these equations is not true?

A. $N + 11 = 26$

B. $N + 12 = 27$

C. $N - 5 = 20$

D. $N + 9 = 24$

27. *(45, 47)* (a) Compare: $8 \div (4 \div 2)$ ◯ $(8 \div 4) \div 2$

(b) Look at your answer to part (a). Does the associative property apply to division?

28. *(36, Inv. 5)* (a) Nineteen pennies are what fraction of a dollar?

(b) Nineteen pennies are what percent of a dollar?

(c) Write the value of nineteen pennies as a decimal part of a dollar.

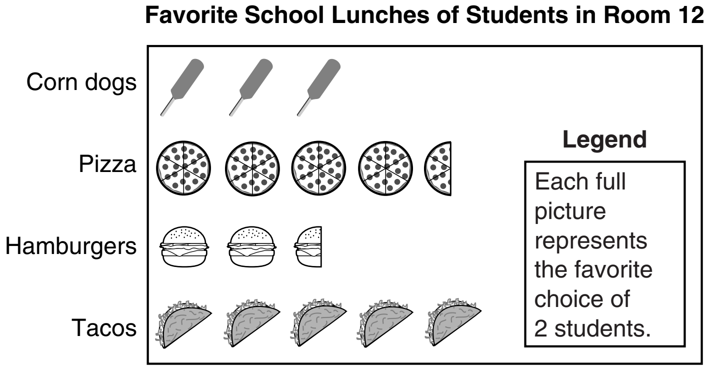
INVESTIGATION 6

Focus on

Displaying Data Using Graphs

In this investigation we will practice finding information in different types of graphs. Then we will practice making graphs. The four types of graphs we will study are **pictographs, bar graphs, line graphs,** and **circle graphs.** The first three types usually have a rectangular shape. On these graphs look for titles, labels, scales, and units. You might also find a **legend,** or **key,** that tells what the symbols on the graph stand for.

We begin with a pictograph, which uses pictures to display information. The following pictograph shows the results of a **survey** of some students at Thompson School. The cafeteria manager wanted to know the favorite lunches of Thompson School students, so each student in Room 12 was asked to name his or her favorite lunch from the school menu. Each student could name one lunch. The pictograph shows how students in the class answered the question.



1. What is the title of the pictograph?

2. How many different types of lunches are shown in the graph?

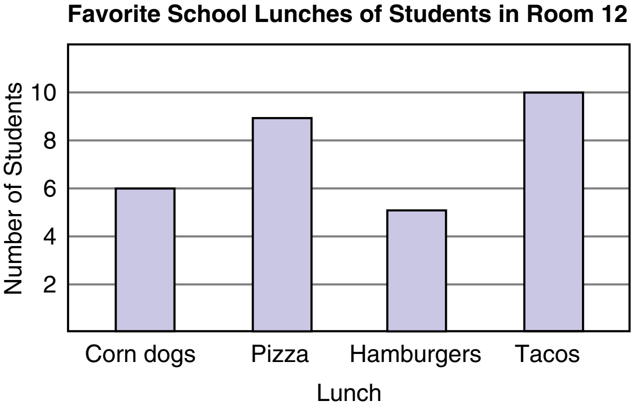
3. How can you tell how many students chose a particular lunch as their favorite lunch?

4. How many students named corn dogs as their favorite lunch? How did you find your answer?

5. "Pizza" was the favorite choice of how many students? How did you find your answer?

6. The pictograph shows the favorite lunches of how many students? How did you find your answer?

The information in the pictograph can also be shown in a bar graph like the one below. In this graph the bars are vertical (they go up and down). In some bar graphs the bars are horizontal (they go sideways). The words along the sides of the graph are **labels.** The labels tell what other words or numbers along the sides mean.



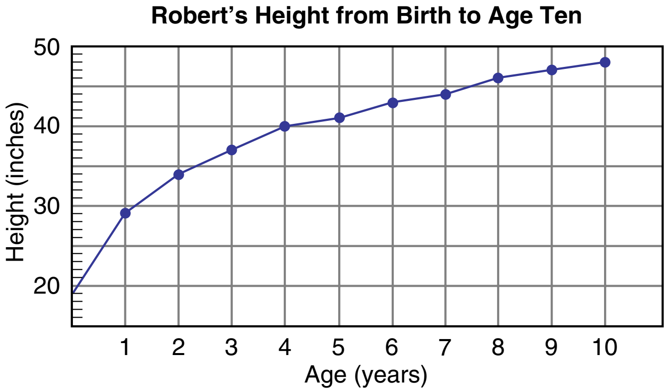
7. What is the label along the vertical left side of the graph?

8. Along the vertical left side of the graph are marks and numbers. What does the number 8 stand for?

9. Which bar is the longest and what does that mean?

10. The bar for pizza is longer than the bar for hamburgers. So there were more students who named pizza as their favorite lunch than students who named hamburgers. How many more students named pizza than named hamburgers? How did you find the answer?

The graph below is a line graph. Line graphs are often used to show information that changes over time. This graph shows Robert's height from his birth until he was 10 years old. Notice that there is a vertical scale and a horizontal scale. The labels along these scales show the units (in parentheses) for the numbers along the scales. The change in Robert's height is shown by the segments connecting the dots. The background grid makes the chart easier to read.



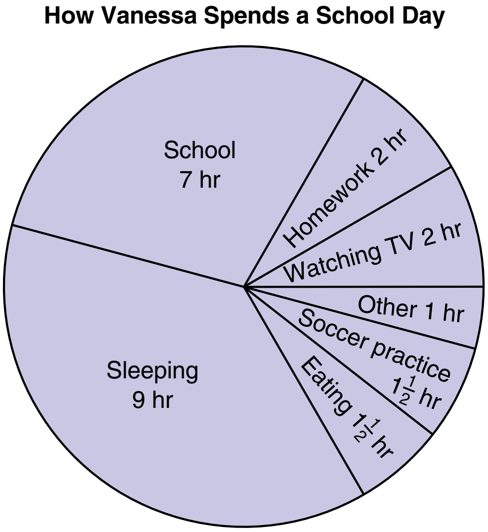
11. What does the 8 on the horizontal scale mean?

12. How tall was Robert on his fourth birthday? How did you find your answer?

13. During which year did Robert become 45 inches tall? How did you find the answer?

14. The graph of Robert's height is steep during the first few years and then becomes less steep. What does the change in steepness mean about Robert's growth?

We have looked at three rectangular graphs. Now we will look at a circle graph. A circle graph shows how a whole is divided into parts. A circle graph is sometimes called a **pie graph.** The "pie" is cut into "slices" that show the size of the parts. In this circle graph we see how Vanessa usually spends a whole school day.



15. The "scale" on a circle graph is the size of the slices. Which slice of this circle graph is the largest, and what does it mean that it is the largest?

16. Together, school and homework amount to how many hours of Vanessa's day?

17. What is the total number of hours represented by the entire circle graph?

18. According to the graph, Vanessa is awake about how many hours each day? How did you find the answer?

Activity: *Displaying Information on Graphs*

Materials needed:

- copies of Activity Masters 10 and 11 (1 copy of each master per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)

Activity Masters 10 and 11 are patterns for making the four kinds of graphs we have studied in this investigation. Use these patterns to make graphs for the following information.

Pictograph: The students in Room 12 were asked to name the drink they most liked to have with lunch. Eight students said "punch," six said "water," nine said "milk," and seven said "juice."

Display this information in a pictograph. Title the graph. List the drink choices along the vertical left side of the graph. Draw an object, like a cup, to represent the students' drink preferences. You may use the same object for each category. Decide whether the picture will represent the choice of one student or more than one student, and show that information in a legend. Here is an example:

= choice of one student

Bar Graph: Diane asked the students in Room 15 how they travel to school in the morning. She found that six students walk, seven ride bikes, three ride skateboards, six travel by car, and seven ride the bus.

Display this information in a bar graph. Title the graph. Label the vertical and horizontal sides of the graph. Mark a scale and draw the bars.

Line Graph: Mr. Lopez ran a six-mile race. As he passed each mile mark of the race, he looked at his stopwatch to see how long he had been running. Here are the times Mr. Lopez read on his stopwatch at each mile mark:

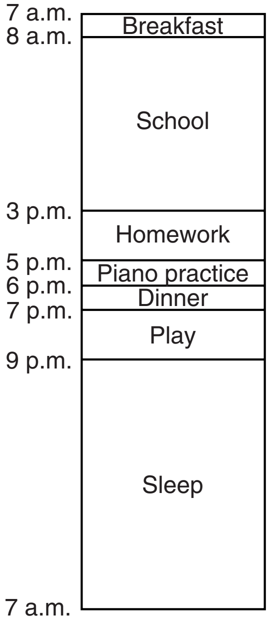
1 mile	6 minutes
2 miles	13 minutes
3 miles	20 minutes
4 miles	28 minutes
5 miles	36 minutes
6 miles (finished race)	45 minutes

On a line graph, make the vertical scale represent the distance run in miles. Make the horizontal scale represent the time run in minutes. Let the lower-left corner of the scale be zero miles and zero minutes. Mark each scale with a sequence of numbers that allows the information to fit well on the graph. (For instance, let the distance between marks on the horizontal scale be 5 minutes.) Remember to title the graph.

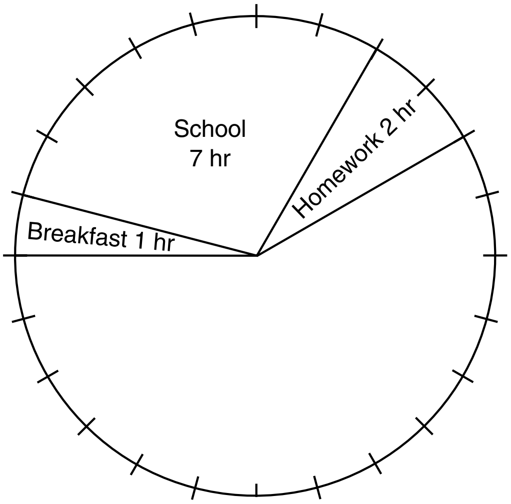
Now make seven dots on the graph. One dot will be at the lower-left corner to show the start of the race. The other six dots will show the elapsed time at each mile mark. On the one-mile level of the graph, mark a dot at your best estimate for 6 minutes. On the two-mile level mark a dot up from 13 minutes. Continue marking dots to the end of the race. After marking the dots, draw line segments from dot to dot, beginning at the lower-left corner and stopping at the dot for the end of the race. Every point along the line graph shows the approximate running time and distance run by Mr. Lopez at that point in the race.

Circle Graph: Jared made a schedule for school days. His schedule is shown below at left. Notice that the schedule has seven sections. Use the information in this schedule to make a circle graph of how Jared spends his day. Your circle graph should also have seven sections. The size of the sections should show the number of hours Jared spends on each activity. (The circle-graph pattern on Activity Master 11 has 24 marks to make it easier to divide the circle into sections. The distance from one mark to the next represents one hour.) Create a title for the graph, and label each section with Jared's activity and the amount of time spent on that activity. Below we show an example with three of the seven sections completed.

My Schedule



How Jared Spends a School Day



Extensions

a. Students may bring examples of graphs from newspapers, magazines, or Web sites to show how different types of graphs are used to display information.

b. Students may generate or collect information (data) and create graphs to display the information.

LESSON

61 Remaining Fraction • Two-Step Equations

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Multiply by ten:

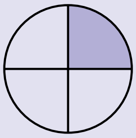
a. 12 × 10 **b.** 120 × 10 **c.** 10 × 10

Review:

d. 48 + 250 **e.** \$1.00 − \$0.36 **f.** \$3.75 + \$3.75

Problem Solving:

The whole circle has been divided into quarters. What percent of the circle is darkly shaded? What percent is lightly shaded?

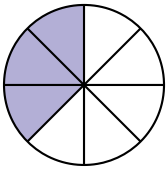


NEW CONCEPTS

Remaining fraction The circle in the Problem Solving exercise above has a darkly shaded portion and a lightly shaded portion. If we know the size of one portion of a whole, then we can figure out the size of the other portion.

Example 1 (a) What fraction of the circle is shaded?

(b) What fraction of the circle is *not* shaded?



Solution We see that the whole circle has been divided into eight equal parts. Three of the parts are shaded, so five of the parts are not shaded.

(a) The fraction that is shaded is $\frac{3}{8}$.

(b) The fraction that is *not* shaded is $\frac{5}{8}$.

Example 2 The pizza was cut into eight equal slices. After Willis, Tony, and Jenny each took a slice, what fraction of the pizza was left?

Solution The whole pizza was cut into eight equal parts. Since three of the eight parts were taken, five of the eight parts remained. The fraction that was left was $\frac{5}{8}$.

Example 3 Two fifths of the crowd cheered. What fraction of the crowd did not cheer?

Solution We think of the crowd as though it were divided into five equal parts. We are told that two of the five parts cheered. So there were three parts that did not cheer. The fraction of the crowd that did not cheer was $\mathbf{\frac{3}{5}}$.

Two-step equations

In this equation we need to find the quantity on the right side of the equation before we find the number for N:

$$2N = 7 + 5$$

So the first step is to add 7 and 5, which gives us 12. Then we have this equation:

$$2N = 12$$

The second step is to find N. Since $2 \times 6 = 12$, we know that N is 6.

$$N = 6$$

Example 4 Find M in the following equation: $3M = 4 \cdot 6$

Solution A dot is sometimes used between two numbers to indicate multiplication. So $4 \cdot 6$ means "4 times 6." The product of 4 and 6 is 24.

$$3M = 4 \cdot 6$$

$$3M = 24$$

Now we find M. Three times 8 equals 24, so M equals 8.

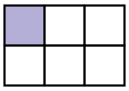
$$3M = 24$$

$$M = \mathbf{8}$$

LESSON PRACTICE

Practice set

a. What fraction of this rectangle is not shaded?



b. Three fifths of the race was over. What fraction of the race was left?

Find each missing number:

c. $2N = 2 + 8$

d. $2 + N = 2 \cdot 8$

MIXED PRACTICE

Problem set

1. *(21)* The diameter of Filomena's bicycle tire is 24 inches. What is the radius of the tire?

2. *(49)* Five sparrows could crowd into each birdhouse. If there were thirty-five birdhouses, how many sparrows could crowd in?

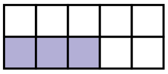
3. *(36, Inv. 4)* (a) Two nickels are what fraction of a dollar?

(b) Two nickels are what decimal part of a dollar?

4. *(60)* The Gilbreth family drank 39 quarts of milk in 3 days. That averages to how many quarts of milk each day?

5. *(1, 17)* Carl weighed 88 pounds. He put on his clothes, which weighed 2 pounds, and his shoes, which weighed 1 pound each. Finally he put on a jacket that weighed 3 pounds and stepped on the scale. How much did the scale show that he weighed?

6. *(61)* What fraction of this rectangle is not shaded?



7. *(55)* Which of these numbers is a multiple of 10?

A. 2 B. 5 C. 25 D. 50

8. *(61)* The pumpkin pie was sliced into 6 equal pieces. After 1 piece was taken, what fraction of the pie was left?

9. *(56)* Compare these fractions. Draw and shade two congruent circles to show the comparison.

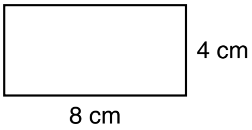
$$\frac{2}{3} \bigcirc \frac{3}{4}$$

10. *(54)* Estimate the sum of 5070 and 3840 by rounding each number to the nearest thousand before adding.

11. *(Inv. 5)* If 60% of the answers were true, then were there more true answers or more false answers?

12. (Inv. 2, Inv. 3) (a) What is the perimeter of this rectangle?

(b) What is the area of this rectangle?



13. (43, 51)
$$\begin{array}{r} \$62.59 \\ +\ \$17.47 \\ \hline \end{array}$$

14. (24) $Z - 417 = 268$

15. (45, 58) $1000 - (110 \times 9)$

16. (50) $3.675 - 1.76$

17. (58)
$$\begin{array}{r} \$6.70 \\ \times\quad 4 \\ \hline \end{array}$$

18. (58)
$$\begin{array}{r} 703 \\ \times\quad 6 \\ \hline \end{array}$$

19. (58)
$$\begin{array}{r} \$346 \\ \times\quad 9 \\ \hline \end{array}$$

20. (53) $5\overline{)39}$

21. (53) $7\overline{)39}$

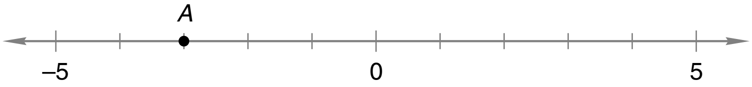
22. (53) $4\overline{)39}$

23. (53) $16 \div 3$

24. (53) $26 \div 6$

25. (Inv. 3, 47) $36 \div \sqrt{36}$

26. (Inv. 1) Point *A* represents what number on this number line?

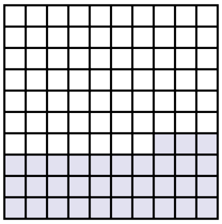


27. (Inv. 1) Compare: –5 ○ –3

28. (Inv. 4, Inv. 5) (a) What fraction of the large square is not shaded?

(b) What percent of the large square is not shaded?

(c) The unshaded part of the large square represents what decimal number?



LESSON

62

Multiplying Three or More Factors • Exponents

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Multiply three numbers, including ten:

a. $6 \times 7 \times 10$ **b.** $5 \times 8 \times 10$ **c.** $12 \times 10 \times 10$

Review:

d. \$6.47 + \$1.85 **e.** 400 + 37 + 210 **f.** \$10.00 − \$6.87

Patterns:

In this sequence the count from one number to the next increases. Copy this sequence and find the next three terms.

1, 3, 6, 10, 15, ___, ___, ___, …

NEW CONCEPTS

Multiplying three or more factors

To find the product of three numbers, we first multiply two of the numbers. Then we multiply the answer we get by the third number. To multiply four numbers, we must multiply once more. In any multiplication we continue the process until no factors remain.

Example 1 Multiply: $3 \times 4 \times 5$

Solution First we multiply two of the numbers to get a product. Then we multiply that product by the third number. If we multiply 3 by 4 first, we get 12. Then we multiply 12 by 5 and get 60.

STEP 1 **STEP 2**

$$\begin{array}{r} 3 \\ \times\ 4 \\ \hline 12 \end{array} \longrightarrow \begin{array}{r} 12 \\ \times\ \ 5 \\ \hline \mathbf{60} \end{array}$$

It does not matter which two numbers we multiply first. If we multiply 5 by 4 first, we get 20. Then we multiply 20 by 3 and again get 60.

STEP 1 **STEP 2**

$$\begin{array}{r} 5 \\ \times\ 4 \\ \hline 20 \end{array} \longrightarrow \begin{array}{r} 20 \\ \times\ \ 3 \\ \hline \mathbf{60} \end{array} \longleftarrow \text{same answer}$$

The order of the multiplications does not matter because of the commutative property of multiplication, which we studied in Lesson 28.

Example 2 Multiply: $4 \times 5 \times 10 \times 10$

Solution We may perform this multiplication mentally. If we first multiply 4 by 5, we get 20. Then we multiply 20 by 10 to get 200. Finally we multiply 200 by 10 and find that the product is **2000.**

Exponents

An **exponent** is a number that shows how many times another number (the **base**) is to be used as a factor. An exponent is written above and to the right of the base.

$$\text{base} \rightarrow 5^2 \leftarrow \text{exponent}$$

$$5^2 \text{ means } 5 \times 5.$$

$$5^2 \text{ equals } 25.$$

If the exponent is 2, we say "squared" for the exponent. So 5^2 is read as "five squared." If the exponent is 3, we say "cubed" for the exponent. So 2^3 is read as "two cubed."

Example 3 Simplify: $5^2 + 2^3$

Solution We will add five squared and two cubed. We find the values of 5^2 and 2^3 before adding.

$$5^2 \text{ means } 5 \times 5, \text{ which is } 25.$$

$$2^3 \text{ means } 2 \times 2 \times 2, \text{ which is } 8.$$

Now we add 25 and 8.

$$25 + 8 = \mathbf{33}$$

Example 4 Rewrite this expression using exponents:

$$5 \times 5 \times 5$$

Solution Five is used as a factor three times, so the exponent is 3.

$$\mathbf{5^3}$$

LESSON PRACTICE

Practice set Simplify:

a. $2 \times 3 \times 4$

b. $3 \times 4 \times 10$

c. 8^2

d. 3^3

e. $10^2 - 6^2$

f. $3^2 - 2^3$

g. Rewrite this expression using exponents:

$$4 \times 4 \times 4$$

MIXED PRACTICE

Problem set

1. *(52)* There were twice as many peacocks as peahens. If there were 12 peacocks, then how many peahens were there?

2. *(27)* Beth's dance class begins at 6 p.m. It takes 20 minutes to drive to dance class. What time should she leave home to get to dance class on time?

3. *(1, 43)* Mae-Ying bought a package of paper priced at $1.98 and 2 pens priced at $0.49 each. The tax on the entire purchase was 18¢. What was the total cost of the items?

4. *(57)* Nalcomb earns $3 a week for washing the car. How much money does he earn in a year of car washing? (There are 52 weeks in a year.)

5. *(61)* Two thirds of the race was over. What fraction of the race was left?

6. *(59)* Estimate the difference: $887 - 291$

7. *(61)* In the equation $9 \times 11 = 100 - y$, the letter y stands for what number?

8. *(56)* Compare: $\frac{2}{4} \bigcirc \frac{4}{8}$. Draw and shade two congruent circles to show the comparison.

9. *(55)* What is the sum of the eighth multiple of 5 and the fourth multiple of 10?

10. *(54)* According to this calendar, July 4, 2014, is what day of the week?

JULY 2014

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

11. *(47)* Write four multiplication/division facts using the numbers 6, 3, and 18.

12. *(62)* $5 \times 6 \times 7$

13. *(62)* 4^3

14. *(51)*
$$\begin{array}{r} 476{,}385 \\ +\ 259{,}518 \\ \hline \end{array}$$

15. *(52)*
$$\begin{array}{r} \$20.00 \\ -\ \$17.84 \\ \hline \end{array}$$

16. *(24)*
$$\begin{array}{r} C \\ -\ 19{,}434 \\ \hline 45{,}579 \end{array}$$

17. *(58)*
$$\begin{array}{r} \$4.17 \\ \times\ \ \ \ 8 \\ \hline \end{array}$$

18. *(58)*
$$\begin{array}{r} \$470 \\ \times\ \ \ 7 \\ \hline \end{array}$$

19. *(58)*
$$\begin{array}{r} 608 \\ \times\ \ 4 \\ \hline \end{array}$$

20. *(53)* $4\overline{)29}$

21. *(53)* $8\overline{)65}$

22. *(53)* $5\overline{)29}$

23. *(53)* $65 \div 7$

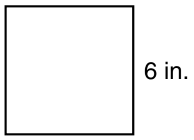
24. *(53)* $39 \div 5$

25. *(53)* $65 \div 9$

26. *(Inv. 5)* If 40% of the students are boys, then what percent of the students are girls?

27. *(Inv. 2, Inv. 3)* (a) What is the perimeter of this square?

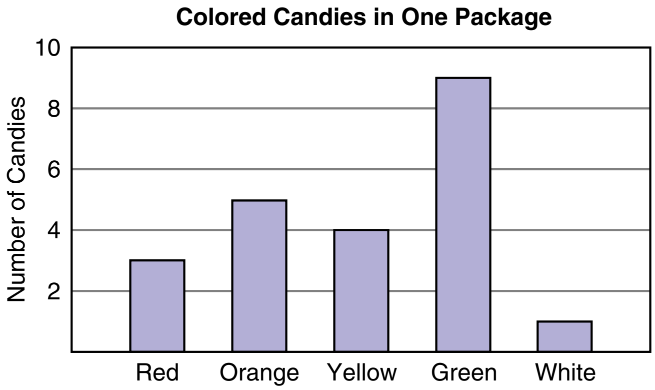
(b) What is the area of this square?



28. *(23)* What type of angle is each angle of a square?

A. acute B. right C. obtuse

29. *(Inv. 6)* This bar graph shows the number of colored candies in a package. Use the bar graph to answer each question.



(a) How many red candies were there?

(b) There were how many more green candies than orange candies?

LESSON

63 Polygons

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Multiply four numbers, including two tens:

a. $6 \times 4 \times 10 \times 10$ **b.** $3 \times 4 \times 10 \times 10$ **c.** $4 \times 5 \times 10 \times 10$

Review:

d. $\$5.00 - \$3.25$ **e.** $\$7.59 + \$0.95$ **f.** $470 - 30$

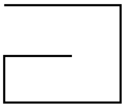
Problem Solving:

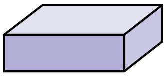
Fifty percent of the students in Gabriel's class are girls. Do we know how many students are in this class? Do we know whether there are more boys or more girls in the class? Do we know whether the number of students in the class is even or odd?

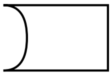
NEW CONCEPT

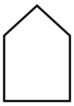
Polygons are closed, flat shapes formed by line segments.

Example 1 Which of these shapes is a polygon?

A.


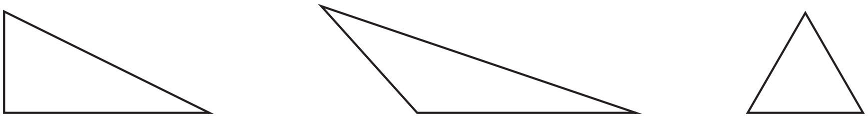
B.


C.


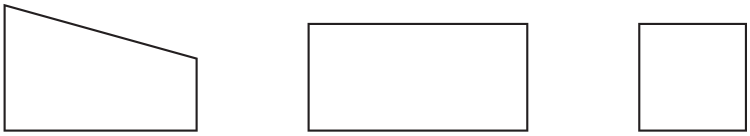
D.


Solution Figure A is not a polygon because it is not closed. Figure B is not a polygon because it is not flat. Figure C is not a polygon because not all of its sides are straight. **Figure D** is a polygon. It is closed and flat, and all its sides are line segments.

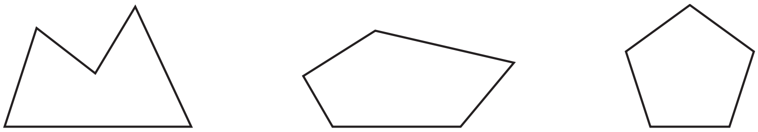
Polygons are named according to the number of sides they have. The lengths of the sides may or may not be the same. If a polygon's sides are all the same length and its angles are all the same size, it is called a **regular polygon.** The figure to the right in each row below is a regular polygon.



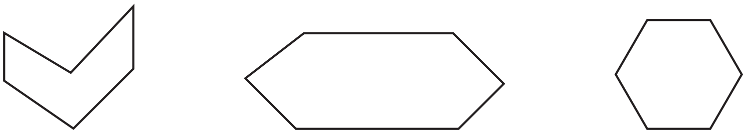
Three-sided polygons are **triangles.**



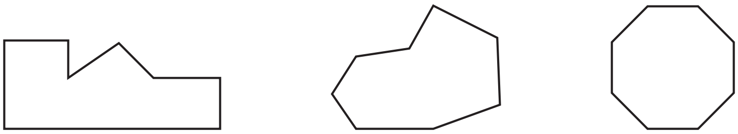
Four-sided polygons are **quadrilaterals.**



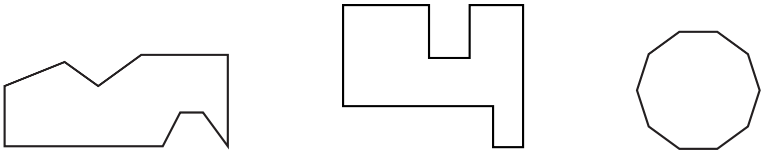
Five-sided polygons are **pentagons.**



Six-sided polygons are **hexagons.**



Eight-sided polygons are **octagons.**



Ten-sided polygons are **decagons.**

Example 2 What kind of a polygon is a square?

Solution A square has four sides, so a square is a **quadrilateral.** In fact, a square is a regular quadrilateral.

Each corner of a polygon is called a **vertex** (plural: *vertices*). A polygon has as many vertices as it has sides.

Example 3 An octagon has how many more vertices than a pentagon?

Solution An octagon has eight sides and eight vertices. A pentagon has five sides and five vertices. So an octagon has **3 more vertices** than a pentagon.

LESSON PRACTICE

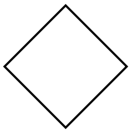
Practice set Draw an example of each of these polygons:

a. triangle **b.** quadrilateral **c.** pentagon

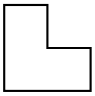
d. hexagon **e.** octagon **f.** decagon

Name each polygon shown:

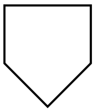
g.



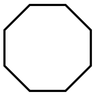
h.



i.



j.



k. Which figures in problems **g–j** appear to be regular polygons?

l. What common street sign has the shape of the polygon in problem **j?**

m. A decagon has how many more vertices than a hexagon?

MIXED PRACTICE

Problem set

1. *(52)* Three feet equals 1 yard. A car that is 15 feet long is how many yards long?

2. *(47)* Write four multiplication/division facts using the numbers 3, 10, and 30.

3. *(35)* Roberta had six quarters, three dimes, and fourteen pennies. How much money did she have in all?

4. *(1, 10)* What is the sum of the even numbers that are greater than 10 but less than 20?

5. *(59)* Estimate the sum of 715 and 594 by rounding the numbers to the nearest hundred and then adding.

6. *(40, 62)* Erin opened a 1-gallon bottle of milk and began filling glasses. Each glass held 1 cup of milk. Two cups equals a pint. Two pints equals a quart. Four quarts equals a gallon. How many glasses could Erin fill?

7. *(37)* To what mixed number is the arrow pointing?

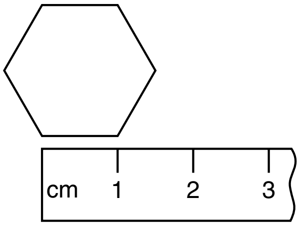
8. *(61)* The cake was cut into 12 equal pieces. Seven of the pieces were eaten. What fraction of the cake was left?

9. *(31, 38)* The product of 4 and 3 is how much greater than the sum of 4 and 3?

10. *(Inv. 3, 62)* What is the sum of 9^2 and $\sqrt{9}$?

11. *(Inv. 2, 63)* (a) What is the name of this polygon?

(b) Each side is the same length. What is the perimeter of this polygon?



12. *(60)* Roger could pick 56 flowers in 8 minutes. At that rate, how many flowers could he pick in 1 minute?

13. *(57)* Sarah could pick 11 flowers in 1 minute. At that rate, how many flowers could she pick in 5 minutes?

14. *(24, 52)* $\$40.00 - D = \$2.43$

15. *(Inv. 3, 61)* $5 \times N = 15 + \sqrt{25}$

16. *(62)* $6 \times 4 \times 10$

17. *(62)* 5^3

18. *(50)* $3.5 + 2.45$

19. *(50)* $1.95 - 0.4$

20. *(43, 45)* $\$1.00 - (\$0.36 + \$0.57)$

21. *(58)* 349×8

22. *(58)* $\$7.60 \times 7$

23. *(53)* $6\overline{)34}$

24. *(53)* $8\overline{)62}$

25. *(53)* $5\overline{)24}$

26. *(47)* $\dfrac{63}{7}$

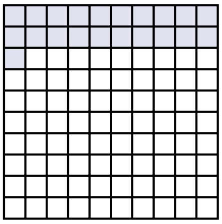
27. *(Inv. 5)* If 60% of the flowers that Sarah picked were red, what percent of the flowers that Sarah picked were not red?

28. *(55)* Which of these numbers is a factor of 10?

A. 3 B. 5 C. 15 D. 40

29. *(Inv. 4, Inv. 5)* (a) What fraction of the large square is shaded?

(b) What percent of the large square is not shaded?



LESSON

64 Division with Two-Digit Answers, Part 1

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Multiply two numbers ending in zero. (*Example:* 30 × 40 equals 3 × 10 times 4 × 10. We rearrange factors to get 3 × 4 × 10 × 10, which is 1200.)

a. 40 × 40 **b.** 30 × 50 **c.** 60 × 70 **d.** 40 × 50

Problem Solving:

This question is written in the code described in Lesson 60. After you decode the question, write the answer in the same code.

23-8-9-3-8 3-15-9-14 5-17-21-1-12-19
8-1-12-6 15-6 1 4-9-13-5?

NEW CONCEPT

In this lesson we will learn a pencil-and-paper method for dividing a two-digit number by a one-digit number. We will demonstrate the method as we solve this problem:

> *The seventy-eight fifth-graders at Washington School need to be divided equally among three classrooms. How many students should be in each room?*

There are three numbers in this "equal groups" problem: the total number of students, the number of classrooms, and the number of students in each classroom.

PATTERN:
Number of groups × number in each group = total

PROBLEM:
3 classrooms × *N* students in each classroom = 78 students

To find the number of students in each classroom, we divide 78 by 3.

$$3\overline{)78}$$

For the first step we ignore the 8 and divide 7 by 3. We write "2" above the 7. Then we multiply 2 by 3 and write "6" below the 7. Then we subtract and write "1."

$$\begin{array}{r} 2 \\ 3\overline{)78} \\ \underline{6} \\ 1 \end{array}$$

Next we "bring down" the 8, as shown here. Together, the 1 and 8 form 18.

$$\begin{array}{r} 2 \\ 3\overline{)78} \\ \underline{6}\downarrow \\ 18 \end{array}$$

Now we divide 18 by 3 and get 6. We write the 6 above the 8 in 78. Then we multiply 6 by 3 and write "18" below the 18.

$$\begin{array}{r} 26 \\ 3\overline{)78} \\ \underline{6} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

We subtract and find that the remainder is zero. This means that if the students are divided equally among the classrooms, there will be 26 students in each classroom.

$$78 \div 3 = 26$$

Since division facts and multiplication facts form fact families, we may arrange these three numbers to form a multiplication fact:

$$3 \times 26 = 78$$

We can multiply 3 by 26 to check our work.

$$\begin{array}{r} {}^{1} \\ 26 \\ \underline{\times\ \ 3} \\ 78 \end{array} \quad \text{check}$$

Example 1 Divide 87 by 3. Then check your work.

Solution For the first step we ignore the 7. We divide 8 by 3, multiply, and then subtract. Next we bring down the 7 to form 27. Now we divide 27 by 3, multiply, and subtract again.

$$\begin{array}{r} 29 \\ 3\overline{)87} \\ \underline{6}\!\downarrow \\ 27 \\ \underline{27} \\ 0 \end{array}$$

The remainder is zero, so we see that 87 divides into 3 equal groups of **29.**

Now we multiply 3 by 29 to check our work. If the product is 87, we can be confident that our division was correct.

$$\begin{array}{r} \overset{2}{2}9 \\ \times\ \ 3 \\ \hline 87 \end{array} \quad \text{check}$$

Notice that there is no remainder when 87 is divided by 3. That is because 87 is a multiple of 3. We cannot identify the multiples of 3 by looking at the last digit, because the multiples of 3 can end with any digit. However, adding the digits of a number can tell us whether a number is a multiple of 3. If the sum is a multiple of 3, then so is the number. For example, adding the digits in 87 gives us 15 ($8 + 7 = 15$). Since 15 is a multiple of 3, we know that 87 is a multiple of 3.

Example 2 Which of these numbers can be divided by 3 with no remainder?

A. 56 B. 64 C. 45

Solution We add the digits of each number:

A. $5 + 6 = 11$ B. $6 + 4 = 10$ C. $4 + 5 = 9$

Of the numbers 11, 10, and 9, only 9 is a multiple of 3. So the only choice that can be divided by 3 with no remainder is **C. 45.**

LESSON PRACTICE

Practice set* Divide:

a. $3\overline{)51}$ **b.** $4\overline{)52}$ **c.** $5\overline{)75}$

d. $3\overline{)72}$ **e.** $4\overline{)96}$ **f.** $2\overline{)74}$

g. Which of these numbers can be divided by 3 with no remainder? How do you know?

A. 75 B. 76 C. 77

MIXED PRACTICE

Problem set

1. (34) A square mile is twenty-seven million, eight hundred seventy-eight thousand, four hundred square feet. Use digits to write that number of square feet.

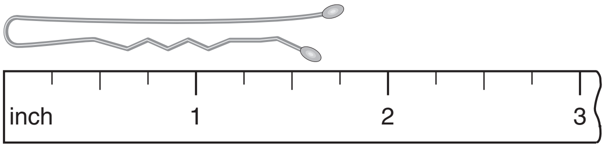
2. (49) Apollo's target was one hundred thirteen paces away. If each pace was 3 feet, how many feet away was the target?

3. (25, 41) Tracy's baseball card album will hold five hundred cards. Tracy has three hundred eighty-four cards. How many more cards will fit in the album?

4. (52, 54) The trip lasted 21 days. How many weeks did the trip last?

5. (49, 63) A stop sign has the shape of an octagon. How many sides do seven stop signs have?

6. (39) Find the length of this hairpin to the nearest quarter inch:



7. (16, 33) Write 406,912 in expanded form. Then use words to write the number.

8. (Inv. 2) One foot equals 12 inches. If each side of a square is 1 foot long, then what is the perimeter of the square in inches?

9. *(59)* Estimate the sum of 586 and 797 by rounding the numbers to the nearest hundred before adding.

10. *(56)* Compare: $\frac{3}{6} \bigcirc \frac{1}{2}$. Draw and shade two congruent circles to show the comparison.

11. *(Inv. 3, Inv. 5)* Compare: 50% of 100 $\bigcirc$ $\sqrt{100}$

12. *(11, 30)* Some birds sat on the wire at sunup. After 47 more birds came there were 112 birds sitting on the wire. How many birds sat on the wire at sunup?

13. *(43, 51)* $\begin{array}{r} \$32.47 \\ + \ \$67.54 \\ \hline \end{array}$

14. *(52)* $\begin{array}{r} 51{,}036 \\ - \ \ 7{,}648 \\ \hline \end{array}$

15. *(50)* $\begin{array}{r} 53.6 \\ 2.9 \\ 97.4 \\ 8.8 \\ + \ 436.1 \\ \hline \end{array}$

16. *(64)* $5\overline{)75}$

17. *(64)* $3\overline{)84}$

18. *(64)* $4\overline{)92}$

19. *(53)* $6\overline{)58}$

20. *(58)* $\begin{array}{r} 257 \\ \times \quad 5 \\ \hline \end{array}$

21. *(58)* $\begin{array}{r} \$7.09 \\ \times \quad 3 \\ \hline \end{array}$

22. *(58)* $\begin{array}{r} \$334 \\ \times \quad 9 \\ \hline \end{array}$

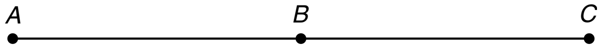
23. *(64)* $2\overline{)36}$

24. *(41)* $4N = 36$

25. *(62)* $4^2 + 2^3$

26. *(43, 45)* $3.5 - (2.4 - 1.3)$

27. *(39, 45)* Segments *AB* and *BC* are each $1\frac{1}{2}$ in. long. How long is segment *AC?*

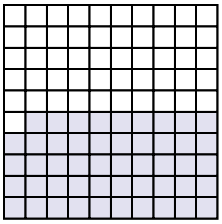


28. *(61)* Three fourths of the game was over. What fraction of the game remained?

29. *(Inv. 4, Inv. 5)* (a) What fraction of the large square is shaded?

(b) What percent of the large square is not shaded?

(c) What decimal number is represented by the shaded part of the square?



LESSON

65

Divisor, Dividend, and Quotient • Division with Two-Digit Answers, Part 2

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Multiply three numbers, including numbers ending in zero:

a. $3 \times 10 \times 20$ **b.** $4 \times 20 \times 30$ **c.** $3 \times 40 \times 10$

Review:

d. \$10.00 − \$9.24 **e.** \$6.48 + \$2.39 **f.** 480 − 125

Problem Solving:

Joan paid a dollar for an item that cost 44¢. If she got back four coins in change, what should the four coins have been?

NEW CONCEPTS

Divisor, dividend, and quotient

The numbers in a division problem are named the **divisor,** the **dividend,** and the **quotient.**

$$\begin{array}{r} \text{quotient} \\ \text{divisor}\overline{)\text{dividend}} \end{array} \qquad \text{dividend} \div \text{divisor} = \text{quotient}$$

$$\frac{\text{dividend}}{\text{divisor}} = \text{quotient}$$

If we calculate how to divide 78 students among 3 classrooms, then 78 becomes the dividend and 3 becomes the divisor. The result, 26, is the quotient.

$$\begin{array}{rrl} & 26 & \longleftarrow \text{quotient} \\ \text{divisor} \longrightarrow & 3\overline{)78} & \longleftarrow \text{dividend} \end{array}$$

The dividend is the number being divided. The divisor is the number by which the dividend is divided. The quotient is the result of the division.

Example 1 Identify the 8 in each of these problems as the *divisor, dividend,* or *quotient:*

(a) $8 \div 2 = 4$ (b) $\begin{array}{r} 3 \\ 8\overline{)24} \end{array}$ (c) $\frac{40}{5} = 8$

Solution (a) **dividend** (b) **divisor** (c) **quotient**

Division with two-digit answers, part 2

We solve the following problem by dividing:

> *On a three day bike trip Hans rode 234 kilometers. Hans rode an average of how many kilometers each day?*

We find the answer by dividing 234 by 3.

$$3\overline{)234}$$

To perform the division, we begin by dividing $3\overline{)23}$. We write "7" above the 3 of 23. Then we multiply and subtract.

$$\begin{array}{r} 7 \\ 3\overline{)234} \\ \underline{21} \\ 2 \end{array}$$

Next we bring down the 4.

$$\begin{array}{r} 7 \\ 3\overline{)234} \\ \underline{21}\!\downarrow \\ 24 \end{array}$$

Now we divide 24 by 3. We write "8" above the 4. Then we multiply and finish by subtracting.

$$\begin{array}{r} 78 \\ 3\overline{)234} \\ \underline{21} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

We find that Hans rode an average of 78 kilometers each day.

We can check our work by multiplying the quotient, 78, by the divisor, 3. If the product is 234, then our division answer is correct.

$$\begin{array}{r} 78 \\ \times 3 \\ \hline 234 \end{array} \quad \text{check}$$

Example 2 Divide 468 by 9. Then check your answer.

Solution We begin by finding $9\overline{)46}$. We write "5" above the 6 in 46. Then we multiply and subtract.

$$\begin{array}{r} 5 \\ 9\overline{)468} \\ \underline{45} \\ 1 \end{array}$$

Next we bring down the 8. Now we divide 18 by 9.

$$\begin{array}{r} 52 \\ 9\overline{)468} \\ \underline{45}\!\downarrow \\ 18 \\ \underline{18} \\ 0 \end{array}$$

We see that 468 divides into 9 equal groups of **52.**

We check the division by multiplying 52 by 9, looking for 468 as the answer.

$$\begin{array}{r} \overset{1}{5}2 \\ \times\ \ 9 \\ \hline 468 \end{array}\quad \text{check}$$

We see that there is no remainder when 468 is divided by 9. That is because 468 is a multiple of 9. Just as we identified multiples of 3 by adding the digits of a number, we can identify multiples of 9 by adding the digits. For the number 468, we have

$$4 + 6 + 8 = 18$$

The sum 18 is a multiple of 9, so 468 is a multiple of 9.

Example 3 Which of these numbers is a multiple of 9?

A. 123 B. 234 C. 345

Solution We add the digits of each number:

A. $1 + 2 + 3 = 6$

B. $2 + 3 + 4 = 9$

C. $3 + 4 + 5 = 12$

The sums 6, 9, and 12 are all multiples of 3, but only 9 is a multiple of 9. Therefore, only **B. 234** is a multiple of 9 and can be divided by 9 without a remainder.

LESSON PRACTICE

Practice set* In the division fact $32 \div 8 = 4$,

a. what number is the divisor?

b. what number is the dividend?

c. what number is the quotient?

Divide:

d. $3\overline{)144}$ **e.** $4\overline{)144}$ **f.** $6\overline{)144}$

g. $225 \div 5$ **h.** $455 \div 7$ **i.** $200 \div 8$

j. Which of these numbers can be divided by 9 without a remainder? How do you know?

A. 288 B. 377 C. 466

MIXED PRACTICE

Problem set

1. *(52)* The chef uses 3 eggs for each omelette. How many omelettes can he make with 24 eggs?

2. *(25)* Seventy-two young knights met peril in the forest. Twenty-seven fought bravely, but the others fled. How many young knights fled?

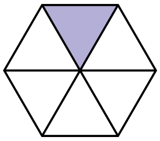
3. *(49)* Armando wore braces for 3 years. For how many months did he wear braces?

4. *(20, 59)* Freddy bought a book for $12.89 and a folder for $3.95. Estimate how much money Freddy spent by rounding each amount to the nearest dollar before adding.

5. *(60)* Fanga ran 28 miles in 4 hours. She ran at a rate of how many miles per hour?

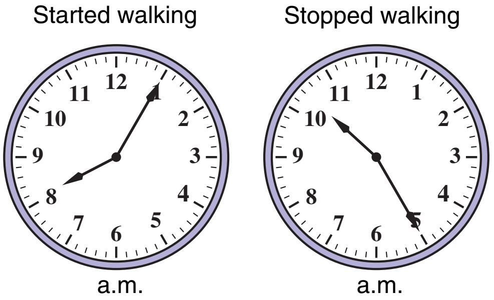
6. *(1, 43, 51)* Mallory bought ballet shoes for $18.95 and tap shoes for $42.85. How much did she pay for both pairs of shoes?

7. *(61)* What fraction of this hexagon is not shaded?



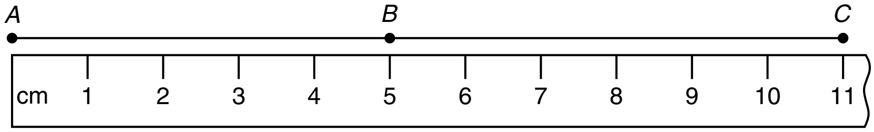
8. *(Inv. 2)* Each side of the hexagon in problem 7 is 1 cm long. What is its perimeter?

9. *(27)* Jim started walking early in the morning and did not stop until later that morning. How much time did Jim spend walking?



10. *(21)* Nigel drew a circle with a radius of 18 inches. What was the diameter of the circle?

11. *(45)* How long is segment BC?



12. *(65)* Which of these words names the answer to a division problem?

A. product B. dividend C. divisor D. quotient

13. *(Inv. 3, 47, 62)* Compare: $27 \div 3^2 \bigcirc 27 \div \sqrt{9}$

14. *(43, 51)*
$$\begin{array}{r} \$97.56 \\ +\ \$\ \ 8.49 \\ \hline \end{array}$$

15. *(52)*
$$\begin{array}{r} \$60.00 \\ -\ \$54.78 \\ \hline \end{array}$$

16. *(43)*
$$\begin{array}{r} 37.64 \\ 29.45 \\ 3.01 \\ +\ 75.38 \\ \hline \end{array}$$

17. *(65)* $168 \div 3$

18. *(65)* $378 \div 7$

19. *(58)* 840×3

20. *(58)* 4×564

21. *(58)* 304×6

22. *(65)* $4\overline{)136}$

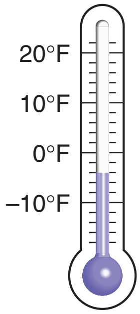
23. *(65)* $2\overline{)132}$

24. *(65)* $6\overline{)192}$

25. *(41)* $7N = 56$

26. *(62)* $12 \times 7 \times 10$

27. *(18)* Dooley awoke to a cold morning. He glanced out the window at the thermometer. What temperature is shown on this thermometer?



28. *(36, Inv. 5)* (a) Three quarters are what fraction of a dollar?

(b) Three quarters are what percent of a dollar?

29. *(63)* Draw a quadrilateral. A quadrilateral has how many vertices?

LESSON

66 Similar and Congruent Figures

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Multiply numbers ending in two zeros by numbers ending in one zero:

a. 200 × 10 **b.** 300 × 20 **c.** 400 × 50

Review:

d. 250 × 10 **e.** \$1.00 + \$0.29 **f.** \$4.47 + \$2.95

Patterns:

Counting by fives from 5, we say this sequence:

5, 10, 15, 20, 25, 30, …

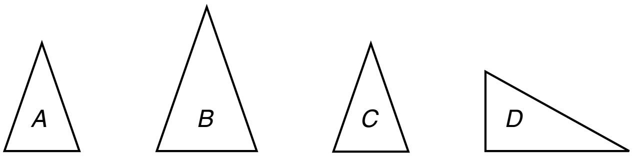
If we count by fives from 1, we say this sequence:

1, 6, 11, 16, 21, 26, …

What sequence do we say when we count by fives from 2?

NEW CONCEPT

Look at these four triangles:



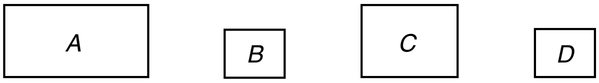
Triangle *A* and triangle *B* have matching angles. Triangle *B* is an enlarged version of triangle *A*. We could use a magnifying glass to make Triangle *A* look like triangle *B*. We say that triangle *A* and triangle *B* are **similar.** They are not exactly alike, though, since the sides of triangle *B* are longer than the sides of triangle *A*.

Triangles *A* and *C* also have matching angles, so they are similar. Since triangles *A* and *C* are the same size and have the same shape, we say that they are **congruent** in addition to being similar.

Triangle A and triangle D are not similar. Neither one is an enlarged version of the other. Looking at either triangle through a magnifying glass cannot make it look like the other, because their angles do not match.

Example (a) Which of these rectangles are similar?

(b) Which of these rectangles are congruent?

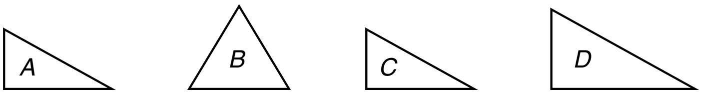


Solution (a) **Rectangles *B*, *C*,** and ***D*** are similar. Rectangle A is not similar to the other three rectangles because it is not a "magnified" version of any of the other rectangles.

(b) **Rectangle *B*** and **rectangle *D*** are congruent, because they have the same shape and size.

LESSON PRACTICE

Practice set Refer to the figures below to answer problems **a** and **b.**



a. Which of these triangles are similar?

b. Which of these triangles are congruent?

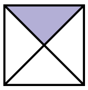
MIXED PRACTICE

Problem set

1. *(26, 49)* With his bow and arrow William Tell split 10 apples in half. How many apple halves were there?

2. *(52, 65)* Every third bead on the necklace was red. There were one hundred forty-one beads in all. How many beads were red? (Make equal groups of three.)

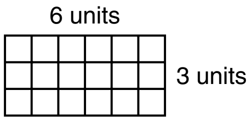
3. *(Inv. 5, 61)* Twenty-five percent of this square is shaded. What percent of the square is not shaded?



4. *(25)* Big Fox chased Little Rabbit 20 kilometers north, then 15 kilometers south. How far was Big Fox from where he started? (Draw a diagram to help solve the problem.)

5. *(27)* At 11:45 a.m. Jason glanced at the clock. His doctor's appointment was in $2\frac{1}{2}$ hours. At what time was his appointment?

6. *(Inv. 2, Inv. 3)* In the figure below we do not state the size of the units used to measure the rectangle. Find the perimeter and area of the rectangle. When writing your answers, use the terms *units* or *square units* instead of terms for standard units, such as inches and square inches.



7. *(57)* The car could go 30 miles on 1 gallon of gas. How far could the car go on 8 gallons of gas?

8. *(61)* Two sevenths of the crowd cheered wildly. The rest of the crowd stood silently. What fraction of the crowd stood silently?

9. *(40, 49)* Forty-two glops were required to make a quart of good glue. Jean needed a gallon of good glue. How many glops did she need?

10. *(56)* Compare: $\frac{1}{2} \bigcirc \frac{2}{5}$. Draw and shade two congruent rectangles to show the comparison.

11. *(61)* $N + 2 = 3 \times 12$

12. *(45, 50)* $6.42 - (3.3 - 1.5)$

13. *(Inv. 3, 62)* $\sqrt{81} + 82 + 3^2$

14. *(43)* $10 − 10¢

15. *(52)* $43{,}016 - 5987$

16. *(62)* $24 \times 3 \times 10$

17. *(58)* $\begin{array}{r} \$4.86 \\ \times \quad 7 \\ \hline \end{array}$

18. *(58)* $\begin{array}{r} 307 \\ \times \quad 8 \\ \hline \end{array}$

19. *(58)* $\begin{array}{r} \$460 \\ \times \quad 9 \\ \hline \end{array}$

20. *(65)* $2\overline{)152}$

21. *(65)* $6\overline{)264}$

22. *(64)* $4\overline{)56}$

23. *(65)* $230 \div 5$

24. *(64)* $91 \div 7$

25. *(65)* $135 \div 3$

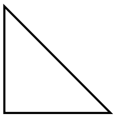
26. *(35)* Write each amount of money using a dollar sign and a decimal point:

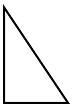
(a) 17¢ (b) 8¢ (c) 345¢

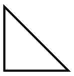
27. *(35, Inv. 4)* Use words to name each number:

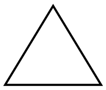
(a) $2\frac{3}{10}$ (b) 2.3

28. *(66)* Which two triangles are similar?

A.


B.


C.


D.


29. *(63)* Draw a pentagon. A pentagon has how many vertices?

LESSON 67 Multiplying by Multiples of 10

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Multiply three numbers ending in zero:

a. 10 × 10 × 10 **b.** 10 × 20 × 30 **c.** 20 × 30 × 40

Review:

d. \$6.48 + \$2.84 **e.** 320 + 200 + 60 **f.** \$5.00 − \$3.79

Problem Solving:

Mathea exercised for 50% of an hour. For 50% of her exercise time, she was running. For how many minutes was Mathea exercising? For how many minutes was she running?

NEW CONCEPT

We remember that the multiples of 10 are the numbers we say when we count by tens starting from 10. The last digit in every multiple of 10 is a zero. The first five multiples of 10 are

10, 20, 30, 40, 50

We may think of 20 as 2 × 10. So to find 34 × 20, we may look at the problem this way:

34 × 2 × 10

We multiply 34 by 2 and get 68. Then we multiply 68 by 10 and get 680.

Example 1 Write 25 × 30 as a product of 10 and two other factors. Then multiply.

Solution Since 30 equals 3 × 10, we may write 25 × 30 as

25 × 3 × 10

Three times 25 is 75, and 75 times 10 is **750.**

To multiply a whole number or a decimal number by a multiple of 10, we may write the multiple of 10 so that the zero “hangs out” to the right. Below we use this method to find 34 × 20.

$$\begin{array}{r} 34 \\ \times \quad 20 \\ \hline \end{array} \longleftarrow \text{zero “hangs out” to the right}$$

We first write a zero in the answer directly below the “hanging” zero.

$$\begin{array}{r} 34 \\ \times \quad 20 \\ \hline 0 \end{array}$$

Then we multiply by the 2 in 20.

$$\begin{array}{r} 34 \\ \times \quad 20 \\ \hline 680 \end{array}$$

Example 2 Multiply: 30 × 34

Solution We write the multiple of 10 as the bottom number and let the zero “hang out.”

$$\begin{array}{r} 34 \\ \times \quad 30 \\ \hline \end{array}$$

Next, we write a zero in the answer directly below the zero in 30. Then we multiply by the 3. Our answer is **1020.**

$$\begin{array}{r} \overset{1}{3}4 \\ \times \quad 30 \\ \hline 1020 \end{array}$$

Example 3 Multiply: \$1.43 × 20

Solution We write the multiple of 10 so that the zero “hangs out.” We write a zero below the bar, and then we multiply by the 2. We place the decimal point so that there are two digits after it. Finally, we write a dollar sign in front and get **\$28.60.**

$$\begin{array}{r} \$1.43 \\ \times \qquad 20 \\ \hline \$28.60 \end{array}$$

LESSON PRACTICE

Practice set* In problems **a–f,** multiply the factors.

a. 75 × 10 **b.** 10 × 32 **c.** 10 × 53¢

d. $\begin{array}{r} 26 \\ \times\ \ 20 \\ \hline \end{array}$

e. $\begin{array}{r} \$1.64 \\ \times\ \ \ \ 30 \\ \hline \end{array}$

f. $\begin{array}{r} 45 \\ \times\ \ 50 \\ \hline \end{array}$

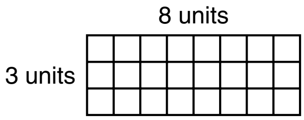
g. Write 12 × 30 as a product of 10 and two other factors. Then multiply.

MIXED PRACTICE

Problem set

1. *(52, 65)* Seventy-five beans were equally divided into five pots. How many beans were in each pot?

2. *(Inv. 2, Inv. 3)* Find the perimeter and area of this rectangle. Remember to label your answer with "units" or "square units."



3. *(40)* The server placed a full pitcher of water on the table. Which of the following is a reasonable estimate of the amount of water in the pitcher?

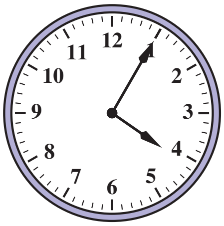
A. 2 gallons B. 2 quarts C. 2 cups D. 2 ounces

4. *(55)* Which of these numbers is not a factor of 12?

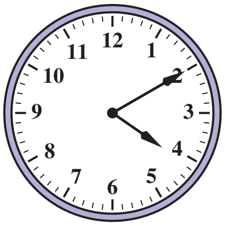
A. 6 B. 5 C. 4 D. 3

5. *(27)* The starting time was before dawn. The stopping time was in the afternoon. What was the difference in the two times?

Starting time

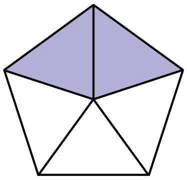


Stopping time



6. *(33)* One square mile is 3,097,600 square yards. Use words to write that number of square yards.

7. What fraction of this pentagon is not shaded?
(61)



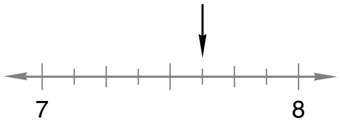
8. Is the shaded part of this pentagon more than 50% or less than 50% of the pentagon?
(Inv. 5)

9. According to this calendar, what is the date of the last Saturday in July 2019?
(54)

JULY 2019

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

10. To what mixed number is the arrow pointing?
(37)



11. Estimate the product of 78 and 4 by rounding 78 to the nearest ten before multiplying by 4.
(59)

12. Compare: $2^3 \bigcirc 2 \times 3$
(Inv. 1, 62)

13. \$6.25 + \$4 + \$12.78
(43)

14. 3.6 + 12.4 + 0.84
(50)

15. *(24, 52)*
$$\begin{array}{r} \$30.25 \\ -\quad B \\ \hline \$13.06 \end{array}$$

16. *(52)*
$$\begin{array}{r} 149{,}384 \\ -\ 98{,}765 \\ \hline \end{array}$$

17. *(67)*
$$\begin{array}{r} 409 \\ \times\ 70 \\ \hline \end{array}$$

18. $5 \times \$3.46$
(58)

19. $\$0.79 \times 6$
(58)

20. 10 × 39¢
(67)

21. $6\overline{)90}$
(64)

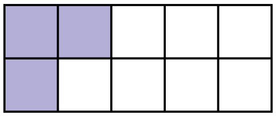
22. $4\overline{)96}$
(64)

23. $8\overline{)456}$
(65)

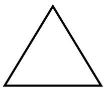
24. $95 \div 5$
(64)

25. $234 \div 3$
(65)

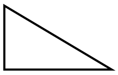
26. Name the shaded part of this rectangle as a fraction and as a decimal.
(Inv. 4)

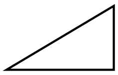


27. Which two figures are congruent?
(66)

A.


B.

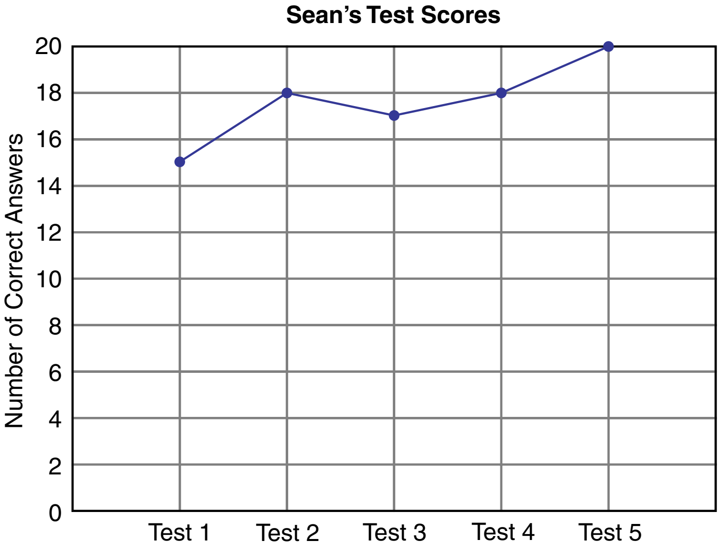

C.


D.


28. How much money is $\frac{1}{4}$ of a dollar?
(36)

29. Draw a hexagon. A hexagon has how many vertices?
(63)

30. Sean is using a line graph to keep a record of his test scores. There are 20 questions on each test. According to Sean's line graph, how many correct answers did he have on Test 3?
(Inv. 6)



LESSON 68

Division with Two-Digit Answers and a Remainder

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Multiply three numbers:

a. 12 × 10 × 10 **b.** 12 × 2 × 10 **c.** 12 × 3 × 10

Review:

d. 20 × 20 × 20 **e.** \$5.36 + \$1.98 **f.** 56 + 9 + 120

Problem Solving:

In this addition problem, some digits are missing. Copy this problem on your paper, and fill in the missing digits.

$$\begin{array}{r} 7\_6 \\ +\ \_4\_ \\ \hline \_45 \end{array}$$

NEW CONCEPT

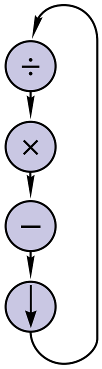
The pencil-and-paper method we use for dividing has four steps: divide, multiply, subtract, and bring down. The steps are repeated until the division is complete.

Step 1. Divide.

Step 2. Multiply.

Step 3. Subtract.

Step 4. Bring down.



For each step we write a number. When we finish Step 4, we go back to Step 1 and repeat the steps until there are no more digits to bring down. The number left after the last subtraction is the remainder. We show the remainder in the division answer by writing it with an uppercase "R" in front.

Example Divide: $5\overline{)137}$

Solution

Step 1: Divide 13 by 5 and write "2."

Step 2: Multiply 2 by 5 and write "10."

Step 3: Subtract 10 from 13 and write "3."

Step 4: Bring down 7 to make 37.

$$\begin{array}{r} 2 \\ 5\overline{)137} \\ \underline{10}\downarrow \\ 37 \end{array}$$

Now we repeat the same four steps:

Step 1: Divide 37 by 5 and write "7."

Step 2: Multiply 7 by 5 and write "35."

Step 3: Subtract 35 from 37 and write "2."

Step 4: There are no more digits to bring down, so we will not repeat the steps. The remainder is 2, so our answer is **27 R 2.**

$$\begin{array}{r} 27 \\ 5\overline{)137} \\ \underline{10} \\ 37 \\ \underline{35} \\ 2 \end{array}$$

If we divide 137 into 5 equal groups, there will be 27 in each group. There will also be 2 extra.

To check a division answer that has a remainder, we multiply the quotient (without the remainder) by the divisor and then add the remainder. For this example we multiply 27 by 5 and then add 2.

$$\begin{array}{r} 27 \\ \underline{\times \quad 5} \\ 135 \end{array} \qquad \begin{array}{r} 135 \\ \underline{+ \quad\ 2} \\ 137 \end{array} \quad \text{check}$$

LESSON PRACTICE

Practice set* Divide:

a. $3\overline{)134}$ **b.** $7\overline{)240}$ **c.** $5\overline{)88}$

d. $259 \div 8$ **e.** $95 \div 4$ **f.** $325 \div 6$

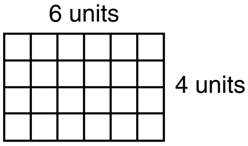
g. Grey divided 235 by 4 and got 58 R 3 for her answer. Describe how to check Grey's calculation.

MIXED PRACTICE

Problem set

1. (49) It took four spoonfuls to make one batch. How many spoonfuls were required to make 40 batches?

2. (Inv. 2, Inv. 3) Find the perimeter and area of this rectangle:



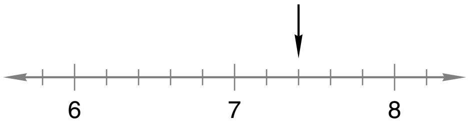
3. *(Inv. 4)* Angela ran 100 meters in twelve and fourteen hundredths seconds. Use digits to write her time for 100 meters.

4. *(61)* Maura ran $\frac{3}{5}$ of the course but walked the rest of the way. What fraction of the course did she walk?

5. *(Inv. 5, 56)* In problem 4, did Maura run more than 50% of the course or less than 50% of the course?

6. *(63)* Jimmy drew an octagon and a pentagon. What was the total number of sides in the two polygons?

7. *(37)* To what mixed number is the arrow pointing?



8. *(34)* Mount Rainier stands four thousand, three hundred ninety-two meters above sea level. Use digits to write that number of meters.

9. *(60)* Abigail could make 35 prizes in 7 minutes. How many prizes could she make in 1 minute?

10. *(59)* Estimate the sum of 6810 and 9030 by rounding each number to the nearest thousand before adding.

11. *(43, 45)* \$20 − (\$8.95 + 75¢)

12. *(62)* $5^2 - 4^2$

13. *(43)* 23.64 − 5.45

14. *(48)* $\begin{array}{r} 43¢ \\ \times \quad 8 \\ \hline \end{array}$

15. *(58)* $\begin{array}{r} \$3.05 \\ \times \quad 5 \\ \hline \end{array}$

16. *(58)* $\begin{array}{r} \$2.63 \\ \times \quad 7 \\ \hline \end{array}$

17. *(27)* Rewrite this addition problem as a multiplication problem and find the answer.

64 + 64 + 64 + 64 + 64

18. *(67)* 47×30

19. *(67)* 60×39

20. *(67)* 85×40

21. *(68)* $5\overline{)96}$

22. *(68)* $7\overline{)156}$

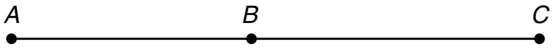
23. *(65)* $3\overline{)246}$

24. *(65)* $\frac{216}{6}$

25. *(65)* $156 \div 4$

26. *(68)* $195 \div 8$

27. *(39, 45)* Use an inch ruler to find the lengths of segments *AB, BC,* and *AC.*



28. *(21, 63, 66)* Which word makes the following sentence untrue?

All squares are ___________.

A. polygons
B. rectangles
C. similar
D. congruent

29. *(40)* Compare: 2 liters ◯ $\frac{1}{2}$ gallon

30. *(63)* Draw an octagon. An octagon has how many vertices?

LESSON

69 Millimeters

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Multiply three numbers:

a. 21 × 2 × 10 **b.** 25 × 2 × 10 **c.** 12 × 4 × 10

Review:

d. 30 × 30 × 30 **e.** \$10.00 − \$2.99 **f.** \$7.16 + \$1.99

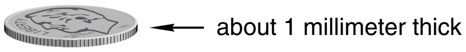
Problem Solving:

The parking lot charged \$1.50 for the first hour and 75¢ for each additional hour. Harold parked the car in the lot from 11 a.m. to 3 p.m. How much did he have to pay?

NEW CONCEPT

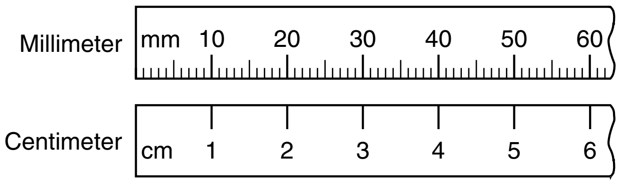
This line segment is one centimeter long:

If we divide a centimeter into ten equal lengths, each equal length is 1 **millimeter** long. A dime is about 1 millimeter thick.



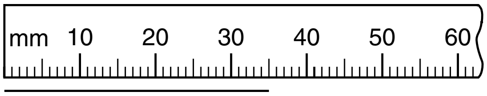
The words *centimeter* and *millimeter* are based on Latin words. *Centum* is the Latin word for "hundred." A centimeter is one hundredth $\left(\frac{1}{100}\right)$ of a meter, just as a cent is one hundredth of a dollar. *Mille* is the Latin word for "thousand." A millimeter is one thousandth $\left(\frac{1}{1000}\right)$ of a meter, just as a milliliter is one thousandth of a liter.

Here we show a millimeter scale and a centimeter scale:



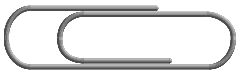
We can see from the scales that each centimeter equals ten millimeters. Also, notice that the abbreviation “mm” is used for *millimeter.*

Example 1 The segment below is how many millimeters long?



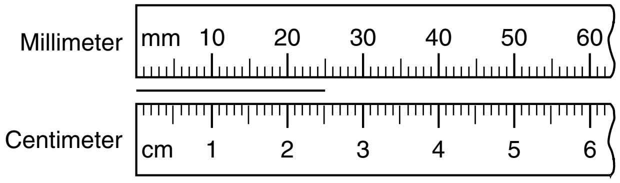
Solution The length of the segment is **35 mm.**

Example 2 This paper clip is 3 cm long. How many millimeters long is it?



Solution Each centimeter is 10 mm. We multiply 10 mm by 3 to find that the length of the paper clip is **30 mm.**

Using the scales below, we see that a segment that is 25 mm long is $2\frac{5}{10}$ cm long.

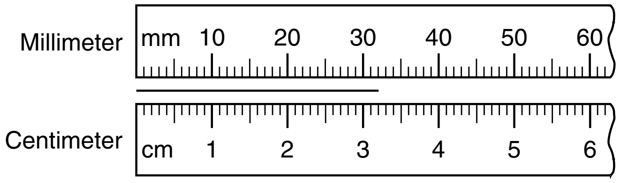


We usually write metric measures as decimal numbers instead of fractions. So a 25-mm segment is 2.5 cm long.

Example 3 Write the length of this segment

(a) in millimeters.

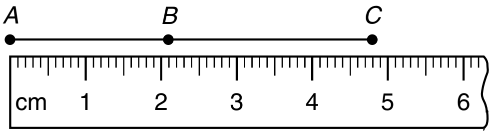
(b) in centimeters.



Solution (a) **32 mm**

(b) **3.2 cm**

Example 4 Write a decimal subtraction problem that shows how to find the length of segment BC.



Solution Segment AC is 4.8 cm long. Segment AB is 2.1 cm long. If we "take away" segment AB from segment AC, what is left is segment BC. So we subtract 2.1 cm from 4.8 cm.

$$\mathbf{4.8 - 2.1 = 2.7}$$

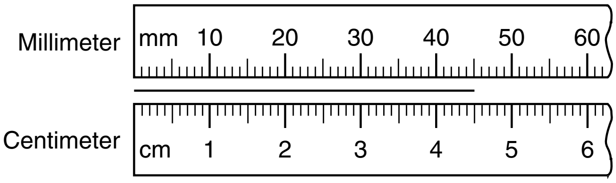
We find that segment BC is 2.7 cm long.

LESSON PRACTICE

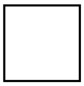
Practice set

a. The thickness of a dime is about 1 mm. Estimate the number of dimes it would take to form a stack that is about 1 cm high.

b. Write the length of this segment twice, once in millimeters and once in centimeters.

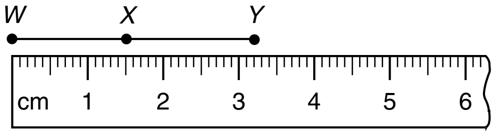


c. Each side of this square is 1 cm long. What is the perimeter of this square in millimeters?



d. The diameter of a penny is about 19 mm. How many centimeters is that?

e. Write a decimal subtraction problem that shows how to find the length of segment XY.



MIXED PRACTICE

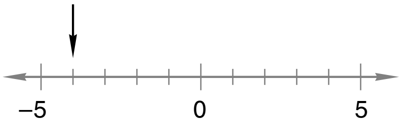
Problem set

1. (69) Maggie's house key is 5.2 cm long. How many millimeters long is her house key?

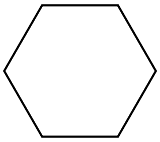
2. (25, 30) Tracy has three hundred eighty-four baseball cards. Nathan has two hundred sixty baseball cards. Tracy has how many more cards than Nathan?

3. (49) Forty-two students could ride in one bus. There were 30 buses. How many students could ride in all the buses?

4. (Inv. 1) To what number is the arrow pointing?

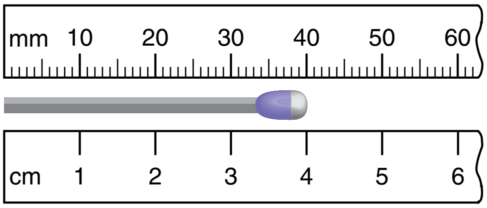


5. (26) Copy this hexagon and shade one sixth of it.



6. (69) (a) This match is how many centimeters long?

(b) This match is how many millimeters long?

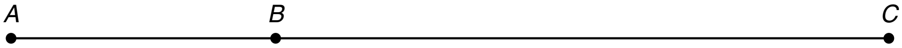


7. (Inv. 5) Twenty-five percent of the students earned an A. What percent of the students did not earn an A?

8. (Inv. 2, 49) One yard equals 3 feet. If each side of a square is 1 yard long, then what is the perimeter of the square in feet?

9. (59) Estimate the sum of 412, 695, and 379 by rounding each of the three numbers to the nearest hundred before adding.

10. (45, 69) Segment *AB* is 3.5 cm long. Segment *AC* is 11.6 cm long. How long is segment *BC?* Write a decimal subtraction problem and find the answer.



11. *(60)* Hugo rode 125 miles in 5 hours. His average speed was how many miles per hour?

12. *(57)* Urgo could go 21 miles in 1 hour. At that rate, how many miles could Urgo go in 7 hours?

13. *(20, 59)* Christina's meal cost $7.95. Tom's meal cost $8.95. Estimate the total price for both meals by rounding each amount to the nearest dollar before adding.

14. *(68)* $250 \div 6$

15. *(68)* $100 \div 9$

16. *(43)*
$$\begin{array}{r} 36.2 \\ 4.7 \\ 15.9 \\ 148.4 \\ 30.5 \\ +\ \ \ 6.0 \\ \hline \end{array}$$

17. *(65)* $\frac{256}{8}$

18. *(41, 64)* $4W = 60$

19. *(58)* $9 \times \$4.63$

20. *(67)* $80 \times 29¢$

21. *(52)*
$$\begin{array}{r} \$10.00 \\ -\ \$\ \ 1.73 \\ \hline \end{array}$$

22. *(52)*
$$\begin{array}{r} 36{,}428 \\ -\ 27{,}338 \\ \hline \end{array}$$

23. *(67)*
$$\begin{array}{r} 78 \\ \times\ \ 60 \\ \hline \end{array}$$

24. *(65)* $4\overline{)328}$

25. *(68)* $7\overline{)375}$

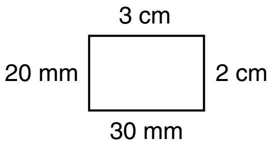
26. *(65)* $5\overline{)320}$

27. *(61)* $A + 5 = 25 + 25$

28. *(43, 45)* $4.7 - (3.6 - 1.7)$

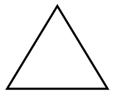
29. *(Inv. 2, Inv. 3)* (a) Find the perimeter of this rectangle in millimeters.

(b) Find the area of this rectangle in square centimeters.



30. *(23)* Each angle of this triangle is

A. acute B. right C. obtuse



LESSON 70

Stories About a Fraction of a Group

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

a. 300×30
b. 240×10
c. $11 \times 4 \times 10$
d. $\$10.00 - \$9.28$
e. $\$3.75 + \$2.95$
f. $467 - 63$

Problem Solving:

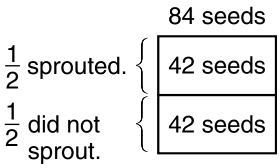
Henry has ten coins that total one dollar, but only one of the coins is a dime. What are the other nine coins?

NEW CONCEPT

We know that the fraction $\frac{1}{2}$ means that a whole has been divided into 2 parts. To find the number in $\frac{1}{2}$ of a group, we divide the total number in the group by 2. To find the number in $\frac{1}{3}$ of a group, we divide the total number in the group by 3. To find the number in $\frac{1}{4}$ of a group, we divide the total number in the group by 4, and so on.

Example 1 One half of the carrot seeds sprouted. If 84 seeds were planted, how many seeds sprouted?

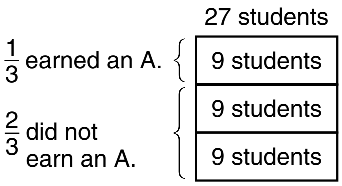
Solution We will begin by drawing a picture. The large rectangle stands for all the seeds. We are told that $\frac{1}{2}$ of the seeds sprouted, so we divide the large rectangle into 2 equal parts (into halves). Then we divide 84 by 2 and find that **42 seeds** sprouted.



$$\begin{array}{r} 42\text{ seeds} \\ 2\overline{)84\text{ seeds}} \end{array}$$

Example 2 One third of the 27 students earned an A on the test. How many students earned an A on the test?

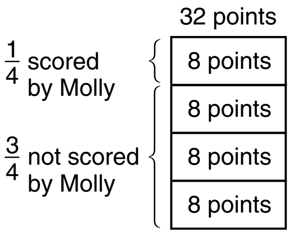
Solution We start with a picture. The whole rectangle stands for all the students. Since $\frac{1}{3}$ of the students earned an A, we divide the rectangle into 3 equal parts. To find how many students are in each part, we divide 27 by 3 and find that **9 students** earned an A on the test.



$$\begin{array}{r} 9 \text{ students} \\ 3\overline{)27 \text{ students}} \end{array}$$

Example 3 One fourth of the team's 32 points were scored by Molly. Molly scored how many points?

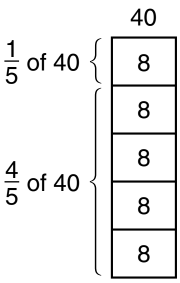
Solution We draw a rectangle. The whole rectangle stands for all 32 points. Molly scored $\frac{1}{4}$ of the points, so we divide the rectangle into 4 equal parts. We divide 32 by 4 and find that each part is 8 points. Molly scored **8 points.**



$$\begin{array}{r} 8 \text{ points} \\ 4\overline{)32 \text{ points}} \end{array}$$

Example 4 What is $\frac{1}{5}$ of 40?

Solution We draw a rectangle to stand for 40. We divide the rectangle into five equal parts, and we divide 40 by 5. Each part is 8, so $\frac{1}{5}$ of 40 is **8.**



$$\begin{array}{r} 8 \\ 5\overline{)40} \end{array}$$

LESSON PRACTICE

Practice set Draw a picture to help you solve each problem:

a. What is $\frac{1}{3}$ of 60?

b. What is $\frac{1}{2}$ of 60?

c. What is $\frac{1}{4}$ of 60?

d. What is $\frac{1}{5}$ of 60?

e. One half of the 32 children were boys. How many boys were there?

f. One third of the 24 coins were quarters. How many quarters were there?

MIXED PRACTICE

Problem set

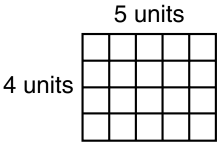
1. Forty-two million is how much greater than twenty-four million? *(31, 34)*

2. There were 150 seats at the Round Table. If 128 seats were filled, how many seats were empty? *(31)*

3. Angela ran 100 meters in 12.14 seconds. Marion ran 100 meters in 11.98 seconds. Marion ran 100 meters how many seconds faster than Angela? *(Inv. 4, 43)*

4. Keenan bought his lunch Monday through Friday. If each lunch cost $1.25, how much did he spend on lunch for the week? *(49)*

5. Find the perimeter and area of this rectangle: *(Inv. 2, Inv. 3)*



6. Rhonda read 30 pages a day on Monday, Tuesday, and Wednesday. She read 45 pages on Thursday and 26 pages on Friday. How many pages did she read in all? *(1, 17)*

7. One half of the cabbage seeds sprouted. If 74 seeds were planted, how many sprouted? Draw a picture to help you solve the problem. *(70)*

8. In problem 7, what percent of the seeds sprouted? *(Inv. 5)*

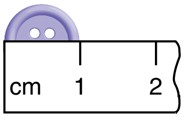
9. What is $\frac{1}{6}$ of 60? Draw a picture to help you solve the problem. *(70)*

10. Driving at a highway speed limit of 65 miles per hour, how far can a truck travel in 3 hours? *(57)*

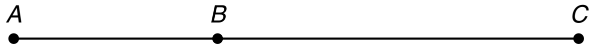
11. *(60, 65)* If a truck traveled 248 miles in 4 hours, then the truck traveled an average of how many miles each hour?

12. *(69)* (a) What is the diameter of this shirt button in centimeters?

(b) What is the radius of this shirt button in millimeters?



13. *(45, 69)* Segment AB is 2.7 cm long. Segment BC is 4.8 cm long. How long is segment AC? Write a decimal addition problem and find the answer.



14. *(43)* \$8 + \$9.48 + 79¢

15. *(50)* 5.36 + 2.1 + 0.43

16. *(52)* $\begin{array}{r} \$100.00 \\ -\ \$\ \ 59.47 \\ \hline \end{array}$

17. *(52)* $\begin{array}{r} 37{,}102 \\ -\ 18{,}590 \\ \hline \end{array}$

18. *(Inv. 3, 62)* $\sqrt{49} \times 2^3$

19. *(67)* \$1.63 × 40

20. *(67)* 60 × 39

21. *(58)* 7 × \$2.56

22. *(68)* $3\overline{)89}$

23. *(65)* $9\overline{)234}$

24. *(64)* $\frac{90}{6}$

25. *(68)* 243 ÷ 7

26. *(65)* 355 ÷ 5

27. *(2)* $7 + N = 28$

28. *(35, Inv. 4)* Write twelve and three tenths as a mixed number and as a decimal number.

29. *(55)* Which of these numbers is a factor of both 12 and 20?

A. 3 B. 4 C. 5 D. 6

30. *(23)* Draw a triangle that has one right angle.

INVESTIGATION 7

Focus on

Collecting Data with Surveys

In Investigation 6 a pictograph displayed the favorite lunches of the students in Room 12. The information in the graph was gathered by asking students to name their favorite lunch from the school menu. The students who answered the question were participating in a **survey.** A survey is an effort to gather specific information about a group, called a **population.** People who create the survey collect information about part of the population, called a **sample.** Then they draw conclusions about how the results of the survey apply to the whole population. In the favorite-lunch survey, the students in Room 12 were the sample, while all Thompson School students were the population.

In this investigation you will conduct a survey of students in your class. You will need to write questions for the survey, ask the questions fairly, record the answers, and display the results of the survey. From the survey you may be able to draw conclusions about a larger population.

How survey questions are asked can affect the results of a survey. Here are two survey questions. Describe how the answers to these questions might be different.

Which of these school lunches is your favorite?

○ pizza ○ hamburgers
○ tacos ○ corn dogs

Which lunch from the school menu is your favorite?

____

Notice that one of the questions is a multiple-choice question. The answer is limited to the choices that are provided. The other question is open to many answers.

1. Write two questions that you could ask to determine students' favorite drink to have with lunch. For one question, provide options to choose from. For the other, leave the question open (do not list options). You may use the favorite-lunch questions as models.

Survey questions should be phrased without **bias,** that is, without favoring one choice over another.

2. Describe the bias in the following question:

> *Which drink do you prefer with lunch: cool, sweet lemonade or milk that has been out of the refrigerator for an hour?*

3. Rewrite the question in problem 2 in order to remove the bias.

When we use a sample to find information about a larger population, we need to be careful that the sample is very similar to the population. For example, if we wanted to know the favorite TV show of kindergarten students, we would not survey a group of fourth-grade students.

4. For your survey you will collect answers from students in your class. This means that your class is the sample. So your survey results will probably apply best to which of these larger populations? (For each choice, state why or why not the larger population is like your sample.)

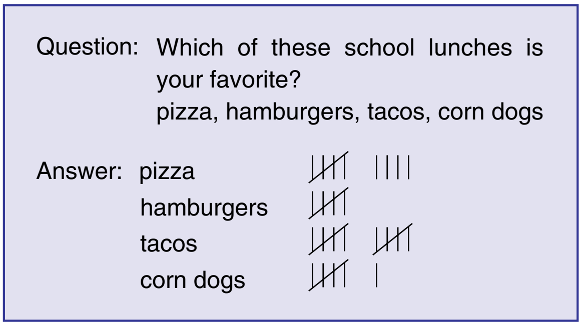
A. All the students in the school.

B. All the school children your age in your community.

C. All the children your age in the country.

D. All the parents of the students in the class.

When we ask our survey questions, we need to have a way to record the answers. One way to keep track of answers is with a **tally sheet.** On a tally sheet we make **tally marks.** A tally mark is a short vertical mark that counts as one. Two marks count as two. Four marks with a fifth, diagonal mark crossing them count as five. Here is an example of a tally sheet for the favorite-lunch question:



Question: Which of these school lunches is your favorite?
pizza, hamburgers, tacos, corn dogs

Answer: pizza 𝍸 ||||
hamburgers 𝍸
tacos 𝍸 𝍸
corn dogs 𝍸 |

The question was written on the tally sheet so that it could be read to the person being interviewed. By reading the question from a sheet, we make sure that we ask the question the same way each time.

5. Each time a person answers the question, a tally mark is placed by the answer. Look at the tally marks for pizza. According to the tally marks, how many students named pizza as their favorite lunch?

6. Create a tally sheet similar to the one above to show favorite drinks to have with lunch. Write a question with choices. Then list the possible answers, leaving room on the paper to tally the answers. One of the options may be "no opinion."

Activity: *Class Survey*

Have small groups of students create a survey question to ask other students in the class.[†] The question should provide two or more options from which to select. The question should be free of bias. Have each group make a tally sheet that contains the question and the answer choices. After approving the tally sheet for each group, provide time for students to interview other students in the class. The tally sheet should be used to read the question and to tally the answers.

When the surveys are concluded, have each group create an appropriate graph to display the results of the survey.

[†] Sample topics for surveys:

- favorite sport or sports team
- favorite television show
- favorite school subject
- number of siblings in family
- how students get to school
- favorite season of the year

LESSON

71

Division Answers Ending with Zero

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Multiply two-digit numbers by numbers ending in zero:

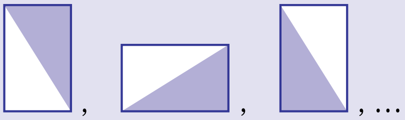
a. 12 × 20 **b.** 12 × 30 **c.** 12 × 40

Review:

d. 36 + 29 + 230 **e.** \$4.87 + \$3.98 **f.** \$1.00 − 36¢

Problem Solving:

Sketch the next figure in this sequence:



NEW CONCEPT

Sometimes division answers end with a zero. It is important to continue the division until all the digits inside the division box have been used. Look at this problem:

> *Two hundred pennies are separated into 4 equal piles. How many pennies are in each pile?*

This problem can be answered by dividing 200 by 4. First we divide 4 into 20. We put a 5 on top. Then we multiply and then we subtract.

$$\begin{array}{r} 5 \\ 4\overline{)200} \\ \underline{20} \\ 0 \end{array}$$

The division might look complete, but it is not. The answer is not "five pennies in each pile." That would total only 20 pennies. There is another zero inside the division box to bring down. So we bring down the zero and divide again. Of course, 4 goes into zero 0 times, and 0×4 is zero.

$$\begin{array}{r} 50 \\ 4\overline{)200} \\ \underline{20}\downarrow \\ 00 \\ \underline{0} \\ 0 \end{array} \qquad \begin{array}{r} \text{Check:} \\ 50 \\ \underline{\times \quad 4} \\ 200 \end{array}$$

We check our work by multiplying the quotient, 50, by the divisor, 4. The product should equal the dividend, 200. The answer checks. We find that there are 50 pennies in each pile.

Sometimes there will be a remainder with a division answer that ends in zero. We show this in the following example.

Example Divide: $3\overline{)121}$

Solution We begin by finding $3\overline{)12}$. Since 3 goes into 12 four times, we write "4" above the 2. We multiply and subtract, getting 0, but we are not finished. We bring down the last digit of the dividend, which is 1. Now we find how many times 3 goes into 01 (which is the same as 3 going into 1). Since 3 goes into 1 zero times, we write "0" on top in the ones place. We then multiply zero by 3 and subtract. The remainder is 1.

$$\begin{array}{r} 4 \\ 3\overline{)121} \\ \underline{12} \\ 0 \end{array}$$

$$\begin{array}{r} \mathbf{40\ R\ 1} \\ 3\overline{)121} \\ \underline{12} \\ 01 \\ \underline{0} \\ 1 \end{array}$$

LESSON PRACTICE

Practice set Divide:

a. $3\overline{)120}$

b. $4\overline{)240}$

c. $5\overline{)152}$

d. $4\overline{)121}$

e. $3\overline{)91}$

f. $2\overline{)41}$

MIXED PRACTICE

Problem set

1. (Inv. 3, 67) Terrell stared at the rectangular ceiling and saw that it was covered with square tiles. The ceiling was 40 tiles long and 30 tiles wide. In all, how many tiles were on the ceiling?

2. (30) There were two hundred sixty seats in the movie theater. All but forty-three seats were occupied. How many seats were occupied?

3. (49, 58) Each cookie contains 5 chocolate chips. How many chocolate chips are in 115 cookies?

4. (40) A recipe for homemade ice cream calls for a cup of sugar for each quart of ice cream. How many cups of sugar are needed for a gallon of ice cream?

5. (35) What is the value of 5 pennies, 3 dimes, 2 quarters, and 3 nickels?

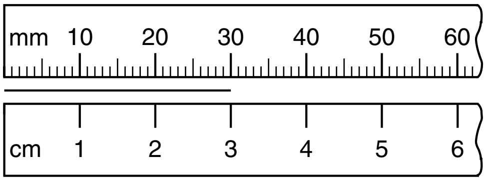
6. (70) One fourth of the students earned A's. There were 280 students in all. How many students earned A's? Draw a picture to help you solve the problem.

7. (Inv. 5) What percent of the students in problem 6 earned A's?

8. (70) What is $\frac{1}{2}$ of 560? Draw a picture to help you solve the problem.

9. (69) (a) The line segment shown below is how many centimeters long?

(b) The segment is how many millimeters long?



10. (55) The first four multiples of 9 are 9, 18, 27, and 36. What are the first four multiples of 90?

11. (56) Compare: $\frac{2}{3} \bigcirc \frac{2}{5}$. Draw and shade two congruent rectangles to show the comparison.

12. (57) Jenny could hop 72 times in 1 minute. At that rate, how many times could she hop in 9 minutes?

13. (43, 51)
$$\begin{array}{r} \$375.48 \\ +\ \$536.70 \\ \hline \end{array}$$

14. (51)
$$\begin{array}{r} 367{,}419 \\ +\ \ 90{,}852 \\ \hline \end{array}$$

15. (43)
$$\begin{array}{r} 42.3 \\ 57.1 \\ 28.9 \\ 96.4 \\ +\ 38.0 \\ \hline \end{array}$$

16. (52)
$$\begin{array}{r} \$20.00 \\ -\ \$19.39 \\ \hline \end{array}$$

17. (52)
$$\begin{array}{r} 310{,}419 \\ -\ 250{,}527 \\ \hline \end{array}$$

18. (58)
$$\begin{array}{r} \$6.08 \\ \times\ \ \ \ 7 \\ \hline \end{array}$$

19. (67)
$$\begin{array}{r} 86 \\ \times\ 40 \\ \hline \end{array}$$

20. (48)
$$\begin{array}{r} 59¢ \\ \times\ \ 8 \\ \hline \end{array}$$

21. (71) $3\overline{)180}$

22. (71) $8\overline{)241}$

23. (68) $5\overline{)323}$

24. (71) $184 \div 6$

25. (71) $423 \div 7$

26. (Inv. 3, 62) $\sqrt{36} + 4^2 + 10^2$

27. (61) $9 + M = 27 + 72$

28. (41, 64) $6N = 90$

29. (39, 45) Use an inch ruler to find the lengths of segments *AB, BC,* and *AC.*

30. (21, 69) If the diameter of a coin is 2 centimeters, then its radius is how many millimeters?

LESSON

72

Finding Information to Solve Problems

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Multiply two-digit numbers by numbers ending in zero:

a. 21 × 20 **b.** 25 × 30 **c.** 25 × 20

Review:

d. \$10.00 − \$2.98 **e.** 48 + 19 + 310 **f.** 490 − 125

Problem Solving:

John figures that about 50% of the calories he consumes are from carbohydrates. John consumes about 2000 calories each day. About how many of those calories are from carbohydrates?

NEW CONCEPT

Part of the problem-solving process is finding the information needed to solve a problem. Sometimes we need to find information in graphs, tables, books, or other places. In other cases, we might be given more information than we need to solve the problem. In this lesson we will practice choosing the information needed to solve a problem.

Example Read this information. Then answer the questions that follow.

> *The school elections were held on Friday, February 2. Kim, Lily, and Miguel ran for president. Lily received 146 votes and Kim received 117 votes. Miguel received 35 more votes than Kim.*

(a) How many votes did Miguel receive?

(b) Who received the most votes?

(c) Speeches were given on the Tuesday before the elections. What was the date on which the speeches were given?

Solution (a) Miguel received 35 more votes than Kim, and Kim received 117 votes. So we add 35 to 117 and find that Miguel received **152 votes.**

(b) **Miguel** received the most votes.

(c) The elections were on Friday, February 2. The Tuesday when the speeches were presented was 3 days before that. We count back 3 days: February 1, January 31, January 30. The speeches were given on Tuesday, **January 30.**

LESSON PRACTICE

Practice set Read this information. Then answer the questions that follow.

> *Tom did yard work on Saturday. He worked for 3 hours in the morning and 4 hours in the afternoon. He was paid $6 for every hour he worked.*

a. How many hours did Tom work in all?

b. How much money did Tom earn in the morning?

c. How much money did Tom earn in all?

MIXED PRACTICE

Problem set

1. *(57)* Christie's car travels 18 miles on each gallon of gas. How many miles can it travel on 10 gallons of gas?

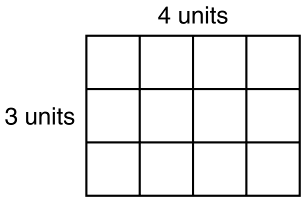
2. *(Inv. 2, 52)* Alejandro mowed a yard that was 50 feet wide. Each time he pushed the mower along the length of the yard, he mowed a path 24 inches wide. To mow the entire yard, how many times did Alejandro need to push the mower along the length of the yard?

3. *(52, 71)* If Humpty Dumpty weighed 160 pounds and broke into 8 equal pieces, then how much did each piece weigh?

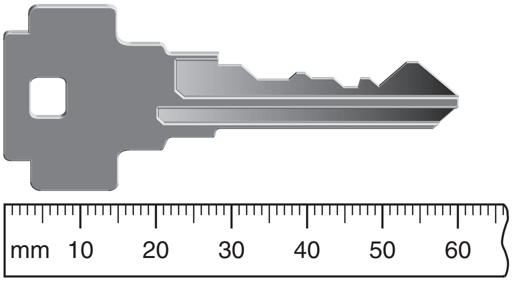
4. *(27)* Soccer practice lasts for an hour and a half. If practice starts at 3:15 p.m., at what time does it end?

5. *(70)* One third of the team's 36 points were scored by Lucy. How many points did Lucy score? Draw a picture to help you solve the problem.

6. Find the perimeter and area of this rectangle:
(Inv. 2, Inv. 3)



7. This key is 60 mm long. The key is how many centimeters long?
(69)



8. According to this calendar, the year 1902 began on what day of the week?
(54)

DECEMBER 1901

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

9. The chance of rain is 30%. What is the chance that it will not rain?
(Inv. 5)

10. A meter equals 100 centimeters. If each side of a square is 1 meter long, then what is the perimeter of the square in centimeters?
(Inv. 2)

11. List the first four multiples of 90.
(55)

12. $1.68 + 32¢ + $6.37 + $5
(43)

13. $4.3 + 2.4 + 0.8 + 6.7$
(43)

14. $10 − ($6.46 + $2.17)
(43, 45)

15. $5 \times 4 \times 5$
(62)

16. 359×70
(67)

17. 50×74
(67)

18. $2\overline{)161}$
(71)

19. $5\overline{)400}$
(71)

20. $9\overline{)462}$
(68)

21. (65) $\frac{216}{3}$

22. (68) 159 ÷ 4

23. (71) $\frac{490}{7}$

24. (65) $\frac{126}{3}$

25. (Inv. 3, 71) $360 \div \sqrt{36}$

26. (41, 65) $5N = 120$

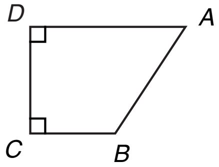
Use this information to answer problems 27 and 28:

> *Selby scored two goals as her soccer team won 5 to 4 on November 3. To make the playoffs, her team needs to win two of the next three games.*

27. (72) How many goals were scored by Selby's teammates?

28. (72) Selby's team has won four games and lost three games. Altogether, how many games does Selby's team need to win to make the playoffs?

29. (23) Angles C and D of this polygon are right angles. Which angle appears to be an obtuse angle?



30. (66) Draw a polygon that is congruent to the polygon in problem 29.

LESSON

73 Geometric Transformations

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Multiply by 100:

a. 25 × 100 **b.** 100 × 40 **c.** 12 × 3 × 100

Review:

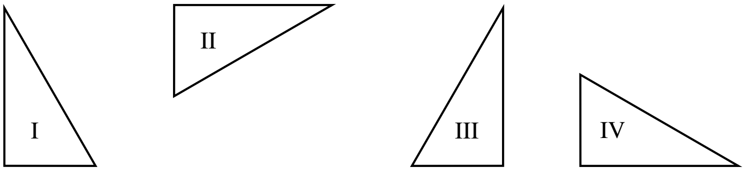
d. 567 − 230 **e.** \$20.00 − \$12.50 **f.** \$6.49 + \$2.99

Problem Solving:

The charge for the taxi ride was \$2.50 for the first mile and \$1.50 for each additional mile. What was the charge for an 8-mile taxi ride?

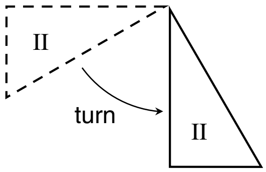
NEW CONCEPT

Geometry is a branch of mathematics that deals with such figures as lines, angles, polygons, circles, and solid objects. One concept from geometry that we have practiced is congruent figures. Recall that figures are congruent if they have the same shape and size. However, congruent figures may be in different orientations (positions). For example, all four of these triangles are congruent:

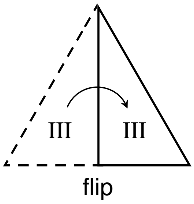


The right angle of ΔI ("triangle one") is at the lower left of the triangle. The other triangles may be reoriented to match ΔI.

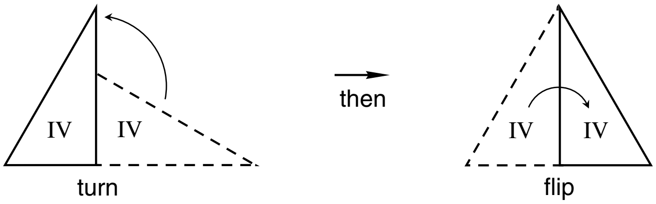
To reorient ΔII, we may **turn** the triangle so that its right angle is at the lower left.



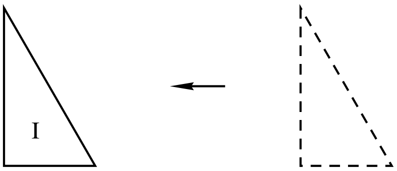
To reorient ΔIII, we may **flip** the triangle as we might flip a pancake or flip a page in a book. (Imagine flipping ΔIII so that its right angle is at the lower left.)



To reorient ΔIV, we may both turn and flip the triangle. (Imagine turning ΔIV so that it is oriented like ΔIII. After turning the triangle, flip the triangle to match ΔI.)



To put each of triangles II, III, and IV in the same *location* as ΔI requires an additional step. Each reoriented triangle needs to **slide** to the location of ΔI.

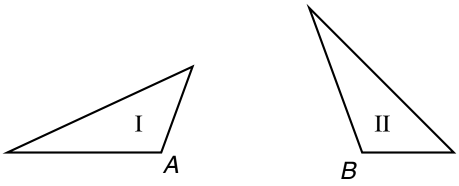


Turns, flips, and slides are three ways of moving figures. In geometry we call these movements **transformations,** and we give them special names: a turn is a **rotation,** a flip is a **reflection,** and a slide is a **translation.**

Transformations

Movement	Name
Slide	Translation
Turn	Rotation
Flip	Reflection

Example Which transformations would move ΔII to the same orientation and location as ΔI?



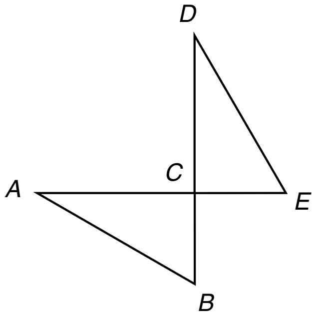
Solution We may move ΔII to the location of ΔI with two transformations: a turn and a slide. The order of the transformations does not matter. We may slide ΔII so that point B is on point A. Then we may turn ΔII around point B so that the sides and angles align with ΔI. We call a slide a **translation,** and we call a turn a **rotation.**

LESSON PRACTICE

Practice set

a. Congruent figures may be repositioned through transformations so that all corresponding sides and angles are aligned. Name the three transformations described in this lesson. Give the common name and the geometric name for each transformation.

b. Which transformations would position ΔABC on ΔDEC?



MIXED PRACTICE

Problem set Use this information to answer problems 1–3:

> *Thirty students are going on a field trip. Each car can hold five students. The field trip will cost each student $5.*

1. How many cars are needed for the field trip? (52, 72)

2. Altogether, how much money will be needed? (72)

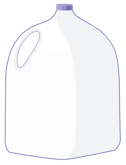
3. Don has saved $3.25. How much more does he need to go on the field trip? (72)

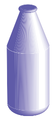
4. (27) During the summer the swim team practiced $3\frac{1}{2}$ hours a day. If practice started at 6:30 a.m., at what time did it end if there were no breaks?

5. (Inv. 5, 70) Half of the 48 pencils were sharpened. How many were *not* sharpened? What percent of the pencils were not sharpened? Draw a picture to help you solve the problem.

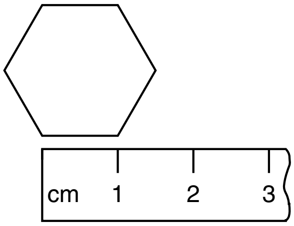
6. (70) What number is $\frac{1}{4}$ of 60? Draw a picture to help you solve the problem.

7. (40) One gallon of water will be poured into 1-quart bottles. How many 1-quart bottles will be filled?


1 gal


1 qt

8. (69) Each side of a regular polygon has the same length. A regular hexagon is shown below. How many millimeters is the perimeter of this hexagon?



9. (30, 31) A mile is five thousand, two hundred eighty feet. The Golden Gate Bridge is four thousand, two hundred feet long. The Golden Gate Bridge is how many feet less than 1 mile long?

10. (55) Which of these numbers is not a multiple of 90?

A. 45 B. 180 C. 270 D. 360

11. (Inv. 1) What number is halfway between 300 and 400?

12. (50) $37.56 - 4.2$

13. (50) $4.2 + 3.5 + 0.25 + 4.0$

14. (52)
$$\begin{array}{r} \$100.00 \\ -\ \$\ \ 31.53 \\ \hline \end{array}$$

15. (52)
$$\begin{array}{r} 251{,}546 \\ -\ \ 37{,}156 \\ \hline \end{array}$$

16. (24)
$$\begin{array}{r} N \\ +\ 423 \\ \hline 618 \end{array}$$

17. *(58)* $\begin{array}{r} \$3.46 \\ \times \quad\ 7 \\ \hline \end{array}$

18. *(67)* $\begin{array}{r} 96 \\ \times \ 30 \\ \hline \end{array}$

19. *(58)* $\begin{array}{r} \$0.59 \\ \times \quad\ 8 \\ \hline \end{array}$

20. *(71)* $7\overline{)633}$

21. *(68)* $5\overline{)98}$

22. *(71)* $3\overline{)150}$

23. *(68)* $329 \div 6$

24. *(68)* $274 \div 4$

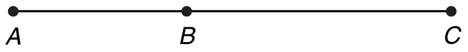
25. *(71)* $247 \div 8$

26. *(Inv. 3, 41, 65)* $\sqrt{25} \times M = 135$

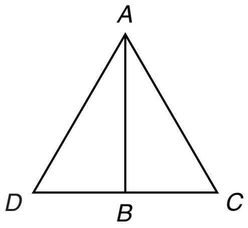
27. *(24)* $Z - 476 = 325$

28. *(61)* $6A = 12 + 6$

29. *(45, 69)* Segment *AB* is 2.3 cm long. Segment *BC* is 3.5 cm long. How long is segment *AC?* Write a decimal addition problem and find the answer.



30. *(73)* Which transformation would position ΔABC on ΔABD?



LESSON

74 Fraction of a Set

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

The sum of 38 and 17 is 55. If we make 38 larger by 2 and 17 smaller by 2, then the addition is 40 + 15. The sum is still 55, but the mental addition is easier. Before finding the following sums, make one number larger and the other smaller so that one of the numbers ends in zero:

a. 38 + 27 **b.** 48 + 24 **c.** 59 + 32 **d.** 57 + 26

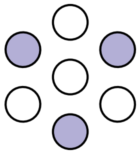
Problem Solving:

In this subtraction problem some digits are missing. Copy this problem on your paper, and fill in the missing digits.

$$\begin{array}{r} 123 \\ -\ 4\_ \\ \hline \_4 \end{array}$$

NEW CONCEPT

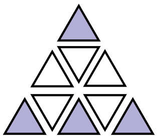
There are seven circles in the set below. Three of the circles are shaded. The fraction of the set that is shaded is $\frac{3}{7}$.



$\frac{3}{7}$ Three circles are shaded.
There are seven circles in all.

The number of members in the set is the denominator (bottom number) of the fraction. The number of members named is the numerator (top number) of the fraction.

Example 1 What fraction of the triangles is not shaded?



Solution The denominator of the fraction is 9, because there are 9 triangles in all. The numerator is 5, because 5 of the 9 triangles are not shaded. So the fraction of triangles that are not shaded is $\mathbf{\frac{5}{9}}$.

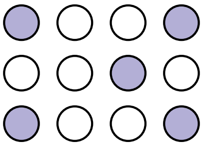
Example 2 In a class of 25 students, there are 12 girls and 13 boys. What fraction of the class is girls?

Solution Twelve of the 25 students in the class are girls. So the fraction of the class that is girls is $\frac{12}{25}$.

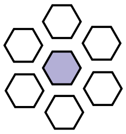
LESSON PRACTICE

Practice set

a. What fraction of the set is shaded?



b. What fraction of the set is not shaded?



c. In a class of 27 students, there are 14 girls and 13 boys. What fraction of the class is boys?

d. In the word ALABAMA, what fraction of the letters are A's?

MIXED PRACTICE

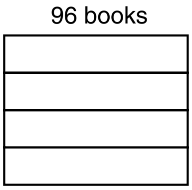
Problem set

1. *(1, 17)* Michael caught sixty-two crawfish in the creek. Miguel caught seven crawfish, and Marcus and Michelle each caught twelve crawfish. Altogether, how many crawfish did these young people catch?

2. *(31, 52)* The Matterhorn is fourteen thousand, six hundred ninety-one feet high. Mont Blanc is fifteen thousand, seven hundred seventy-one feet high. How much taller is Mont Blanc than the Matterhorn?

3. *(49)* There are 25 squares on a bingo card. How many squares are on 4 bingo cards?

4. *(70)* Ninety-six books were placed on 4 shelves so that the same number of books were on each shelf. How many books were on each shelf?

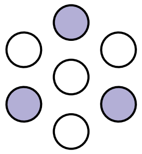


5. One half of the 780 fans stood and cheered. How many fans stood and cheered? What percent of the fans stood and cheered?
(Inv. 5, 70)

6. How many years is ten centuries?
(54)

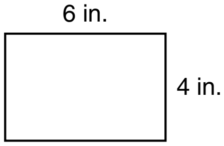
7. Estimate the sum of 493 and 387 by rounding both numbers to the nearest hundred before adding.
(59)

8. What fraction of this set is not shaded?
(74)



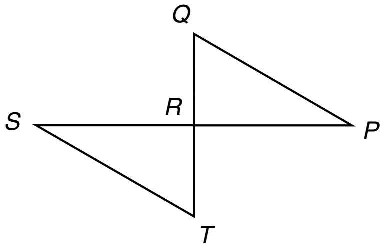
9. This 2-liter bottle contains how many milliliters of soda?
(40)

10. What is the perimeter of this rectangle?
(Inv. 2)



11. If the rectangle in problem 10 were to be covered with squares with sides one inch long, how many squares would be needed?
(Inv. 3)

12. Which transformation(s) would position ΔSTR on ΔPQR?
(73)



13. \$6.15 − (\$0.57 + \$1.20)
(43, 45)

14. 43,160 − 8459
(52)

15. 8 × 8 × 8
(62)

16. \$3.54 × 6
(58)

17. 80 × 57
(67)

18. 704 × 9
(58)

19. $9\overline{)354}$ *(68)*

20. $7\overline{)285}$ *(71)*

21. $5\overline{)439}$ *(68)*

22. $515 \div 6$ *(68)*

23. $\frac{360}{4}$ *(71)*

24. $784 \div 8$ *(65)*

25. $\sqrt{36} + N = 6^2$ *(24, Inv. 3, 62)*

26. $462 - Y = 205$ *(24)*

27. $50 = 5R$ *(41)*

28. Find the next number in this counting sequence: *(3)*

…, 90, 180, 270, _____, …

29. Sierra's arm is 20 inches long. If Sierra swings her arm in a circle, what will be the diameter of the circle? *(21)*

30. Which of these numbers is a multiple of 8? *(55)*

A. 4 B. 12 C. 48 D. 84

LESSON 75

Measuring Turns

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Before adding, make one number larger and the other number smaller:

a. 49 + 35 **b.** 57 + 35 **c.** 28 + 44

Review:

d. 400 × 30 **e.** \$10.00 − \$4.98 **f.** 350 + 47 + 200

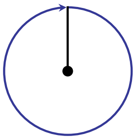
Problem Solving:

Which day of the week is 7 days after Monday? Which day of the week is 71 days after Monday? Which day of the week is 699 days after Monday?

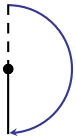
NEW CONCEPT

As Micah rides a skateboard, we can measure his movements. We might use feet or meters to measure the distance Micah travels. To measure Micah's turns, we may use **degrees.** Just as for temperature measurements, we use the symbol "°" to stand for degrees.

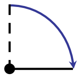
If Micah makes a full turn, then he has turned 360°. If Micah makes a half turn, he has turned 180°. A quarter turn is 90°.



Full turn
360°

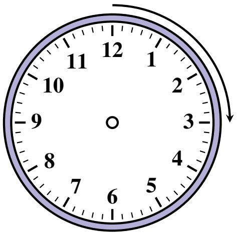


Half turn
180°

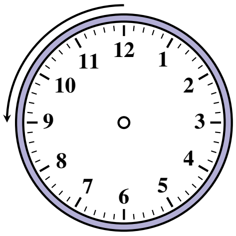


Quarter turn
90°

Besides measuring the amount of turn, we can also describe the direction of a turn as **clockwise** or **counterclockwise.**



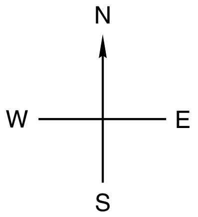
Clockwise turn



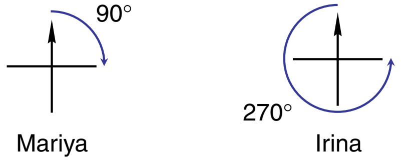
Counterclockwise turn

For instance, we tighten a screw by turning it clockwise, and we loosen a screw by turning it counterclockwise.

Example Mariya and Irina were both facing north. Mariya turned 90° clockwise and Irina turned 270° counterclockwise. After turning, in which directions were the girls facing?



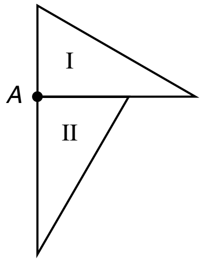
Solution Below we show the turns Mariya and Irina made.



After turning 90° clockwise, Mariya was facing east. After turning 270° counterclockwise, Irina was also facing east. (Each quarter turn is 90°, so 270° is three quarters of a full turn.) So both girls were facing **east** after their turns.

LESSON PRACTICE

Practice set **a.** Describe the amount and the direction of a turn around point A that would position ΔII on ΔI.

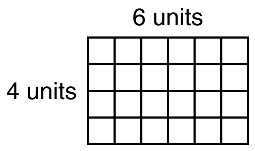


b. Micah skated east, turned 180° clockwise, and then continued skating. In what direction was Micah skating after the turn?

MIXED PRACTICE

Problem set **1.** Pears cost 59¢ per pound. How much would 4 pounds of pears cost?
(49)

2. Find the perimeter and area of this rectangle:
(Inv. 2, Inv. 3)



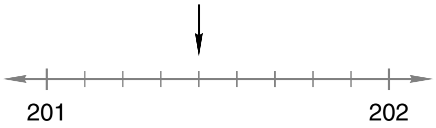
3. There were three hundred sixty books on the floor. Frankie put one fourth of the books on a table.
(70)

(a) How many books did Frankie put on the table?

(b) How many books were still on the floor?

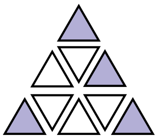
4. (Inv. 5) What percent of the books in problem 3 were left on the floor?

5. (37) To what mixed number is the arrow pointing?



6. (59) Estimate the sum of 272 and 483. Begin by rounding each number to the nearest hundred.

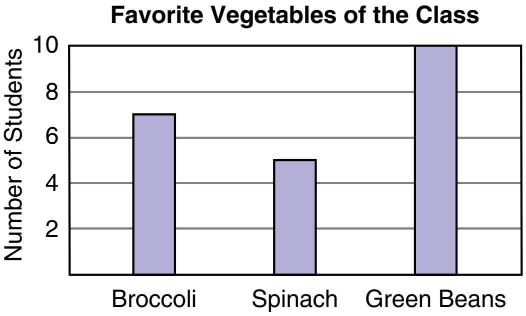
7. (74) What fraction of this set is shaded?



8. (40) One quart of milk is how many ounces?

9. (40, Inv. 5) One quart is a quarter of a gallon. So one quart is what percent of a gallon?

Use the information in the bar graph below to answer problems 10 and 11.



10. (Inv. 6) Spinach was the favorite vegetable of how many students?

11. (Inv. 6) Altogether, how many students said broccoli or spinach was their favorite vegetable?

12. (75) Describe the amount and the direction of a turn that would move this letter *B* to an upright position.

13. (51) $\begin{array}{r} \$86.47 \\ +\ \$47.98 \\ \hline \end{array}$

14. (43) $\begin{array}{r} 36.7 \\ -\ 18.5 \\ \hline \end{array}$

15. (51) $\begin{array}{r} 2358 \\ 4715 \\ 317 \\ 2103 \\ +\ \ \ 62 \\ \hline \end{array}$

16. (68) $8\overline{)716}$

17. (71) $2\overline{)161}$

18. (65) $7\overline{)434}$

19. (68) $513 \div 6$

20. (71) $\dfrac{270}{9}$

21. (65) $\dfrac{267}{3}$

22. (24, 43) $N - 7.5 = 21.4$

23. (58) $\begin{array}{r} \$6.95 \\ \times\ \ \ \ 8 \\ \hline \end{array}$

24. (67) $\begin{array}{r} 46 \\ \times\ 70 \\ \hline \end{array}$

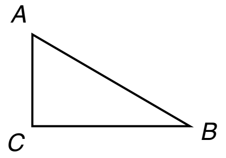
25. (58) $\begin{array}{r} 460 \\ \times\ \ 9 \\ \hline \end{array}$

26. (61) $3A = 30 + 30$

27. (62) $3^2 - 2^3$

28. (2) $4 + 7 + 3 + 5 + 6 + 5 + 7 + 2 + N = 43$

29. (23, 45) Which segment appears to be perpendicular to segment *BC*?



30. (66) Draw a triangle similar to but not congruent to ΔABC in problem 29.

LESSON

76

Division with Three-Digit Answers • Dividing Money

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Before adding, make one number larger and the other number smaller:

a. 55 + 47 **b.** 24 + 48 **c.** 458 + 33

Review:

d. $6.25 + $1.95 **e.** 15 × 30 **f.** $1.00 − $0.38

Patterns:

Counting by fives from one we say this sequence:

1, 6, 11, 16, 21, 26, …

What sequence do we say when we count by fives from four? Which two digits appear as final digits?

NEW CONCEPTS

Division with three-digit answers

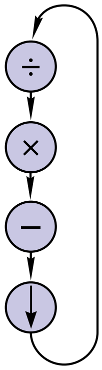
We have practiced division problems that have two-digit answers. In this lesson we will practice division problems that have three-digit answers. Remember that the pencil-and-paper method we have used for dividing has four steps.

Step 1. Divide.

Step 2. Multiply.

Step 3. Subtract.

Step 4. Bring down.



For each step we write a number. When we finish Step 4, we go back to Step 1 and repeat the steps until no digits remain to bring down.

Example 1 Divide: $3\overline{)794}$

Solution **Step 1:** Divide $3\overline{)7}$ and write "2."

Step 2: Multiply 2 by 3 and write "6."

Step 3: Subtract 6 from 7 and write "1."

Step 4: Bring down the 9 to make 19.

$$\begin{array}{r} \mathbf{264}\ \mathbf{R\ 2} \\ 3\overline{)794} \\ \underline{6} \\ 19 \\ \underline{18} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

Repeat:

Step 1: Divide 19 by 3 and write "6."

Step 2: Multiply 6 by 3 and write "18."

Step 3: Subtract 18 from 19 and write "1."

Step 4: Bring down the 4 to make 14.

Check:

$$\begin{array}{r} 264 \\ \underline{\times \quad 3} \\ 792 \end{array} \qquad \begin{array}{r} 792 \\ \underline{+ \quad 2} \\ 794 \end{array}$$

Repeat:

Step 1: Divide 14 by 3 and write "4."

Step 2: Multiply 4 by 3 and write "12."

Step 3: Subtract 12 from 14 and write "2."

Step 4: There are no digits to bring down. We are finished dividing. We write "2" as the remainder for a final answer of **264 R 2.**

Dividing money

To divide dollars and cents by a whole number, we divide the digits just like we divide whole numbers. **The decimal point in the answer is placed directly above the decimal point inside the division box.** We write a dollar sign in front of the answer.

Example 2 Divide: $\$8.40 \div 3$

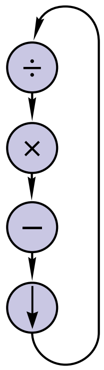
Solution The decimal point in the quotient is directly above the decimal point in the dividend. We write a dollar sign in front of the quotient.

$$\begin{array}{r} \mathbf{\$2.80} \\ 3\overline{)\$8.40} \\ \underline{6} \\ 2\ 4 \\ \underline{2\ 4} \\ 00 \\ \underline{00} \\ 0 \end{array}$$

LESSON PRACTICE

Practice set*

a. Copy the diagram at right. Then name the four steps of pencil-and-paper division.



Divide:

b. $4\overline{)974}$

c. $7.95 ÷ 5

d. $6\overline{)1512}$

e. $8\overline{)\$50.00}$

MIXED PRACTICE

Problem set

1. *(31, 52)* Seven thousand, three hundred ninety-six is how much less than eleven thousand, eight hundred seventy-three?

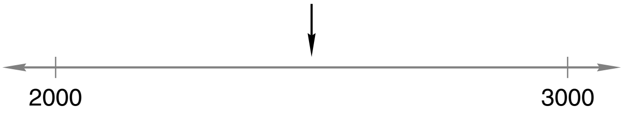
2. *(52, 71)* Shannon has five days to read a 200-page book. If she wants to read the same number of pages each day, how many pages should she read each day?

3. *(1, 43)* Julie ordered a book for $6.99, a dictionary for $8.99, and a set of maps for $5.99. What was the price for all three items?

4. *(49)* The prince searched 7 weeks for the princess. For how many days did he search?

5. *(61)* One third of the books were placed on the first shelf. What fraction of the books were not placed on the first shelf?

6. *(Inv. 1)* On a number line, what number is halfway between 2000 and 3000?

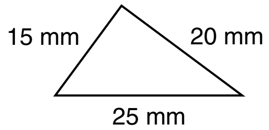


7. *(74)* In the word HIPPOPOTAMI, what fraction of the letters are P's?

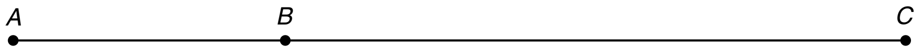
8. *(Inv. 2)* Mary ran a 5-kilometer race. Five kilometers is how many meters?

9. *(61)* $12 + 13 + 5 + N = 9 \times 8$

10. *(Inv. 2)* What is the perimeter of this triangle?



11. *(45, 69)* The length of segment *AB* is 3.6 cm. The length of segment *AC* is 11.8 cm. What is the length of segment *BC?* Write a decimal subtraction problem and find the answer.



12. *(43, 45)* \$25 − (\$19.71 + 98¢)

13. *(62)* $365 + 10^2 + 3^3$

14. *(41)* \$5.00 − \$2.92

15. *(52)* 36.21 − 5.7

16. *(62)* 5 × 6 × 9

17. *(67)* 50 × 63

18. *(58)* 478 × 6

19. *(76)* $3\overline{)435}$

20. *(76)* $7\overline{)867}$

21. *(76)* $5\overline{)\$13.65}$

22. *(68)* 453 ÷ 6

23. *(76)* 543 ÷ 4

24. *(76)* \$4.72 ÷ 8

25. *(24)* $N + 6 = 120$

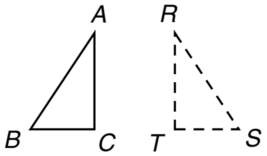
26. *(41, 65)* $4W = 132$

27. *(2)* $4 + 8 + 7 + 6 + 4 + N + 3 + 6 + 5 = 55$

28. *(75)* Mieko was facing east. She heard "Simon says, 'Turn 90° clockwise.'" If Mieko turned correctly, in which direction would she be facing?

29. *(21)* If the diameter of a playground ball is one foot, then its radius is how many inches?

30. *(73)* Which transformations would move ΔABC to position *RST?*



LESSON

77

U.S. Customary Units of Weight • Metric Units of Mass

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

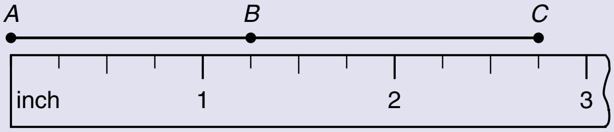
Mental Math:

a. 77 + 14 **b.** 87 − 40 **c.** 35 × 100

d. $5.00 − $4.36 **e.** $4.38 + $2.99 **f.** 120 × 10

Problem Solving:

Segment *AC* is how much longer than segment *AB?*



NEW CONCEPTS

U.S. Customary units of weight

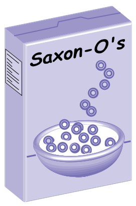
The units of **weight** in the U.S. Customary System are **ounces, pounds,** and **tons.** Remember that in Lesson 40 we used the word *ounce* to describe an amount of fluid. However, *ounce* can also describe an amount of weight. A fluid ounce of water weighs about one ounce.

As we see in the table below, one pound is 16 ounces, and one ton is 2000 pounds. *Ounce* is abbreviated **oz.** *Pound* is abbreviated **lb.**

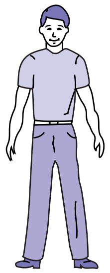
16 oz = 1 lb

2000 lb = 1 ton

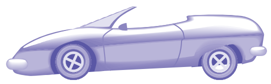
A box of cereal might weigh 24 ounces. Some students weigh 98 pounds. Many cars weigh 1 ton or more.



24 ounces



98 pounds



1 ton

Example 1 This book weighs about 2 pounds. Two pounds is how many ounces?

Solution Each pound is 16 ounces. So 2 pounds is 2 × 16 ounces, which is **32 ounces.**

Example 2 The rhinoceros weighed 3 tons. Three tons is how many pounds?

Solution Each ton is 2000 pounds. So 3 tons is 3 × 2000 pounds, which is **6000 pounds.**

Metric units of mass

Grams and **kilograms** are metric units of **mass.**[†] Recall that the prefix *kilo-* means "thousand." Thus, a kilogram is 1000 grams. *Gram* is abbreviated **g.** *Kilogram* is abbreviated **kg.**

1000 g = 1 kg

A dollar bill has a mass of about 1 gram. This book has a mass of about 1 kilogram. Since this book has fewer than 1000 pages, each page is more than 1 gram.

Example 3 Choose the more reasonable measure:

(a) pair of shoes	(b) cat	(c) quarter
1 g 1 kg	4g 4 kg	5 g 5 kg

Solution (a) **1 kg** (b) **4 kg** (c) **5 g**

Example 4 Malika's rabbit has a mass of 4 kilograms. Four kilograms is how many grams?

Solution Each kilogram is 1000 grams. So 4 kilograms is 4 × 1000 grams, which is **4000 grams.**

LESSON PRACTICE

Practice set

a. Dave's pickup truck can haul a half ton of cargo. How many pounds is a half ton?

b. The newborn baby weighed 7 lb 12 oz. The baby's weight was how much less than 8 pounds?

[†] There is a technical difference between *weight* and *mass.* An object's weight depends on the force of gravity, but its mass does not. The force of gravity does not vary much on Earth, though, so we commonly use units of weight and mass interchangeably.

Choose the more reasonable measure in problems **c–e:**

c. tennis ball
57 g   57 kg

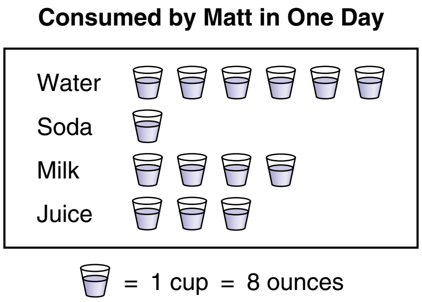
d. dog
6 g   6 kg

e. bowling ball
7 g   7 kg

f. Seven kilograms is how many grams?

MIXED PRACTICE

Problem set Use the information in the pictograph below to answer problems 1–3.



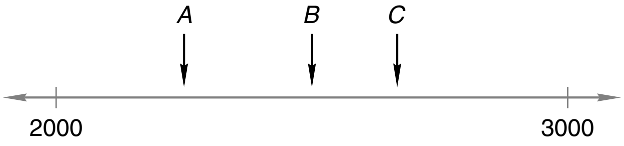
1. *(Inv. 6)* How many pints of liquid did Matt drink in 1 day?

2. *(Inv. 6)* Matt drank twice as much water as he did what other beverage?

3. *(40, Inv. 6)* Of which beverage did he drink exactly 1 quart?

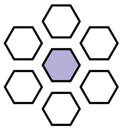
4. *(Inv. 5, 70)* There were 4 rooms. One fourth of the 56 guests gathered in each room. How many guests were in each room? What percent of the guests were in each room?

5. *(Inv. 1)* Which of these arrows could be pointing to 2500?



6. *(59)* Estimate the sum of 682, 437, and 396 by rounding each number to the nearest hundred before adding.

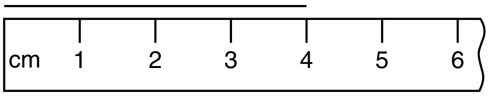
7. *(74)* What fraction of this set is shaded?



8. *(77)* McGillicuddy weighed 9 pounds when he was born. How many ounces is that?

9. *(69)* (a) The segment below is how many centimeters long?

(b) The segment is how many millimeters long?



10. *(33)* The mansion sold for $7,450,000. Use words to write that amount of money.

11. *(Inv. 2, 63)* If each side of a hexagon is 1 foot long, then how many inches is its perimeter?

12. *(51)*
$$\begin{array}{r} 93{,}417 \\ +\ \ 8{,}915 \\ \hline \end{array}$$

13. *(24, 52)*
$$\begin{array}{r} 42{,}718 \\ -\ \ \ \ K \\ \hline 26{,}054 \end{array}$$

14. *(51)*
$$\begin{array}{r} 1307 \\ 638 \\ 5219 \\ 138 \\ +\ \ \ 16 \\ \hline \end{array}$$

15. *(41, 52)*
$$\begin{array}{r} \$100.00 \\ -\ \$\ 86.32 \\ \hline \end{array}$$

16. *(52)*
$$\begin{array}{r} 405{,}158 \\ -\ 396{,}370 \\ \hline \end{array}$$

17. *(58)* 567×8

18. *(67)* $30 \times 84¢$

19. *(58)* $\$2.08 \times 4$

20. *(76)* $4\overline{)\$15.00}$

21. *(76)* $\dfrac{936}{6}$

22. *(76)* $8\overline{)4537}$

23. *(71)* $452 \div 5$

24. *(65)* $378 \div 9$

25. *(76)* $960 \div 7$

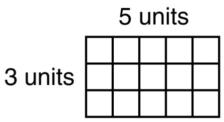
26. *(Inv. 3, 41)* $\sqrt{16} \times N = 100$

27. *(61, 62)* $5B = 10^2$

28. *(Inv. 1)* To what number is the arrow pointing?

29. *(75)* Mona turned a quarter turn clockwise, then a quarter turn clockwise, then a quarter turn clockwise. Altogether Mona turned how many degrees?

30. *(Inv. 2, Inv. 3)* Find the perimeter and area of this rectangle:



LESSON

78 Classifying Triangles

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Before adding, make one number larger and the other number smaller:

a. 48 + 37
b. 62 + 29
c. 135 + 47

Review:

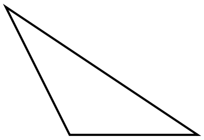
d. 30 × 40 × 20
e. $20.00 − $12.50
f. $6.46 + $1.98

Problem Solving:

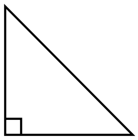
Robby is mailing an envelope that weighs 6 ounces. The postage rates are 37¢ for the first ounce and 23¢ for each additional ounce. If Robby pays the postal clerk $2.00 for postage, how much money should he get back?

NEW CONCEPT

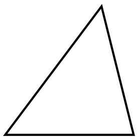
One way to classify (describe) a triangle is by referring to its largest angle as either **obtuse, right,** or **acute.** An obtuse angle is larger than a right angle. An acute angle is smaller than a right angle.



Obtuse triangle
(One angle is obtuse.)

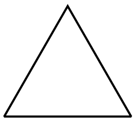


Right triangle
(One angle is right.)

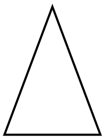


Acute triangle
(All angles are acute.)

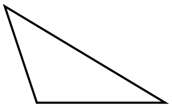
Another way to classify a triangle is by comparing the lengths of its sides. If all three sides are equal in length, the triangle is **equilateral.** If at least two sides are equal in length, the triangle is **isosceles.** If all three sides have different lengths, the triangle is **scalene.**



Equilateral triangle



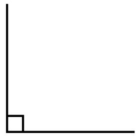
Isosceles triangle



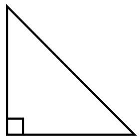
Scalene triangle

Example Draw a triangle that is both a right triangle and an isosceles triangle.

Solution A right triangle contains one right angle. An isosceles triangle has two sides of equal length. We begin by drawing a right angle with equal-length sides.



Then we draw the third side of the triangle.



LESSON PRACTICE

Practice set

a. Can a right triangle have two right angles? Why or why not?

b. What is the name for a triangle that has at least two sides equal in length?

c. If one side of an equilateral triangle is 4 inches long, then what is the perimeter of the triangle?

MIXED PRACTICE

Problem set

1. *(52, 64)* Jamaal bought apples at 5 cents per pound at the sale. He spent 95 cents. How many pounds of apples did Jamaal buy?

2. *(25, 30)* Laura placed 243 paint cans on the shelf. Ninety-five of the cans fell during the earthquake. How many paint cans stayed on the shelf?

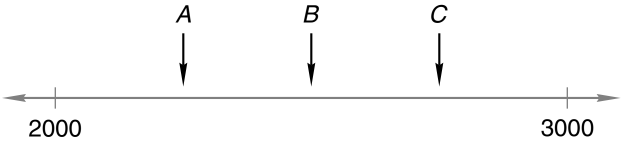
3. *(70)* Pamela listened to half of a 90-minute tape. How many minutes of the tape did she hear?

4. *(Inv. 5, 61)* One fourth of the guests gathered in the living room. What fraction of the guests did not gather in the living room? What percent of the guests did not gather in the living room?

5. *(Inv. 2, 69, 78)* If one side of an equilateral triangle is 3 centimeters long, then what is its perimeter in

(a) centimeters? (b) millimeters?

6. *(Inv. 1)* Which of these arrows could be pointing to 2750?

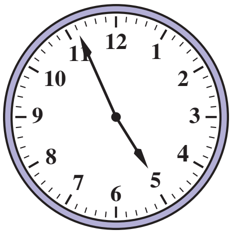


7. *(40, 74)* Half of a gallon is a half gallon. Half of a half gallon is a quart. Half of a quart is a pint. Half of a pint is a cup. A cup is what fraction of a quart?

8. *(77)* Isabel weighed 3 kilograms when she was born. How many grams is that?

9. *(59)* Estimate the product of 396 and 7.

10. *(27)* It is afternoon. What time was it 12 hours ago?



11. *(56)* Compare: $\frac{3}{4} \bigcirc \frac{4}{5}$. Draw and shade two congruent rectangles to show the comparison.

12. *(50)* $4.325 - 2.5$ **13.** *(50)* $3.65 + 5.2 + 0.18$

14. *(52)* \$50.00 − \$42.60 **15.** *(43)* \$17.54 + 49¢ + \$15

16. *(76)* $2\overline{)567}$ **17.** *(76)* $6\overline{)\$34.56}$ **18.** *(76)* $4\overline{)978}$

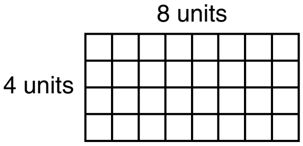
19. *(58)* 398×6 **20.** *(67)* 47×60 **21.** *(58)* $8 \times \$6.25$

22. *(Inv. 3, 76)* $970 \div \sqrt{25}$ **23.** *(76)* $\frac{372}{3}$ **24.** *(71)* $491 \div 7$

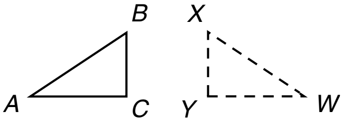
25. *(41, 65)* $8N = 120$ **26.** *(41, 62, 65)* $F \times 3^2 = 108$

27. $7 + 8 + 5 + 4 + N + 2 + 7 + 3 = 54$
(2)

28. Find the perimeter and area of this rectangle:
(Inv. 2, Inv. 3)



29. Name the transformation(s) that would move ΔABC to position WXY.
(73)



30. The first four multiples of 18 are 18, 36, 54, 72. What are the first four multiples of 180?
(55)

LESSON

79 Symmetry

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Subtracting two-digit numbers mentally is easier if the second number ends in zero. By increasing both numbers in a subtraction by the same amount, we can sometimes make the subtraction easier while keeping the difference the same. For example,

instead of $\begin{array}{r} 45 \\ -\ 28 \\ \hline \end{array}$ we can think $\begin{array}{r} 47 \\ -\ 30 \\ \hline \end{array}$

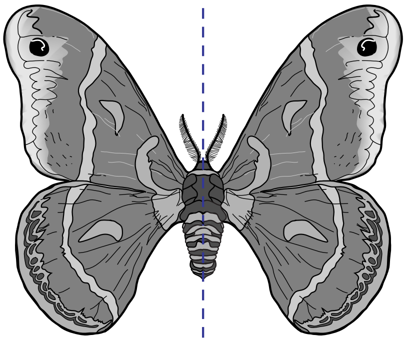
We added 2 to 28 so that the second number would end in zero. Then we added 2 to 45 to keep the difference the same. Use this strategy for the problems below.

a. $\begin{array}{r} 45 \\ -\ 39 \\ \hline \end{array}$ **b.** $\begin{array}{r} 56 \\ -\ 27 \\ \hline \end{array}$ **c.** $\begin{array}{r} 63 \\ -\ 48 \\ \hline \end{array}$ **d.** $\begin{array}{r} 82 \\ -\ 35 \\ \hline \end{array}$

NEW CONCEPT

In nature we often find balance in the appearance and structure of objects and living things. For example, we see a balance in the wing patterns of moths and butterflies. We call this kind of balance *reflective symmetry,* or just **symmetry.**

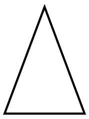
The dashes across this drawing of a moth indicate a **line of symmetry.** The portion of the figure on either side of the dashes is the *mirror image* of the other side. If we stood a mirror along the dashes, the reflection in the mirror would appear to complete the figure.

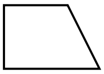


Some polygons and other figures have one or more lines of symmetry.

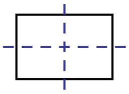
Example 1 Which of these polygons does not have a line of symmetry?

A. 

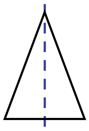
B. 

C. 

Solution The rectangle has two lines of symmetry.



The isosceles triangle has one line of symmetry.



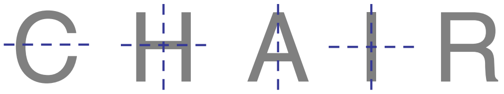
The third polygon has no line of symmetry. The answer is **C.**

About half of the uppercase letters of the alphabet have lines of symmetry.

Example 2 Copy these letters and draw each line of symmetry, if any.

C H A I R

Solution The letters **H** and **I** each have two lines of symmetry. The letters **C** and **A** each have one line of symmetry. The letter **R** has no lines of symmetry.



Activity: *Lines of Symmetry*

Materials needed:

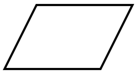
- copies of Activity Master 12 (masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- mirrors

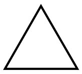
In small groups (or as a class), use a mirror to find lines of symmetry in the figures on Activity Master 12.

LESSON PRACTICE

Practice set Copy each figure and draw the lines of symmetry, if any.

a. 

b. 

c. 

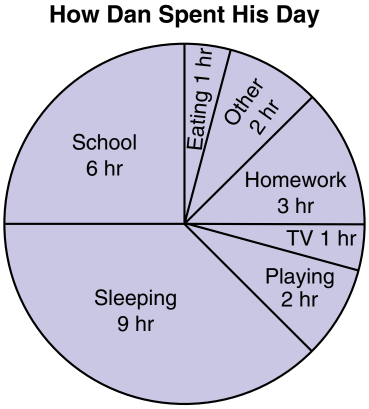
d. W

e. X

f. Z

MIXED PRACTICE

Problem set Use this circle graph to answer problems 1–4:



1. What is the total number of hours shown in the graph? *(Inv. 6)*

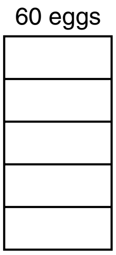
2. What fraction of Dan's day was spent watching TV? *(Inv. 6, 74)*

3. If Dan's school day starts at 8:30 a.m., at what time does it end? *(27, Inv. 6)*

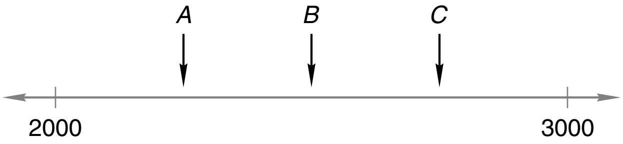
4. Which two activities together take more than half of Dan's day? *(56, Inv. 6)*

A. sleeping and playing
B. school and homework
C. school and sleeping
D. school and playing

5. One fifth of the 60 eggs were placed in each box. How many eggs were placed in each box? *(70)*

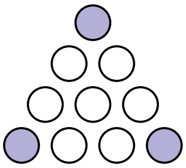


6. *(Inv. 1)* Which of these arrows could be pointing to 2250?



7. *(59)* Estimate the sum of 427, 533, and 764 by rounding each number to the nearest hundred before adding.

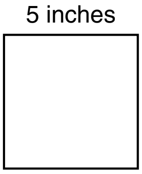
8. *(74)* What fraction of this set is not shaded?



9. *(49, 67)* Forty-two oranges could be shipped in one box. Luther had 30 boxes. How many oranges could he ship?

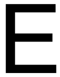
10. *(52, 65)* Only 5 apples will fit in one small box. If Hannah has 145 apples, how many boxes does she need to pack the apples?

11. *(Inv. 2)* What is the perimeter of this square?



12. *(Inv. 3)* If the square in problem 11 were to be covered with small squares one inch on each side, how many squares would be needed?

13. *(73)* Draw the capital letter *E* rotated 90° clockwise.



14. *(52)* $\begin{array}{r} \$20.10 \\ -\ \$16.45 \\ \hline \end{array}$

15. *(43, 51)* $\begin{array}{r} \$98.54 \\ +\ \$\ \ 9.85 \\ \hline \end{array}$

16. *(58)* 380×4

17. *(67)* 97×80

18. *(76)* $5\overline{)3840}$

19. *(58)* $\$8.63 \times 7$

20. *(50)* $4.25 - 2.4$

21. *(76)* $8\overline{)\$70.00}$

22. *(76)* $6\overline{)3795}$

23. *(41, 71)* $4 \times P = 160$

24. *(Inv. 3)* $\dfrac{\sqrt{64}}{\sqrt{16}}$

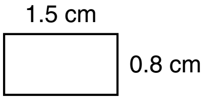
25. *(65)* $\dfrac{287}{7}$

26. *(45, 62)* $10 \times (6^2 + 2^3)$

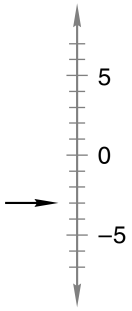
27. Find the perimeter of this rectangle
(Inv. 2, 69)

(a) in centimeters.

(b) in millimeters.



28. At right we show a vertical number line. To what number is the arrow pointing?
(Inv. 1)



29. Micah spun completely around twice on a skateboard. How many degrees did Micah spin?
(75)

30. Which of these letters does not have a line of symmetry?
(79)

T U V W

LESSON 80

Division with Zeros in Three-Digit Answers

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Find each difference by first enlarging both numbers so that the second number ends in zero:

a. 63 − 28 **b.** 45 − 17 **c.** 80 − 46

Review:

d. 48 + 34 **e.** 24 × 100 **f.** \$10.00 − \$5.85

Patterns:

When we count by fives from five, the numbers end with 0 or 5. When we count by fives from one, the numbers end with 1 or 6. When we count by fives from two, from three, and from four, how do the numbers end?

NEW CONCEPT

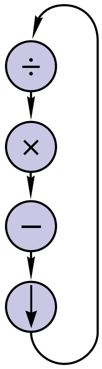
Recall that the pencil-and-paper method we have used for dividing numbers has four steps.

Step 1. Divide.

Step 2. Multiply.

Step 3. Subtract.

Step 4. Bring down.



Every time we bring a number down, we return to Step 1. Sometimes the answer to Step 1 is zero, and we will have a zero in the answer.

Example 1 Divide: $3\overline{)618}$

Solution **Step 1:** Divide $3\overline{)6}$ and write "2."

Step 2: Multiply 2 by 3 and write "6."

Step 3: Subtract 6 from 6 and write "0."

Step 4: Bring down the 1 to make 01 (which is 1).

$$\begin{array}{r} 2 \\ 3\overline{)618} \\ \underline{6} \\ 01 \end{array}$$

Repeat:

Step 1: Divide 3 into 01 and write "0."

Step 2: Multiply 0 by 3 and write "0."

Step 3: Subtract 0 from 1 and write "1."

Step 4: Bring down the 8 to make 18.

$$\begin{array}{r} \mathbf{206} \\ 3\overline{)618} \\ \underline{6} \\ 01 \\ \underline{0} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

Repeat:

Step 1: Divide 3 into 18 and write "6."

Step 2: Multiply 6 by 3 and write "18."

Step 3: Subtract 18 from 18 and write "0."

Step 4: There are no more digits to bring down, so the division is complete. The remainder is zero.

Example 2 Divide: $4\overline{)1483}$

Solution **Step 1:** Divide $4\overline{)14}$ and write "3."

Step 2: Multiply 3 by 4 and write "12."

Step 3: Subtract 12 from 14 and write "2."

Step 4: Bring down the 8 to make 28.

$$\begin{array}{r} \mathbf{370\ R\ 3} \\ 4\overline{)1483} \\ \underline{12} \\ 28 \\ \underline{28} \\ 03 \\ \underline{0} \\ 3 \end{array}$$

Repeat:

Step 1: Divide 4 into 28 and write "7."

Step 2: Multiply 7 by 4 and write "28."

Step 3: Subtract 28 from 28 and write "0."

Step 4: Bring down the 3 to make 03 (which is 3).

Repeat:

Step 1: Divide 4 into 03 and write "0."

Step 2: Multiply 0 by 4 and write "0."

Step 3: Subtract 0 from 3 and write "3."

Step 4: There are no digits to bring down, so the division is complete. We write "3" as the remainder.

Example 3 Divide: $6\overline{)2400}$

Solution Some division problems can be performed mentally. We see that $6\overline{)24}$ equals 4 with no remainder. So bringing down the two zeros of 2400 would result in two zeros in the quotient.

$$\begin{array}{r} \mathbf{400} \\ 6\overline{)2400} \end{array}$$

LESSON PRACTICE

Practice set* **a.** List the four steps of division and draw the division diagram.

Divide:

b. $4\overline{)815}$ **c.** $5\overline{)4152}$

d. $6\overline{)5432}$ **e.** $7\overline{)845}$

Divide mentally:

f. $5\overline{)1500}$ **g.** $4\overline{)2000}$

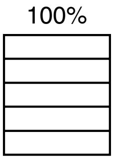
MIXED PRACTICE

Problem set

1. *(Inv. 5)* If the chance of rain is 30%, then which is more likely—that it will rain or that it will not rain?

2. *(31)* Monty ran the race 12 seconds faster than Ivan. Monty ran the race in 58 seconds. Ivan ran the race in how many seconds?

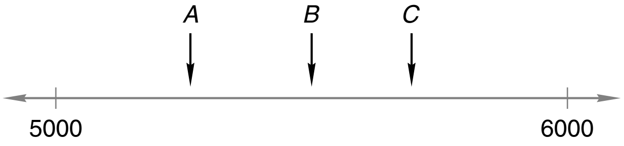
3. *(70)* The whole rectangle is divided into 5 equal parts. Each part is what percent of the rectangle? (*Hint:* Divide 100 by 5.)



4. *(52)* How many 6-inch-long sticks can be cut from a 72-inch-long stick of sugar cane?

5. *(61)* One fifth of the leaves had fallen. What fraction of the leaves had not fallen?

6. *(Inv. 1)* Which of these arrows could be pointing to 5263?

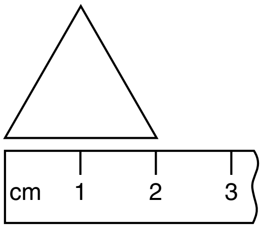


7. What fraction of the months of the year have 31 days?
(54, 74)

8. The prefix *kilo-* means what number?
(77)

9. Estimate the sum of 393, 589, and 241 by rounding each number to the nearest hundred before adding.
(59)

10. This triangle is equilateral. How many millimeters is the perimeter of the triangle?
(Inv. 2, 69)



11. Three liters equals how many milliliters?
(40)

12. Wilma could run 5 miles in 1 hour. At that rate, how long would it take her to run 40 miles?
(60)

13. $2N = 150$
(41, 65)

14. $24.25 - (6.2 + 4.8)$
(45, 50)

15.
(51)

$$\begin{array}{r} 103{,}279 \\ +\ \ 97{,}814 \\ \hline \end{array}$$

16.
(43, 51)

$$\begin{array}{r} \$36.14 \\ +\ \$27.95 \\ \hline \end{array}$$

17.
(52)

$$\begin{array}{r} 39{,}420 \\ -\ 29{,}516 \\ \hline \end{array}$$

18.
(24, 52)

$$\begin{array}{r} \$60.50 \\ -\qquad N \\ \hline \$43.20 \end{array}$$

19.
(58)

$$\begin{array}{r} 604 \\ \times\quad 9 \\ \hline \end{array}$$

20.
(67)

$$\begin{array}{r} 87 \\ \times\ \ 60 \\ \hline \end{array}$$

21.
(58)

$$\begin{array}{r} \$6.75 \\ \times\qquad 4 \\ \hline \end{array}$$

22. $3\overline{)618}$
(80)

23. $5\overline{)\$21.50}$
(76, 80)

24.
(24, 52)

$$\begin{array}{r} N \\ +\ 1467 \\ \hline 2459 \end{array}$$

25. $\dfrac{600}{4}$
(80)

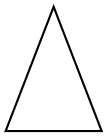
26. $543 \div 6$
(71)

27. $472 \div 8$
(65)

28. $9 \times W = 9^2 + (9 \times 2)$
(45, 61, 62)

29. Divide mentally: $5\overline{)3000}$
(80)

30. Draw a triangle that is congruent to this isosceles triangle. Then draw its line of symmetry.
(66, 79)



INVESTIGATION 8

Focus on

Graphing Relationships

Tables and graphs can be used to display relationships between two quantities, such as pay and time worked.

Suppose Dina has a job that pays $10 per hour. This table shows the total pay Dina would receive for 1, 2, 3, or 4 hours of work.

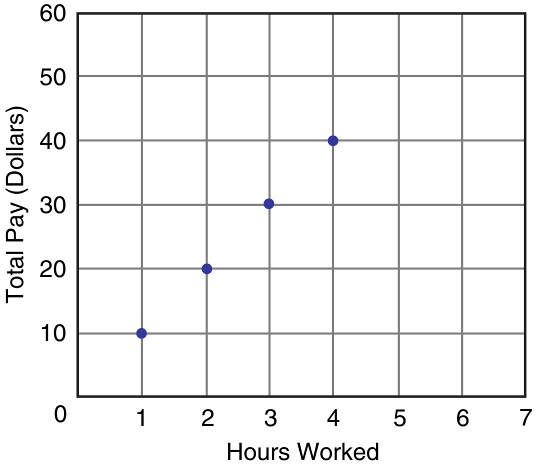
Pay Schedule

Hours Worked	Total Pay
1	$10
2	$20
3	$30
4	$40

1. Copy the table. Extend the table to show Dina's pay for each hour up to 8 hours of work.

The graph below shows the same relationship between hours worked and total pay. Each dot on the graph represents both a number of hours and an amount of pay.

Total Pay for Hours Worked



2. Copy the graph. Extend the sides of the graph to include 8 hours and $80. Then graph (draw) the dots for Dina's total pay for each hour up to 8 hours.

Mrs. Smith writes the percent of correct answers on each test and quiz she grades. These tables show percent scores for 10-question quizzes and 20-question tests:

Percent Correct

10 Questions

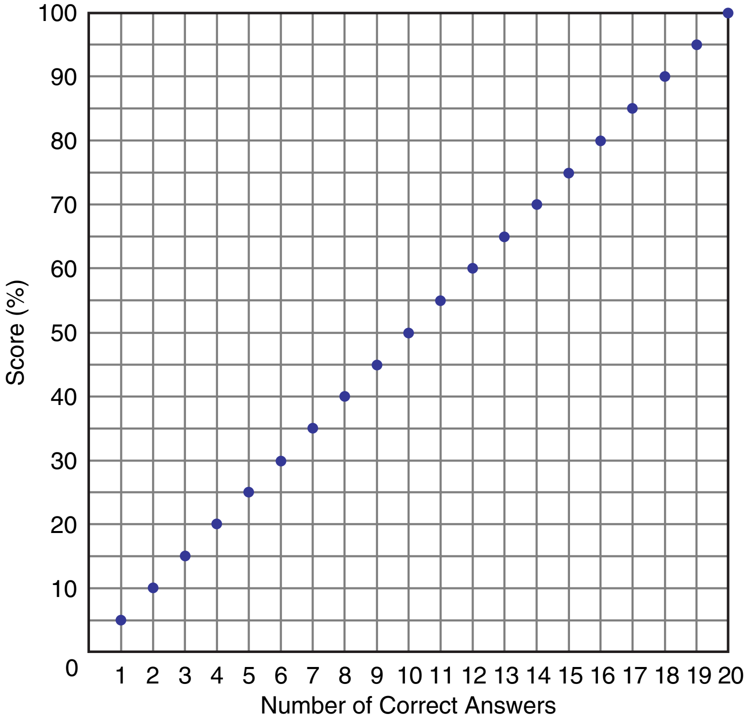
Number of Correct Answers	Score
1	10%
2	20%
3	30%
4	40%
5	50%
6	60%
7	70%
8	80%
9	90%
10	100%

20 Questions

Number of Correct Answers	Score
1	5%
2	10%
3	15%
4	20%
5	25%
6	30%
7	35%
8	40%
9	45%
10	50%
11	55%

3. Copy the table for 20-question tests. Extend the table to show scores for each number of correct answers up to 20.

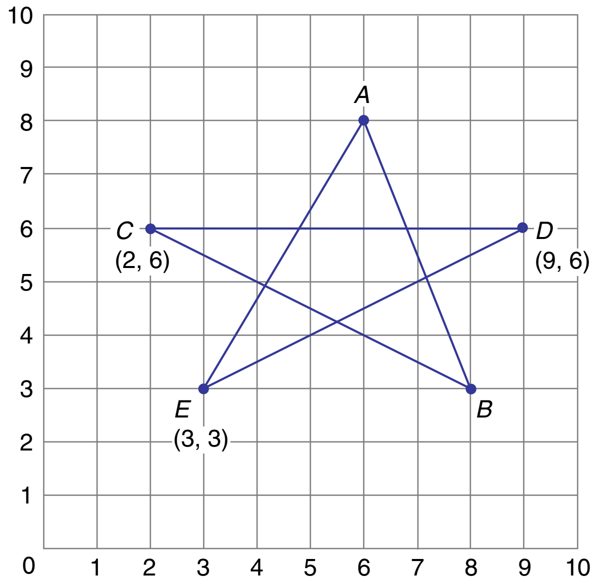
This graph shows the relationship between correct answers and percent scores for a 20-question test. Refer to the graph to answer the questions that follow.



4. Sonia answered 18 questions correctly. What was her percent score?

5. Litzl scored 75%. How many correct answers did Litzl have?

Sometimes we want to name points on a grid. Below we show how to name points using pairs of numbers called **coordinates.** The first number in each coordinate pair is taken from the horizontal scale. The second number in each pair is taken from the vertical scale. We write the coordinates in parentheses.



6. Write the coordinates of point *A.*

7. Write the coordinates of point *B.*

To draw this star, we connect points by using segments. We start at point *A,* draw a segment to point *B,* and then continue in order to points *C, D,* and *E* before going back to point *A.*

Activity: *Graphing on a Coordinate Grid*

Materials needed:

- Activity Master 13 (1 copy per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)

Have students practice graphing points on a grid and connecting the points to complete a design.

LESSON

81 Angle Measures

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Before adding, make one number larger and the other number smaller:

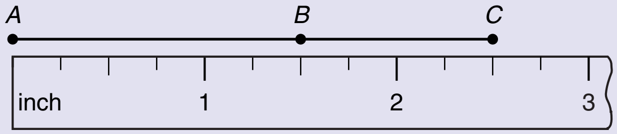
a. 38 + 46 **b.** 67 + 24 **c.** 44 + 28

Review:

d. 30 × 50 × 10 **e.** $5.00 − $3.15

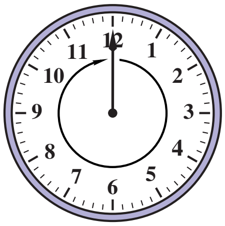
Problem Solving:

How long is segment *AB*? How long is segment *BC*? Segment *AB* is how much longer than segment *BC*?

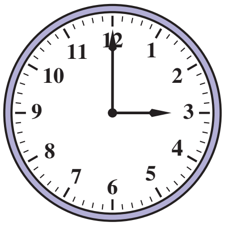


NEW CONCEPT

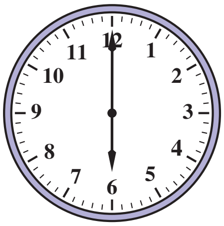
In one hour the minute hand of a clock turns all the way around once. Recall from Lesson 75 that one full turn measures 360°.



As the minute hand moves, it forms changing angles with the hour hand. At 3 o'clock the angle formed is a right angle, which measures 90°. At 6 o'clock the angle formed is a **straight angle,** because the two sides of the angle form a straight line. A straight angle measures 180°.

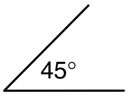


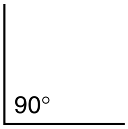
right angle, 90°

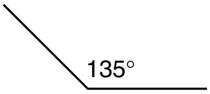


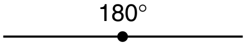
straight angle, 180°

Here we show some angles and their measures in degrees:









Notice that a 45° angle is half the size of a 90° angle. Also notice that a 135° angle is the size of a 90° angle plus a 45° angle. A 180° angle is twice the size of a 90° angle.

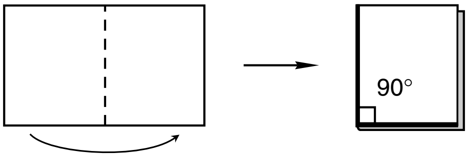
Activity: *Angle Measurement Tool*

Materials needed by each student:

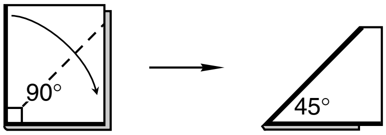
- one 3-by-5-in. rectangle of unlined paper

Distribute 3-by-5-in. paper rectangles. As a class, follow the directions in Steps 1–4.

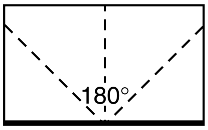
Step 1: Fold the paper in half, making sure the sides are aligned before creasing. Draw a square corner at the fold and write "90°" as shown. Use the edge of your pencil point to shade the sides of the angle.



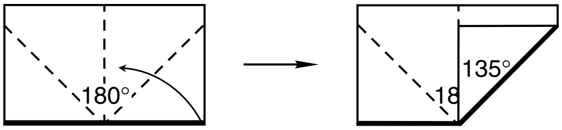
Step 2: Fold the paper again so that the left side aligns with the bottom side before creasing. Write "45°" as shown. Shade the sides of the angle.



Step 3: Unfold the paper. Turn over the paper so that the 90° and 45° labels are on the back and the folds appear as shown. Write "180°" where the folds meet. Shade the sides of the angle across the bottom of the card.



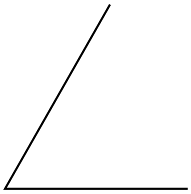
Step 4: Fold up the right-hand corner of the paper, and write "135°" as shown. Shade the remaining side of the angle.



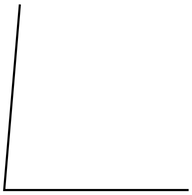
LESSON PRACTICE

Practice set Using the paper you folded in this lesson, estimate the measure of each angle in problems **a–d.** First find an angle on the paper that is a close match to the angle you are measuring. Then fit the corner and one side of the paper with the corner and one side of the angle. If the angle is larger or smaller than the paper angle, estimate how much larger or smaller. Add or subtract from your paper measurement to get a final estimate.

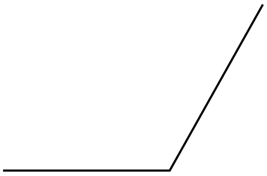
a.



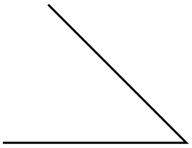
b.



c.



d.



e. At 9 o'clock the hands of a clock form an angle of how many degrees?

MIXED PRACTICE

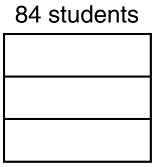
Problem set

1. *(1, 9)* Cecilia skated 27 times around the rink forward and 33 times around the rink backward. In all, how many times did she skate around the rink?

2. *(49)* Nectarines cost 68¢ per pound. What is the price for 3 pounds of nectarines?

3. *(72)* In bowling, the sum of Amber's score and Beth's score was equal to Consuela's score. If Consuela's score was 113 and Beth's score was 55, what was Amber's score?

4. *(70)* One third of the 84 students were assigned to each room. How many students were assigned to each room?

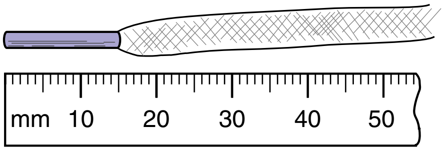


5. *(54)* Round 2250 to the nearest thousand.

6. *(74)* In the word ARIZONA, what fraction of the letters are not A's?

7. *(77)* The African elephant weighed 7 tons. How many pounds is that?

8. *(69)* The tip of this shoelace is how many millimeters long?



9. *(40, 77)* Choose the more reasonable measure:

(a) box of cereal: 400 g or 400 kg

(b) pail of water: 10 mL or 10 L

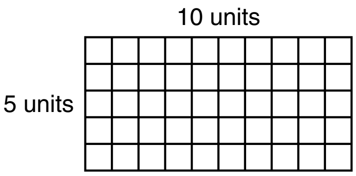
10. *(54)* According to this calendar, what is the date of the last Tuesday in February 2019?

FEBRUARY 2019

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

11. *(31, 52)* Forty-two thousand, seven hundred is how much greater than thirty-four thousand, nine hundred?

12. *(Inv. 2, Inv. 3)* Find the perimeter and area of this rectangle:



13. *(75)* Samantha was riding north. Then she turned 90° to the left. After turning, in what direction was Samantha riding?

14. $6743 - (507 \times 6)$
(45, 52, 58)

15. $\$70.00 - \$63.17$
(52)

16. $3 \times 7 \times 0$
(62)

17. $\$8.15 \times 6$
(58)

18. $67¢ \times 10$
(67)

19. $4.5 + 0.52 + 1.39$
(50)

20. $2\overline{)\$12.16}$
(76, 80)

21. $6\overline{)4321}$
(80)

22. $8\overline{)4800}$
(80)

23. $963 \div \sqrt{9}$
(Inv. 3, 76)

24. $5^3 \div 5$
(62, 65)

25. $\$6.57 \div 9$
(76)

26. $200 = 4 \times B$
(41)

27. $D \times 7 = 105$
(41, 65)

28.
(17, 24)

$$\begin{array}{r} 473 \\ 286 \\ +\quad N \\ \hline 943 \end{array}$$

29.
(17)

$$\begin{array}{r} 1 \\ 12 \\ 3 \\ 14 \\ 5 \\ +\ 26 \\ \hline \end{array}$$

30.
(17)

$$\begin{array}{r} 2 \\ 33 \\ 4 \\ 25 \\ 6 \\ +\ 27 \\ \hline \end{array}$$

LESSON 82

Tessellations

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Before subtracting, make both numbers larger:

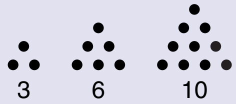
a. 56 − 29
b. 43 − 18
c. 63 − 37

Review:

d. 65 + 27
e. 365 × 10
f. \$7.52 + \$1.98

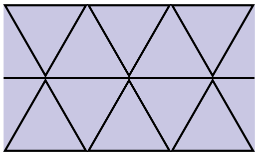
Patterns:

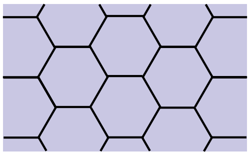
Copy this pattern of dot triangles on your paper. Then continue the sequence by drawing the next three triangles in the pattern.

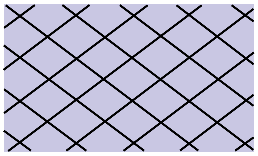


NEW CONCEPT

Archaeologists have found that people used tiles to make mosaics and to decorate homes, temples, and other buildings as long ago as 4000 B.C. The Romans called these tiles *tesselae,* from which we get the word **tessellation.** A tessellation, also called a *tiling,* is the repeated use of shapes to fill a flat surface without gaps or overlaps. Below are examples of tessellations and the name of the shape that produced each one.


triangle

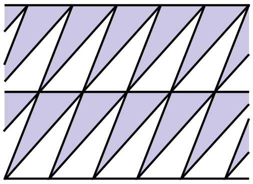

hexagon


quadrilateral

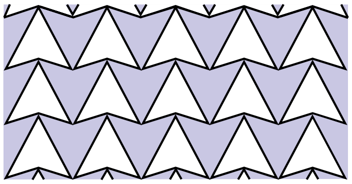
Starting with any tile, how might you move that tile to continue each tessellation above? That is, what transformations can be used to go from one tile to another?

- For the triangle tessellation, rotate a tile 180° and then translate it up, down, right, or left.
- For the hexagon tessellation, translate a tile until one of its sides aligns with the side of another hexagon.
- For the quadrilateral tessellation, translate a tile to continue the pattern. The translation can be up, down, left, right, or diagonal.

Not all polygons tessellate, that is, fill a flat surface. However, every triangle and every quadrilateral can fill a flat surface. Here we show examples using these two types of polygon:



triangle



quadrilateral

Activity: *Tessellations*

Materials needed:

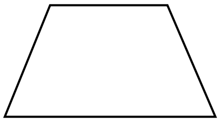
- Activity Master 14 (1 copy per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- scissors

Cut out the triangles and quadrilaterals on Activity Master 14. Then use the figures to form two tessellations, one with the triangles and one with the quadrilaterals. You may want to color the figures before cutting them out and then put them together in a way that creates a colorful design.

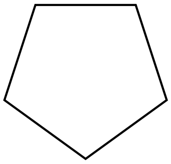
LESSON PRACTICE

Practice set

a. Trace this figure on your paper a few times, turning your paper as you trace, to show that the figure will fill a flat surface.



b. Does this figure tessellate?



MIXED PRACTICE

Problem set

1. (31) There are 35 students in the class but only 28 math books. How many more math books are needed so that every student in the class has a math book?

2. (49) Each of the 7 children slid down the water slide 11 times. How many times did they slide in all?

3. (Inv. 2, 52) A bowling lane is 60 feet long. How many yards is 60 feet?

4. (1, 51) Willis carried the baton four hundred forty yards. Eric carried it eight hundred eighty yards. Joe carried it one thousand, three hundred twenty yards, and Braulio carried it one thousand, seven hundred sixty yards. In all, how many yards was the baton carried?

5. (61) One third of the members voted no. What fraction of the members did not vote no?

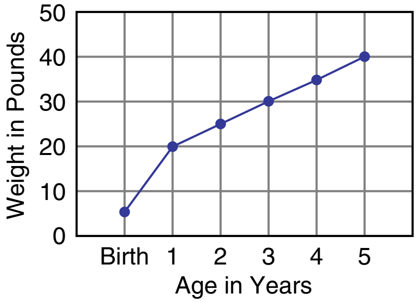
6. (59) Round 6821 and 4963 to the nearest thousand. Then add the rounded numbers.

7. (74) What fraction of the days of the week start with the letter S?

8. (77) Together, Bob's shoes weigh about 1 kilogram. Each shoe weighs about how many grams?

Use the line graph below to answer problems 9–11.

Juan's Growth



9. (Inv. 6) About how many pounds did Juan weigh on his second birthday?

10. (Inv. 6) About how many pounds did Juan gain between his third and fifth birthdays?

11. (Inv. 6) Copy and complete this table using information from the line graph.

Juan's Growth

Age	Weight
At birth	6 pounds
1 year	20 pounds
2 years	25 pounds
3 years	30 pounds
4 years	35 pounds
5 years	40 pounds

12. *(Inv. 5)* If 65% of the lights are on, then what percent of the lights are off?

13. *(43, 51)* $\begin{array}{r} \$60.75 \\ +\ \$95.75 \\ \hline \end{array}$

14. *(52)* $\begin{array}{r} \$16.00 \\ -\ \$15.43 \\ \hline \end{array}$

15. *(50)* $\begin{array}{r} 3.15 \\ -\ 3.12 \\ \hline \end{array}$

16. *(67)* $\begin{array}{r} 320 \\ \times\ \ 30 \\ \hline \end{array}$

17. *(58)* $\begin{array}{r} 465 \\ \times\ \ \ 7 \\ \hline \end{array}$

18. *(58)* $\begin{array}{r} \$0.98 \\ \times\ \ \ \ 6 \\ \hline \end{array}$

19. *(71)* $425 \div 6$

20. *(76)* $\$6.00 \div 8$

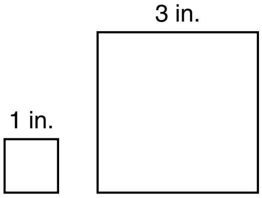
21. *(76)* $625 \div 5$

22. *(41)* $3R = 150$

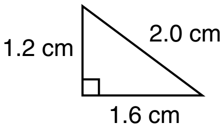
23. *(24, 62)* $10^2 + T = 150$

24. *(2)* $1 + 7 + 2 + 6 + 9 + 4 + N = 37$

25. *(Inv. 3)* If the 3-inch square is covered with 1-inch squares, how many of the 1-inch squares are needed?



26. *(Inv. 2, 43)* What is the perimeter of this right triangle?

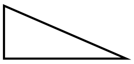
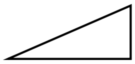
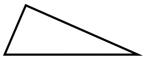
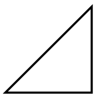


27. *(79)* Which of these letters has a line of symmetry?

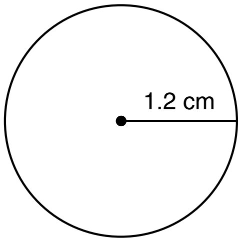
Q R S T

28. *(75)* Write the capital letter P rotated 90° counterclockwise.

29. *(66)* Three of these triangles are congruent. Which triangle is not one of the three congruent triangles?

A.  B.  C.  D. 

30. *(21, 43)* The radius of this circle is 1.2 cm. What is the diameter of the circle?



LESSON

83 Sales Tax • Change Back

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Counting by fives from 1, 2, 3, 4, or 5, we find five different final-digit patterns: 1 and 6; 2 and 7; 3 and 8; 4 and 9; and 5 and 0. When a number ending in 5 is added to or subtracted from another number, the final digit of that number and of the answer will fit one of the five patterns. Look for the final-digit patterns in these problems:

a. $\begin{array}{r} 22 \\ +\ \ 5 \\ \hline \end{array}$ **b.** $\begin{array}{r} 22 \\ -\ \ 5 \\ \hline \end{array}$ **c.** $\begin{array}{r} 38 \\ +\ \ 5 \\ \hline \end{array}$ **d.** $\begin{array}{r} 38 \\ -\ \ 5 \\ \hline \end{array}$ **e.** $\begin{array}{r} 44 \\ +\ \ 5 \\ \hline \end{array}$ **f.** $\begin{array}{r} 44 \\ -\ \ 5 \\ \hline \end{array}$

NEW CONCEPTS

Sales tax

Sales tax is an extra amount of money that sometimes must be paid when items are purchased. The amount of tax depends upon the amount purchased and the local sales-tax rate. In the United States sales-tax rates vary by city, by county, and by state.

Example 1 Yin bought six bolts priced at 89¢ each. The total sales tax was 32¢. How much did Yin spend in all?

Solution First we find the cost of the six bolts by multiplying.

$$\begin{array}{r} \overset{5}{8}9\text{¢} \\ \times\ \ \ 6 \\ \hline 534\text{¢} \end{array} = \$5.34$$

The six bolts cost $5.34. Now we add the sales tax.

$$\begin{array}{rl} \$5.34 & \text{cost of bolts} \\ +\ \$0.32 & \text{sales tax} \\ \hline \$5.66 & \text{total cost} \end{array}$$

The total cost, including tax, was **$5.66.**

Example 2 Pam bought a blouse priced at $25. The sales-tax rate was 8¢ per dollar. How much tax did Pam pay?

Solution The tax was 8¢ for *each* dollar of the purchase price. So the tax on \$1 was 8¢, the tax on \$2 was 16¢, the tax on \$3 was 24¢, and so on. To find the tax on \$25, we multiply 25 by 8¢.

$$25 \times 8¢ = 200¢$$

Since 200¢ is two dollars, Pam paid a tax of **\$2.00** on the blouse.

Change back If we do not have the exact amount of money needed to buy something at a store, we pay more than the total cost and then we get change back. To find how much change we should get back, we subtract the total cost from the amount we paid.

Example 3 Midge bought a pair of pants priced at \$23.99. The sales tax was \$1.56. Midge paid the clerk \$40.00. How much money should she get back in change?

Solution First we figure out the total cost.

$$\begin{array}{rl} \$23.99 & \text{price of pants} \\ + \ \$ \ \ 1.56 & \text{sales tax} \\ \hline \$25.55 & \text{total cost} \end{array}$$

Now we subtract the total cost from the amount she paid.

$$\begin{array}{rl} \$40.00 & \text{amount paid} \\ - \ \$25.55 & \text{total cost} \\ \hline \$14.45 & \text{change back} \end{array}$$

Midge should get **\$14.45** back from the clerk.

LESSON PRACTICE

Practice set

a. Sarah bought three pairs of socks. Each pair was priced at \$2.24. The total sales tax was 34¢. Altogether, how much did Sarah spend on socks?

b. Hakim paid \$10.00 for a tape that cost \$6.95. The sales tax was 49¢. How much money should Hakim get back in change?

MIXED PRACTICE

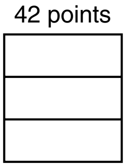
Problem set

1. *(49, 67)* Blackbeard brought home 30 bags. Each bag contained 320 gold coins. How many coins were there in all?

2. *(27)* The movie was 3 hours long. If it started at 11:10 a.m., at what time did it end?

3. *(25, 30)* Jeremy is reading a 212-page book. If he has finished page 135, how many pages does he still have to read?

4. *(70)* Brad, Jan, and Jordan each scored one third of the team's 42 points. They each scored how many points?



5. *(54)* Round 4286 to the nearest thousand.

6. *(83)* The shirt was priced at \$16.98. The tax was \$1.02. Sam paid the clerk \$20. How much money should Sam get back?

7. *(74)* What fraction of the letters in the following word are I's?

SUPERCALIFRAGILISTICEXPIALIDOCIOUS

Use the information below to answer problems 8–10:

> *In the first 8 games of this season, the Rio Hondo football team won 6 games and lost 2 games. They won their next game by a score of 24 to 20. The team will play 12 games in all.*

8. *(72)* In the first nine games of the season, how many games did Rio Hondo win?

9. *(72)* Rio Hondo won its ninth game by how many points?

10. *(72)* What is the greatest number of games Rio Hondo could win this season?

11. *(Inv. 1, 62)* Compare: $3 \times 4 \times 5 \bigcirc 5 \times 4 \times 3$

12. *(24)* $M - 137 = 257$

13. *(24)* $N + 137 = 257$

14. *(50)* $1.45 + 2.4 + 0.56 + 7.6$

15. *(45, 50)* $5.75 - (3.12 + 0.5)$

16. *(67)* $\begin{array}{r} 638 \\ \times\ \ 50 \\ \hline \end{array}$

17. *(58)* $\begin{array}{r} 472 \\ \times\ \ \ 9 \\ \hline \end{array}$

18. *(58)* $\begin{array}{r} \$6.09 \\ \times\ \ \ \ 6 \\ \hline \end{array}$

19. *(80)* $3\overline{)921}$

20. *(76)* $5\overline{)678}$

21. *(80)* $4\overline{)2400}$

22. (76) \$12.60 ÷ 5

23. (76) \$14.34 ÷ 6

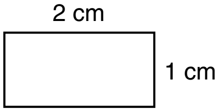
24. (76) \$46.00 ÷ 8

25. (61, 62) $9^2 = 9 \times N$

26. (61, 62) $5 \times W = 5 \times 10^2$

27. (Inv. 5) The names of one fourth of the months begin with the letter J. What percent of the months begin with the letter J?

28. (Inv. 2, 69) What is the perimeter of this rectangle in millimeters?



29. (Inv. 2, 66) Draw a rectangle that is similar to the rectangle in problem 28 and whose sides are twice as long. What is the perimeter in centimeters of the rectangle you drew?

30. (75) Kurt spun around three times and then fell down dizzy. How many degrees did Kurt turn?

LESSON 84

Decimal Numbers to Thousandths

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Use the 5's patterns as you add:

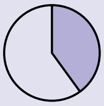
a. $36 + 15$ **b.** $47 + 25$ **c.** $28 + 35$

Review:

d. $40 \times 40 \times 10$ **e.** $\$10.00 - \$2.75$ **f.** $72 - 39$

Problem Solving:

Estimate the percent of this circle that is darkly shaded.



NEW CONCEPT

In Investigation 4 we practiced writing fractions with a denominator of 10 as decimal numbers with one decimal place.

$\frac{7}{10} = 0.7$ Both numbers are *seven tenths.*

We also wrote fractions with a denominator of 100 as decimal numbers with two decimal places.

$\frac{12}{100} = 0.12$ Both numbers are *twelve hundredths.*

In this lesson we will write fractions with a denominator of 1000 as decimal numbers with three decimal places.

$\frac{125}{1000} = 0.125$ Both numbers are *one hundred twenty-five thousandths.*

$\frac{25}{1000} = 0.025$ Both numbers are *twenty-five thousandths.*

Example 1 Write $\frac{375}{1000}$ as a decimal number. Then use words to name both numbers.

Solution The denominator of the fraction is 1000, so we use three decimal places to write the fraction as a decimal number.

$\frac{375}{1000} = \mathbf{0.375}$ **three hundred seventy-five thousandths**

Going the other way, we see that a decimal number with three decimal places may be written as a fraction with a denominator of 1000.

Example 2 Write each decimal number as a fraction or mixed number. Then use words to name the numbers.

(a) 0.625 (b) 3.125

Solution (a) Since there are three places that follow the decimal point, we will use the denominator 1000 for our fraction. We write the digits that follow the decimal point as the numerator of the fraction.

$0.625 = \mathbf{\frac{625}{1000}}$ **six hundred twenty-five thousandths**

(b) Since there is a whole number, 3, we may write this decimal number as a mixed number. Only the digits that follow the decimal point become part of the fraction.

$3.125 = \mathbf{3\frac{125}{1000}}$ **three and one hundred twenty-five thousandths**

LESSON PRACTICE

Practice set Write each fraction or mixed number as a decimal number:

a. $\frac{425}{1000}$ **b.** $3\frac{875}{1000}$

c. $\frac{35}{1000}$ **d.** $2\frac{7}{1000}$

Write each decimal number as a fraction or mixed number. Then use words to name the numbers.

e. 0.214 **f.** 4.321

g. 0.025 **h.** 5.012

i. 0.003 **j.** 9.999

MIXED PRACTICE

Problem set

1. *(54)* If it is not a leap year, what is the total number of days in January, February, and March?

2. *(49)* The shoemaker's wife made each of the 12 children a pair of pants and 2 shirts. How many pieces of clothing did she make?

3. *(31)* John did seven more chin-ups than Paloma did. If John did eighteen chin-ups, how many chin-ups did Paloma do?

4. *(60)* Kadeeja drove 200 miles on 8 gallons of gas. Her car averaged how many miles on each gallon of gas?

5. *(83)* Melinda paid the clerk $20.00 for a book that was priced at $8.95. The tax was 54¢. How much money should she get back?

6. *(Inv. 7)* The tally for 8 is 𝍸 |||. What is the tally for 9?

7. *(69)* If each side of an octagon is 1 centimeter long, what is the octagon's perimeter in millimeters?

8. *(70)* One third of the 18 marbles were cat's-eyes. How many of the marbles were cat's-eyes? Draw a picture to help you solve the problem.

9. *(57)* Robert picked 46 peaches in 1 day. At that rate, how many peaches could he pick in 6 days?

10. *(60, 80)* Mary picked 3640 peaches in 7 days. She picked an average of how many peaches each day?

11. *(74)* In a feat of strength, Jack did 1000 push-ups, 129 of them with one arm. What fraction of the 1000 push-ups did Jack do with one arm?

12. *(84)* Write the answer to problem 11 as a decimal number. Then use words to name the number.

13. *(45, 50)* $4.56 - (2.3 + 1.75)$

14. *(Inv. 3, 61)* $\sqrt{36} + N = 7 \times 8$

15. *(62)* $3 \times 6 \times 3^2$

16. *(Inv. 3, 58)* $462 \times \sqrt{9}$

17. *(Inv. 3, 62)* $7^2 - \sqrt{49}$

18. *(67)* $\begin{array}{r} 36 \\ \times\ \ 50 \\ \hline \end{array}$

19. *(58)* $\begin{array}{r} \$4.76 \\ \times\ \ \ \ 7 \\ \hline \end{array}$

20. *(2)* $\begin{array}{r} 4 \\ 3 \\ 2 \\ 7 \\ 6 \\ 8 \\ +\ N \\ \hline 47 \end{array}$

21. *(76)* $\frac{524}{4}$

22. *(80)* $6\overline{)4200}$

23. *(76)* $5\overline{)\$26.30}$

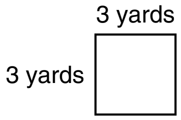
24. *(76)* $\$3.70 \div 2$

25. *(76)* $786 \div 3$

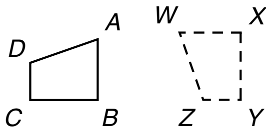
26. *(80)* $4902 \div 7$

27. *(84)* Write 0.321 as a fraction.

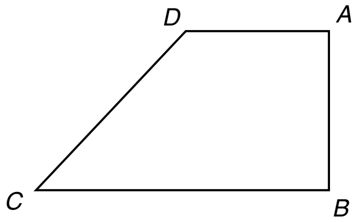
28. *(Inv. 2, Inv. 3)* Find the perimeter and area of this square.



29. *(73)* Which transformations would move figure *ABCD* to position *WXYZ?*



30. *(23, 81)* Which angle in this figure looks like it measures about 45°?



LESSON

85

Multiplying by 10, by 100, and by 1000

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Use the 5's patterns as you subtract:

a. 41 − 15
b. 72 − 25
c. 84 − 45

Review:

d. 25 × 30
e. $6.54 + $2.99
f. 56 − 28

Patterns:

Find the next two numbers in each sequence:

1, 4, 9, 16, ____, ____, ...
1, 3, 6, 10, 15, 21, ____, ____, ...

NEW CONCEPT

To multiply a whole number by 10, we just attach a zero to the end of the number.

$$\begin{array}{r} 123 \\ \times \quad 10 \\ \hline 1230 \end{array}$$

When we multiply a whole number by 100, we add two zeros to the end of the number.

$$\begin{array}{r} 123 \\ \times \quad 100 \\ \hline 12{,}300 \end{array}$$

When we multiply a whole number by 1000, we add three zeros to the end of the number.

$$\begin{array}{r} 123 \\ \times \quad 1000 \\ \hline 123{,}000 \end{array}$$

When we multiply dollars and cents, we remember to insert the decimal point two places from the right-hand side of the product.

$$\begin{array}{r} \$1.23 \\ \times \quad 100 \\ \hline \$123.00 \end{array}$$

Example Multiply mentally:

(a) 37 × 10 (b) $6.12 × 100 (c) 45¢ × 1000

Solution (a) The answer is "37" with one zero at the end:

370

(b) The answer is "612" with two zeros at the end. We remember to place the decimal point and dollar sign:

$612.00

(c) The answer is "45" with three zeros at the end. This makes 45,000¢, which in dollar form is

$450.00

LESSON PRACTICE

Practice set Multiply mentally:

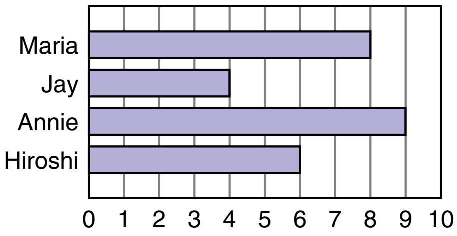
a. 365 × 10 **b.** 52 × 100 **c.** 7 × 1000

d. $3.60 × 10 **e.** 420 × 100 **f.** $2.50 × 1000

MIXED PRACTICE

Problem set Use the information in the graph below to answer problems 1–3.

Books Read by Students



1. Which student has read exactly twice as many books as Jay?
(Inv. 6)

2. Hiroshi's goal is to read 10 books. How many more books does he need to read to reach his goal?
(Inv. 6)

3. If the books Annie has read have an average of 160 pages each, how many pages has she read?
(49, Inv. 6)

4. *(52, 63)* Jim saw some pentagons. The pentagons had a total of 100 sides. How many pentagons did Jim see?

5. *(Inv. 3, Inv. 5)* Sophia bought a rectangular piece of land that was 3 miles long and 2 miles wide. Fifty percent of the land could be farmed. How many square miles could be farmed?

6. *(83)* Max bought 10 pencils for 24¢ each. The tax was 14¢. What was the total cost of the pencils?

7. *(40)* A full pitcher of orange juice contains about how much juice?

A. 2 ounces B. 2 liters C. 2 gallons

8. *(23, 78)* Draw a triangle so that two sides are perpendicular. What type of triangle did you draw?

9. *(70)* One fourth of the 48 gems were rubies. How many of the gems were rubies? Draw a picture to help you solve the problem.

10. *(Inv. 5, 70)* What percent of the gems in problem 9 were not rubies?

11. *(74)* One thousand fans attended the game, but only 81 fans were pleased with the outcome. What fraction of the fans who attended the game were pleased with the outcome?

12. *(84)* Write the answer to problem 11 as a decimal number. Then use words to name the number.

13. *(45, 50)* $46.01 - (3.68 + 10.2)$

14. *(24)* $728 + C = 1205$

15. *(85)* 36×10

16. *(85)* 100×42

17. *(85)* $\$2.75 \times 1000$

18. *(58)* $\begin{array}{r} \$3.17 \\ \times \quad 4 \\ \hline \end{array}$

19. *(58)* $\begin{array}{r} 206 \\ \times \quad 5 \\ \hline \end{array}$

20. *(67)* $\begin{array}{r} 37 \\ \times \ 40 \\ \hline \end{array}$

21. *(76)* $3\overline{)492}$

22. *(76)* $5\overline{)860}$

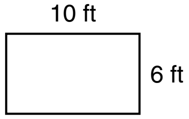
23. *(76)* $6\overline{)\$9.30}$

24. $168 \div 2^3$ *(62, 65)*

25. $\$20.00 \div 8$ *(76, 80)*

26. $1600 \div \sqrt{16}$ *(Inv. 3, 80)*

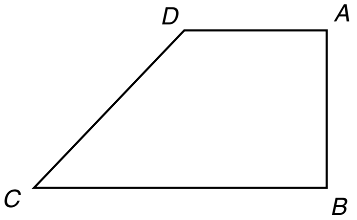
27. *(Inv. 2, Inv. 3)* Find the perimeter and area of this rectangle.



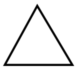
28. *(79)* Which of these letters has two lines of symmetry?

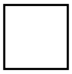
H A P P Y

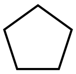
29. *(23, 81)* Which angle in this figure looks like it measures about 135°?

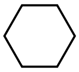


30. *(82)* Blanca wants to cover a floor with tiles. Which of these shapes of tile will not completely cover the floor (will not tessellate)?

A. 

B. 

C. 

D. 

LESSON

86 Multiplying Round Numbers Mentally

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Use the 5's patterns as you add or subtract:

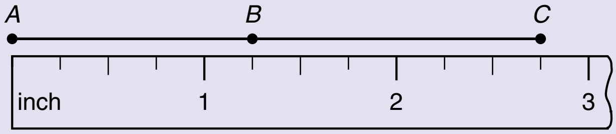
a. 83 − 15
b. 29 + 35
c. 76 + 15

Review:

d. 100 × 30
e. $5.00 − $4.38
f. 67 + 26

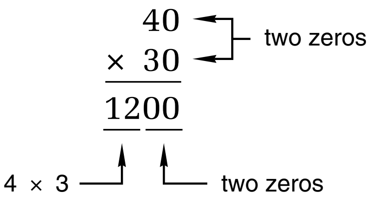
Problem Solving:

How long is segment *AB?* How long is segment *BC?* Segment *BC* is how much longer than segment *AB?*



NEW CONCEPT

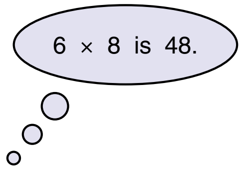
Once we have memorized the multiplication facts, we can multiply round numbers "in our head." To do this, we multiply the first digits of the factors and count zeros. Study the multiplication below:



To find the product of 40 and 30, we multiply 4 by 3 and then attach two zeros.

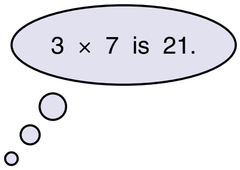
Example 1 Multiply mentally: 60 × 80

Solution We think, "six times eight is 48." Since there is one zero in 60 and one zero in 80, we attach two zeros to 48. The product is **4800**.



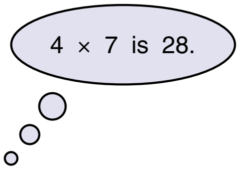
Example 2 Multiply mentally: 30 × $7.00

Solution We think, "three times seven is 21." There are three zeros in the problem, so we attach three zeros to 21 to get 21,000. Since we multiplied dollars and cents, we insert the decimal point two places from the right and add a dollar sign. The product is **$210.00.**



Example 3 Multiply mentally: 400 × 700

Solution We think, "Four times seven is 28." We attach four zeros to get **280,000.**



LESSON PRACTICE

Practice set Multiply mentally:

a. 70 × 80

b. 40 × 50

c. 40 × $6.00

d. 30 × 800

MIXED PRACTICE

Problem set

1. (27) It takes Jennifer 20 minutes to walk to school. At what time should she start for school if she wants to arrive at 8:10 a.m.?

2. (25, 30) Before her haircut Rapunzel weighed 125 pounds. After her haircut she weighed 118 pounds. What was the weight of the hair that was cut?

3. (83) Lucy bought a hamburger for $2.89, fries for $0.89, and a drink for 79¢. The tax was 28¢. She paid with a $5 bill. How much money should Lucy get back?

4. (54) According to this calendar, October 30, 1904, was what day of the week?

OCTOBER 1904

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

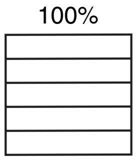
5. *(Inv. 7)* The tally for 16 is . What is the tally for 17?

6. *(34, 54)* Round three thousand, seven hundred eighty-two to the nearest thousand.

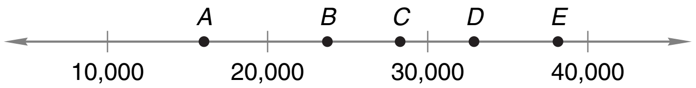
7. *(77)* The limousine weighed 2 tons. How many pounds is 2 tons?

8. *(70)* One fifth of the 45 horses were pintos. How many of the horses were pintos? Draw a picture to illustrate the problem.

9. *(Inv. 5, 70)* What percent of the horses in problem 8 were pintos? (*Hint:* Find $\frac{1}{5}$ of 100%.)



10. *(Inv. 1)* Which point on the number line below could represent 23,650?



11. *(Inv. 4, 84)* Write each decimal number as a fraction:

(a) 0.1 (b) 0.01 (c) 0.001

12. *(43, 51)* $\begin{array}{r} \$36.47 \\ +\ \$\ \ 9.68 \\ \hline \end{array}$

13. *(52)* $\begin{array}{r} \$30.00 \\ -\ \$13.45 \\ \hline \end{array}$

14. *(17)* $\begin{array}{r} 6 \\ 8 \\ 17 \\ 23 \\ 110 \\ 25 \\ +\ 104 \\ \hline \end{array}$

15. *(58)* $\begin{array}{r} 476 \\ \times\ \ \ 7 \\ \hline \end{array}$

16. *(58)* $\begin{array}{r} 804 \\ \times\ \ \ 5 \\ \hline \end{array}$

17. *(45, 50)* $12.65 - (7.43 - 2.1)$

18. *(61, 62)* $5^2 + 5^2 + N = 10^2$

19. *(35, Inv. 4)* Write each of these numbers with words:

(a) $2\frac{1}{10}$ (b) 2.1

20. *(85)* 100 × 23¢

21. *(86)* 60 × 30

22. *(86)* 70 × $2.00

23. *(76, 80)* $3\overline{)\$6.27}$

24. *(76)* $7\overline{)820}$

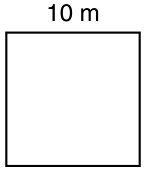
25. *(68)* $6\overline{)333}$

26. $625 \div \sqrt{25}$ *(Inv. 3, 76)*

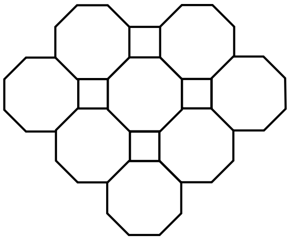
27. $4000 \div 2^3$ *(62, 80)*

28. $1370 \div 2$ *(76)*

29. *(Inv. 2, Inv. 3)* Find the perimeter and area of this square.



30. *(63, 82)* Some combinations of shapes will fit together to cover a flat surface. What two types of polygons are used in the pattern below?



LESSON

87

Multiplying Two Two-Digit Numbers, Part 1

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

a. \$10.00 − \$7.50

b. 400 × 20

c. 58 + 35

d. 250 × 10

e. \$7.68 + \$1.95

f. 85 − 38

Problem Solving:

Sandra bought a CD priced at \$12.95. Sales tax was \$1.10. She paid for her purchase with a \$10 bill and a \$5 bill. Sandra got back five coins (not including a half-dollar). What were the coins Sandra should have received in change?

NEW CONCEPT

We use three steps to multiply by a two-digit number. First we multiply by the ones digit. Next we multiply by the tens digit. Then we add the products. To multiply 34 by 12, for example, we multiply 34 by 2 and then multiply 34 by 10. Then we add the products.

$$\begin{array}{rcrcrl} 34 & \times & 2 & = & 68 & \text{partial product} \\ 34 & \times & 10 & = & 340 & \text{partial product} \\ \hline 34 & \times & 12 & = & 408 & \text{total product} \end{array}$$

It is easier to write the numbers one above the other when we multiply, like this:

$$\begin{array}{r} 34 \\ \times\ 12 \\ \hline \end{array}$$

First we multiply 34 by 2 and write the answer.

$$\begin{array}{r} 34 \\ \times\ 12 \\ \hline 68 \end{array}$$

Next we multiply 34 by 1. This 1 is actually 10, so the product is 340. We write the answer; then we add the results of the two multiplications and get 408.

$$\begin{array}{r} 34 \\ \times\ 12 \\ \hline 68 \\ 340 \\ \hline 408 \end{array}$$

An alternate method often used is to omit the zero from the second multiplication. Using this method, we position the last digit of the second multiplication in the second column from the right. The empty place is treated like a zero when adding.

$$\begin{array}{r} 34 \\ \times\ 12 \\ \hline 68 \\ 34 \\ \hline 408 \end{array}$$

Example Multiply: $\begin{array}{r} 31 \\ \times\ 23 \\ \hline \end{array}$

Solution First we multiply 31 by 3.

$$\begin{array}{r} 31 \\ \times\ 23 \\ \hline 93 \end{array}$$

Now we multiply 31 by 2. Since this 2 is actually 20, we write the last digit of the product in the tens column. Then we add to get **713.**

$$\begin{array}{r} 31 \\ \times\ 23 \\ \hline 93 \\ 62 \\ \hline 713 \end{array} \quad \text{or} \quad \begin{array}{r} 31 \\ \times\ 23 \\ \hline 93 \\ 620 \\ \hline 713 \end{array}$$

LESSON PRACTICE

Practice set Multiply:

a. $\begin{array}{r} 32 \\ \times\ 23 \\ \hline \end{array}$ **b.** $\begin{array}{r} 23 \\ \times\ 32 \\ \hline \end{array}$ **c.** $\begin{array}{r} 43 \\ \times\ 12 \\ \hline \end{array}$ **d.** $\begin{array}{r} 34 \\ \times\ 21 \\ \hline \end{array}$

e. $\begin{array}{r} 32 \\ \times\ 32 \\ \hline \end{array}$ **f.** $\begin{array}{r} 22 \\ \times\ 14 \\ \hline \end{array}$ **g.** $\begin{array}{r} 13 \\ \times\ 32 \\ \hline \end{array}$ **h.** $\begin{array}{r} 33 \\ \times\ 33 \\ \hline \end{array}$

MIXED PRACTICE

Problem set Use this information to answer problems 1–3:

> *Freeman rode his bike 2 miles from his house to Didi's house. Together they rode 4 miles to the lake. Didi caught 8 fish. At 3:30 p.m. they rode back to Didi's house. Then Freeman rode home.*

1. *(72)* Altogether, how far did Freeman ride his bike?

2. *(27, 72)* It took Freeman an hour and a half to get home from the lake. At what time did he get home?

3. *(72)* Didi caught twice as many fish as Freeman. How many fish did Freeman catch?

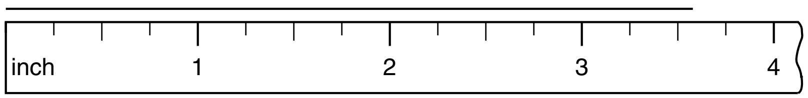
4. *(83)* Shep bought some feed priced at \$12.97. Tax was 91¢. He paid with a \$20 bill. How much money should he get back?

5. *(59)* Estimate the sum of 4876 and 3149 by rounding each number to the nearest thousand before adding.

6. *(Inv. 7)* This is the tally for what number? 

7. *(Inv. 2, 63)* What is the perimeter of a pentagon if each side is 20 centimeters long?

8. *(39)* Find the length of this segment to the nearest quarter inch:



9. *(70)* One half of the 18 players were on the field. How many players were on the field? Draw a picture to illustrate the problem.

10. *(36)* A dime is $\frac{1}{10}$ of a dollar. What fraction of a dollar is a penny?

11. *(Inv. 5)* A dime is what percent of a dollar?

12. *(Inv. 4)* Two hundred eighty-three miles of the thousand-mile trip were through the desert. What fraction of the trip was through the desert?

13. *(84)* Write the answer to problem 12 as a decimal number. Then use words to write the number.

14. *(87)* $\begin{array}{r} 31 \\ \times\ 21 \\ \hline \end{array}$

15. *(87)* $\begin{array}{r} 32 \\ \times\ 31 \\ \hline \end{array}$

16. *(87)* $\begin{array}{r} 13 \\ \times\ 32 \\ \hline \end{array}$

17. *(87)* $\begin{array}{r} 11 \\ \times\ 11 \\ \hline \end{array}$

18. *(87)* $\begin{array}{r} 12 \\ \times\ 14 \\ \hline \end{array}$

19. *(86)* 30×800

20. *(76)* $7\overline{)1000}$

21. *(76)* $3\overline{)477}$

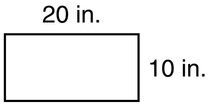
22. *(80)* $5\overline{)2535}$

23. *(76, 80)* $\$64.80 \div 9$

24. *(76)* $716 \div 4$

25. *(65)* $352 \div 8$

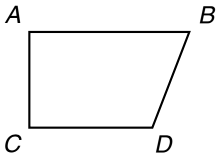
26. *(Inv. 2, Inv. 3, 86)* Find the perimeter and area of this rectangle.



27. *(78)* Draw an equilateral triangle with sides 2 cm long.

28. *(Inv. 2, 69)* What is the perimeter in millimeters of the triangle you drew in problem 27?

29. *(23)* In this polygon, which side appears to be parallel to side *AB?*



30. *(23, 81)* Which angle in the quadrilateral in problem 29 looks as if it might measure 110°?

LESSON

88 Remainders in Stories About Equal Groups

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Multiply by tens, hundreds, and thousands:

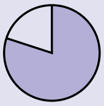
a. 25 × 10 **b.** 25 × 100 **c.** 25 × 1000

Review:

d. \$10.00 − \$6.75 **e.** 58 + 35 **f.** 37 − 19

Problem Solving:

Estimate the percent of this circle that is darkly shaded.



NEW CONCEPT

We have practiced "equal groups" problems that we solved by division. In these problems there were no remainders from the division. In this lesson we will begin practicing division word problems that involve remainders. When solving these problems, we must be careful to identify exactly what the question is asking.

Example The packer needs to place 100 bottles into boxes that hold 6 bottles each.

(a) How many boxes can be **filled?**

(b) How many bottles will be **left over?**

(c) How many boxes are needed to hold **all the bottles?**

Solution Each of these questions asks for different information. To answer the questions, we begin by dividing 100 by 6.

$$\begin{array}{r} 16 \text{ R } 4 \\ 6\overline{)100} \\ \underline{6} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

The result "16 R 4" means that the 100 bottles can be separated into 16 groups of 6 bottles. There will be 4 extra bottles.

(a) The bottles can be separated into 16 groups of 6 bottles, so **16 boxes** can be filled.

(b) The 4 remaining bottles do not completely fill a box. So after filling 16 boxes, there will still be **4 bottles** left over.

(c) Although the 4 remaining bottles do not completely fill a box, another box is needed to hold them. Thus, **17 boxes** are needed to hold all the bottles.

LESSON PRACTICE

Practice set Use the statements below to answer problems **a–e.**

Tomorrow 32 students are going on a field trip. Each car can carry 5 students.

a. How many cars can be filled?

b. How many cars will be needed?

Rafik found 31 quarters in his bank. He made stacks of 4 quarters each.

c. How many stacks of 4 quarters did he make?

d. How many extra quarters did he have?

e. If Rafik made a “short stack” with the extra quarters, how many stacks would he have in all?

MIXED PRACTICE

Problem set

1. *(88)* Peter packed 6 table-tennis balls in each package. There were 100 table-tennis balls to pack.

(a) How many packages could he fill?

(b) How many table-tennis balls were left over?

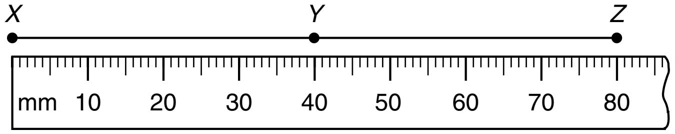
2. *(31)* One hundred twenty-three is how much less than three hundred twenty-one?

3. *(83)* Brooke bought four giant pretzels priced at 59¢ each. The sales tax was 16¢. What was the total cost of the pretzels?

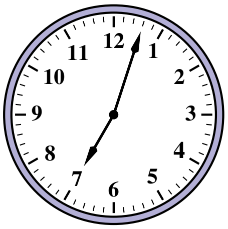
4. *(Inv. 2)* Twenty-four inches is how many feet?

5. *(45, 69)* (a) Segment YZ is how many millimeters long?

(b) Segment YZ is how many centimeters long?



6. *(27)* It is morning. What time will it be 5 hours 20 minutes from now?



7. *(16, 33)* Write the number 7528 in expanded form. Then use words to write the number.

8. *(70)* One fifth of the 25 band members missed the note. How many band members missed the note? Draw a picture to illustrate the problem.

9. *(Inv. 5, 70)* What percent of the band members in problem 8 missed the note?

10. *(43, 51)* \$6.35 + \$14.25 + \$0.97 + \$5

11. *(43, 50)* $4.60 - (1.4 + 2.75)$

12. *(43, 45)* \$10.00 − (46¢ + \$1.30)

13. *(85)* 28×1000

14. *(87)* $\begin{array}{r} 13 \\ \times\ 13 \\ \hline \end{array}$

15. *(87)* $\begin{array}{r} 12 \\ \times\ 11 \\ \hline \end{array}$

16. *(58)* $\begin{array}{r} \$8.67 \\ \times\ \quad 9 \\ \hline \end{array}$

17. *(87)* $\begin{array}{r} 31 \\ \times\ 31 \\ \hline \end{array}$

18. *(87)* $\begin{array}{r} 12 \\ \times\ 31 \\ \hline \end{array}$

19. *(80)* $7\overline{)3542}$

20. *(76, 80)* $6\overline{)\$33.00}$

21. *(80)* $8\overline{)4965}$

22. *(68)* $482 \div 5$

23. *(80)* $2700 \div 9$

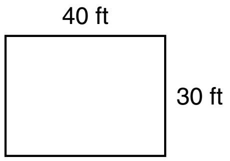
24. *(Inv. 3, 80)* $2700 \div \sqrt{9}$

25. *(61, 62)* $7 + 7 + N = 7^2$

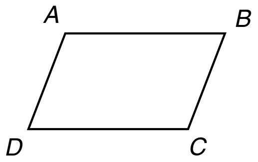
26. *(61, 62)* $3 \times N = 6^2$

27. Draw an obtuse triangle.
(78)

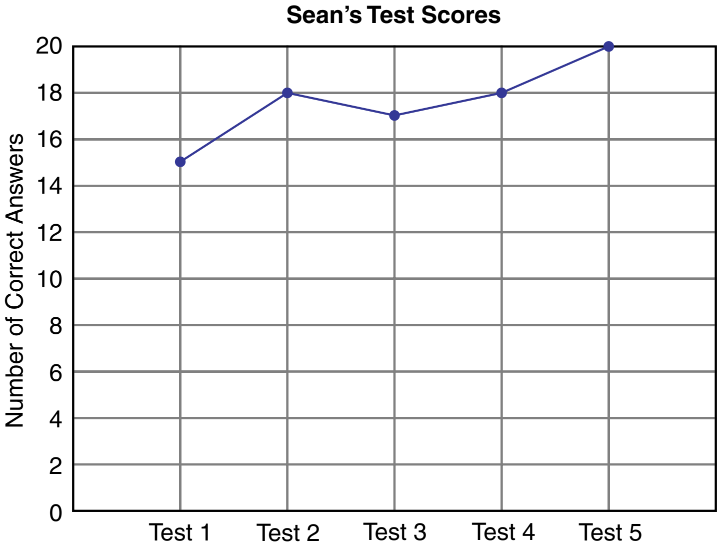
28. The classroom was 40 feet long and 30 feet wide. How many 1-foot square floor tiles were needed to cover the floor?
(Inv. 3, 86)



29. In this polygon, which side appears to be parallel to side *AD*?
(23)



30. According to this line graph, Sean's score improved by how many answers from Test 1 to Test 2?
(Inv. 6)



LESSON

89

Mixed Numbers and Improper Fractions

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Find half of each number:

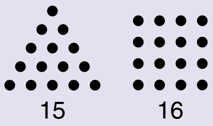
a. 10 **b.** 40 **c.** 48 **d.** 64 **e.** 86

Review:

f. \$3.54 + \$2.99 **g.** $75 + 37$ **h.** $86 - 38$

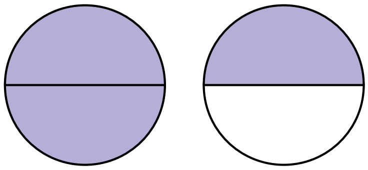
Patterns:

Fifteen dots can be arranged in a triangle pattern. Sixteen dots can be arranged in a square pattern. Thirty-six dots can be arranged in either a triangle pattern or a square pattern. Make a triangle and a square pattern using 36 dots for each.



NEW CONCEPT

Here we show a picture of $1\frac{1}{2}$ shaded circles. Each whole circle has been divided into two half circles.

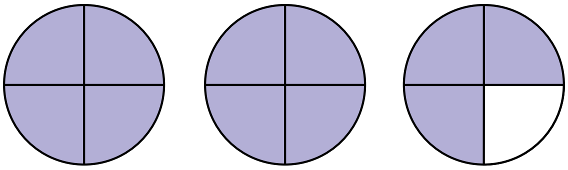


$$1\frac{1}{2} = \frac{2}{2} + \frac{1}{2} = \frac{3}{2}$$

We see from the picture that $1\frac{1}{2}$ is the same as *three halves,* which is written $\frac{3}{2}$. The numerator is greater than the denominator, so the fraction $\frac{3}{2}$ is greater than 1. Fractions that are greater than or equal to 1 are called **improper fractions.** In this lesson we will draw pictures to show mixed numbers and their equivalent improper fractions.

Example Draw circles to show that $2\frac{3}{4}$ equals $\frac{11}{4}$.

Solution We begin by drawing three circles. The denominator of the fraction part of $2\frac{3}{4}$ is four, so we divide all the circles into fourths and shade $2\frac{3}{4}$ of them.



$$2\frac{3}{4} = \frac{4}{4} + \frac{4}{4} + \frac{3}{4} = \frac{11}{4}$$

We count 11 shaded fourths. The drawing shows that $2\frac{3}{4}$ equals $\frac{11}{4}$.

LESSON PRACTICE

Practice set

a. Draw circles to show that $1\frac{3}{4} = \frac{7}{4}$.

b. Draw circles to show that $2\frac{1}{2} = \frac{5}{2}$.

c. Draw circles to show that $1\frac{1}{3} = \frac{4}{3}$.

MIXED PRACTICE

Problem set

1. *(88)* The coach divided 33 players as equally as possible into 4 teams.

(a) How many teams had exactly 8 players?

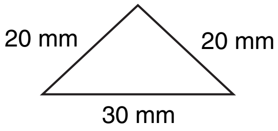
(b) How many teams had 9 players?

2. *(1, 43)* On the package there were two 37-cent stamps, two 20-cent stamps, and one 15-cent stamp. Altogether, how much did the stamps that were on the package cost?

3. *(49, 67)* Danielle read 20 pages each day. How many pages did she read in 2 weeks?

4. *(Inv. 2)* The Frog Prince leapt 27 feet to get out of the well. How many yards did he leap?

5. *(Inv. 2, 69)* What is the perimeter of this isosceles triangle in centimeters?



6. *(Inv. 7)* This is the tally for what number?

7. *(40)* About how much liquid is in this medicine dropper?

A. 2 milliliters

B. 2 liters

C. 2 pints

8. *(61)* $87 + 0 = 87 \times N$

9. *(70)* One third of the 24 students finished early. How many students finished early? Draw a picture to illustrate the problem.

10. *(Inv. 5)* What percent of a dollar is a quarter?

11. *(43, 51)* $\begin{array}{r} \$478.63 \\ +\ \$\ \ 32.47 \\ \hline \end{array}$

12. *(52)* $\begin{array}{r} 137{,}140 \\ -\ 129{,}536 \\ \hline \end{array}$

13. *(52)* $\begin{array}{r} \$60.00 \\ -\ \$24.38 \\ \hline \end{array}$

14. *(86)* 70×90

15. *(87)* $\begin{array}{r} 11 \\ \times\ 13 \\ \hline \end{array}$

16. *(87)* $\begin{array}{r} 12 \\ \times\ 12 \\ \hline \end{array}$

17. *(58)* $\begin{array}{r} \$4.76 \\ \times\qquad 8 \\ \hline \end{array}$

18. *(87)* $\begin{array}{r} 21 \\ \times\ 13 \\ \hline \end{array}$

19. *(87)* $\begin{array}{r} 21 \\ \times\ 21 \\ \hline \end{array}$

20. *(80)* $4\overline{)3000}$

21. *(76)* $5\overline{)635}$

22. *(71)* $7\overline{)426}$

23. *(76)* $8\overline{)3614}$

24. *(76)* $\dfrac{2736}{6}$

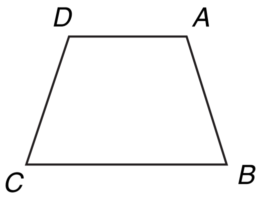
25. *(70)* How much is one fourth of $10.00?

26. *(89)* Draw and shade circles to show that $1\frac{1}{2}$ equals $\frac{3}{2}$.

27. *(21)* Draw a rectangle that is 5 cm long and 4 cm wide.

28. *(Inv. 2, Inv. 3)* What is the perimeter and area of the rectangle you drew in problem 27?

29. *(23)* In this polygon, which side appears to be parallel to side *BC?*



30. *(55)* Which two-digit number less than 20 is a multiple of both 4 and 6?

LESSON

90

Multiplying Two Two-Digit Numbers, Part 2

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find half of each number:

a. 20 **b.** 24 **c.** 50 **d.** 46 **e.** 120

Review:

f. \$5.00 − \$3.67 **g.** 52 + 39 **h.** 42 − 25

Problem Solving:

A half-ton pickup truck can carry a load weighing half of a ton. How many 100-pound sacks of cement can a half-ton pickup truck carry?

NEW CONCEPT

Recall the three steps for multiplying two two-digit numbers:

Step 1: Multiply by the ones digit.

Step 2: Multiply by the tens digit.

Step 3: Add to find the total.

Example 1 Multiply:

$$\begin{array}{r} 46 \\ \times\ 27 \\ \hline \end{array}$$

Solution The first step is to multiply 46 by 7. The product is 322.

$$\begin{array}{r} \overset{4}{4}6 \\ \times\ 27 \\ \hline 322 \end{array}$$

The second step is to multiply 46 by the 2 of 27. We multiply 6 by 2 and get 12. Since we are actually multiplying by 20, **we record the 2 in the tens column** and carry the 1 above the 4.

(We ignore the 4 that we carried in the first step.) Then we multiply 4 by 2 and add the 1 to get 9.

$$\begin{array}{r} \overset{\overset{1}{4}}{4}6 \\ \times\ 27 \\ \hline 322 \\ 92 \end{array}$$

The third step is to add the products. The total product is **1242.**

$$\begin{array}{r} \overset{\overset{1}{4}}{4}6 \\ \times\ 27 \\ \hline 322 \\ 92 \\ \hline 1242 \end{array} \quad \text{or} \quad \begin{array}{r} \overset{\overset{1}{4}}{4}6 \\ \times\ 27 \\ \hline 322 \\ 920 \\ \hline 1242 \end{array}$$

Example 2 Multiply: $\begin{array}{r} 46 \\ \times\ 72 \\ \hline \end{array}$

Solution First we multiply 46 by 2 and get 92.

$$\begin{array}{r} \overset{1}{4}6 \\ \times\ 72 \\ \hline 92 \end{array}$$

Next we multiply 46 by 7 and then add the products to get **3312.**

$$\begin{array}{r} \overset{\overset{4}{1}}{4}6 \\ \times\ 72 \\ \hline 92 \\ 322 \\ \hline 3312 \end{array} \quad \text{or} \quad \begin{array}{r} \overset{\overset{4}{1}}{4}6 \\ \times\ 72 \\ \hline 92 \\ 3220 \\ \hline 3312 \end{array}$$

LESSON PRACTICE

Practice set* Multiply:

a. $\begin{array}{r} 38 \\ \times\ 26 \\ \hline \end{array}$

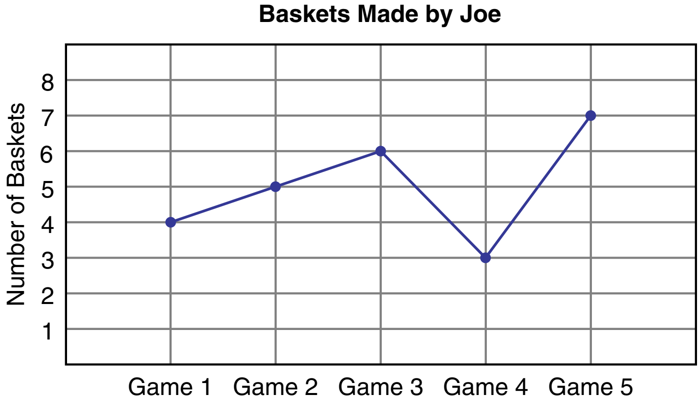
b. $\begin{array}{r} 49 \\ \times\ 82 \\ \hline \end{array}$

c. $\begin{array}{r} 84 \\ \times\ 67 \\ \hline \end{array}$

d. $\begin{array}{r} 65 \\ \times\ 48 \\ \hline \end{array}$

MIXED PRACTICE

Problem set Use the information in the graph to answer problems 1–3.



1. *(Inv. 6)* How many baskets did Joe make in the first game?

2. *(49, Inv. 6)* Each basket is worth 2 points. How many points did Joe score in Game 5?

3. *(Inv. 6)* How many more points did Joe score in Game 5 than in Game 3?

4. *(52)* The 3-pound melon cost $1.44. What was the cost per pound?

5. *(75)* Jim spun all the way around in the air and dunked the basketball. Jim turned about how many degrees?

6. *(83)* Sammy bought a pair of shoes priced at $47.99. The sales tax was $2.88. Sammy gave the clerk $60.00. How much money should he get back?

7. *(Inv. 2)* If the perimeter of a square is 1 foot, how many inches long is each side?

8. *(77)* A dollar bill weighs about 1 gram. Use this information to estimate the number of dollar bills it would take to weigh 1 kilogram.

9. *(70)* One fourth of the 64 clowns had red noses. How many clowns had red noses? Draw a picture to illustrate the problem.

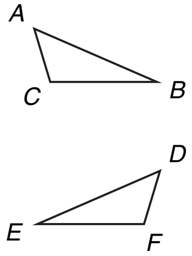
10. *(Inv. 5, 70)* What percent of the clowns in problem 9 did not have red noses?

11. *(27)* Kerry knew that her trip would take about 7 hours. If she left at half past nine in the morning, around what time should she arrive?

12. *(49)* Jill’s boat holds 42 containers. Each container can hold 8 big fish. How many big fish can Jill put in her 42 containers?

13. *(52, 64)* Eighty-eight horseshoes are enough to shoe how many horses?

14. *(73)* Triangles *ABC* and *DEF* are congruent. Which transformations would move ΔABC to the same position as ΔDEF?



15. *(78)* Which of these words does not describe the triangles in problem 14?

A. similar B. obtuse C. scalene D. isosceles

16. *(45, 50)* $0.625 - (0.5 + 0.12)$

17. *(85)* 47×100

18. *(58)* $\begin{array}{r} 328 \\ \times \quad 4 \\ \hline \end{array}$

19. *(87)* $\begin{array}{r} 43 \\ \times \ 32 \\ \hline \end{array}$

20. *(90)* $\begin{array}{r} 25 \\ \times \ 35 \\ \hline \end{array}$

21. *(76)* $5\overline{)4317}$

22. *(80)* $8\overline{)\$40.00}$

23. *(80)* $6\overline{)3963}$

24. *(76)* $426 \div 3$

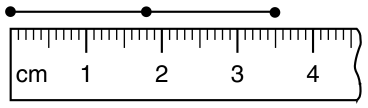
25. *(76)* $2524 \div 4$

26. *(86)* 60×700

27. *(89)* Draw and shade circles to show that $2\frac{1}{2}$ equals $\frac{5}{2}$.

28. *(2)* $4 + 3 + 27 + 35 + 8 + N = 112$

29. *(69)* Segment *BC* is 1.7 cm long. How many centimeters long is segment *AB?*



30. *(69)* Write a decimal addition problem that is illustrated by the lengths of segments *AB, BC,* and *AC* in problem 29.

INVESTIGATION 9

Focus on

Investigating Fractions with Manipulatives

Fraction manipulatives can help us better understand fractions. In this investigation students will make and use their own set of fraction manipulatives by cutting circles into equal-size parts.

Materials needed:

- photocopies of Activity Masters 15, 16, and 17 (1 copy of each master per student; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- scissors
- envelopes or locking plastic bags (optional)

Note: Color-coding the fraction manipulatives makes sorting easier. If you wish to color-code the manipulatives, photocopy each master on a different color of construction paper. Following the activity, each student may store the fraction manipulatives in an envelope or plastic bag for use in later lessons.

Preparation:

Distribute materials. Have students separate the fraction manipulatives by cutting out the circles and cutting apart the fraction slices along the lines.

Activity: *Using Fraction Manipulatives*

Use your fraction manipulatives to help you with the following exercises:

1. Another name for $\frac{1}{4}$ is a *quarter.* How many quarters of a circle does it take to form a whole circle? Show your work.

2. Fit two quarter circles together to form a half circle. That is, show that $\frac{2}{4}$ equals $\frac{1}{2}$.

3. How many $\frac{1}{8}$ pieces are needed to form $\frac{1}{4}$ of a circle? Show your work.

4. How many $\frac{1}{8}$ pieces are needed to form $\frac{1}{2}$ of a circle? Show your work.

5. This number sentence shows how to make a whole circle using half circles:

$$\frac{1}{2} + \frac{1}{2} = 1$$

Write a number sentence that shows how to make a whole circle using only quarter circles.

6. Write a number sentence that shows how to make a whole circle using a half circle and some quarter circles.

7. Write a number sentence that shows how to make a whole circle using a half circle, a quarter circle, and some one-eighth circles.

Manipulatives can help us compare fractions. Use your fraction manipulatives to illustrate and answer each comparison:

8. $\frac{1}{2}$ ○ $\frac{2}{4}$

9. $\frac{1}{2}$ ○ $\frac{3}{8}$

10. $\frac{1}{4}$ ○ $\frac{3}{8}$

11. $\frac{3}{4}$ ○ $\frac{4}{8}$

Manipulatives can also help us **reduce** fractions. When we reduce a fraction, we do not change the size of the fraction. We just use smaller numbers to name the fraction. (With manipulatives, we use fewer pieces to form the fraction.) For example, we may reduce $\frac{2}{4}$ to $\frac{1}{2}$. Both $\frac{2}{4}$ and $\frac{1}{2}$ name the same portion of a whole, but $\frac{1}{2}$ uses smaller numbers (fewer pieces) to name the fraction.

Use your fraction manipulatives to help you reduce the fractions in problems 12–14.

12. $\frac{2}{8}$

13. $\frac{4}{8}$

14. $\frac{6}{8}$

Manipulatives can also help us add and subtract fractions. Illustrate each addition below by combining fraction manipulatives. Record each sum.

15. $\frac{1}{4} + \frac{2}{4}$

16. $\frac{2}{8} + \frac{3}{8}$

17. $\frac{4}{8} + \frac{3}{8}$

To illustrate each subtraction in problems 18–20, form the first fraction; then separate the second fraction from the first fraction. Record what is left of the first fraction as your answer.

18. $\frac{3}{4} - \frac{2}{4}$

19. $\frac{4}{8} - \frac{1}{8}$

20. $\frac{2}{2} - \frac{1}{2}$

Fraction manipulatives can help us understand how fractions and percents are related. Use the percent labels on your manipulatives to answer these problems:

21. One half of a circle is what percent of a circle?

22. What percent of a circle is $\frac{1}{4}$ of a circle?

23. What percent of a circle is $\frac{3}{4}$ of a circle?

Fraction manipulatives can help us understand how fractions and decimals are related. Use the decimal labels on your manipulatives to answer these problems:

24. What decimal number is equivalent to $\frac{1}{2}$?

25. What decimal number is equivalent to $\frac{1}{4}$?

26. What decimal number is equivalent to $\frac{1}{8}$?

27. Compare: 0.125 ○ 0.25

28. Form a half circle using two $\frac{1}{4}$ pieces. Here is a fraction number sentence for the model:

$$\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

Write an equivalent number sentence using the decimal numbers on the pieces.

29. Compare: 0.50 ○ 0.5

30. Form a half circle using four $\frac{1}{8}$ pieces. Here is a fraction number sentence for the model:

$$\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{1}{2}$$

Write an equivalent number sentence using the decimal numbers on the pieces.

31. Compare: 0.500 ○ 0.5

32. Form $\frac{3}{4}$ of a circle two ways. For one way use three $\frac{1}{4}$ pieces. For the other way use a $\frac{1}{2}$ piece and a $\frac{1}{4}$ piece. Here are the two fraction number sentences for these models:

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \qquad \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

Write equivalent number sentences using the decimal numbers on these pieces.

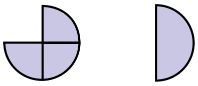
33. Form a whole circle using four $\frac{1}{4}$ pieces. Then take away one of the $\frac{1}{4}$ pieces. Here is a fraction number sentence for this subtraction. Write an equivalent number sentence using the decimal numbers on the pieces.

$$1 - \frac{1}{4} = \frac{3}{4}$$

34. Form a half circle using four $\frac{1}{8}$ pieces. Then take away one of the pieces. Here is a fraction number sentence for this subtraction. Write an equivalent number sentence using the decimal numbers on the pieces.

$$\frac{1}{2} - \frac{1}{8} = \frac{3}{8}$$

35. Here we show $\frac{3}{4}$ of a circle and $\frac{1}{2}$ of a circle:



We see that $\frac{3}{4}$ is greater than $\frac{1}{2}$. In fact, we see that $\frac{3}{4}$ is greater than $\frac{1}{2}$ by a $\frac{1}{4}$ piece. Here we show a "larger-smaller-difference" number sentence for this comparison:

$$\frac{3}{4} - \frac{1}{2} = \frac{1}{4}$$

Write an equivalent number sentence using the decimal numbers on the pieces.

LESSON 91

Decimal Place Value

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find half of a product:

a. half of 10×12 **b.** half of 10×24 **c.** half of 10×480

Review:

d. \$20.00 − \$17.50 **e.** $56 + 239$ **f.** $284 - 65$

Roman numerals:[†]

g. Write 12 in Roman numerals.

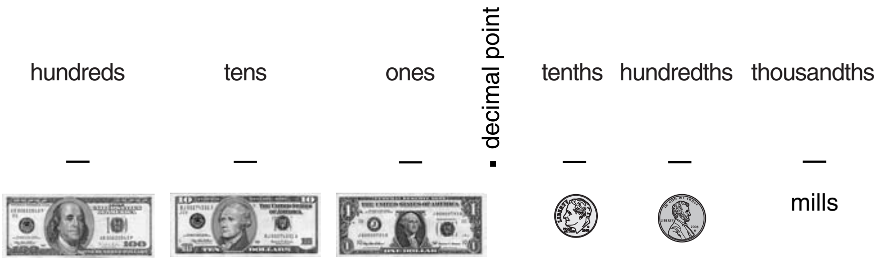
h. Write VII in our number system.

Problem Solving:

There were two gallons of punch for the class party. The punch was served in 8-ounce cups. Two gallons of punch was enough to fill how many cups? (Remember that 16 ounces is a pint, two pints is a quart, two quarts is a half gallon, and two half gallons is a gallon.)

NEW CONCEPT

Thinking about money can help us understand decimal place value.



We have used \$100, \$10, and \$1 bills to represent place values to the left of the decimal point. To the right of the decimal point, we see the tenths, hundredths, and thousandths places. Since a dime is $\frac{1}{10}$ of a dollar, the

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[†] In Lessons 91–105 the Mental Math section "Roman numerals" reviews concepts from Appendix Topic B. Skip these Warm-up problems if you have not covered Appendix Topic B.

tenths place is for dimes. The number of pennies goes in the hundredths place because a penny is $\frac{1}{100}$ of a dollar. The third place to the right of the decimal point is the thousandths place. We do not have a coin for a thousandth of a dollar, but we do have a name for it. A thousandth of a dollar is a *mill.* So one mill is $\frac{1}{1000}$ of a dollar, and ten mills equals one cent.

Example 1 Which digit in 12.875 is in the tenths place?

Solution To identify decimal place value, we pay attention to the decimal point, not to the end of the number. The tenths place is the first place to the right of the decimal point. The digit in the tenths place is **8.**

Example 2 Which digit is in the hundredths place in each of these two decimal numbers?

(a) 4.37 (b) 4.370

Solution We focus on the decimal point. The hundredths place is the second place to the right of the decimal point.

(a) The second place to the right of the decimal point in 4.37 is **7.**

(b) The second place to the right of the decimal point in 4.370 is also **7.**

Notice in example 2 that each digit in 4.37 holds the same place in 4.370.

ones		tenths	hundredths	thousandths
4	.	3	7	
4	.	3	7	0

The zero in the thousandths place in 4.370 does not add value. So 4.37 and 4.370 are equal.

$$4.37 = 4.370$$

Example 3 Compare: 23.25 ○ 23.250

Solution We will write the numbers with the decimal points aligned and compare the numbers place by place.

$$\begin{array}{l} 23.25 \\ 23.250 \end{array}$$

Both numbers have the same digits in the same places. The zero in the thousandths place of 23.250 adds no value. So the numbers are equal.

23.25 = 23.250

When performing decimal arithmetic, it is often helpful to attach one or more zeros to the end of a decimal number, as we see below. The attached zeros do not add value, so the original problem remains the same.

Example 4 Subtract: 4.37 − 1.146

Solution We line up the decimal points whenever we add or subtract decimal numbers. This ensures that we add or subtract digits with the same place values. In this example, notice that there is no digit to subtract the 6 from. We may fill the empty place with a zero because 4.370 equals 4.37. Then we can subtract. The answer is 3.224.

$$\begin{array}{l} 4.37 \\ -\ 1.146 \\ \hline \end{array}$$

$$\begin{array}{r} 4.3\overset{6}{\cancel{7}}\overset{1}{0} \\ -\ 1.146 \\ \hline \mathbf{3.224} \end{array}$$

LESSON PRACTICE

Practice set

a. Which digit in 4.370 is in the hundredths place?

b. Which digit in 4.370 is in the same place as the 2 in 15.24?

c. Name the place value of the 4 in the number 1.234.

d. Which two numbers below are equal?

A. 12.34 B. 12.340 C. 1.234

e. Compare: 3.25 ○ 32.50

f. Compare: 3.250 ○ 3.25

Subtract. Show your work for each problem.

g. 12.34 − 1.234 **h.** 1.2 − 0.12

MIXED PRACTICE

Problem set

1. (35) Three quarters, four dimes, two nickels, and seven pennies is how much money?

2. (88) Carmen separated the 37 math books as equally as possible into 4 stacks.

(a) How many stacks had exactly 9 books?

(b) How many stacks had 10 books?

3. (83) Lily paid $1 for a folder and received 52¢ back in change. If the tax was 3¢, how much did the folder cost without tax?

4. (49) Frank wrote each of his 12 spelling words five times. In all, how many words did he write?

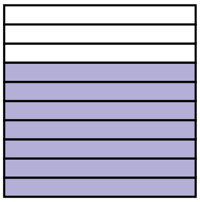
5. (59) Round 5456 to the nearest thousand. Round 2872 to the nearest thousand. Find the sum of the two rounded numbers.

6. (Inv. 7) What is the tally for 10?

7. (Inv. 4) Name the shaded part of this square

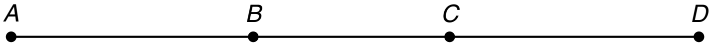
(a) as a fraction.

(b) as a decimal number.



8. (70) One sixth of the 48 crayons are broken. How many crayons are broken? Draw a picture to illustrate the problem.

9. (45, 69) Segment *AB* is 32 mm long. Segment *BC* is 26 mm long. Segment *AD* is 91 mm long. How many millimeters long is segment *CD?*



10. (91) Which digit in 6.125 is in the hundredths place?

11. (40, 77) If a pint of water weighs about one pound, then about how many pounds does a quart of water weigh?

12. (91) $4.32 - 0.432$

13. (2, Inv. 3, 62) $5^2 + \sqrt{25} + N = 30$

14. *(58)* $\begin{array}{r} \$6.08 \\ \times \quad\;\; 8 \\ \hline \end{array}$

15. *(90)* $\begin{array}{r} 47 \\ \times\ 24 \\ \hline \end{array}$

16. *(90)* $\begin{array}{r} 36 \\ \times\ 62 \\ \hline \end{array}$

17. *(67)* 53×30

18. *(90)* 63×37

19. *(85)* 100×32

20. *(76)* $4\overline{)3456}$

21. *(76)* $8\overline{)6912}$

22. *(76, 80)* $7\overline{)\$50.40}$

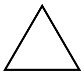
23. *(89)* Draw and shade circles to show that $1\frac{1}{4}$ equals $\frac{5}{4}$.

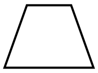
24. *(21)* Draw a square with sides 4 cm long.

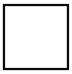
25. *(Inv. 5)* Shade 50% of the square you drew in problem 24. How many square centimeters did you shade?

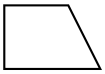
26. *(84)* Write twenty-one thousandths as a fraction and as a decimal number.

27. *(79)* Which of these polygons has no lines of symmetry?

A. 

B. 

C. 

D. 

28. *(63)* Which polygon in problem 27 is not a quadrilateral?

29. *(75)* In half an hour the minute hand of a clock turns how many degrees?

30. *(91)* Compare: 4.2 ◯ 4.200

LESSON

92

Classifying Quadrilaterals

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find half of a product:

a. half of 10 × 18 **b.** half of 10 × 44 **c.** half of 10 × 260

Review:

d. \$14.56 + \$1.98 **e.** 37 − 18 **f.** 248 + 155

Roman numerals:

g. Write 16 in Roman numerals.
h. Write XI in our number system.

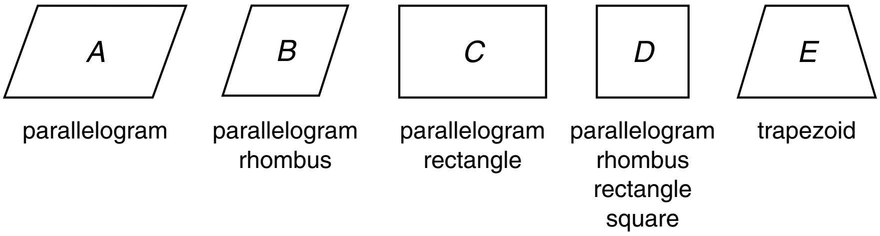
Patterns:

Each number in this sequence is doubled to make the next number in the sequence. Find the next three numbers.

1, 2, 4, 8, ___, ___, ___, …

NEW CONCEPT

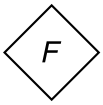
Recall from Lesson 63 that a quadrilateral is a polygon with four sides. In this lesson we will practice recognizing and naming different types of quadrilaterals. Below we show five different types.

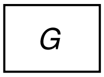


A **parallelogram** is a quadrilateral with *two* pairs of parallel sides. Figures *A, B, C,* and *D* each have two pairs of parallel sides. A **trapezoid** is a quadrilateral with exactly *one* pair of parallel sides. So figure *E* is not a parallelogram; it is a trapezoid.

A **rectangle** is a special type of parallelogram that has four right angles. So figures *C* and *D* are rectangles. A **rhombus** is a special type of parallelogram whose sides are equal in length. So figure *B* is a rhombus, as is figure *D.* A **square** is a regular quadrilateral. Its sides are equal in length, and its angles are all right angles. Figure *D* is a square. It is also a parallelogram, a rhombus, and a rectangle.

Example Which of these quadrilaterals is not a parallelogram?



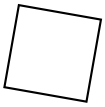


Solution We look for pairs of parallel sides. A parallelogram has two pairs of parallel sides. Figures *F, G,* and *I* each have two pairs of parallel sides. **Figure *H*** has only one pair of parallel sides, so it is a trapezoid, not a parallelogram.

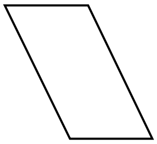
LESSON PRACTICE

Practice set Describe each quadrilateral as a trapezoid, parallelogram, rhombus, rectangle, or square. (More than one description may apply to each figure.)

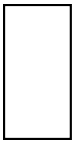
a.



b.



c.



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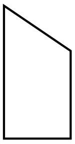


MIXED PRACTICE

Problem set Use this information to answer problems 1–3:

> *Mary invited 14 friends for lunch. She plans to make 12 tuna sandwiches, 10 bologna sandwiches, and 8 roast beef sandwiches.*

1. How many sandwiches will Mary make in all?
(72)

2. Including Mary, each person can have how many sandwiches?
(72, 88)

3. If Mary cuts each tuna sandwich in half, how many halves will there be?
(72)

4. *(52)* Five pounds of grapes cost \$2.95. What was the cost per pound?

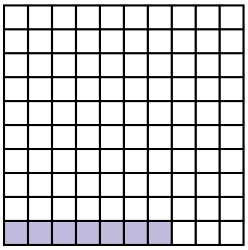
5. *(Inv. 2, 63)* If each side of a hexagon is 4 inches long, what is the perimeter of the hexagon in feet?

6. *(31, 52)* Nine million, four hundred thousand is how much greater than two million, seven hundred thousand?

7. *(Inv. 4)* Name the shaded part of the large square

(a) as a fraction.

(b) as a decimal number.

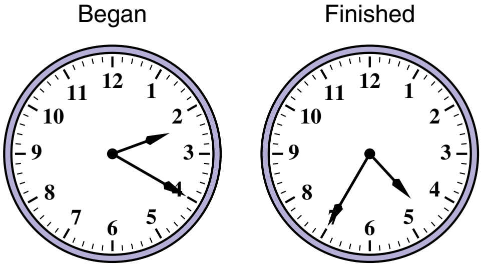


8. *(35)* Use words to write $7572\frac{1}{8}$.

9. *(70)* One fifth of the 80 chariots lost wheels in the chase. How many of the chariots lost wheels? Draw a picture to illustrate the problem.

10. *(Inv. 5, 70)* What percent of the chariots in problem 9 lost wheels?

11. *(27)* Franca began the trip when it was still dark. She finished the trip a couple of hours later. According to the clocks shown below, exactly how long did the trip take?



12. *(60)* James traveled 301 miles in 7 hours. He traveled an average of how many miles per hour?

13. *(83)* Marvin bought 3 folders priced at \$1.99 each. Sales tax was 33¢. He paid with a \$20 bill. How much money should Marvin get back?

14. *(43, 51)* \$25 + \$2.75 + \$15.44 + 27¢

15. 6.2 − 0.26
(91)

16. \$100 − \$89.85
(43, 52)

17. 60×900
(86)

18. 42×30
(67)

19. 21×17
(87)

20.
(90)
$$\begin{array}{r} 36 \\ \times\ 74 \\ \hline \end{array}$$

21.
(90)
$$\begin{array}{r} 48 \\ \times\ 25 \\ \hline \end{array}$$

22.
(58)
$$\begin{array}{r} \$4.79 \\ \times\ \quad 6 \\ \hline \end{array}$$

23. $9\overline{)2718}$
(80)

24. $5\overline{)4815}$
(76)

25. $6\overline{)4829}$
(80)

26. \$50.00 ÷ 8
(76)

27. 2100 ÷ 7
(80)

28. 0.875 − (0.5 + 0.375)
(45, 50)

29. This polygon is what type of quadrilateral?
(92)

30. Draw and shade rectangles to show that $1\frac{2}{3}$ equals $\frac{5}{3}$.
(89)

LESSON

93 Estimating Multiplication and Division Answers

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Five is half of 10. To multiply by 5, we may multiply by half of 10. For example, 5 × 12 equals half of 10 × 12. Find each product by multiplying by "half of 10":

a. 5 × 16 **b.** 5 × 24 **c.** 5 × 28 **d.** 5 × 64

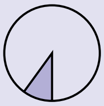
Roman numerals:

e. Write 9 in Roman numerals.

f. Write IV in our number system.

Problem Solving:

About what percent of the circle is darkly shaded? About what percent of the circle is lightly shaded?



NEW CONCEPT

Estimation can help prevent mistakes. If we estimate the answer before we multiply, we can tell whether our answer is reasonable.

Example 1 Jim multiplied 43 by 29 and got 203. Is Jim's answer reasonable?

Solution We estimate the product of 43 and 29 by multiplying the rounded numbers 40 and 30.

$$40 \times 30 = 1200$$

Jim's answer of 203 and our estimate of 1200 are very different, so Jim's answer is **not reasonable.** He should check his work.

Example 2 Estimate the product of 38 and 53. Then find the exact answer.

Solution We estimate the product by multiplying the rounded numbers 40 and 50.

$$40 \times 50 = 2000$$

Then we find the exact answer.

$$\begin{array}{r} 38 \\ \times\ 53 \\ \hline 114 \\ 190 \\ \hline 2014 \end{array}$$

Our estimate of the product was **2000,** so our answer of **2014** is reasonable.

Example 3 Estimate the quotient when 1845 is divided by 6.

Solution We choose a number close to 1845 that is easily divided by 6. We know that 18 is a multiple of 6, so we choose 1800. We can calculate mentally: "18 hundred divided by 6 is 3 hundred."

$$1800 \div 6 = \mathbf{300}$$

LESSON PRACTICE

Practice set Estimate each product or quotient. Then find the exact answer.

a. 58 × 23 **b.** 49 × 51 **c.** 61 × 38 **d.** 1845 ÷ 9

MIXED PRACTICE

Problem set

1. (88) Ninety-one students are divided as equally as possible among 3 classrooms.

(a) How many classrooms have exactly 30 students?

(b) How many classrooms have 31 students?

2. (49) In 1970 it cost 6¢ to mail a letter. How much did it cost to mail twenty letters in 1970?

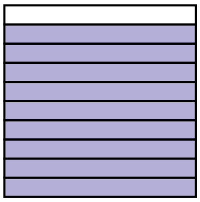
3. (31) What number is seven hundred ninety more than two hundred ten?

4. George Washington was born in 1732 and died in 1799. About how many years did he live?
(54)

5. A $1 bill weighs about 1 gram. How much would a $5 bill weigh?
(77)

6. This is the tally for what number? 
(Inv. 7)

7. Name the shaded part of the large square
(Inv. 4)



(a) as a fraction.

(b) as a decimal number.

8. Estimate the product of 49 and 62.
(93)

9. One half of the 32 chess pieces were still on the board. How many chess pieces were still on the board? Draw a picture to illustrate the problem.
(70)

10. Miriam left home at 10:30 a.m. She traveled for 7 hours. What time was it when she arrived?
(27)

11. Mark traveled 42 miles in 1 hour. If he kept going at the same speed, how far would he travel in 20 hours?
(57)

12. Violet gave the cashier $40 for a toaster that cost $29.99 plus $1.80 in tax. How much money should she get back?
(83)

13. Connor faced the sun as it set in the west, then turned 90° counterclockwise and headed home. In what direction was Connor heading after the turn?
(75)

14. $N + 8 + 2 + 3 + 5 + 2 = 24$
(2)

15. $4.12 - (3.6 + 0.2 + 0.125)$
(45, 50, 91)

16. \$18 − \$15.63
(43, 52)

17. \$15.27 + \$85.75
(43, 51)

18. $2^3 \times \sqrt{25}$
(Inv. 3, 62)

19. 30×90
(86)

20. $\$7.50 \times 8$
(58)

21.
(90)
$$\begin{array}{r} 49 \\ \times\ 62 \\ \hline \end{array}$$

22.
(90)
$$\begin{array}{r} 54 \\ \times\ 23 \\ \hline \end{array}$$

23.
(67)
$$\begin{array}{r} 74 \\ \times\ 40 \\ \hline \end{array}$$

24. $4\overline{)\$6.36}$
(76)

25. $5\overline{)800}$
(80)

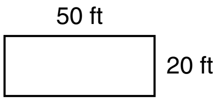
26. $4735 \div 8$
(76)

27. $1800 \div 3$
(80)

28. Estimate the quotient when 1520 is divided by 5. Then find the exact quotient.
(93)

29. Draw and shade circles to show that $2\frac{1}{4}$ equals $\frac{9}{4}$.
(89)

30. Find the perimeter and area of this rectangle.
(Inv. 2, Inv. 3, 86)



LESSON

94 Two-Step Word Problems

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Find each product by multiplying by "half of 10":

a. 5×46 **b.** 5×62 **c.** 5×240

Review:

d. $24.87 + $1.95 **e.** $73 - 35$ **f.** $76 + 38$

Roman numerals:

g. Write 30 in Roman numerals.
h. Write XIV in our number system.

Patterns:

Each number in this sequence is one half of the preceding number in the sequence. Find the next five numbers.

…, 64, 32, 16, 8, ___, ___, ___, ___, ___, …

NEW CONCEPT

We have practiced two-step word problems that involved finding total costs (including tax) and change back. Starting with this lesson, we will practice other kinds of two-step word problems. Writing down the given information or drawing a picture is often helpful in solving these problems.

Example 1 Jim is 5 years older than Ali. Ali is 2 years younger than Blanca. Blanca is 9 years old. How old is Jim?

Solution We will use two steps to solve the problem. First we will use Blanca's age to find Ali's age. Then we will use Ali's age to calculate Jim's age. We write down the given information.

Blanca is 9 years old.

Ali is 2 years younger than Blanca.

Jim is 5 years older than Ali.

We know that Blanca is 9 years old. Ali is 2 years younger than Blanca, so Ali is $9 - 2$, or 7 years old. Jim is 5 years older than Ali, so Jim is $7 + 5$, or **12 years old.**

Example 2 Carlos paid for 5 pounds of apples with a $10 bill. He got back $6. What was the cost of each pound of apples?

Solution We begin by finding how much all 5 pounds of apples cost. If Carlos paid for the apples with a $10 bill and got $6 back, then all 5 pounds must have cost $4.

$$\begin{array}{rl} \$10 & \text{amount paid} \\ \underline{-\ \$\ \ 6} & \text{change back} \\ \$\ \ 4 & \text{cost of 5 pounds of apples} \end{array}$$

To find the cost of each pound of apples, we divide $4 by 5.

$$\begin{array}{r} \$0.80 \\ 5\overline{)\$4.00} \\ \underline{4\ 0} \\ 00 \\ \underline{0} \\ 0 \end{array}$$

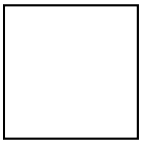
Each pound of apples cost **$0.80.**

LESSON PRACTICE

Practice set

a. Nancy paid for 4 pounds of peaches with a $5 bill. She got back $3. What was the cost of each pound of peaches? (*Hint:* First find the cost of 4 pounds of peaches.)

b. The perimeter of this square is 12 inches. What is the area of the square? (*Hint:* First find the length of each side.)



c. Robert is 10 years younger than John, and John is 2 years older than Jenny. If Robert is 13 years old, how old is Jenny? (*Hint:* First find how old John is.)

MIXED PRACTICE

Problem set

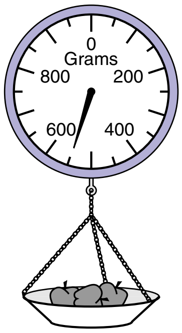
1. (83) Gabriel gave the clerk a $5 bill to pay for a half gallon of milk that cost $1.06 and a box of cereal that cost $2.39. How much money should he get back?

2. (70, 94) Eighty-one animals crossed the bridge. One third of them were billy goats. The rest were bears. How many bears crossed the bridge? (*Hint:* First find how many billy goats crossed the bridge.)

3. *(49)* Johnny planted 8 rows of apple trees. There were 15 trees in each row. How many trees did he plant?

4. *(52, 65)* Four pounds of bananas cost Titania one hundred fifty-six rubles. Each pound of bananas cost how many rubles?

5. *(18)* This scale shows a mass of how many grams?

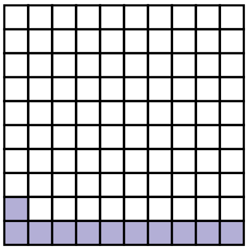


6. *(Inv. 7)* Write the tally for 16.

7. *(Inv. 4)* Name the shaded part of the large square

(a) as a fraction.

(b) as a decimal number.



8. *(93)* Estimate the product of 32 and 48. Then find the exact product.

9. *(70)* One third of the 24 camels were Bactrian. How many camels were Bactrian? Draw a picture to illustrate the problem.

10. *(40, Inv. 5)* A quart is a quarter of a gallon. A quart is what percent of a gallon?

11. *(92)* For each statement, write either "true" or "false."

(a) Every square is also a rectangle.

(b) Every rectangle is also a square.

12. *(Inv. 4)* Four hundred seventy-one of the one thousand students in the school were girls. Girls made up what fraction of the students in the school?

13. *(84)* Write the answer to problem 12 as a decimal number. Then use words to name the number.

14. *(91)* Which digit in 1.875 is in the tenths place?

15. *(60)* Matthew traveled 496 miles in 8 hours. He traveled an average of how many miles per hour?

16. *(45, 91)* $8.3 - (1.74 + 0.9)$

17. *(85)* 63×1000

18. *(86)* 80 × 50¢

19. *(17)*
$$\begin{array}{r} 37 \\ 81 \\ 45 \\ 139 \\ 7 \\ 15 \\ +\quad 60 \\ \hline \end{array}$$

20. *(90)*
$$\begin{array}{r} 52 \\ \times\ 15 \\ \hline \end{array}$$

21. *(90)*
$$\begin{array}{r} 36 \\ \times\ 27 \\ \hline \end{array}$$

22. *(76)* $2\overline{)714}$

23. *(76)* $6\overline{)789}$

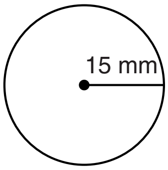
24. *(41, 80)* $3N = 624$

25. *(61, 62)* $5 + W = 5^2$

26. *(89)* Draw and shade rectangles to show that $1\frac{2}{5}$ equals $\frac{7}{5}$.

27. *(Inv. 3)* A room is 5 yards long and 4 yards wide. How many square yards of carpeting are needed to cover the floor?

28. *(21, 69)* The radius of this circle is 15 millimeters. The diameter of the circle is how many centimeters?



29. *(79)* Which of these letters has two lines of symmetry?

V W X Y Z

30. *(81)* The angle formed by the letter V in problem 29 measures about how many degrees?

A. 45° B. 90° C. 135° D. 180°

LESSON

95 Two-Step Problems About a Fraction of a Group

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Find half of a product:

a. half of 100×12 **b.** half of 100×24 **c.** half of 100×48

Review:

d. $10.00 − $4.89 **e.** $151 - 27$ **f.** $340 + 60 + 200$

Roman numerals:

g. Write 15 in Roman numerals.
h. Write XXV in our number system.

Problem Solving:

On February 4 Edgar remembered that his two library books were due on January 28. The fine for late books is 15¢ per book per day. If he returns the books on February 4, what will be the total fine?

NEW CONCEPT

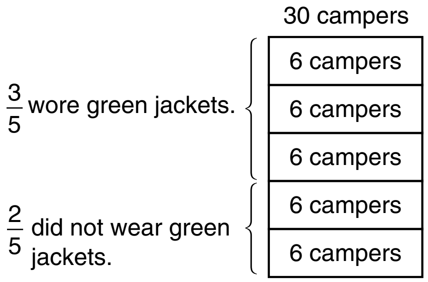
The word problems in this lesson are two-step problems involving fractions of a group. First we divide to find the number in one part. Then we multiply to find the number in more than one part.

Example 1 There were 30 campers in the forest. Three fifths of them wore green jackets. How many campers wore green jackets?

Solution The word *fifths* tells us there were 5 equal groups. First we find the number of campers in each group. Since there were 30 campers in all, we divide 30 by 5.

$$5\overline{)30}^{\,6}$$

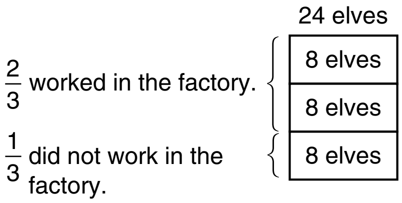
There were 6 campers in each group. We draw this diagram:



Three fifths wore green jackets. In three groups there were 3 × 6 campers. That is, **18 campers** wore green jackets. We also see that two groups did not wear green jackets, so 12 campers did not wear green jackets.

Example 2 Two thirds of the 24 elves worked in the toy factory. How many elves worked in the toy factory?

Solution First we divide 24 by 3 and find that the number of elves in each third was 8.



Then we multiply 8 by 2 and find that the number of elves in two thirds was 16. We have found that **16 elves** worked in the toy factory.

LESSON PRACTICE

Practice set Diagram each problem. Then answer the question.

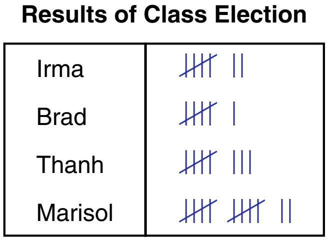
a. Three fourths of the 24 checkers were still on the board. How many checkers were still on the board?

b. Two fifths of the 30 soldiers guarded the fort. How many soldiers guarded the fort?

c. Three eighths of the 40 students had perfect scores. How many students had perfect scores?

MIXED PRACTICE

Problem set Use this tally sheet to answer problems 1–3:



1. Who was second in the election?
(Inv. 7)

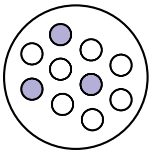
2. Who received twice as many votes as Brad?
(Inv. 7)

3. Altogether, how many votes were cast?
(Inv. 7)

4. Two fifths of the 20 balloons were yellow. How many balloons were yellow? Draw a picture to illustrate the problem.
(95)

5. Tim is 5 years younger than Brad. Brad is 2 years older than Linda. Linda is 11 years old. How old is Tim?
(94)

6. Name the shaded part of this group
(Inv. 4, 74)
(a) as a fraction.
(b) as a decimal number.



7. The fraction $\frac{1}{10}$ equals 10%. What percent of the group in problem 6 is shaded?
(Inv. 5)

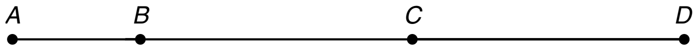
8. Estimate the product of 88 and 59. Then find the exact product.
(93)

9. Sue's birthday is May 2. Her birthday will be on what day of the week in the year 2045?
(54)

MAY 2045

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

10. Segment *AB* is 17 mm long. Segment *CD* is 36 mm long. Segment *AD* is 89 mm long. How long is segment *BC*?
(45, 69)



11. *(43, 51)* \$32.63 + \$42 + \$7.56

12. *(43, 45)* \$86.45 − (\$74.50 + \$5)

13. *(67)* 83×40

14. *(85)* 1000×53

15. *(Inv. 3, 62)* $9^2 - \sqrt{81}$

16. *(90)* $\begin{array}{r} 32 \\ \times\ 16 \\ \hline \end{array}$

17. *(90)* $\begin{array}{r} 67 \\ \times\ 32 \\ \hline \end{array}$

18. *(58)* $\begin{array}{r} \$8.95 \\ \times\quad 4 \\ \hline \end{array}$

19. *(80)* $3\overline{)625}$

20. *(76)* $4\overline{)714}$

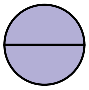
21. *(80)* $6\overline{)1385}$

22. *(80)* $\frac{900}{5}$

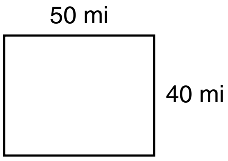
23. *(76)* $3748 \div 9$

24. *(76)* $\$28.56 \div 8$

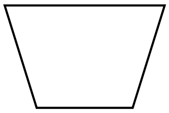
25. *(89)* This circle shows that $\frac{2}{2}$ equals 1. Draw a circle that shows that $\frac{3}{3}$ equals 1.



26. *(Inv. 2, Inv. 3, 86)* Find the perimeter and area of this rectangle.



27. *(66, 92)* Draw a quadrilateral on your paper congruent to this quadrilateral. Then write the name for this type of quadrilateral.



28. *(79)* On the figure you made for problem 27, draw the line of symmetry.

29. *(91)* Compare: 0.05 ○ 0.050

30. *(93)* Estimate the quotient when 2412 is divided by 6. Then find the exact quotient.

LESSON

96 Average

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Fifty is half of 100. Find each product by multiplying by half of 100:

a. 50 × 16 **b.** 50 × 44 **c.** 50 × 26 **d.** 50 × 68

Review:

e. $32.48 + $4.99 **f.** 96 − 29 **g.** 156 + 45

Roman numerals:

h. Write 14 in Roman numerals.

i. Write XXXIII in our number system.

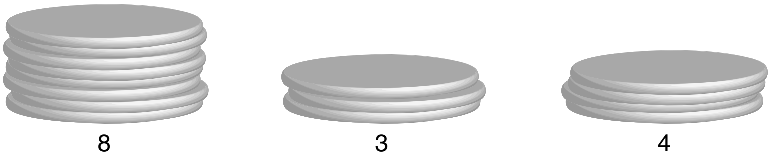
Patterns:

Copy this sequence on your paper, and continue it up to the first number you reach that is greater than 500.

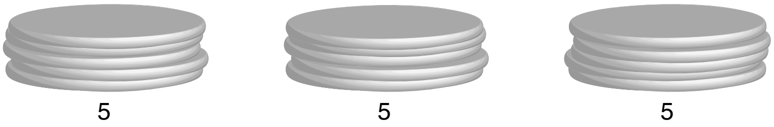
1, 2, 4, 8, 16, …

NEW CONCEPT

Here we show three stacks of pancakes:



There are 15 pancakes in all. If we rearrange the pancakes to have an equal number in each stack, we get 5 pancakes in each stack.



We say that the **average** number of pancakes in each stack is 5. Finding an average is a two-step problem. First we find how many there are altogether. Then we find how many there would be in each group if the groups were equal.

Example Four vans carried the team to the soccer field. There were 5 players in the first van, 4 players in the second van, 3 players in the third van, and 8 players in the fourth van. What was the average number of players per van?

Solution The average is the number of players there would be in each van if each van carried the same number of players. Imagine starting over and reloading the vans equally. First we need to find the total number of players. We find the total by adding the number of players in each van.

$$\begin{array}{r} 5 \text{ players} \\ 4 \text{ players} \\ 3 \text{ players} \\ +\ 8 \text{ players} \\ \hline 20 \text{ players} \end{array}$$

Since there were four vans, we divide the 20 players into four equal groups.

$$\frac{20 \text{ players}}{4 \text{ vans}} = 5 \text{ players in each van}$$

If the vans had been loaded equally, there would have been 5 players in each van. Even though the vans were not loaded equally, the average number of players per van was **5 players.**

LESSON PRACTICE

Practice set

a. In three classrooms there were 24, 26, and 28 children. What was the average number of children per classroom?

b. There were two stacks of books on the shelf, one with 17 books and the other with 11 books. Allison moved some of the books from the taller stack to the shorter stack so that the number of books in the two stacks was equal. When she finished, how many books were in each stack?

c. Spencer's scores on his first three tests were 85, 85, and 100. What was the average of his first three test scores?

MIXED PRACTICE

Problem set

1. *(94)* Freddie is 2 years older than Francesca. Francesca is twice as old as Becky. Becky is 6 years old. How old is Freddie?

2. *(54)* What is the total number of days in the first three months of a leap year?

3. *(94)* It costs \$1.52 to mail the package. Taro put three 37-cent stamps on the package. How much more postage does Taro need to mail the package?

4. *(88)* Thirty-two desks were arranged as equally as possible in 6 rows.

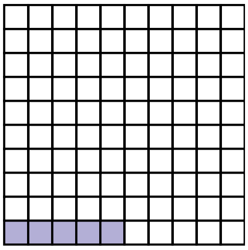
(a) How many rows had exactly 5 desks?

(b) How many rows had 6 desks?

5. *(95)* Two thirds of the 21 riders rode bareback. How many riders rode bareback? Draw a picture to illustrate the problem.

6. *(Inv. 4)* (a) What decimal number names the shaded part of the large square?

(b) What decimal number names the part that is not shaded?

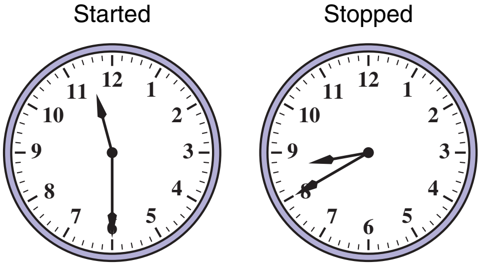


7. *(Inv. 5)* Each small square in problem 6 is 1% of the large square. What percent of the large square is shaded?

8. *(54)* Round 3874 to the nearest thousand.

9. *(40, Inv. 5)* Beth opened a liter of milk and poured half of it into a pitcher. How many milliliters of milk did she pour into the pitcher? What percent of the milk was still in the container?

10. *(27)* The sun was up when Mark started. It was dark when he stopped later in the day. How much time had gone by?


Started Stopped

11. *(96)* For five days Pilar recorded the high temperature. The temperatures were 79°F, 82°F, 84°F, 81°F, and 74°F. What was the average high temperature for those five days?

12. *(60)* Mickey drove 368 miles in 8 hours. If she drove the same number of miles each hour, how far did she drive each hour?

13. *(51)*
$$\begin{array}{r} 496{,}325 \\ +\quad 3{,}680 \\ \hline \end{array}$$

14. *(52)*
$$\begin{array}{r} \$36.00 \\ -\ \$30.78 \\ \hline \end{array}$$

15. *(22)*
$$\begin{array}{r} \$12.45 \\ \$\ \ 1.30 \\ \$\ \ 2.00 \\ \$\ \ 0.25 \\ \$\ \ 0.04 \\ \$\ \ 0.32 \\ +\ \$\ \ 1.29 \\ \hline \end{array}$$

16. *(90)*
$$\begin{array}{r} 26 \\ \times\ 24 \\ \hline \end{array}$$

17. *(90)*
$$\begin{array}{r} 25 \\ \times\ 25 \\ \hline \end{array}$$

18. *(80)* $\$16.40 \div 8$

19. *(86)* 60×300

20. *(58)* $\$8.56 \times 7$

21. *(80)* $7\overline{)845}$

22. *(76)* $9\overline{)1000}$

23. *(65)* $\dfrac{432}{6}$

24. *(89)* Draw and shade a circle that shows that $\frac{4}{4}$ equals 1.

25. *(Inv. 3)* The wall was 8 feet high and 12 feet wide. How many square feet of wallpaper were needed to cover the wall?

Below are Spencer's scores on the first seven tests. Refer to these scores to answer problems 26–28.

85, 85, 100, 90, 80, 100, 85

26. *(Inv. 1)* Rearrange the scores so that the scores are in order from lowest to highest.

27. *(5)* In your answer to problem 26, which score is the middle score in the list?

28. *(5)* In the list of test scores, which score occurs most frequently?

29. *(93)* Estimate the quotient when 912 is divided by 3. Then find the exact quotient.

30. *(52)* According to many health experts, a person should drink 64 ounces of water each day. If Amy's glass holds 8 ounces of water, how many glasses of water should she drink in one day?

LESSON

97 Mean • Median • Range • Mode

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

Double each number:

a. 3 **b.** 4 **c.** 15 **d.** 50 **e.** 25

Review:

f. $1.00 − 42¢ **g.** 199 + 56 **h.** 43 − 25

Roman numerals:

i. Write 25 in Roman numerals.

j. Write XIX in our number system.

Problem Solving:

There are 365 days in a common year, which is about 52 weeks. However, since 52 weeks is 364 days, a year does not start on the same day of the week as the start of the preceding year. If a common year starts on a Tuesday, on what day of the week will the following year begin?

NEW CONCEPTS

Mean In Lesson 96 we practiced finding an average. To find the average of a set of numbers, we added the numbers and then divided by the number of numbers. Another name for the average is the **mean.**

Example 1 Find the mean of Ian's seven test scores.

80, 85, 85, 10, 90, 90, 85

Solution We add the scores and divide by the number of scores. The sum of the scores is 525. We divide the sum by 7.

$$525 \div 7 = 75$$

The mean of the seven scores, the average, is **75.** This means that Ian's seven scores are equivalent to seven test scores of 75. This might seem unfair, since six of Ian's scores were higher than 75. However, his one very low score of 10 lowered his average.

Median The **median** of a set of numbers is the middle number (or the average of the two middle numbers) when the numbers are arranged in order of size.

Range The **range** of a set of numbers is the difference between the largest and the smallest numbers. We find the range by subtracting the smallest number from the largest number.

Example 2 Find the median and the range of Ian's seven test scores.

80, 85, 85, 10, 90, 90, 85

Solution The median score is the middle score. To find the median score, we arrange the scores in order. We begin with the lowest score.

$$\underbrace{10,\ 80,\ 85}_{\text{3 scores}},\ \underset{\substack{\uparrow \\ \text{middle}}}{85},\ \underbrace{85,\ 90,\ 90}_{\text{3 scores}}$$

The scores vary from a low of 10 to a high of 90. The range is the difference of the high and low scores. We subtract 10 from 90 and find that the **range is 80.** The middle score is 85. So the **median score is 85.** Notice that the median is not affected by the low score of 10. Such a score, which is far from the other scores, is called an **outlier.** Outliers sometimes significantly affect the mean while having little or no effect on the median.

Mode The **mode** of a set of numbers is the number that occurs most often.

Example 3 Find the mode of Ian's seven test scores.

80, 85, 85, 10, 90, 90, 85

Solution We see that the score of 85 appears three times. No other score appears more than twice. So the mode is **85.**

LESSON PRACTICE

Practice set

a. Find the mean, median, mode, and range of Raquel's test scores shown below. (*Note:* Since there is an even number of scores, the median is the average of the two middle scores.)

50, 80, 90, 85, 90, 95, 90, 100

b. Find the mean, median, mode, and range of this set of numbers:

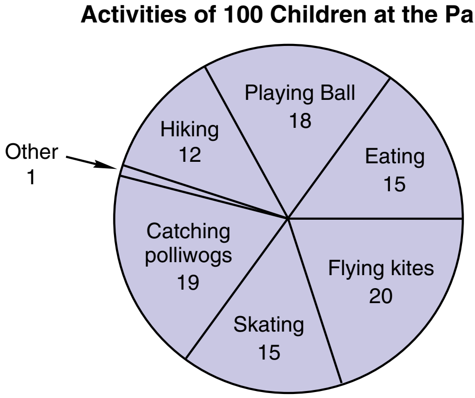
31, 28, 31, 30, 25

c. Find the median of these test scores. Explain your answer.

75, 80, 80, 90, 95, 100

MIXED PRACTICE

Problem set Use the information in this circle graph to answer problems 1–4.



1. *(Inv. 6)* Altogether, how many children were at the park?

2. *(Inv. 6)* How many children were not catching polliwogs?

3. *(Inv. 6)* How many children were either hiking or skating?

4. *(Inv. 6)* How many more children were flying kites than were catching polliwogs?

5. *(95)* Three fourths of the one thousand gold coins were doubloons. How many doubloons were there? Draw a picture to illustrate the problem.

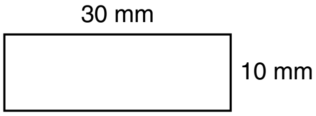
6. *(Inv. 5, 95)* What percent of the gold coins in problem 5 were doubloons?

7. *(84)* Write each mixed number as a decimal:

(a) $3\frac{5}{10}$ (b) $14\frac{21}{1000}$ (c) $9\frac{4}{100}$

8. *(93)* Estimate the product of 39 and 406. Then find the exact product.

Refer to this rectangle to answer problems 9 and 10:



9. *(Inv. 2, 69)* What is the perimeter of the rectangle

(a) in millimeters?

(b) in centimeters?

10. *(Inv. 3, 86)* What is the area of the rectangle

(a) in square millimeters?

(b) in square centimeters?

11. *(27)* Santos figured the trip would take seven and a half hours. He left at 7 a.m. At what time did he think he would arrive?

12. *(96)* What is the average number of days per month in the first three months of a common year?

13. *(67)* 25×40

14. *(48)* 98¢ × 7

15. *(Inv. 3)* $\sqrt{36} \times \sqrt{4}$

16. *(62)* $\dfrac{3^3}{3}$

17. *(90)*

$$\begin{array}{r} 36 \\ \times\ 34 \\ \hline \end{array}$$

18. *(90)*

$$\begin{array}{r} 35 \\ \times\ 35 \\ \hline \end{array}$$

19. *(2)*

$$\begin{array}{r} 4 \\ 2 \\ 1 \\ 3 \\ 4 \\ 7 \\ 2 \\ 2 \\ 3 \\ 4 \\ +\ X \\ \hline 42 \end{array}$$

20. *(76)* $8\overline{)\$70.00}$

21. *(80)* $6\overline{)1234}$

22. *(76)* $800 \div 7$

23. *(76)* $487 \div 3$

24. *(43, 51)* \$2.74 + \$0.27 + \$6 + 49¢

25. *(45, 50)* $9.487 - (3.7 + 2.36)$

26. *(89)* Draw and shade circles to show that $2\frac{1}{3}$ equals $\frac{7}{3}$.

Below are Ian's nine quiz scores, which range from 6 to 10. Refer to these scores to answer problems 27–30.

8, 7, 7, 8, 6, 10, 9, 10, 7

27. *(97)* What is the mode of the scores?

28. *(97)* What is the median of the scores?

29. *(97)* What is the range of the scores?

30. *(97)* What is the mean of the scores?

LESSON 98

Geometric Solids

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

We can double one factor of a multiplication and take one half of the other factor to find the product.

$$\begin{array}{rcccl} & 4 & \times & 18 & \\ \text{double} & \downarrow & & \downarrow & \text{half} \\ & 8 & \times & 9 & = 72 \end{array}$$

Find each product by the "double and half" method.

a. 3×14 **b.** 4×16 **c.** 5×22 **d.** 50×24

Roman numerals:

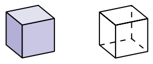
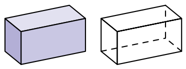
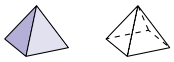
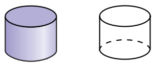
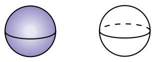
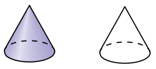
e. Write 28 in Roman numerals.

f. Write XXVII in our number system.

NEW CONCEPT

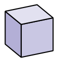
Shapes such as triangles, rectangles, and circles are flat shapes that cover an area but do not take up **space.** They have length and width but not depth. Objects that take up space are things such as cars, basketballs, desks, houses, and people. Geometric shapes that take up space are called **geometric solids.** The chart below shows the names of some geometric solids.

Geometric Solids

Shape	Name
	Cube
	Rectangular solid (or rectangular prism)
	Pyramid
	Cylinder
	Sphere
	Cone

Example 1 Name each shape:

(a) 

(b) 

(c) 

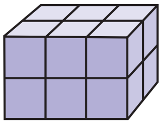
Solution We compare each shape with the chart.

(a) **sphere** (b) **cube** (c) **cone**

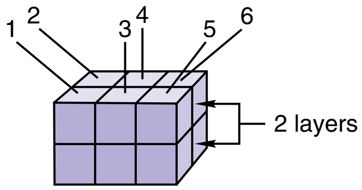
Example 2 What is the shape of a soup can?

Solution A soup can has the shape of a **cylinder.**

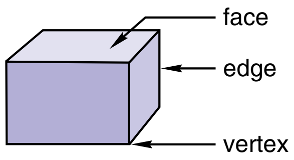
Example 3 This rectangular solid is made up of how many small cubes?



Solution We see that the rectangular solid is made up of 2 layers of cubes with 6 cubes in each layer (2 × 6 = 12). The rectangular solid is made up of **12 small cubes.**



A flat surface of a solid is called a **face.** Two faces meet at an **edge.** Three or more edges meet at a corner called a **vertex** (plural: **vertices**).



Example 4 Find a closed, rectangular box in the classroom (a tissue box, for example) and answer these questions:

(a) How many faces does the box have?

(b) How many vertices does the box have?

(c) How many edges does the box have?

Solution (a) **6 faces** (top, bottom, left, right, front, back)

(b) **8 vertices** (4 around the top, 4 around the bottom)

(c) **12 edges** (4 around the top, 4 around the bottom, and 4 running from top to bottom)

LESSON PRACTICE

Practice set In problems **a–d,** name the shape of the object listed:

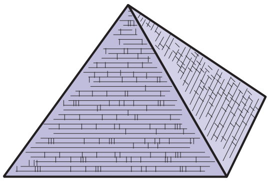
a. basketball

b. shoebox

c. funnel

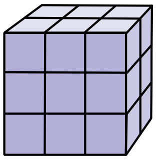
d. soda can

e. What is the shape of this Egyptian landmark?



f. The figure in problem **e** has a square base. How many edges does the figure have?

g. This rectangular solid is made up of how many small cubes?



MIXED PRACTICE

Problem set Use this information to answer problems 1–3:

> *In the Jones family there are 3 children. John is 10 years old. James is 2 years younger than Jill. James is 4 years older than John.*

1. How old is James? (72, 94)

2. How old is Jill? (72, 94)

3. When James is 16 years old, how old will Jill be? (72, 94)

4. (94) Denise bought an artichoke and 6 pounds of carrots for \$2.76. If the artichoke cost 84¢, how much was 1 pound of carrots? (*Hint:* First find the cost of all the carrots.)

5. (84) Write each mixed number as a decimal:

(a) $5\frac{31}{1000}$ (b) $16\frac{7}{10}$ (c) $5\frac{7}{100}$

6. (95) Three fifths of the team's 40 points were scored in the first half. How many points did the team score in the first half? Draw a picture to illustrate the problem.

7. One fifth is 20%. What percent is three fifths?
(Inv. 5, 95)

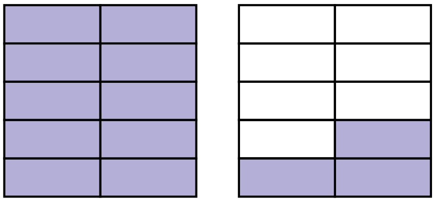
8. Use words to write 7.68.
(Inv. 4)

9. Use words to write 76.8.
(Inv. 4)

10. Estimate the product of 78 and 91.
(93)

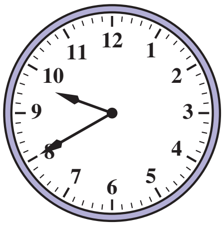
11. Name the number of shaded squares below
(Inv. 4)
(a) as a mixed number.

(b) as a decimal.



12. There were 24 people in one line and 16 people in the other line. What was the average number of people per line?
(96)

13. It is evening. What time will it be 5 hours 20 minutes from now?
(27)



14. Mr. Toto could bake 27 pizzas in 3 hours.
(60)
(a) How many pizzas could he bake in 1 hour?

(b) How many pizzas could he bake in 5 hours?
Hint: Multiply the answer to part (a) by 5.

15. $3.65 + 4.2 + 0.625$ *(50)*

16. \$13.70 − \$6.85 *(43, 51)*

17. 26×100 *(85)*

18. 9 × 87¢ *(48)*

19. 14×16 *(90)*

20. 15^2 *(62, 90)*

21. $\frac{456}{6}$ *(65)*

22. $\begin{array}{r} 47 \\ \times\ 60 \\ \hline \end{array}$ *(67)*

23. $6\overline{)4248}$ *(80)*

24. $1\overline{)163}$ *(76)*

25. $5\overline{)\$49.00}$ *(76, 80)*

26. $1 + 3 + 5 + P + 7 + 3 + 2 + 3 = 44$
(2)

27. *(Inv. 3, 85)* How many floor tiles that are one-foot square are needed to cover the floor of a room that is 15 feet long and 10 feet wide?

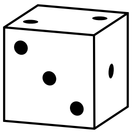
28. *(97)* Find the median and mode of this set of numbers:

1, 1, 2, 3, 5, 8, 13

29. *(98)* What geometric shape is a globe?

30. *(98)* (a) What is the geometric name for this solid?

(b) How many faces does this solid have?



LESSON

99 Decimal Numbers and Money

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Find each product by the "double and half" method:

a. 3 × 18 **b.** 15 × 60 **c.** 50 × 48

Review:

d. $5.00 − $1.75 **e.** 299 + 125 **f.** 76 − 48

Roman numerals:

g. Write 31 in Roman numerals.
h. Write XXIV in our number system.

Problem Solving:

Emily can walk twice as fast as she can swim. She can run twice as fast as she can walk. She can ride a bike twice as fast as she can run. If Emily can ride her bike a quarter mile in one minute, how long would it take her to swim a quarter mile?

NEW CONCEPT

We remember that there are two forms for writing money amounts. In one form the unit is *cents.* To write cents, we use a cent sign (¢) and do not use a decimal point. When we write

25¢

we mean "25 *whole* cents" (or 25 pennies). In the other form the unit is *dollars.* To write dollars, we use a dollar sign ($). We also may use a decimal point to show fractions of a dollar. When we write

$0.25

we mean "twenty-five hundredths of a dollar," which is a fraction of a dollar equal to 25 cents.

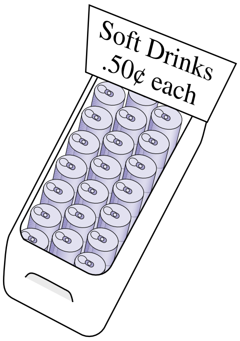
A penny is 1 cent.

A penny is also $\frac{1}{100}$ of a dollar.

1¢ = $0.01

Sometimes we see the notations for money used incorrectly.

Example Something is wrong with this sign. What should be changed to correct the sign?



Solution The notation .50¢ is incorrect. We can use a cent sign (¢) and a whole number to tell how many cents. Or we can use a dollar sign and a decimal point to write the fractional part of a dollar.

50¢ is correct **$0.50** is also correct

LESSON PRACTICE

Practice set At a vegetable stand Martin saw this incorrect sign. Draw two different signs that show how to correct the error.

MIXED PRACTICE

Problem set

1. (88) Susan B. Anthony divided her 53 suffragettes into groups of 6.

(a) How many groups of 6 could she make?

(b) How many suffragettes were left over?

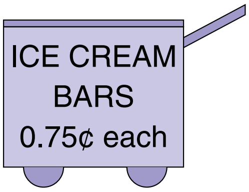
(c) If the remaining suffragettes formed a group, how many groups were there in all?

2. (54) Abraham Lincoln was born in 1809 and died in 1865. About how many years did he live?

3. (94) The parking lot charges $1.25 for the first hour. It charges 75¢ for each additional hour. How much does it cost to park a car in the lot for 3 hours?

4. (95) Two thirds of the team's 45 points were scored in the second half. How many points did the team score in the second half? Draw a picture to illustrate the problem.

5. Something is wrong with this sign. Draw two different signs that show how to correct the error.
(99)



6. What is the value of 3 ten-dollar bills, 4 one-dollar bills, 5 dimes, and 2 pennies?
(35)

7. Use words to write 6412.5.
(Inv. 4)

8. Round 5139 to the nearest thousand. Round 6902 to the nearest thousand. Then add the rounded numbers.
(59)

9. James opened a 1-gallon bottle of milk and poured out 1 quart. How many quarts of milk were left in the bottle?
(40)

10. What percent of the milk in problem 9 was left in the bottle?
(40, Inv. 5)

11. Estimate the product of 39 and 41. Then find the exact product.
(93)

12. Salma slowly gave the doorknob a quarter turn counterclockwise. How many degrees did she turn the doorknob?
(75)

13. Five full buses held 240 students. What was the average number of students per bus?
(96)

14.
(43, 51)
$$\begin{array}{r} \$68.57 \\ +\ \$36.49 \\ \hline \end{array}$$

15.
(52)
$$\begin{array}{r} \$100.00 \\ -\ \$\quad 5.43 \\ \hline \end{array}$$

16.
(17)
$$\begin{array}{r} 15 \\ 24 \\ 36 \\ 75 \\ 21 \\ 8 \\ 36 \\ +\ 420 \\ \hline \end{array}$$

17.
(87)
$$\begin{array}{r} 12 \\ \times\ 12 \\ \hline \end{array}$$

18.
(58)
$$\begin{array}{r} \$5.08 \\ \times\quad 7 \\ \hline \end{array}$$

19. 50^2
(62, 86)

20. $\sqrt{144}$
(Inv. 3)

21. $12.08 - (9.61 - 2.4)$
(45, 50)

22. 49×51
(90)

23. 33×25
(90)

24. $\frac{848}{8}$
(80)

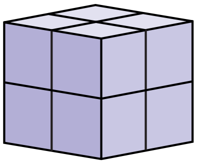
25. $9\overline{)6300}$
(80)

26. (89) Draw and shade circles to show that $2\frac{2}{3}$ equals $\frac{8}{3}$.

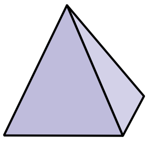
27. (21) Draw a rectangle that is three inches long and one inch wide.

28. (Inv. 2, Inv. 3) What is the perimeter and area of the rectangle you drew in problem 27?

29. (98) This rectangular solid is made up of how many small cubes?



30. (98) This pyramid has a square base. How many vertices does the pyramid have?



LESSON 100

Constructing Geometric Models

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Find each product by the "double and half" method:

a. 4 × 14 **b.** 25 × 80 **c.** 50 × 64

Review:

d. \$10.00 − \$8.16 **e.** \$4.68 + \$2.95 **f.** 62 − 35

Roman numerals:

g. Write 19 in Roman numerals.

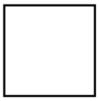
h. Write XXIX in our number system.

Problem Solving:

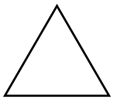
Three of the 30 students in Marshall's class are left-handed. What percent of the students are left-handed? What percent are not left-handed?

NEW CONCEPT

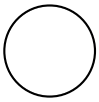
Recall from Lesson 98 that geometric shapes such as triangles, rectangles, and circles have two dimensions—length and width—but they do not have depth. These kinds of figures occupy area, but they do not take up space. We call shapes such as these **plane figures** because they are confined to a plane.



square

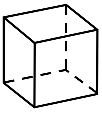


triangle

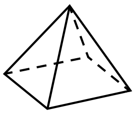


circle

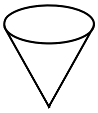
Shapes that take up space are **geometric solids** such as cubes, pyramids, and cones. Geometric solids have three dimensions: length, width, and depth. We sometimes simply call these shapes **solids.** Solids are not confined to a plane, so to draw them we try to create an optical illusion to suggest their shape.



cube



pyramid



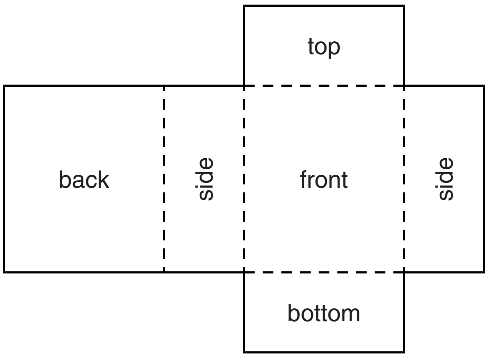
cone

In this lesson you will cut, fold, and glue (or tape) paper patterns to construct three-dimensional models of a cube, a pyramid, and a cone.

Before making the models, consider the shape of a cereal box. The shape is called a *rectangular solid* (or *rectangular prism*). Every panel (side) of a closed cereal box is a rectangle. If an empty cereal box or similar container is available, you may refer to it to answer the following questions:

1. A closed cereal box has how many panels?
2. What words could we use to refer to these panels?
3. Without a mirror, what is the largest number of panels that can be seen at one time?
4. Two panels meet at a fold, or seam, in the cardboard. Each fold is an edge. A closed cereal box has how many edges?
5. Three edges meet at each corner of the box. A closed cereal box has how many corners (vertices)?

If we tape an empty cereal box closed and cut it along seven edges, we can "flatten out" the container, as shown below.



We can see the six rectangles that formed the panels of the closed box. We will use "maps" like this one to construct the models of a cube, a pyramid, and a cone.

Activity: *Constructing Models of Geometric Solids*

Materials needed:

- copies of Activity Masters 18, 19, and 20 (masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- scissors
- glue or tape

Cut out the patterns for the cube, pyramid, and cone. The shaded parts of each pattern are tabs to help hold the figures together. Fold the paper along the edges before you glue or tape the seams. You might want to work with a partner as you construct the models.

MIXED PRACTICE

Problem set

1. One hundred fifty feet equals how many yards?
(Inv. 2, 71)

2. Tammy gave the clerk $6 to pay for a book. She received 64¢ in change. Tax was 38¢. What was the price of the book?
(83)

3. Sergio is 2 years older than Rebecca. Rebecca is twice as old as Dina. Sergio is 12 years old. How old is Dina? (*Hint:* First find Rebecca's age.)
(94)

4. Write each decimal number as a mixed number:
(84)

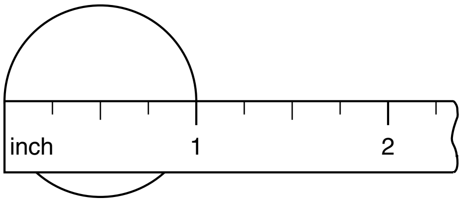
(a) 3.295 (b) 32.9 (c) 3.09

5. Three fourths of the 84 contestants guessed incorrectly. How many contestants guessed incorrectly? Draw a picture to illustrate the problem.
(95)

6. What percent of the contestants in problem 5 guessed incorrectly?
(Inv. 5, 95)

7. (a) What is the diameter of this circle?
(21)

(b) What is the radius of this circle?



8. Use words to write 8.75.
(Inv. 4)

9. Estimate the product of 47 and 62. Then find the actual product.
(93)

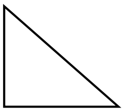
10. The first five odd counting numbers are
(97)

1, 3, 5, 7, 9

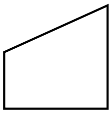
Find the mean and the median of these five numbers.

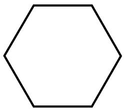
11. What geometric shape is a roll of paper towels?
(98)

12. Which of these polygons is a parallelogram?
(92)

A.


B.


C.


D.


13. \$16.25 − (\$6 − 50¢)
(43, 45)

14. $5 \times 7 \times 9$
(62)

15. \$7.83 × 6
(58)

16. 54×1000
(85)

17.
(90)
$$\begin{array}{r} 45 \\ \times\ 45 \\ \hline \end{array}$$

18.
(67)
$$\begin{array}{r} 32 \\ \times\ \ 40 \\ \hline \end{array}$$

19.
(90)
$$\begin{array}{r} 46 \\ \times\ 44 \\ \hline \end{array}$$

20. $6\overline{)3625}$
(80)

21. $5\overline{)3000}$
(80)

22. $7\overline{)987}$
(76)

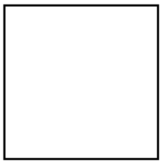
23. $\dfrac{10^3}{\sqrt{25}}$
(Inv. 3, 62, 80)

24. \$13.76 ÷ 8
(76)

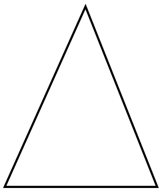
25. $\dfrac{234}{4}$
(68)

26. Draw and shade a circle to show that $\frac{8}{8}$ equals 1.
(89)

27. The perimeter of this square is 40 cm. What is the area of this square? (*Hint:* First find the length of each side.)
(Inv. 2, Inv. 3, 85)



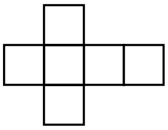
28. Draw a triangle that is similar to this isosceles triangle. Then draw its line of symmetry.
(66, 79)

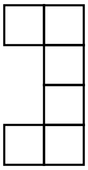


29. (a) Compare: 0.25 ◯ 0.250
(91, 99)

(b) Compare: \$0.25 ◯ 0.25¢

30. One of these maps could be cut out and folded to form a cube. The other will not form a cube. Which map, A or B, will form a cube?
(100)

A.


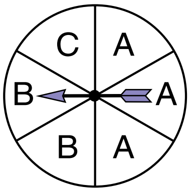
B.


INVESTIGATION 10

Focus on

Probability

Many board games involve an element of **chance.** This means that when we spin a spinner, roll dice, or draw a card from a shuffled deck, for example, we cannot know the outcome (result) of the event ahead of time. However, we can often find how *likely* a particular outcome is. The degree of likelihood of an outcome is called its **probability.**



Here we show a spinner. The face is divided into six equal parts called **sectors.** Each sector is $\frac{1}{6}$ of the face of the spinner. Assuming the spinner is balanced and fair, then a spin of the arrow can end up with the arrow pointing in any direction. The letter that names the sector in which the arrow lands is the outcome of the spin. For the questions that follow, ignore the possibility that the arrow may stop on a line.

1. If the arrow is spun once, what outcomes are possible?
2. On which letter is the arrow most likely to stop and why?
3. List the possible outcomes of a spin in order from least likely to most likely.
4. Which outcome of a spin is twice as likely as the outcome C?
5. If the arrow is spun many times, then about half the outcomes are likely to be which of the following?

   A. outcome A   B. outcome B   C. outcome C

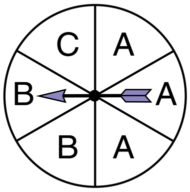
6. If the arrow is spun many times, then what fraction of the spins are likely to stop in sector C?

   A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{5}{6}$

7. In 60 spins, about how many times should we expect it to stop in sector C?

   A. about 6 times   B. about 10 times
   C. about 20 times   D. about 30 times

The probability of an outcome can be expressed as a number ranging from 0 to 1. An outcome that cannot happen has a probability of 0. An outcome that is certain to happen has a probability of 1. An outcome that could happen but is not certain to happen is expressed as a fraction between 0 and 1. Below we again show our spinner.

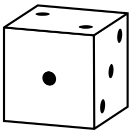


8. What is the probability the arrow will stop in sector D? Why?

9. What is the probability that the outcome will be one of the first three letters of the alphabet? Why?

10. What is the probability the arrow will stop in sector C?

Here we show a standard die (dot cube).



11. What numbers are represented by the dots on the faces of a die?

12. If a die is rolled once, which number is most likely to end up on top and why?

13. If a die is rolled many times, about how often would we expect to roll a number greater than 3?

A. less than half the time

B. about half the time

C. more than half the time

14. If a die is rolled once, what is the probability of rolling a 7?

15. With one roll of a die, what is the probability of rolling a 1?

16. How would we describe the likelihood of rolling a 6 with one roll of a die?

A. very likely

B. just as likely as not

C. unlikely

The **chance** of an event is sometimes expressed as a percent from 0% to 100%. For example, if a meteorologist forecasts that the chance of rain is 20%, then the meteorologist is stating that it might rain, but that it is more likely not to rain. A forecast of 100% chance of rain means that the meteorologist believes it is certain to rain.

17. The weather forecast stated that the chance of rain is 40%. According to the forecast, is it more likely to rain or not to rain?

18. The meteorologist said that the chance of rain is 80%. This means that the chance it will not rain is what percent?

Activity: *Probability Experiments*

Materials needed:

- dice (at least 1 die for each pair of students)
- Activity Master 21 (at least 1 copy for each pair of students; masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)

Experiment 1: Work with a partner for this experiment. In this experiment, you and your partner will roll one die 36 times and tally the number of times each face of the die turns up. You will record the results in the Experiment 1 table on Activity Master 21. (A copy of the table is shown below.) Before starting the experiment, predict the number of times each outcome will occur during the experiment. Write your predictions in the column labeled "Prediction."

36 Rolls of One Die

Outcome	Prediction	Tally	Total Frequency
1			
2			
3			
4			
5			
6			

Now begin rolling the die. For each roll, make a tally mark in the appropriate box in the "Tally" column. When all groups have finished, report your results to the class. As a class, total the groups' tallies for each outcome, and write these totals in the boxes under "Total Frequency."

19. What conclusions can you draw from the results of Experiment 1?

Experiment 2: In this experiment you and your group will roll a pair of dice 36 times and tally the outcomes. For each roll the outcome will be the sum of the two numbers that end up on top. You will record your results in the Experiment 2 table on Activity Master 21.

Form groups so that each group can have two dice. Before starting the experiment, predict as a group the number of times each outcome will occur during the experiment. Write your predictions in the column labeled "Prediction."

36 Rolls of Two Dice

Outcome	Prediction	Tally	Total Frequency
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Now begin rolling the dice. For each roll of a pair of dice, make a tally mark in the appropriate box. When all groups have finished, report your results to the class. As a class, total the groups' tallies for each outcome, and record these totals in the "Total Frequency" column.

20. Which outcome(s) occurred most frequently? Why?

21. Which outcome(s) occurred least frequently? Why?

22. What conclusions can you draw from the results of Experiment 2?

LESSON

101 Tables • Schedules

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Thinking of quarters can make mentally adding and subtracting numbers ending in 25, 50, and 75 easier:

a. 350 + 175 **b.** 325 − 150 **c.** \$1.75 + \$1.25

Review:

d. 50 × 66 **e.** \$10.00 − \$1.95 **f.** 36 − 18

Roman numerals:

g. Write 36 in Roman numerals.

h. Compare: 29 ○ XXXI

Problem Solving:

Recall that 52 weeks is 364 days, that a common year is 365 days, and that a leap year is 366 days. If we know on which day of the week a year begins, what rule can we use to tell us the day of the week the year will end? (You will find two rules, one for common years and one for leap years.)

NEW CONCEPTS

Tables We have studied graphs that present number information in picture form. Another way of presenting number information is in a **table.**

Example 1 Use the information in this table to answer the questions that follow:

Heights of Major Mountains

Mountain	Feet	Meters
Everest	29,035	8850
McKinley	20,320	6194
Kilimanjaro	19,340	5895
Matterhorn	14,691	4478
Pikes Peak	14,110	4301
Fuji	12,388	3776

(a) The Matterhorn is how many meters taller than Pikes Peak?

(b) Mount McKinley is how many feet taller than Mount Kilimanjaro?

Solution We compare the heights by subtracting.

(a) We use the numbers from the meters column.

$$\begin{array}{lr} \text{Matterhorn} & 4478 \text{ m} \\ \text{Pikes Peak} & -\ 4301 \text{ m} \\ \hline & \mathbf{177 \text{ m}} \end{array}$$

(b) We use the numbers from the feet column.

$$\begin{array}{lr} \text{McKinley} & 20{,}320 \text{ ft} \\ \text{Kilimanjaro} & -\ 19{,}340 \text{ ft} \\ \hline & \mathbf{980 \text{ ft}} \end{array}$$

Schedules A **schedule** is a list of events organized by the times at which they are planned to occur.

Example 2 Michael follows this schedule on school days:

School-Day Schedule

6:30 a.m.	Wake up, dress, eat breakfast
7:30 a.m.	Leave for school
8:00 a.m.	School starts
12:00 p.m.	Eat lunch
2:45 p.m.	School ends, walk home
3:15 p.m.	Eat snack
3:30 p.m.	Start homework
5:00 p.m.	Play
6:00 p.m.	Eat dinner
7:00 p.m.	Watch TV
8:00 p.m.	Read
8:30 p.m.	Shower
9:00 p.m.	Go to bed

If lunch and recess together last 45 minutes, then how many hours does Michael spend in class?

Solution School starts at 8:00 a.m. and ends at 2:45 p.m., which is a span of 6 hours and 45 minutes. Since 45 minutes of school time is spent on lunch and recess, the time spent in class is **6 hours.**

LESSON PRACTICE

Practice set Refer to the table and the schedule in this lesson to answer problems **a–c.**

a. Mount Kilimanjaro is how many meters taller than Mount Fuji?

b. Mount Everest is how many feet taller than the Matterhorn?

c. How much sleep does Michael get on a school night if he follows his schedule?

MIXED PRACTICE

Problem set Use the information in this table to answer problems 1–3.

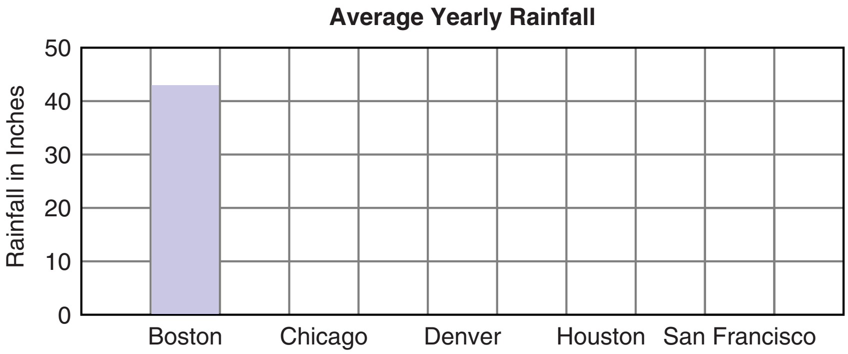
Average Yearly Rainfall

City	Rainfall in Inches
Boston	43
Chicago	36
Denver	16
Houston	48
San Francisco	20

1. *(Inv. 2, 101)* Which cities listed in the table average less than 2 feet of rain per year?

2. *(101)* One year Houston received 62 inches of rain. This was how much more than its yearly average?

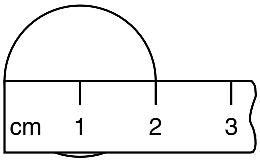
3. *(Inv. 6, 101)* Copy and complete this bar graph to show the information in the rainfall table:



4. *(95)* Five sixths of the 288 marchers were out of step. How many marchers were out of step? Draw a picture to illustrate the problem.

5. *(99)* Something is wrong with this sign. Draw two different signs that show how to correct the error.

6. *(21, 69)* What is the radius of this circle in millimeters?



7. *(Inv. 10)* The chance of rain is 60%. Is it more likely that it will rain or that it will not rain?

8. *(93)* Estimate the product of 88 and 22. Then find the actual product.

9. *(49)* Apples were priced at 53¢ per pound. What was the cost of 5 pounds of apples?

10. *(16, 33)* Write the number 3708 in expanded form. Then use words to write the number.

11. *(Inv. 2)* The top of a doorway is about two meters from the floor. Two meters is how many centimeters?

12. *(94)* Four pounds of pears cost \$1.20. What did 1 pound of pears cost? What did 6 pounds of pears cost?

13. *(60)* Mike drove his car 150 miles in 3 hours. What was his average speed in miles per hour?

14. *(52)*
$$\begin{array}{r} \$46.00 \\ -\ \$45.56 \\ \hline \end{array}$$

15. *(52)*
$$\begin{array}{r} 10{,}165 \\ -\quad 856 \\ \hline \end{array}$$

16. *(43, 51)*
$$\begin{array}{r} \$\ \ 0.63 \\ \$\ \ 1.49 \\ \$12.24 \\ \$\ \ 0.38 \\ \$\ \ 0.06 \\ \$\ \ 5.00 \\ +\ \$\ \ 1.20 \\ \hline \end{array}$$

17. *(62, 86)* 70^2

18. *(90)* 71×69

19. *(76, 80)* $4\overline{)\$30.00}$

20. *(68)* $3\overline{)263}$

21. *(76)* $5\overline{)4080}$

22. *(65)* $\dfrac{344}{8}$

23. *(67)*
$$\begin{array}{r} 37 \\ \times\ \ 60 \\ \hline \end{array}$$

24. *(90)*
$$\begin{array}{r} 56 \\ \times\ 42 \\ \hline \end{array}$$

25. *(58)*
$$\begin{array}{r} \$5.97 \\ \times\qquad 8 \\ \hline \end{array}$$

26. *(45, 50)* $10.000 - (4.468 - 2.3)$

27. *(97)* Find the mean, median, mode, and range of this set of numbers:

3, 1, 4, 1, 6

28. *(89)* Draw and shade circles to show that 2 equals $\frac{4}{2}$.

29. *(Inv. 2, 21)* Draw a square with sides 4 cm long.

30. *(Inv. 2, Inv. 3)* Find the perimeter and the area of the square you drew in problem 29.

LESSON

102

Decimal Number Line: Tenths and Hundredths

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Think of quarters as you add or subtract:

a. 325 + 75 **b.** 425 − 175 **c.** \$3.75 + \$1.75

Review:

d. 4 × 18 **e.** \$3.65 + \$1.98 **f.** 456 − 39

Roman numerals:

g. Write 24 in Roman numerals.

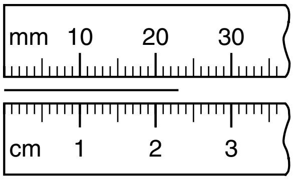
h. Compare: XXXIX ◯ 40

Problem Solving:

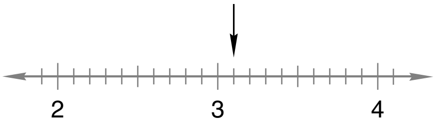
Amber said, "An inch is less than 10% of a foot." Write a short paragraph explaining why you agree or disagree with Amber's statement.

NEW CONCEPT

We have used decimal numbers to name lengths that include a fraction of a centimeter. For instance, the length of this segment can be written as 23 millimeters or 2.3 centimeters:

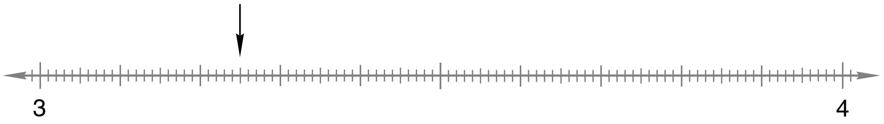


Likewise, on the following number line, the distance between every two whole numbers is divided into ten equal parts. So the arrow is pointing to the number three and one tenth. We can write three and one tenth as a mixed number or as a decimal.



$3\frac{1}{10}$ or 3.1

If the distance between whole numbers on a number line is divided into 100 parts, then points between whole numbers may need to be written with two decimal places. The arrow below is pointing to three and twenty-five hundredths, which can be written as 3.25 or as $3\frac{25}{100}$.



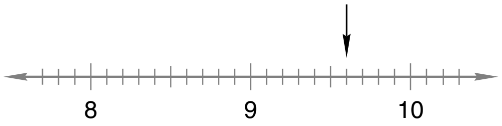
If you inspect a meterstick, you will see that it is divided into 100 centimeters. Each centimeter is $\frac{1}{100}$ of a meter. So a pencil that is 18 cm long is 0.18 m (eighteen hundredths of a meter) long.

Example 1 Santiago is 162 cm tall. What is Santiago's height in meters?

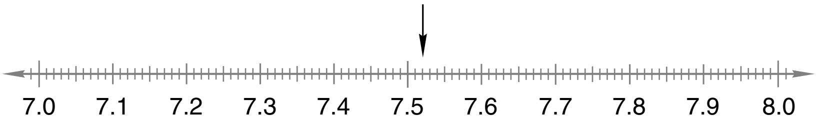
Solution One hundred centimeters equals a meter. So Santiago's height is one meter plus 62 centimeters. Since 62 centimeters is 62 hundredths of a meter, Santiago is **1.62 meters** tall.

Example 2 Write the decimal number to which each arrow points:

(a)



(b)



Solution (a) **9.6**

(b) **7.52**

Example 3 (a) Round 9.6 to the nearest whole number.

(b) Round 7.52 to the nearest tenth.

Solution (a) The decimal number 9.6 is between the whole numbers 9 and 10. Halfway from 9 to 10 is 9.5, and 9.6 is greater than 9.5. So 9.6 rounds to **10.**

(b) Rounding 7.52 to the nearest tenth is like rounding \$7.52 to the nearest ten cents. Just as \$7.52 is between \$7.50 and \$7.60, so 7.52 is between 7.5 and 7.6. It is closer to **7.5,** as we can see on the number line above.

Activity: *Measuring Objects with a Meterstick*

Materials needed:

- meterstick
- pencil and paper

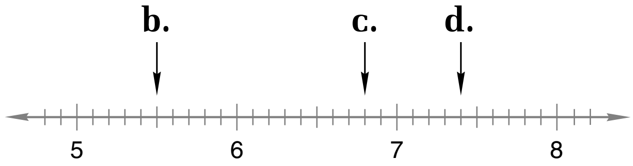
Using a meterstick, measure the heights or widths of various objects in the classroom, such as doors, tables, desks, or books. Measure to the nearest centimeter and record each measurement twice, once in centimeters and once in meters. Here is an example:

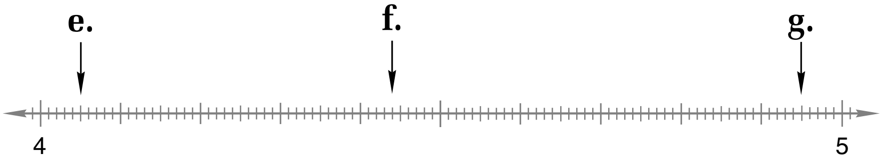
height of door   203 cm   2.03 m

LESSON PRACTICE

Practice set **a.** Julia jumped over a bar that was 167 cm high. How many meters high was the bar?

Write the decimal number to which each arrow points:





h. Round 6.8 to the nearest whole number.

i. Round 4.44 to the nearest whole number.

j. Round 4.44 to the nearest tenth.

MIXED PRACTICE

Problem set **1.** (88) All 110 books must be packed in boxes. Each box will hold 8 books.

(a) How many boxes can be filled?

(b) How many boxes are needed to hold all the books?

2. (94) What number is five more than the product of six and seven?

3. (83) Gabriel gave the man $7 to pay for the tape. He got back a quarter and two dimes. Tax was 42¢. What was the price of the tape without tax?

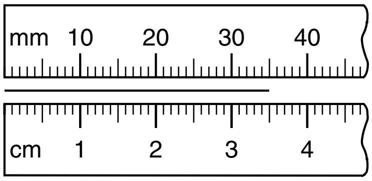
4. (95) Four fifths of the 600 gymnasts did back handsprings. How many gymnasts did back handsprings? Draw a picture to illustrate the problem.

5. (Inv. 5, 70) What percent of the gymnasts in problem 4 did not do back handsprings?

6. (35) What is the value of 2 hundred-dollar bills, 5 ten-dollar bills, 4 one-dollar bills, 3 dimes, and 1 penny?

7. (69) (a) Find the length of this line segment in millimeters.

(b) Find the length of the segment in centimeters. Write the answer as a decimal number.



8. (Inv. 4) Use words to write 12.67.

9. (54, 102) (a) Round 3834 to the nearest thousand.

(b) Round 38.34 to the nearest whole number.

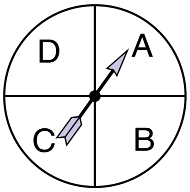
10. (Inv. 2, 21) The diameter of a circle is 1 meter. What is the radius of the circle in centimeters?

11. (34, 51) Find the sum of two hundred eighty-six thousand, five hundred fourteen and one hundred thirty-seven thousand, two.

12. (94) Seven whirligigs cost $56. What is the cost of one whirligig? What would 12 whirligigs cost?

13. (96) There are 36 children in one line and 24 children in the other line. What is the average number of children per line?

14. If the arrow is spun once, what is the probability it will stop in sector C?
(Inv. 10)



15. 7.486 − (6.47 + 0.5)
(45, 50)

16. 40 × 50
(86)

17. 41 × 49
(90)

18. $2^3 \times 5 \times \sqrt{49}$
(Inv. 3, 62)

19. $\begin{array}{r} 32 \\ \times\ 17 \\ \hline \end{array}$
(90)

20. $\begin{array}{r} 38 \\ \times\ 40 \\ \hline \end{array}$
(67)

21. 7 + 4 + 6 + 8 + 5 + 2 + 7 + 3 + K = 47
(2)

22. $8\overline{)3616}$
(76)

23. $4\overline{)2482}$
(80)

24. $7\overline{)3516}$
(80)

25. \$4.38 ÷ 6
(76)

26. 7162 ÷ 9
(76)

27. $\frac{1414}{2}$
(80)

28. Draw and shade circles to show that 2 equals $\frac{8}{4}$.
(89)

29. The basketball player was 211 centimeters tall. Write the height of the basketball player in meters.
(102)

30. How many square yards of carpeting are needed to cover the floor of a classroom that is 15 yards long and 10 yards wide?
(Inv. 3, 85)

LESSON

103

Fractions Equal to 1 • Fractions Equal to $\frac{1}{2}$

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Think of quarters as you add or subtract:

a. 750 + 250 **b.** 450 − 175 **c.** \$6.75 + \$2.50

Review:

d. 50 × 42 **e.** \$1.00 − 62¢ **f.** 463 − 45

Roman numerals:

g. Write 29 in Roman numerals.
h. Compare: 18 ○ XVIII

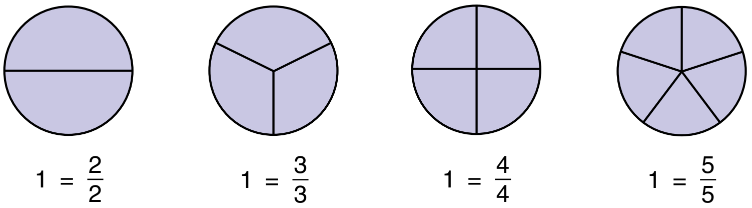
Problem Solving:

Which date occurs only once every four years?

NEW CONCEPTS

Fractions equal to 1

Each circle below is divided into parts. Together, the parts of each circle make up a whole. We see that 2 halves is the same as 1 whole. We also see that 3 thirds, 4 fourths, and 5 fifths are ways to say 1 whole. If the numerator (top number) and the denominator (bottom number) of a fraction are the same, the fraction equals 1.



Example 1 Which of these fractions equals 1?

A. $\frac{1}{6}$ B. $\frac{6}{6}$ C. $\frac{7}{6}$

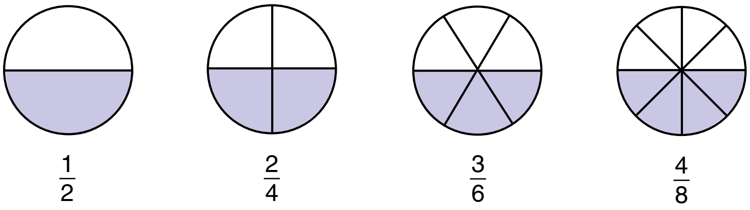
Solution A fraction equals 1 if its numerator and denominator are equal. The fraction equal to 1 is **B.** $\mathbf{\frac{6}{6}}$**.**

Example 2 Write a fraction equal to 1 that has a denominator of 7.

Solution A fraction equals 1 if its numerator and denominator are the same. So if the denominator is 7, the numerator must also be 7. We write $\mathbf{\frac{7}{7}}$**.**

Fractions equal to $\frac{1}{2}$

If the numerator of a fraction is half the denominator, then the fraction equals $\frac{1}{2}$. Notice below that the top number of each fraction illustrated is half of the bottom number of the fraction.



Example 3 Which fraction equals $\frac{1}{2}$?

A. $\frac{3}{7}$ B. $\frac{4}{4}$ C. $\frac{5}{10}$ D. $\frac{5}{9}$

Solution Since 5 is half of 10, the fraction equal to $\frac{1}{2}$ is **C.** $\mathbf{\frac{5}{10}}$**.**

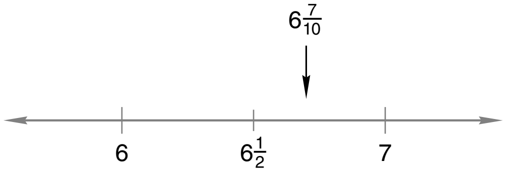
Example 4 Compare: $\frac{3}{8} \bigcirc \frac{1}{2}$

Solution The fraction $\frac{1}{2}$ equals $\frac{4}{8}$. Since $\frac{3}{8}$ is less than $\frac{4}{8}$, we know that $\frac{3}{8}$ is less than $\frac{1}{2}$.

$$\mathbf{\frac{3}{8} < \frac{1}{2}}$$

Example 5 Round $6\frac{7}{10}$ to the nearest whole number.

Solution Halfway between 6 and 7 is $6\frac{1}{2}$. We know that $6\frac{7}{10}$ is greater than $6\frac{1}{2}$ because $\frac{7}{10}$ is greater than $\frac{5}{10}$, which equals $\frac{1}{2}$.



So $6\frac{7}{10}$ rounds to **7.**

LESSON PRACTICE

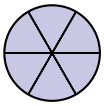
Practice set **a.** Write a fraction equal to 1 and that has a denominator of 6.

b. Which of these fractions equals 1?

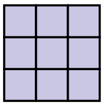
A. $\frac{9}{10}$ B. $\frac{10}{10}$ C. $\frac{11}{10}$

What fraction name for 1 is shown by each picture?

c.



d.



e. Write a fraction equal to $\frac{1}{2}$ with a denominator of 12.

f. Compare: $\frac{9}{20}$ ○ $\frac{1}{2}$

g. Round $5\frac{3}{8}$ to the nearest whole number.

MIXED PRACTICE

Problem set **1.** *(10, 68)* Find an even number between 79 and 89 that can be divided by 6 without a remainder.

2. *(19, 49)* How many minutes are in 3 hours?

3. *(94)* Bill has $8. Mary has $2 less than Bill. How much money do they have altogether?

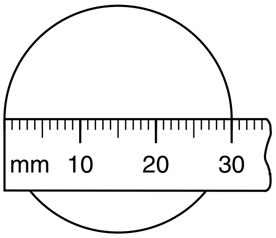
4. *(84)* Write each fraction or mixed number as a decimal number:

(a) $\frac{3}{10}$ (b) $4\frac{99}{100}$ (c) $12\frac{1}{1000}$

5. *(95)* Five eighths of the 40 students earned A's on the test. How many students earned A's on the test? Draw a picture to illustrate the problem.

6. *(21, 69)* (a) What is the diameter of this circle in centimeters?

(b) What is the radius of this circle in centimeters?



7. *(21, Inv. 5)* The radius of a circle is what percent of the diameter?

8. *(93)* Estimate the product of 49 and 68. Then find the actual product.

9. *(94)* Jimbo found that 20 equal-sized blocks would fill 4 containers. How many blocks could he put in 1 container? How many blocks could he put in 20 containers?

10. *(96)* In Row 1 there were 6 students, in Row 2 there were 4 students, in Row 3 there were 6 students, and in Row 4 there were 4 students. What was the average number of students per row?

11. *(94)* Gretchen paid $20 for five identical bottles of fruit juice. She received $6 in change. What was the price of one bottle of juice?

12. *(97)* Find the median, mode, and range of Irv's test scores. (Since there is an even number of scores, the median is the average of the two middle scores.)

100, 80, 90, 85, 100, 90, 100, 100

13. *(58)* $\begin{array}{r} \$3.85 \\ \times \quad 7 \\ \hline \end{array}$

14. *(90)* $\begin{array}{r} 48 \\ \times\ 29 \\ \hline \end{array}$

15. *(17)* $\begin{array}{r} 16 \\ 15 \\ 23 \\ 8 \\ 217 \\ 20 \\ 6 \\ +\ 317 \\ \hline \end{array}$

16. *(2)* $\begin{array}{r} 5 \\ 4 \\ 3 \\ 7 \\ 2 \\ 5 \\ 8 \\ 1 \\ 4 \\ +\ N \\ \hline 45 \end{array}$

17. *(62, 86)* 60^2

18. *(90)* 59×61

19. *(71)* $\dfrac{400}{5}$

20. *(80)* $6\overline{)5824}$

21. *(76)* $9\overline{)\$37.53}$

22. *(80)* $7\overline{)4205}$

23. *(43, 45)* $7.500 - (3.250 - 0.125)$

24. Draw and shade circles to show that $3\frac{3}{4}$ equals $\frac{15}{4}$.
(89)

25. If the perimeter of a square is 20 inches, what is the length of each side of the square? What is the area of the square?
(Inv. 2, Inv. 3)

26. Write a fraction equal to 1 and with a denominator of 8.
(103)

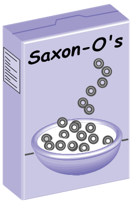
27. If two dice are rolled together, which outcome is more likely—dots totaling 12 or dots totaling 7? Explain your answer.
(Inv. 10)

28. Songhi measured the paper in her notebook and found that it was 28 cm long. Write the length of her paper in meters.
(102)

29. Round $12\frac{5}{12}$ to the nearest whole number.
(103)

30. (a) What is the geometric name for the shape of a cereal box?
(98)

(b) How many edges does this box have?



LESSON

104

Changing Improper Fractions to Whole or Mixed Numbers

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Think of one cent more or less than quarters:

a. 425 + 374 **b.** 550 − 324 **c.** \$4.49 + \$2.26

Review:

d. 15 × 40 **e.** \$4.75 + \$2.95 **f.** 83 − 35

Roman numerals:

g. Write 34 in Roman numerals.

h. Compare: XXXIV ◯ 36

Problem Solving:

Todd rode his bicycle down a 50-foot driveway and counted eight full turns of the front wheel. How many times will the front wheel turn if he rides 100 yards?

NEW CONCEPT

If the numerator of a fraction is equal to or greater than the denominator, the fraction is an **improper fraction.** All of these fractions are improper fractions:

$$\frac{12}{4} \qquad \frac{10}{3} \qquad \frac{9}{4} \qquad \frac{3}{2} \qquad \frac{5}{5}$$

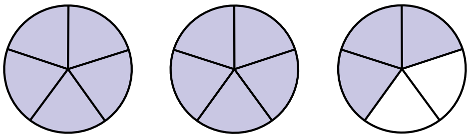
To write an improper fraction as a whole or mixed number, we divide to find out how many wholes the improper fraction contains. If there is no remainder, we write the improper fraction as a whole number. If there is a remainder, the remainder becomes the numerator in a mixed number.

Example 1 Write $\frac{13}{5}$ as a mixed number. Draw a picture to show that the improper fraction and mixed number are equal.

Solution To find the number of wholes, we divide.

$$\begin{array}{rl}
2 & \longleftarrow \text{wholes} \\
5\overline{)13} & \\
\underline{10} & \\
3 & \longleftarrow \text{remainder of 3}
\end{array}$$

This division tells us that $\frac{13}{5}$ equals two wholes with three fifths left over. We write this as $\mathbf{2\frac{3}{5}}$. We can see that $\frac{13}{5}$ equals $2\frac{3}{5}$ if we draw a picture.



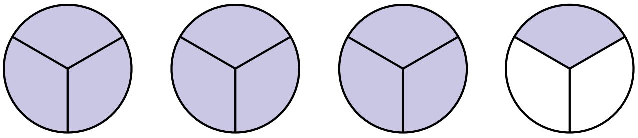
$$\frac{13}{5} = \frac{5}{5} + \frac{5}{5} + \frac{3}{5} = 2\frac{3}{5}$$

Example 2 Write $\frac{10}{3}$ as a mixed number. Then draw a picture to show that the improper fraction and mixed number are equal.

Solution First we divide.

$$\begin{array}{r}
3 \\
3\overline{)10} \\
\underline{9} \\
1
\end{array}$$

From the division we see that there are three wholes. One third is left over. We write $\mathbf{3\frac{1}{3}}$. Then we draw a picture to show that $\frac{10}{3}$ equals $3\frac{1}{3}$.



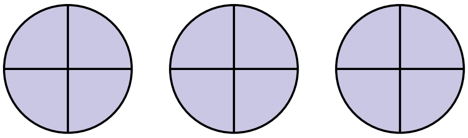
$$\frac{10}{3} = 3\frac{1}{3}$$

Example 3 Write $\frac{12}{4}$ as a whole number. Then draw a picture to show that the improper fraction and whole number are equal.

Solution First we divide.

$$\begin{array}{r}
3 \\
4\overline{)12} \\
\underline{12} \\
0
\end{array}$$

We have three wholes and no remainder. Our picture looks like this:



$$\frac{12}{4} = \mathbf{3}$$

LESSON PRACTICE

Practice set* Change each improper fraction to a whole number or to a mixed number. Then draw a picture to show that the improper fraction is equal to the number you wrote.

a. $\frac{7}{2}$ **b.** $\frac{12}{3}$ **c.** $\frac{8}{3}$ **d.** $\frac{15}{5}$

MIXED PRACTICE

Problem set

1. *(Inv. 2)* If the perimeter of a square is 280 feet, how long is each side of the square?

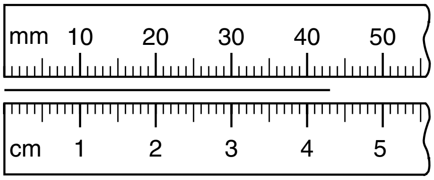
2. *(54, 88)* There are 365 days in a common year. How many full weeks are there in 365 days?

3. *(88, 94)* Nia passed out cookies to her 6 friends. Each of her friends received 3 cookies. There were 2 cookies left for Nia. How many cookies did Nia have when she began?

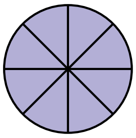
4. *(95)* Three fifths of the 60 kangaroos were less than 2 feet tall. How many kangaroos were less than 2 feet tall? Draw a picture to illustrate the problem.

5. *(69)* (a) Find the length of this line segment in millimeters.

(b) Find the length of the line segment in centimeters. Write the answer as a decimal number.



6. *(103)* What fraction name for 1 is shown by this circle?



7. *(20, 102)* (a) Round $7.86 to the nearest dollar.

(b) Round 7.86 to the nearest whole number.

8. *(93)* Estimate the product of 87 and 71. Then find the actual product.

9. (104) Change the improper fraction $\frac{5}{4}$ to a mixed number. Draw a picture to show that the improper fraction and the mixed number are equal.

10. (Inv. 10) The chance of winning the game was 10%. What was the chance of not winning?

11. (49, 67) The cook used 30 pounds of flour each day to make pancakes and bread. How many pounds of flour did the cook use in 73 days?

12. (96) The cook found that 132 pounds of potatoes would last 6 days. On average, how many pounds of potatoes were used each day?

13. (43, 51) \$6.52 + \$12 + \$1.74 + 26¢

14. (50) $3.65 + 2.7 + 0.454 + 2.0$

15. (43, 45) \$80 − (\$63.72 + \$2)

16. (52) $37{,}614 - 29{,}148$

17. (61) $9W = 9 \cdot 26$

18. (62) 3^4

19. (85) 24×1000

20. (48) 79¢ × 6

21. (86) $\begin{array}{r} 50 \\ \times\ 50 \\ \hline \end{array}$

22. (90) $\begin{array}{r} 51 \\ \times\ 49 \\ \hline \end{array}$

23. (90) $\begin{array}{r} 47 \\ \times\ 63 \\ \hline \end{array}$

24. (76) $4\overline{)2304}$

25. (76) $5\overline{)4815}$

26. (80) $6\overline{)3629}$

27. (Inv. 3, 80) $1435 \div \sqrt{49}$

28. (102) Zack's shoe is 25 cm long. His shoe is how many meters long?

29. (103) Round $16\frac{5}{8}$ to the nearest whole number.

30. (103) The sum of $3\frac{2}{3}$ and $4\frac{1}{2}$ is between which two numbers?

A. 3 and 5 B. 6 and 7 C. 7 and 9 D. 9 and 10

LESSON

105 Dividing by 10

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Think of one cent more or less than quarters:

a. 126 + 375 **b.** 651 − 225 **c.** \$6.51 + \$2.75

Review:

d. 50 × 60 **e.** \$20.00 − \$16.25 **f.** 84 − 47

Roman numerals:

g. Write 39 in Roman numerals.
h. Compare: XIX ○ 20

Patterns:

This sequence has an alternating pattern. Copy this sequence on your paper, and continue the sequence to 18.

0, 5, 3, 8, 6, 11, 9, 14, …

NEW CONCEPT

We have used a four-step procedure to divide by one-digit numbers. We will use the same four-step procedure to divide by two-digit numbers. In this lesson we will learn how to divide by 10.

Example Divide: $10\overline{)432}$

Solution Ten will not divide into 4 but will divide into 43 four times. In Step 1 we are careful to write the 4 above the 3 in 432.

Step 1: We find $10\overline{)43}$ and write "4."

Step 2: We multiply 4 by 10 and write "40."

Step 3: We subtract 40 from 43 and write "3."

Step 4: We bring down the 2, making 32.

$$\begin{array}{r} 4 \\ 10\overline{)432} \\ \underline{40} \\ 32 \end{array}$$

REPEAT:

Step 1: We divide 32 by 10 and write “3.”

Step 2: We multiply 3 by 10 and write “30.”

Step 3: We subtract 30 from 32 and write “2.”

Step 4: There is no number to bring down.

$$\begin{array}{r} \mathbf{43}\ \mathbf{R\ 2} \\ 10\overline{)432}\phantom{\ \mathrm{R\ 2}} \\ \underline{40}\phantom{\ \mathrm{R\ 2}} \\ 32\phantom{\ \mathrm{R\ 2}} \\ \underline{30}\phantom{\ \mathrm{R\ 2}} \\ 2\phantom{\ \mathrm{R\ 2}} \end{array}$$

The answer is 43 with a remainder of 2.

Notice that the remainder is the last digit of the dividend. When dividing by 10, there will be no remainder if the last digit of the whole-number dividend is zero. Otherwise, the remainder will be the last digit of the dividend.

LESSON PRACTICE

Practice set Divide:

a. $10\overline{)73}$ **b.** $10\overline{)342}$ **c.** $10\overline{)243}$

d. $10\overline{)720}$ **e.** $10\overline{)561}$ **f.** $10\overline{)380}$

g. Which of these numbers can be divided by 10 without a remainder?

A. 365 B. 472 C. 560 D. 307

MIXED PRACTICE

Problem set

1. *(88)* How many 6¢ mints can be bought with 2 quarters?

2. *(Inv. 5)* Two quarters are what percent of a dollar?

3. *(94)* Jason has $8. David has $2 more than Jason. How much money do they have altogether?

4. *(95)* Three eighths of the 32 elves packed toys on the sleigh. How many elves packed toys on the sleigh? Draw a picture to illustrate the problem.

5. *(Inv. 10)* If one card is drawn from a standard deck of playing cards, is it more likely that the card will be a "number card" or a "face card"? Explain your answer.

6. *(103)* Write a fraction equal to one and that has a denominator of 10.

7. *(84)* Write 86.743 with words.

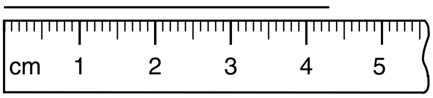
8. *(59)* Estimate the difference of 496 subtracted from 604.

9. *(104)* Change each improper fraction to a whole number or a mixed number:

(a) $\frac{9}{5}$ (b) $\frac{9}{3}$ (c) $\frac{9}{2}$

10. *(58, 94, 105)* Soon after James Marshall discovered gold at John Sutter's mill in California on January 24, 1848, the "gold rush" began. If 2400 people came in 10 days, about how many came each day? About how many people came in 1 week?

11. *(69)* Find the length of this segment to the nearest tenth of a centimeter. Write the length as a decimal number.



12. *(94)* One miner bought 6 bags of flour at \$4.20 per bag and 8 pounds of salt at 12¢ per pound. How much money did the miner spend?

13. *(91, 102)* (a) Which digit in 86.743 is in the tenths place?

(b) Is 86.74 closer to 86.7 or 86.8?

14. *(92)* Draw a trapezoid.

15. *(45, 50)* $4.867 - (2.8 + 0.56)$

16. *(62, 86)* 30^2

17. *(90)* 54×29

18. *(105)* $10\overline{)230}$

19. *(80)* $7\overline{)2383}$

20. (105) $372 \div 10$

21. (76) $\$5.76 \div 8$

22. (17)
$$\begin{array}{r} 12 \\ 26 \\ 13 \\ 35 \\ 110 \\ 8 \\ +\ 15 \\ \hline \end{array}$$

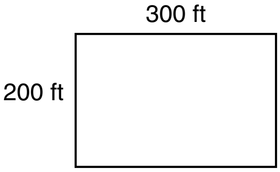
23. (51)
$$\begin{array}{r} 351{,}426 \\ +\ 449{,}576 \\ \hline \end{array}$$

24. (52)
$$\begin{array}{r} \$50.00 \\ -\ \$49.49 \\ \hline \end{array}$$

25. (58)
$$\begin{array}{r} \$12.49 \\ \times\ \ \ \ \ 8 \\ \hline \end{array}$$

26. (90)
$$\begin{array}{r} 73 \\ \times\ 62 \\ \hline \end{array}$$

27. (Inv. 2) A field is 300 feet long and 200 feet wide. How many feet of fencing would be needed to go around the field?



Use this chart to answer problems 28–30:

Mileage Chart

	Atlanta	Boston	Chicago	Kansas City	Los Angeles	New York City	Wash., D.C.
Chicago	674	963		499	2054	802	671
Dallas	795	1748	917	489	1387	1552	1319
Denver	1398	1949	996	600	1059	1771	1616
Los Angeles	2182	2979	2054	1589		2786	2631
New York City	841	206	802	1198	2786		233
St. Louis	541	1141	289	257	1845	948	793

28. (101) The distance from Los Angeles to Boston is how much greater than the distance from Los Angeles to New York City?

29. (101) Rebecca is planning a trip from Chicago to Dallas to Los Angeles to Chicago. How many miles will her trip be?

30. (101) There are three empty boxes in the chart. What number would go in these boxes?

LESSON

106 Evaluating Expressions

WARM-UP

Facts Practice: 100 Addition Facts (Test A)

Mental Math:

Find each fraction of 24:

a. $\frac{1}{2}$ of 24 **b.** $\frac{1}{3}$ of 24 **c.** $\frac{1}{4}$ of 24

Review:

d. 4×18 **e.** \$3.75 + \$4.51 **f.** $54 - 38$

Roman numerals:[†]

g. Write CX in our number system.

h. Write LXX in our number system.

Problem Solving:

Two cups make a pint. Two pints make a quart. Two quarts make a half gallon, and two half gallons make a gallon. A pint of water weighs about one pound. Find the approximate weight of a cup, a quart, a half gallon, and a gallon of water.

NEW CONCEPT

What is the value of the following expression?

$$N + 7$$

The value of the expression depends on the value of N. If we know a value for N, then we can **evaluate** the expression by adding 7 to the value of N.

Example If R is 5, then what is the value of each of these expressions?

(a) $R + 3$ (b) $R - 3$ (c) $3R$

Solution We are told that the value of R is 5. To find the value of each expression, we substitute 5 in place of R and perform the calculation.

(a) $R + 3$
$5 + 3 = \mathbf{8}$

(b) $R - 3$
$5 - 3 = \mathbf{2}$

(c) $3R$
$3 \times 5 = \mathbf{15}$

[†] In Lessons 106–120, the Mental Math section "Roman numerals" reviews concepts from Appendix Topic C. Skip these Warm-up problems if you have not covered Appendix Topic C.

LESSON PRACTICE

Practice set

a. If M equals 12, then what is the value of $M - 10$?

b. Evaluate $A + B$ when $A = 9$ and $B = 15$.

c. What is the value of xy when x is 6 and y is 7?

d. What is the value of W^2 when W is 5?

e. If $A = LW$, then what is A when L is 8 and W is 4?

f. Evaluate $\frac{m}{n}$, using $m = 12$ and $n = 3$.

g. Find the value of $\sqrt{t}$ when t is 16.

MIXED PRACTICE

Problem set Use this information to answer problems 1–3:

Samantha has 6 cats. Each cat eats $\frac{1}{2}$ can of food each day. Cat food costs 47¢ per can.

1. How many cans of cat food are eaten each day?
(94)

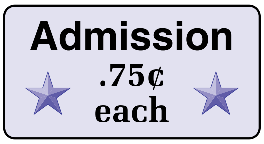
2. How much does Samantha spend on cat food per day?
(94)

3. How much does Samantha spend on cat food in a week?
(94)

4. If the perimeter of a square classroom is 120 feet, then how long is each side of the classroom? What is the area of the classroom?
(Inv. 2, Inv. 3, 86)

5. Math was the favorite class of five sevenths of the 28 students. Math was the favorite class of how many students? Draw a picture to illustrate the problem.
(95)

6. Something is wrong with this sign. Draw two different signs to show how to correct the error.
(99)



7. If the radius of a circle is $1\frac{1}{2}$ inches, then what is the diameter of the circle?
(21, 39)

8. Use words to write 523.43.
(Inv. 4)

9. Estimate the product of 61 and 397.
(93)

10. (104) Change each improper fraction to a whole number or a mixed number:

(a) $\frac{10}{10}$ (b) $\frac{10}{5}$ (c) $\frac{10}{3}$

11. (94) Jewell went to the fair with \$20. She paid \$6.85 for a doll and \$4.50 for lunch. Then she bought a soft drink for 75¢. How much money did she have left?

12. (83) Mary Sue bought 2 dolls priced at \$7.40 each. The tax was 98¢. She paid the clerk with a \$20 bill. How much change should she get back?

13. (60) The big truck that transported the Ferris wheel could go only 140 miles in 5 hours. What was the truck's average speed in miles per hour?

14. (103) Compare: $\frac{49}{100} \bigcirc \frac{1}{2}$

15. (20, 102) (a) Round \$12.25 to the nearest dollar.

(b) Round 12.25 to the nearest whole number.

16. (91, 102) (a) Which digit in 36.47 is in the tenths place?

(b) Is 36.47 closer to 36.4 or to 36.5?

17. (50)
$$\begin{array}{r} 73.48 \\ 5.63 \\ +\ 17.9 \\ \hline \end{array}$$

18. (52)
$$\begin{array}{r} \$65.00 \\ -\ \$29.87 \\ \hline \end{array}$$

19. (52)
$$\begin{array}{r} 24{,}375 \\ -\ 8{,}416 \\ \hline \end{array}$$

20. (58)
$$\begin{array}{r} \$3.68 \\ \times\ \ 9 \\ \hline \end{array}$$

21. (90) 89×91

22. (76) $3\overline{)763}$

23. (105) $10\overline{)430}$

24. (76) $6\overline{)\$57.24}$

25. (65) $765 \div 9$

26. (105) $563 \div 10$

27. (106) Evaluate n^2 for $n = 90$.

28. (106) Find the value of $\frac{m}{\sqrt{m}}$ when m is 36.

29. (103) The sum of $6\frac{3}{4}$ and $5\frac{3}{5}$ is between which two numbers?

A. 5 and 7 B. 30 and 40 C. 0 and 2 D. 11 and 13

30. (49, 77) The African bush elephant is the heaviest land mammal on Earth. Even though it eats only twigs, leaves, fruit, and grass, an African bush elephant can weigh 7 tons. Seven tons is how many pounds?

LESSON

107

Adding and Subtracting Fractions with Common Denominators

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Find each fraction of 30:

a. $\frac{1}{2}$ of 30 **b.** $\frac{1}{3}$ of 30 **c.** $\frac{1}{5}$ of 30

Review:

d. 50×28 **e.** $5.00 − $2.75 **f.** $47 + 29$

Roman numerals:

g. Write XC in our number system.

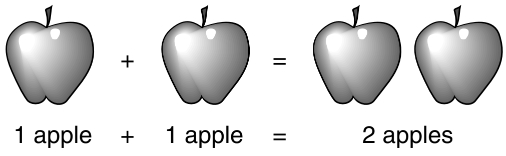
h. Write LXV in our number system.

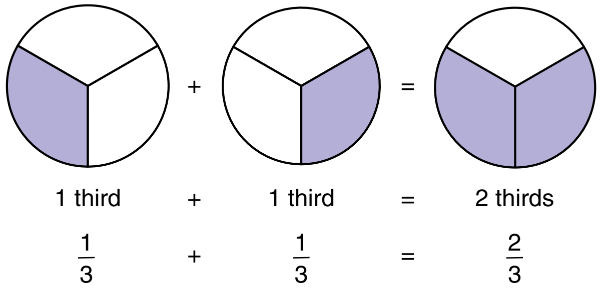
Problem Solving:

In parts of the country where "daylight saving time" is observed, we follow the rule "spring forward; fall back." This rule means we turn the clock forward one hour in the spring and back one hour in the fall. Officially, clocks are reset at 2 a.m. on a Sunday. How many hours long are each of those Sundays when the clocks are reset?

NEW CONCEPT

To add fractions, it helps to think of the denominators as objects, like apples. Just as 1 apple plus 1 apple equals 2 apples, 1 third plus 1 third equals 2 thirds.





$$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$$

When we add fractions, we add the numerators (top numbers). We do not add the denominators (bottom numbers).

Example 1 Add: $\frac{3}{5} + \frac{1}{5}$

Solution Three fifths plus one fifth is four fifths. *We add only the top numbers.*

$$\frac{3}{5} + \frac{1}{5} = \mathbf{\frac{4}{5}}$$

Likewise, when we subtract fractions, we subtract only the numerators. The denominator does not change. For example, five sevenths minus two sevenths is three sevenths.

$$\frac{5}{7} - \frac{2}{7} = \frac{3}{7}$$

Example 2 Subtract: $\frac{3}{5} - \frac{1}{5}$

Solution *We subtract only the numerators.* Three fifths minus one fifth is two fifths.

$$\frac{3}{5} - \frac{1}{5} = \mathbf{\frac{2}{5}}$$

Recall that a mixed number is a whole number plus a fraction, such as $2\frac{3}{5}$. To add mixed numbers, we first add the fraction parts. Then we add the whole-number parts.

Example 3 Add: $2\frac{3}{5} + 3\frac{1}{5}$

Solution It is helpful to write the numbers one above the other. First we add the fractions and get $\frac{4}{5}$. Then we add the whole numbers and get 5. The sum of the mixed numbers is $5\frac{4}{5}$.

$$\begin{array}{r} 2\frac{3}{5} \\ +\ 3\frac{1}{5} \\ \hline \mathbf{5\frac{4}{5}} \end{array}$$

Example 4 Subtract: $5\frac{2}{3} - 1\frac{1}{3}$

Solution We subtract the second number from the first number. To do this, we write the first number above the second number. We subtract the fractions and get $\frac{1}{3}$. Then we subtract the whole numbers and get 4. The difference is $4\frac{1}{3}$.

$$\begin{array}{r} 5\frac{2}{3} \\ -\ 1\frac{1}{3} \\ \hline \mathbf{4\frac{1}{3}} \end{array}$$

Example 5 In the race Martin rode his bike $7\frac{1}{2}$ miles and ran $2\frac{1}{2}$ miles. Altogether, how far did Martin ride his bike and run?

Solution This is a story about combining. We add $7\frac{1}{2}$ miles and $2\frac{1}{2}$ miles. The two half miles combine to make a whole mile. The total distance is **10 miles.**

$$\begin{array}{r} 7\frac{1}{2} \\ +\ 2\frac{1}{2} \\ \hline 9\frac{2}{2} \end{array} = 10$$

LESSON PRACTICE

Practice set* Find each sum or difference:

a. $\frac{1}{3} + \frac{1}{3}$ **b.** $\frac{1}{4} + \frac{2}{4}$ **c.** $\frac{3}{10} + \frac{4}{10}$

d. $\frac{2}{3} - \frac{1}{3}$ **e.** $\frac{3}{4} - \frac{2}{4}$ **f.** $\frac{9}{10} - \frac{6}{10}$

g. $2\frac{1}{4} + 4\frac{2}{4}$ **h.** $5\frac{3}{8} + 1\frac{2}{8}$ **i.** $8 + 1\frac{2}{5}$

j. $4\frac{3}{5} - 1\frac{1}{5}$ **k.** $9\frac{3}{4} - 4\frac{2}{4}$ **l.** $12\frac{8}{9} - 3\frac{3}{9}$

m. How much is three eighths plus four eighths?

n. The troop hiked to the end of the trail and back. If the trail was $3\frac{1}{2}$ miles long, how far did the troop hike?

MIXED PRACTICE

Problem set

1. *(83)* Wendy bought 5 tickets for $2.75 each. She paid for them with a $20 bill. How much money should she have gotten back?

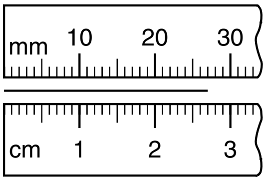
2. *(88)* If fifty cents is divided equally among 3 friends, there will be some cents left. How many cents will be left?

3. *(30)* What is the difference when four hundred nine is subtracted from nine hundred four?

4. *(95)* Two ninths of the 45 stamps were from Brazil. How many of the stamps were from Brazil? Draw a picture to illustrate the problem.

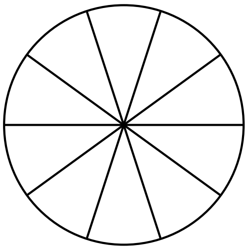
5. *(69)* (a) Find the length of this line segment in millimeters.

(b) Find the length of the segment in centimeters.



6. *(103)* The pizza was cut into 10 equal slices. The entire sliced pizza shows what fraction name for 1?

7. *(Inv. 5)* One slice of the pizza in problem 6 is what percent of the whole pizza?



8. *(Inv. 10)* If a number cube is tossed once, which of these is the most likely outcome?

A. 1
B. 3
C. a number greater than 1
D. a number less than 3

9. *(54)* Round 5167 to the nearest thousand.

10. *(104)* Change the improper fraction $\frac{9}{4}$ to a mixed number.

11. *(103)* Which of these fractions is not equal to 1?

A. $\frac{12}{12}$
B. $\frac{11}{11}$
C. $\frac{11}{10}$
D. $\frac{10}{10}$

12. *(72)* In the summer of 1926 there were only 17 stores in the town. Today there are 8 times as many stores in the town. How many stores are in the town today?

13. *(96)* The wagon train took 9 days to make the 243-mile journey. What was the average number of miles traveled per day?

14. *(107)* On Saturday Jason watched television for $1\frac{1}{2}$ hours and played board games for $2\frac{1}{2}$ hours. Altogether, how much time did Jason spend watching television and playing board games?

15. *(103)* Round $8\frac{21}{100}$ to the nearest whole number.

16. *(50)*
$$\begin{array}{r} 36.31 \\ -\ \ 7.4 \\ \hline \end{array}$$

17. *(107)* $\frac{5}{8} + \frac{2}{8}$

18. *(2)*
$$\begin{array}{r} 6 \\ 5 \\ 4 \\ 3 \\ +\ N \\ \hline 25 \end{array}$$

19. *(107)* $\frac{9}{10} - \frac{2}{10}$

20. *(107)* $3\frac{2}{5} + 1\frac{1}{5}$

21. *(90)* 27×32

22. *(90)* 62×15

23. *(Inv. 3, 62)* $7^2 \times \sqrt{49}$

24. *(105)* $10\overline{)460}$

25. *(76, 80)* $9\overline{)\$27.36}$

26. *(76)* $6\overline{)2316}$

27. *(80)* $1543 \div 7$

28. *(105)* $532 \div 10$

29. *(65)* $\frac{256}{8}$

30. *(Inv. 3, 86)* How many square feet of shingles are needed to cover a roof that is 40 feet wide and 60 feet long?

LESSON

108 Formulas • Distributive Property

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Find each fraction of 36:

a. $\frac{1}{2}$ of 36 **b.** $\frac{1}{3}$ of 36 **c.** $\frac{1}{4}$ of 36

Review:

d. 36 × 100 **e.** \$8.50 + \$3.75 **f.** 83 − 68

Roman numerals:

g. Write CL in our number system.

h. Write LXXVI in our number system.

Patterns:

In this sequence, each term is the sum of the two preceding terms. Copy this sequence and find the next four terms.

1, 1, 2, 3, 5, 8, ___, ___, ___, ___, ...

NEW CONCEPTS

Formulas

Recall that we find the area of a rectangle by multiplying its length by its width.

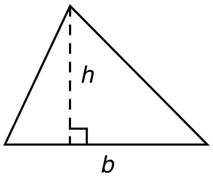
Area = length × width

This expression is a **formula** for finding the area of any rectangle. Usually formulas are written so that a letter represents each measure. In the following formula, the letter A stands for the area of a rectangle, and the letters L and W stand for the length and width of the rectangle.

$$A = LW$$

To find the area of a triangle, we may use this formula:

$$A = \frac{bh}{2}$$



In this formula b means the length of the base, and h means the height.

Below we list several common formulas. In these formulas P stands for perimeter, and s represents the side length of a square.

Some Common Formulas

Area of a rectangle	$A = LW$
Area of a triangle	$A = \frac{bh}{2}$
Perimeter of a rectangle	$P = 2(L + W)$ $P = 2L + 2W$
Area of a square	$A = s^2$
Perimeter of a square	$P = 4s$

Example 1 Use a formula to find the area of a triangle with a base 6 inches long and a height of 4 inches.

Solution According to the formula for the area of a triangle, we multiply the base by the height and then divide by 2. We substitute 6 inches for the base (b) and 4 inches for the height (h).

$$A = \frac{6 \text{ in.} \times 4 \text{ in.}}{2}$$

Multiplying 6 inches by 4 inches, we get 24 square inches.

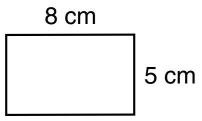
$$A = \frac{24 \text{ sq. in.}}{2}$$

Then, dividing 24 by 2, we find that the area of the triangle is **12 square inches.**

Distributive property There are two formulas for the perimeter of a rectangle. One of the formulas is

$$P = 2(L + W)$$

This formula tells us to add the length and width of a rectangle and then multiply by 2. Applying this formula to the rectangle below, we add 8 cm to 5 cm and get 13 cm. Then we double 13 cm and get 26 cm.



The other formula for the perimeter of a rectangle is

$$P = 2L + 2W$$

This formula tells us to double the length, double the width, and then add the results. Applying this formula to the same rectangle, we double 8 cm and get 16 cm. Then we double 5 cm and get 10 cm. Then we add 16 cm to 10 cm and get 26 cm.

We see that the result of our calculations is the same using either formula for the perimeter of a rectangle. The equality of these two formulas illustrates an important property of mathematics called the **distributive property of multiplication.**

$$2(L + W) = 2L + 2W$$

In the expression $2(L + W)$, both L and W are multiplied by 2. That is, the multiplication by 2 is distributed over both L and W.

$$\overset{\overset{\times}{\curvearrowright}\;\overset{\times}{\curvearrowright}}{2(L + W)}$$

When we multiply 2 by L, the product is $2L$.

When we multiply 2 by W, the product is $2W$.

Example 2 Use the distributive property to multiply:

$$4(20 + 3)$$

Solution This problem is the same as 4×23, except that 23 is written as $20 + 3$. With parentheses we are used to adding 20 and 3 before multiplying. However, the distributive property allows us to multiply first and then add the products.

$$\overset{\overset{\times}{\curvearrowright}\;\overset{\times}{\curvearrowright}}{4(20 + 3)} = \mathbf{80 + 12 = 92}$$

LESSON PRACTICE

Practice set **a.** Use the distributive property to multiply:

$$6(10 + 6)$$

b. Use the formula $P = 2(L + W)$ to find the perimeter of a rectangle that is 15 cm long and 10 cm wide.

c. Use the formula $A = s^2$ to find the area of a square with sides 20 feet long.

MIXED PRACTICE

Problem set

1. (94) Nelson bought 8 pounds of oranges. He gave the storekeeper a \$5 bill and received \$1.96 back in change. What did 1 pound of oranges cost? (*Hint:* First find how much *all* the oranges cost.)

2. (94) Mark had a dozen cookies. He ate two cookies and then gave half of the rest to a friend. How many cookies did Mark have left?

3. (94) What number is six less than the product of five and four?

4. (95) Two thirds of the 12 guitar strings were out of tune. How many of the guitar strings were out of tune? Draw a picture to illustrate the problem.

5. (Inv. 10) What is the probability that a rolled dot cube will stop with exactly two dots on top?

6. (103) Write a fraction equal to 1 and that has a denominator of 5.

7. (35) Use words to write $397\frac{3}{4}$.

8. (59) Estimate the sum of 4178 and 6899 by rounding both numbers to the nearest thousand before adding.

9. (104) Change each improper fraction to a whole number or a mixed number:

(a) $\frac{7}{3}$ (b) $\frac{8}{4}$ (c) $\frac{9}{5}$

10. (96) The hiking club went on hikes of 8 miles, 15 miles, 11 miles, and 18 miles. What was the average length of the club's hikes?

11. (57, 94) For the first 3 hours the hikers hiked at 3 miles per hour. For the next 2 hours they hiked at 4 miles per hour. If the total trip was 25 miles, how far did they still have to go?

12. (40, Inv. 5) What percent of a quart is a pint?

13. (50) $41.6 + 13.17 + 9.2$

14. (50) $26.47 - 8.7$

15. (107) $6\frac{3}{8} + 4\frac{2}{8}$

16. (107) $4\frac{7}{10} - 1\frac{6}{10}$

17. The ranch market sold 54 dozen eggs in the morning. How many eggs is that?
(49, 90)

18. Two fifths of the students rode the bus, and one fifth traveled by car. What fraction of the students either rode the bus or traveled by car?
(107)

19. \$0.48 × 5
(48)

20. 80^2
(62, 86)

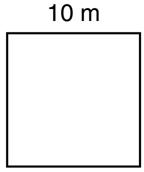
21. $\sqrt{25} \times \sqrt{25}$
(Inv. 3)

22. \$6.36 ÷ 4
(76)

23. $10\overline{)520}$
(105)

24. $\frac{175}{5}$
(65)

25. What is the perimeter and area of this square?
(Inv. 2, Inv. 3)

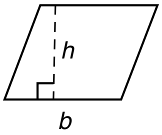


26. We may write 48 as 40 + 8. Use the distributive property to find 5(40 + 8).
(108)

27. The tabletop was 76 cm above the floor. The tabletop was how many meters above the floor?
(102)

28. This is a formula for the area of a parallelogram:
(108)

$$A = bh$$



The letter *b* stands for the length of the base, and *h* stands for the height. Calculate the area of a parallelogram with a base of 5 m and a height of 4 m.

29. There were $3\frac{4}{5}$ pies on the baker's shelf. Then the baker removed $1\frac{3}{5}$ pies. How many pies remained on the shelf?
(107)

30. The mixed numbers $5\frac{3}{8}$ and $7\frac{4}{5}$ do not have common denominators, but we know their sum is between which two numbers?
(103)

A. 14 and 16
B. 12 and 14
C. 10 and 12
D. 5 and 8

LESSON 109 Equivalent Fractions

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Find each fraction of 40:

a. $\frac{1}{2}$ of 40 **b.** $\frac{1}{4}$ of 40 **c.** $\frac{1}{10}$ of 40

Review:

d. 120 × 20 **e.** \$10.00 − \$1.95 **f.** 145 + 65

Roman numerals:

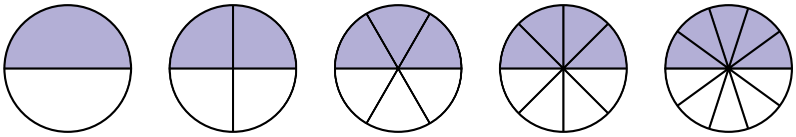
g. Write CLV in our number system.
h. Write XL in our number system.

Problem Solving:

Jimmy was born on a Monday in April 1996. On what day of the week was his first birthday?

NEW CONCEPT

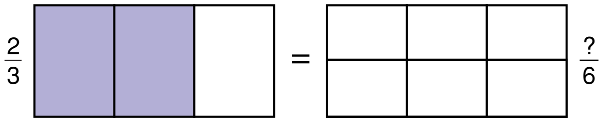
Equal portions of each circle below have been shaded. We see that different fractions are used to name the shaded portions.



$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$$

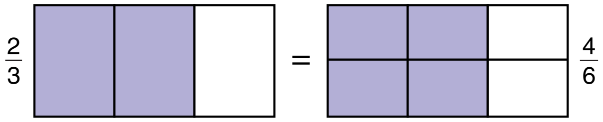
These fractions all name the same amount. Different fractions that name the same amount are called **equivalent fractions.**

Example 1 The rectangle on the left has three equal parts. We see that two parts are shaded. So two thirds of the figure is shaded.



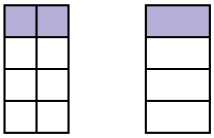
The rectangle on the right has six equal parts. How many parts must be shaded so that the same fraction of this rectangle is shaded?

Solution We see that **four parts** out of six must be shaded. Thus, two thirds is the same as four sixths.



$\frac{2}{3}$ and $\frac{4}{6}$ are equivalent fractions.

Example 2 What equivalent fractions are shown at right?



Solution An equal portion of each rectangle is shaded. The rectangles show the following equivalence:

$$\mathbf{\frac{2}{8} = \frac{1}{4}}$$

We remember that when we multiply a number by 1, the answer equals the number we multiplied.

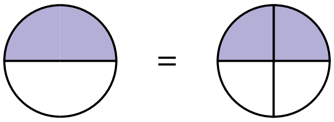
$$2 \times 1 = 2 \qquad 2000 \times 1 = 2000 \qquad \frac{1}{2} \times 1 = \frac{1}{2}$$

We also remember that there are many ways to write “1.”

$$1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6} = \ldots$$

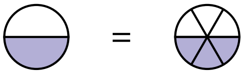
We can use these two facts to find equivalent fractions. If we multiply a fraction by a fraction name for 1, the product is an equivalent fraction.

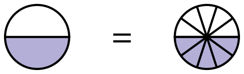
$$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4} \qquad \begin{matrix}(1 \times 2 = 2) \\ (2 \times 2 = 4)\end{matrix}$$



By multiplying $\frac{1}{2}$ by $\frac{2}{2}$, which is a fraction name for 1, we find that $\frac{1}{2}$ equals $\frac{2}{4}$. Notice that we multiply numerator by numerator and denominator by denominator. We can find other fractions equal to $\frac{1}{2}$ by multiplying by other fraction names for 1:

$$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6} \qquad \frac{1}{2} \times \frac{4}{4} = \frac{4}{8} \qquad \frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$$





Example 3 Find four fractions equal to $\frac{1}{3}$ by multiplying $\frac{1}{3}$ by (a) $\frac{2}{2}$, (b) $\frac{3}{3}$, (c) $\frac{4}{4}$, and (d) $\frac{5}{5}$.

Solution (a) $\frac{1}{3} \times \frac{2}{2} = \mathbf{\frac{2}{6}}$ (b) $\frac{1}{3} \times \frac{3}{3} = \mathbf{\frac{3}{9}}$

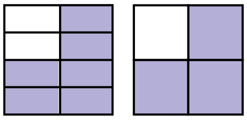
(c) $\frac{1}{3} \times \frac{4}{4} = \mathbf{\frac{4}{12}}$ (d) $\frac{1}{3} \times \frac{5}{5} = \mathbf{\frac{5}{15}}$

Each of our answers is a fraction equal to $\frac{1}{3}$.

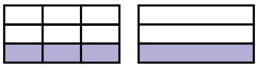
LESSON PRACTICE

Practice set Name the equivalent fractions shown:

a.



b.



Draw pictures to show that the following pairs of fractions are equivalent:

c. $\frac{2}{4} = \frac{1}{2}$ **d.** $\frac{4}{6} = \frac{2}{3}$ **e.** $\frac{2}{8} = \frac{1}{4}$

Find four equivalent fractions for each fraction below. To do this, multiply each fraction by $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, and $\frac{5}{5}$.

f. $\frac{1}{4}$ **g.** $\frac{5}{6}$ **h.** $\frac{2}{5}$ **i.** $\frac{1}{10}$

MIXED PRACTICE

Problem set Use the information below to answer problems 1 and 2.

> *Mario kept a tally of the number of vehicles that drove by his house during 1 hour.*

Number of Vehicles

Cars	𝍸 𝍸 𝍸 𝍸 ||||
Trucks	𝍸 𝍸
Motorcycles	||
Bicycles	𝍸 ||

1. How many more cars than trucks drove by Mario's house?
(Inv. 7)

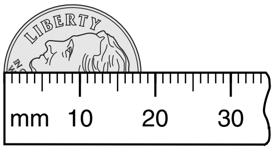
2. Altogether, how many vehicles drove by Mario's house?
(Inv. 7)

3. What number is six less than the sum of seven and eight?
(94)

4. (95) Beth read three tenths of 180 pages in one day. How many pages did she read in one day? Draw a picture to illustrate the problem.

5. (21, 69) (a) What is the diameter of this dime?

(b) What is the radius of the dime?



6. (69) In problem 5 what is the diameter of the dime in centimeters?

7. (103) The candy bar was broken into 4 equal pieces. The broken candy bar illustrates what fraction name for 1?

8. (93) Estimate the product of 78 and 32. Then find the actual product.

9. (104) Change the improper fraction $\frac{5}{2}$ to a mixed number. Draw a picture that shows that the improper fraction and the mixed number are equal.

Use the information below to answer problems 10 and 11:

> *The camel walked 12 miles on the first day. On each of the next four days it walked 2 more miles than it had walked the day before.*

10. (94) Altogether, how far did the camel walk in the five days?

11. (96) What was the average number of miles the camel walked per day?

12. (94) Solve this problem by guessing and then checking your guess: There were red checkers and black checkers on the checkerboard. There were 8 more red checkers than black checkers. Altogether, there were 20 checkers. How many checkers were red, and how many were black?

13. (109) Find three fractions equivalent to $\frac{2}{3}$ by multiplying $\frac{2}{3}$ by $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{10}{10}$.

14. (108) Since 63 equals 60 + 3, we may find 5 × 63 by finding 5(60 + 3). Use the distributive property to find 5(60 + 3).

15. (106) Find ac when a is 18 and c is 22.

16. *(106)* Evaluate b^2 for $b = 20$.

17. *(97)* Find the median, mode, and range of this set of scores:

100, 100, 95, 90, 90, 80, 80, 80, 60

18. *(92)* If a quadrilateral has two pairs of parallel sides, then the quadrilateral is certain to be a

A. rectangle
B. parallelogram
C. trapezoid
D. square

19. *(50)* $24.34 - 8.5$

20. *(91)* $26.4 - 15.18$

21. *(62)* $4 \times 3 \times 2 \times 1$

22. *(67)* 26×30

23. *(76, 80)* $8\overline{)\$16.48}$

24. *(76)* $6\overline{)3744}$

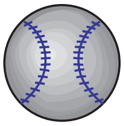
25. *(107)* $\frac{5}{12} + \frac{6}{12}$

26. *(107)* $\frac{8}{12} - \frac{3}{12}$

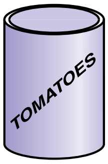
27. *(Inv. 3)* How many square feet of paper are needed to cover a bulletin board that is 3 feet tall and 6 feet wide?

28. *(107)* The bread recipe calls for $7\frac{1}{2}$ cups of flour to make 2 loaves of bread. The baker wants to make 4 loaves of bread. How many cups of flour does the baker need?

29. *(98)* Which of the following is a cylinder?

A.


B.


C.


30. *(11, 74)* The flag of the United States has thirteen stripes. Six of the stripes are white, and the rest of the stripes are red.

(a) How many red stripes are on the American flag?

(b) What fraction of the stripes on the American flag are white?

(c) What fraction of the stripes on the American flag are red?

LESSON

110 Dividing by Multiples of 10

WARM-UP

Facts Practice: 100 Subtraction Facts (Test B)

Mental Math:

Find each fraction of 100:

a. $\frac{1}{2}$ of 100 **b.** $\frac{1}{4}$ of 100 **c.** $\frac{1}{10}$ of 100

Review:

d. 5×46 **e.** $4.37 + $2.98 **f.** $86 - 68$

Roman numerals:

g. Write MCX in our number system.
h. Write XLI in our number system.

Problem Solving:

Using at least one of each coin from a penny through a half-dollar, which nine coins would be needed to make exactly 99¢?

NEW CONCEPT

In this lesson we will begin dividing by multiples of 10. Multiples of 10 are the numbers 10, 20, 30, 40, 50, 60, and so on. To help us divide by a two-digit number, we may think of dividing by the first digit only.

To help us divide this: $20\overline{)72}$

we may think this: $2\overline{)7}$

We use the easier division to estimate the answer to the more difficult division. Since there are three 2's in 7, we estimate that there are also three 20's in 72. Since we are dividing 72 by 20, we write the 3 above the 2 in 72.

$$\begin{array}{r} 3 \\ 20\overline{)72} \end{array}$$

This is correct.
The 3 above the 2 means there are three 20's in 72.

$$\begin{array}{r} 3 \\ 20\overline{)72} \end{array}$$

This is not correct!
Do not write the 3 above the 7. This would mean there are three 20's in 7, which is not true.

It is important to place the digits in the answer correctly!

Now we complete the multiplication and subtraction steps to find the remainder.

$$\begin{array}{rl} 3 \text{ R } 12 & \leftarrow \text{ We write the answer this way.} \\ 20\overline{)72} & \\ \underline{60} & \\ 12 & \end{array}$$

Example Divide: $30\overline{)127}$

Solution To help us divide, we mentally block out the last digit of each number. So we think "$3\overline{)12}$." Since there are four 3's in 12, we estimate that there are also four 30's in 127. We write "4" above the 7 of 127. Next, we multiply 4 by 30 and write "120." Then we subtract 120 from 127 and write "7."

$$\begin{array}{r} \mathbf{4\ R\ 7} \\ 30\overline{)127} \\ \underline{120} \\ 7 \end{array}$$

LESSON PRACTICE

Practice set* Divide:

a. $30\overline{)72}$ **b.** $20\overline{)87}$ **c.** $40\overline{)95}$

d. $20\overline{)127}$ **e.** $40\overline{)127}$ **f.** $30\overline{)217}$

MIXED PRACTICE

Problem set

1. *(88)* Eighty students were divided among three classrooms as equally as possible. Write three numbers to show how many students were in each of the three classrooms.

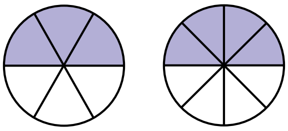
2. *(94)* When the sum of three and four is subtracted from the product of three and four, what is the difference?

3. *(94)* Inma is twice as old as her sister and three years younger than her brother. Inma's sister is six years old. How old is Inma's brother? (*Hint:* First find Inma's age.)

4. *(95)* Four ninths of 513 fans cheered when the touchdown was scored. How many fans cheered? Draw a picture to illustrate the problem.

5. *(99)* Something is wrong with this sign. Draw two different signs that show how to correct the error.

6. *(109)* These circles show fractions equivalent to $\frac{1}{2}$. Name the fractions shown.



7. *(Inv. 10)* The chance of winning the jackpot is 1%. Which is more likely, winning or not winning?

8. *(59)* Estimate the sum of 589 and 398.

9. *(104)* Change the improper fraction $\frac{5}{2}$ to a mixed number.

10. *(60, 96)* Jim ran 7 miles in 42 minutes. What was the average number of minutes it took Jim to run one mile?

11. *(83)* Salamona bought 3 scarves priced at $2.75 each. Tax was 58¢. She paid with a $10 bill. How much change should Salamona have received?

12. *(94)* Two tickets for the play cost $26. At that rate, how much would twenty tickets cost?

13. *(107)* Dawn is $49\frac{1}{2}$ inches tall. Tim is $47\frac{1}{2}$ inches tall. Dawn is how many inches taller than Tim?

14. *(50)* $7.43 + 6.25 + 12.7$

15. *(50)* $14.36 - 7.5$

16. *(86)* 90×8000

17. *(48)* 8 × 73¢

18. *(62)* $7 \times 6 \times 5 \times 0$

19. *(62, 90)* 15^2

20. *(62, 67)* 60×5^2

21. *(Inv. 3)* $\sqrt{49} \times \sqrt{49}$

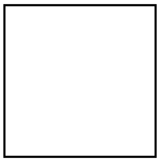
22. *(107)* $5\frac{1}{3} + 3\frac{1}{3}$

23. *(107)* $4\frac{4}{5} - 3\frac{3}{5}$

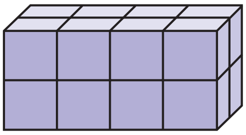
24. *(105)* $\frac{1240}{10}$

25. *(110)* $60\overline{)240}$

26. *(Inv. 2, Inv. 3)* This square has a perimeter of 8 cm. Find the length of each side. Then find the area of the square.



27. *(98)* This rectangular solid is made up of how many small cubes?



Refer to this bus schedule to answer problems 28–30.

Route 346

Terminal	6:43 a.m.	7:25 a.m.	3:45 p.m.
5th & Western	6:50 a.m.	7:32 a.m.	3:50 p.m.
5th & Cypress	6:54 a.m.	7:36 a.m.	3:55 p.m.
Cypress & Hill	7:01 a.m.	7:43 a.m.	4:03 p.m.
Hill & Lincoln	7:08 a.m.	7:50 a.m.	4:12 p.m.
Lincoln & 5th	7:16 a.m.	7:58 a.m.	4:20 p.m.

28. *(101)* Nikki catches the 6:50 morning bus at 5th and Western. When can she expect to arrive at Hill and Lincoln?

29. *(27, 101)* If the bus runs on schedule, how many minutes is her ride?

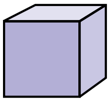
30. *(101)* If Nikki misses the 6:50 a.m. bus, then when can she catch the next Route 346 bus at that corner?

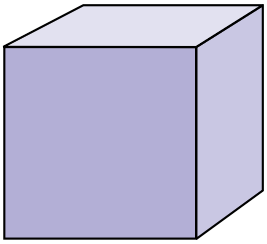
INVESTIGATION 11

Focus on

Volume

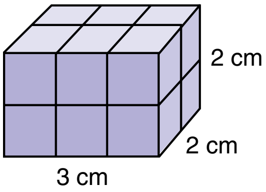
Recall that shapes such as cubes, pyramids, and cones take up space. The amount of space a shape occupies is called its **volume.** We measure volume with **cubic units** like cubic centimeters, cubic inches, cubic feet, and cubic meters.


1 cubic centimeter


1 cubic inch

The model of the cube we constructed in Lesson 100 has a volume of one cubic inch.

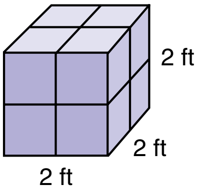
Here is a model of a rectangular solid built with cubes that each have a volume of 1 cubic centimeter. To find the volume of the rectangular solid, we can count the number of cubic centimeters used to build it.



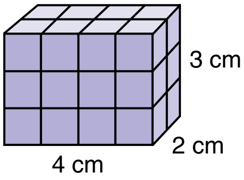
One way to count the small cubes is to count the cubes in one layer and then multiply that number by the number of layers. There are six cubes on the top layer, and there are two layers. So the volume of the rectangular solid is 12 cubic centimeters.

Count cubes to find the volume of each rectangular solid below. Notice the units used in each figure.

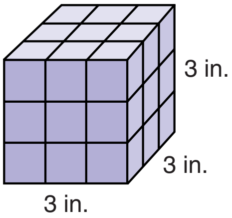
1.



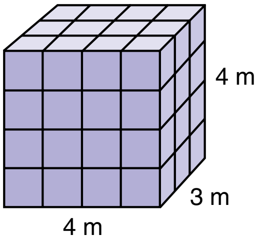
2.



3.

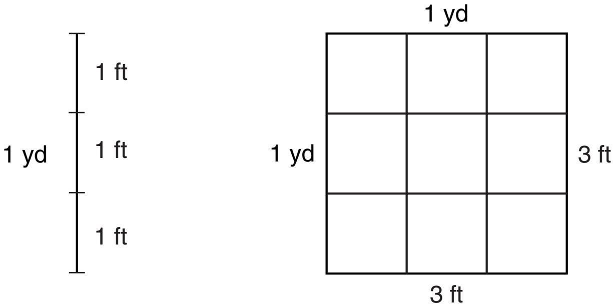


4.

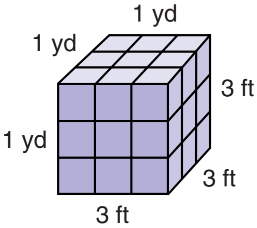


Another way to calculate the volume of a rectangular solid is to multiply the length, the width, and the height (depth) of the solid. The product of the three measures is the volume of the rectangular solid in cubic units. Use this multiplication method to find the volume of each rectangular solid in problems 1–4.

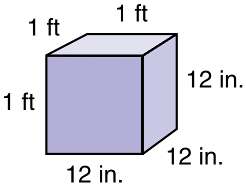
Recall that 3 feet equals 1 yard and that 9 square feet make up 1 square yard. Use this information to help you solve problem 5.



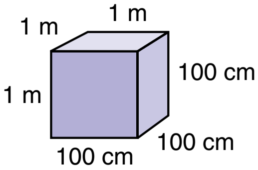
5. The length, width, and height of this cube are each 1 yard. So the volume of the cube is 1 cubic yard. What is the volume of the cube in cubic feet?



6. One foot equals 12 inches. One square foot equals 144 square inches. The volume of this figure is 1 cubic foot. What is its volume in cubic inches?

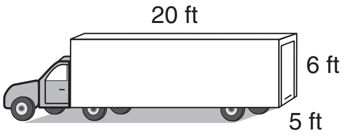


7. One meter equals 100 centimeters. One square meter equals 10,000 square centimeters. A shape with a volume of 1 cubic meter has a volume of how many cubic centimeters?

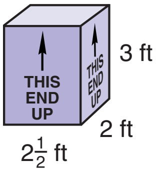


Items that we see on store shelves are usually shipped to stores in trucks. The amount of merchandise a truck can carry depends upon the capacity of the truck's trailer and the weight of the items being shipped.

Suppose the storage area of a delivery truck is shaped like a box that is 5 feet wide, 6 feet high, and 20 feet long on the inside.



8. What is the volume (capacity) of the storage area in cubic feet?



Now suppose the truck is to be loaded with boxes with the dimensions shown at right. The first boxes are stacked against the back wall (which is 5 feet wide and 6 feet high).

9. How many of these boxes can be stacked against the back wall? Draw a diagram.

10. If the same-size boxes continue to be stacked in the truck in the same manner, then how many boxes will fit in the truck? Explain your answer.

Activity: *Calculating Volume*

As a class, calculate the volume of your classroom. First approximate the volume in cubic meters by finding the number of boxes one meter on each edge that could be packed into the room. (Assume all cabinets and other furniture pieces are moved out of the room.)

11. What needs to be measured before the calculation can be performed? What units should be used?

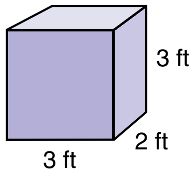
12. What is the volume of your classroom in cubic meters? (Round down the measurements used for the calculation to the nearest meter.)

Perform a second calculation for the volume of the classroom, this time in cubic feet.

13. Record the length, width, and height of the room in feet. (Round down to the nearest foot.)

14. What is the volume of your classroom in cubic feet?

A classroom with 30 desks may seem full. However, many more than 30 desks can fit into most classrooms. Suppose student desks were shipped in boxes 3 feet long, 2 feet wide, and 3 feet tall.



15. How many boxes of this size could be stacked against one wall of your classroom? Draw a diagram.

16. How many such stacks could fit in the classroom?

17. Altogether, how many boxed desks could fill your classroom?

LESSON

111 Estimating Area

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Find each fraction of 60:

a. $\frac{1}{3}$ of 60 **b.** $\frac{2}{3}$ of 60 **c.** $\frac{3}{3}$ of 60

Review:

d. 50×46 **e.** $\$6.59 + \$2.95$ **f.** $62 - 25$

Roman numerals:

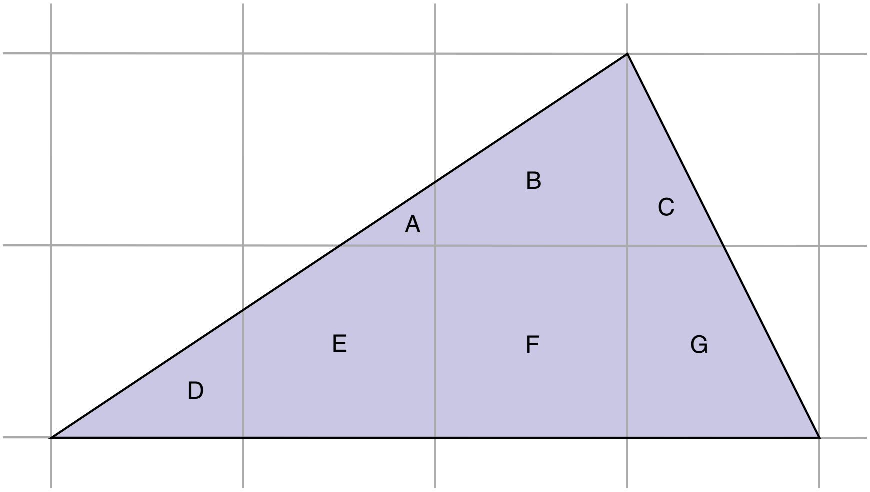
g. Write MXC in our number system.
h. Compare: XLVI ○ 45

Problem Solving:

Marco paid a dollar for an item that cost 54¢. He received four coins in change. What four coins should he have received?

NEW CONCEPT

To estimate the areas of shapes, we can use a grid. Below we show a triangle drawn on 1-inch grid paper. We will describe two strategies that can be used to estimate the area of the triangle.



First strategy:

Look within the outline of the figure. Count all the entire squares. Then estimate the number of entire squares that could be formed with the remaining partial squares.

Using this strategy, we count F as an entire square. C and G could fit together like puzzle pieces to make another square. D and B could make a third square. A and E could make a fourth square. We estimate that the area of the triangle is about 4 square inches.

Second strategy:

Look within the outline of the figure. Count all the entire squares as in the first strategy. Then count all the squares that seem to have at least half their area within the outline of the figure. Do not count the squares that have less than half their area within the figure.

Using this strategy, we again count F as an entire square. Then we count E, B, and G because at least half the area of each square is within the outline of the triangle. We do not count A, C, or D. Using this strategy, we again estimate the area of the triangle to be about 4 square inches.

Both strategies help us estimate areas. An estimate is an **approximation.** Estimates may differ slightly from person to person. The goal is to make each estimate carefully.

Activity: *Estimating Area*

Materials needed by each student:

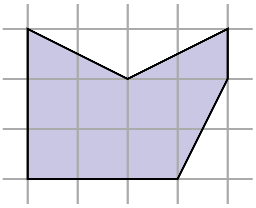
- 1 copy of Activity Master 22 (masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)
- pen or pencil

Outline your shoe or hand on the grid paper. Then use the two strategies described above to estimate the area of the shoe print or handprint.

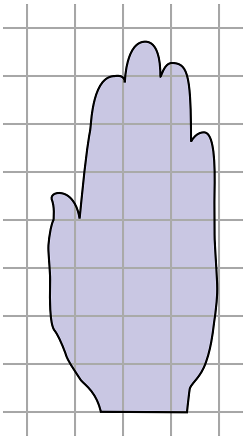
LESSON PRACTICE

Practice set Estimate the area of each figure on these grids. Each small square represents one square inch.

a.



b.



c. On the floor of the classroom, mark off 1 square foot, 1 square yard, and 1 square meter. Estimate the number of each kind of square it would take to cover the whole floor.

MIXED PRACTICE

Problem set

1. (52, 110) Three hundred seconds is how many minutes? (There are 60 seconds in each minute.)

2. (94) David, Ann, and Cho were playing marbles. Ann had twice as many marbles as David had, and Cho had 5 more marbles than Ann had. David had 9 marbles. How many marbles did Cho have? (First find how many marbles Ann had.)

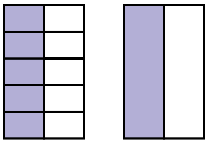
3. (49) On each of 5 bookshelves there are 44 books. How many books are on all 5 bookshelves?

4. (95) Nine tenths of the 30 students remembered their homework. How many students remembered their homework? Draw a picture to illustrate the problem.

5. (Inv. 5, 95) What percent of the students in problem 4 did not remember their homework?

6. (103) What fraction name for 1 has a denominator of 3?

7. (109) What equivalent fractions are shown?



8. (109) Draw a picture to show that $\frac{6}{8}$ and $\frac{3}{4}$ are equivalent fractions.

9. (96, 101) Below is a golf scorecard for 9 holes of golf. What was Michelle's average score per hole?

Putt 'N' Putt

PLAYER	1	2	3	4	5	6	7	8	9	TOTAL
Michelle	6	7	5	2	4	1	3	5	3	36
Mathea	5	4	4	3	4	3	2	5	3	33

10. (27) Sarah had to hurry. The laboratory had to be cleaned by 4:20 p.m. It was already 11:00 a.m. How much time did she have to clean the lab?

11. Sixty minutes is how many seconds?
(19, 49, 86)

12. The factors of 10 are 1, 2, 5, 10. The factors of 15 are 1, 3, 5, 15. Which number is the largest factor of both 10 and 15?
(55)

13. List the factors of 8. List the factors of 12. Which number is the largest factor of both 8 and 12?
(55)

14. 4.3 + 12.6 + 3.75
(50)

15. 364.1 − 16.41
(91)

16. $\frac{5}{8} + \frac{2}{8}$
(107)

17. $\frac{3}{5} + \frac{1}{5}$
(107)

18. $1\frac{9}{10} - 1\frac{2}{10}$
(107)

19. 60 × 800
(86)

20. 73 × 48
(90)

21. 9 × 78¢
(48)

22. 10^3
(62, 86)

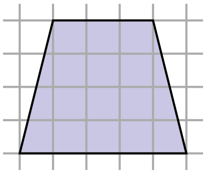
23. $35.00 ÷ 4
(76)

24. $\frac{4824}{8}$
(80)

25. $60\overline{)540}$
(110)

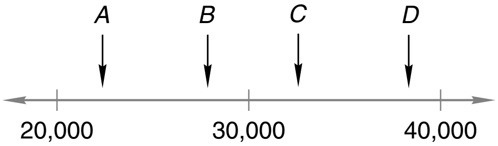
26. $10\overline{)463}$
(105)

27. Estimate the area of this figure. Each small square represents one square inch.
(111)

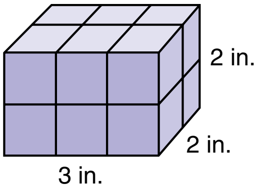


28. Draw a rectangle that is 4 cm long and 1 cm wide. Then shade 25% of it.
(21, Inv. 5)

29. Which arrow could be pointing to 38,274?
(Inv. 1)



30. What is the volume of this rectangular solid?
(Inv. 11)



LESSON

112 Reducing Fractions

WARM-UP

Facts Practice: 64 Multiplication Facts (Test G)

Mental Math:

Find each fraction of 60:

a. $\frac{1}{4}$ of 60 **b.** $\frac{2}{4}$ of 60 **c.** $\frac{3}{4}$ of 60

Review:

d. 30×12 **e.** $10.00 − $5.63 **f.** $37 + 45$

Roman numerals:

g. Write MMCL in our number system.

h. Compare: 48 ◯ XLVII

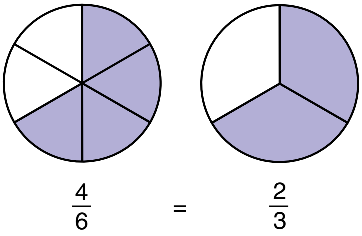
Patterns:

Find the next five terms in this sequence:

$\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}$, ____, ____, ____, ____, ____, …

NEW CONCEPT

Recall from Investigation 9 that when we **reduce** a fraction, we find an equivalent fraction written with **smaller** numbers. The picture below shows $\frac{4}{6}$ reduced to $\frac{2}{3}$.



Not all fractions can be reduced. Only a fraction whose numerator and denominator can be divided by the same number can be reduced. Since both the numerator and denominator of $\frac{4}{6}$ can be divided by 2, we can reduce the fraction $\frac{4}{6}$.

To reduce a fraction, we will use a fraction that is equal to 1. To reduce $\frac{4}{6}$, we will use the fraction $\frac{2}{2}$. We divide both 4 and 6 by 2, as shown below.

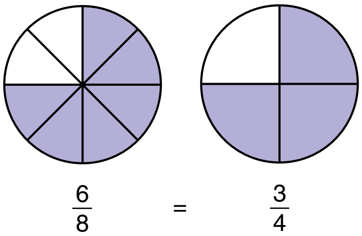
$$\frac{4}{6} \div \overset{1}{\frac{2}{2}} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$$

Example Write the reduced form of each fraction:

(a) $\frac{6}{8}$ (b) $\frac{3}{6}$ (c) $\frac{6}{7}$

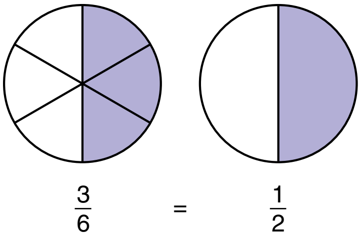
Solution (a) The numerator and denominator are 6 and 8. These numbers can be divided by 2. That means we can reduce the fraction by dividing 6 and 8 by 2.

$$\frac{6}{8} \div \frac{2}{2} = \frac{6 \div 2}{8 \div 2} = \mathbf{\frac{3}{4}}$$



(b) The numerator and denominator are 3 and 6. These numbers can be divided by 3. So we reduce $\frac{3}{6}$ by dividing both 3 and 6 by 3.

$$\frac{3}{6} \div \frac{3}{3} = \frac{3 \div 3}{6 \div 3} = \mathbf{\frac{1}{2}}$$



(c) The numerator is 6 and the denominator is 7. The only number that divides 6 and 7 is 1. Dividing the terms of a fraction by 1 does not reduce the fraction.

$$\frac{6}{7} \div \frac{1}{1} = \frac{6 \div 1}{7 \div 1} = \mathbf{\frac{6}{7}}$$

The fraction $\frac{6}{7}$ cannot be reduced.

LESSON PRACTICE

Practice set* Write the reduced form of each fraction:

a. $\frac{2}{4}$ **b.** $\frac{2}{6}$ **c.** $\frac{3}{9}$ **d.** $\frac{3}{8}$

e. $\frac{2}{10}$ **f.** $\frac{4}{10}$ **g.** $\frac{9}{12}$ **h.** $\frac{9}{10}$

MIXED PRACTICE

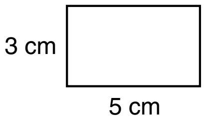
Problem set Use this information to answer problems 1 and 2:

> *One fence board costs 90¢. It takes 10 boards to build 5 feet of fence.*

1. *(94)* How many boards are needed to build 50 feet of fence?

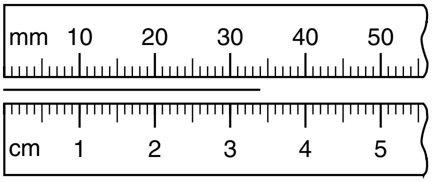
2. *(94)* What will the boards in problem 1 cost?

3. *(Inv. 2, Inv. 3)* Find the perimeter and area of this rectangle:



4. *(69)* (a) Find the length of the line segment in millimeters.

(b) Find the length of the segment in centimeters.

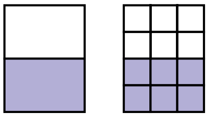


5. *(95)* Five ninths of the 36 burros were gray. How many of the burros were gray? Draw a picture to illustrate the problem.

6. *(104)* Change each improper fraction to a whole number or a mixed number:

(a) $\frac{15}{2}$ (b) $\frac{15}{3}$ (c) $\frac{15}{4}$

7. *(109)* What equivalent fractions are shown?



8. *(Inv. 5)* What percent of each rectangle in problem 7 is shaded?

9. *(112)* Write the reduced form of each fraction:

(a) $\frac{3}{6}$ (b) $\frac{4}{6}$ (c) $\frac{5}{6}$

10. *(96)* In three tries Rodney bounced the soccer ball on his foot 23 times, 36 times, and 34 times. What was the average number of bounces in each try?

11. *(83)* T-shirts were priced at \$5 each. Yoshi had \$27. He bought 5 T-shirts. Tax was \$1.50. How much money did he have left?

12. *(107)* $3\frac{3}{9} + 4\frac{4}{9}$

13. *(107)* $\frac{1}{7} + \frac{2}{7} + \frac{3}{7}$

14. *(50)*
$$\begin{array}{r} 37.2 \\ 135.7 \\ 10.62 \\ 2.47 \\ +\ \ 14.0 \\ \hline \end{array}$$

15. *(107)* $\frac{11}{12} - \frac{10}{12}$

16. *(107)* $\frac{8}{10} - \frac{5}{10}$

17. *(90)*
$$\begin{array}{r} 48 \\ \times\ 36 \\ \hline \end{array}$$

18. *(90)*
$$\begin{array}{r} 72 \\ \times\ 58 \\ \hline \end{array}$$

19. *(58)*
$$\begin{array}{r} \$4.08 \\ \times\quad 7 \\ \hline \end{array}$$

20. *(50)* $25.42 + 24.8$

21. *(91)* $36.2 - 4.27$

22. *(110)* $90 \div 20$

23. *(107)* $\frac{5}{8} - \frac{5}{8}$

24. *(76)* $7\overline{)2549}$

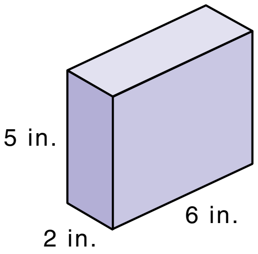
25. *(76)* $\$19.40 \div 5$

26. *(Inv. 1)* What number is halfway between 400,000 and 500,000?

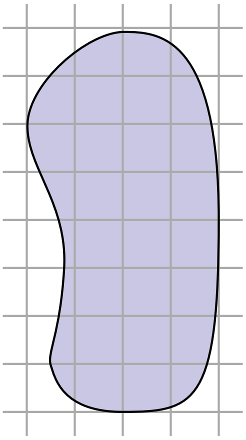
27. *(Inv. 10)* What is the probability that a tossed coin will land heads up?

28. *(98)* What is the geometric name for the shape of this box?

29. *(Inv. 11)* What is the volume of the box shown in problem 28?



30. *(111)* Estimate the area of this shoe print. Each small square represents one square inch.



LESSON

113

Multiplying a Three-Digit Number by a Two-Digit Number

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

An odd number may be written as an even number plus 1. For example, 9 is 8 + 1. So half of 9 is half of 8 plus half of 1. Since half of 8 is 4 and half of 1 is $\frac{1}{2}$, half of 9 is $4\frac{1}{2}$. Use this strategy to find half of each of these odd numbers:

a. 3 **b.** 7 **c.** 11 **d.** 21 **e.** 33

Roman numerals:

f. Compare: MD ○ 2000

g. Write XLIX in our number system.

Patterns:

The numbers 1, 8, and 27 begin the sequence below. (Notice that $1 = 1^3$, $8 = 2^3$, and $27 = 3^3$.) Find the next three numbers in the sequence.

1, 8, 27, ___, ___, ___, …

NEW CONCEPT

We have learned to multiply a two-digit number by another two-digit number. In this lesson we will learn to multiply a three-digit number by a two-digit number.

Example 1 Multiply: 364×24

Solution We write the three-digit number above the two-digit number so that the last digits in each number are lined up. We multiply 364 by 4. Next we multiply 364 by 2. Since this 2 is actually 20, we write the last digit of this product in the tens place, which is under the 2 in 24. Then we add and find that the product is 8736.

$$\begin{array}{r} \overset{1}{\scriptstyle 2}\,{\scriptstyle 1} \\ 364 \\ \times\ \ 24 \\ \hline 1456 \\ 728 \\ \hline \mathbf{8736} \end{array}$$

Example 2 Multiply:

$$\begin{array}{r} \$4.07 \\ \times \quad 38 \\ \hline \end{array}$$

Solution We will ignore the dollar sign and decimal point until we are finished multiplying. First we multiply 407 by 8. Then we multiply 407 by 3 (which is actually 30), remembering to shift the digits of the product one place to the left. We add and find that the product is 15466. Now we write the dollar sign and insert the decimal point two places from the right.

$$\begin{array}{r} {\scriptstyle 2} \\ {\scriptstyle 5} \\ \$4.07 \\ \times \quad 38 \\ \hline 32\,56 \\ 122\,1 \\ \hline \mathbf{\$154.66} \end{array}$$

LESSON PRACTICE

Practice set* Multiply:

a. 235 × 24

b. 14 × 430

c. $1.25 × 24

d. $\begin{array}{r} 406 \\ \times \quad 32 \\ \hline \end{array}$

e. $\begin{array}{r} \$6.20 \\ \times \quad 31 \\ \hline \end{array}$

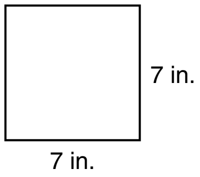
f. $\begin{array}{r} 562 \\ \times \quad 47 \\ \hline \end{array}$

MIXED PRACTICE

Problem set

1. *(11, 13, 52)* Carrie drove to visit her cousin, who lives 3000 miles away. If Carrie drove 638 miles the first day, 456 miles the second day, and 589 miles the third day, how much farther does she need to drive to get to her cousin's house?

2. *(Inv. 2, Inv. 3)* Find the perimeter and area of this square.



3. *(Inv. 2)* If the perimeter of a square is 2 meters, each side is how many centimeters long?

4. *(95)* Gracie found 35 pinecones. Four sevenths of the pinecones still had seeds. How many of the pinecones still had seeds? Draw a picture to illustrate the problem.

5. *(54)* Round 6843 to the nearest thousand.

6. (112) Write the reduced form of each fraction:

(a) $\frac{4}{5}$ (b) $\frac{5}{10}$ (c) $\frac{4}{10}$

7. (84) Write 374.251 using words.

8. (109) Draw a picture to show that $\frac{1}{2}$ and $\frac{4}{8}$ are equivalent fractions.

9. (109) Write three fractions equivalent to $\frac{1}{4}$ by multiplying $\frac{1}{4}$ by $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{5}{5}$.

10. (96) Daniel Boone furnished the settlers with 750 pounds of meat in 5 days. What was the average amount of meat he furnished per day?

11. (12, 51) The explorer Zebulon Pike estimated that the mountain's height was eight thousand, seven hundred forty-two feet. His estimate was five thousand, three hundred sixty-eight feet less than the actual height. Today, we call this mountain *Pikes Peak.* What is the height of Pikes Peak?

12. (80) $6\overline{)4837}$

13. (Inv. 3, 76) $\dfrac{1372}{\sqrt{16}}$

14. (110) $40\overline{)960}$

15. (110) $20\overline{)1360}$

16. (50) 30.07 − 3.7

17. (91) 46.0 − 12.46

18. (50)
$$\begin{array}{r} 37.15 \\ 6.84 \\ 1.29 \\ 29.1 \\ +\ 3.6 \\ \hline \end{array}$$

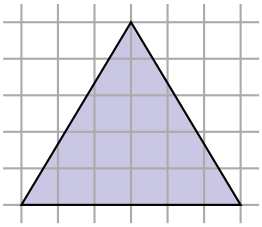
19. (113)
$$\begin{array}{r} \$3.20 \\ \times\ \ 46 \\ \hline \end{array}$$

20. (113)
$$\begin{array}{r} 307 \\ \times\ 25 \\ \hline \end{array}$$

21. (107) $\dfrac{8}{15} + \dfrac{6}{15}$

22. (107) $4\dfrac{4}{5} - 1\dfrac{3}{5}$

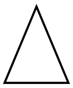
23. (111) Estimate the area of this triangle. Each small square represents one square centimeter.

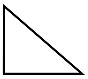


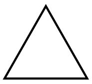
24. (3) Write the next three numbers in this counting sequence:

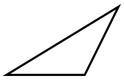
…, 10,000, 20,000, 30,000, …

25. *(78)* Which of these triangles appears to be an equilateral triangle?

A. 

B. 

C. 

D. 

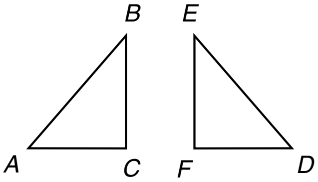
26. *(75)* To remove the lid from the peanut butter jar, Nadir turned the lid counterclockwise two full turns. Nadir turned the lid about how many degrees?

A. 360° B. 180° C. 720° D. 90°

27. *(79)* Which of these letters has no lines of symmetry?

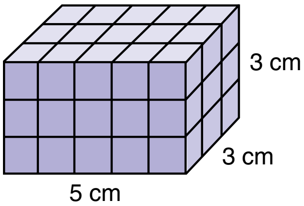
M I C K E Y

28. *(73)* Triangles *ABC* and *DEF* are congruent. Which transformations would move ΔABC to the position of ΔDEF?



29. *(Inv. 2, 78, 107)* If each side of an equilateral triangle is $2\frac{1}{4}$ inches long, what is the perimeter of the triangle?

30. *(Inv. 11)* What is the volume of this stack of cubes?



LESSON 114 Simplifying Fraction Answers

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

a. 25% of 24 **b.** 50% of 24 **c.** 75% of 24

Review:

d. 20 × 250 **e.** \$3.65 + \$2.99 **f.** 56 − 38

Roman numerals:

g. Write MDX in our number system.

h. Write LIX in our number system.

Problem Solving:

Copy this division problem on your paper, and fill in the missing digits:

$$\begin{array}{r} 8\,\_ \\ \_\,\overline{)\,\_\,\_\,7} \\ \underline{2\,4} \\ 2\,\_ \\ \underline{\_\,\_} \\ 0 \end{array}$$

NEW CONCEPT

It is customary to write answers to math problems in the simplest form possible. If an answer contains a fraction, there are two procedures that we usually follow.

1. We write improper fractions as mixed numbers (or whole numbers).
2. We reduce fractions when possible.

Example 1 Add: $\frac{2}{3} + \frac{2}{3}$

Solution We add the fractions and get the sum $\frac{4}{3}$. Notice that $\frac{4}{3}$ is an improper fraction. We take the extra step of changing $\frac{4}{3}$ to the mixed number $1\frac{1}{3}$.

$$\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$$

$$\frac{4}{3} = \mathbf{1\frac{1}{3}}$$

Example 2 Subtract: $\frac{3}{4} - \frac{1}{4}$

Solution We subtract and get the difference $\frac{2}{4}$. Notice that $\frac{2}{4}$ can be reduced. We take the extra step of reducing $\frac{2}{4}$ to $\frac{1}{2}$.

$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$$

$$\frac{2}{4} = \mathbf{\frac{1}{2}}$$

Example 3 Add: $3\frac{1}{3} + 4\frac{2}{3}$

Solution We add the mixed numbers and get the sum $7\frac{3}{3}$. Notice that $\frac{3}{3}$ is an improper fraction equal to 1. So $7\frac{3}{3} = 7 + 1$, which is 8.

$$3\frac{1}{3} + 4\frac{2}{3} = 7\frac{3}{3}$$

$$7\frac{3}{3} = \mathbf{8}$$

Example 4 Add: $5\frac{3}{5} + 6\frac{4}{5}$

Solution We add the mixed numbers and get $11\frac{7}{5}$. Notice that $\frac{7}{5}$ is an improper fraction that can be changed to $1\frac{2}{5}$. So $11\frac{7}{5}$ equals $11 + 1\frac{2}{5}$, which is $12\frac{2}{5}$.

$$5\frac{3}{5} + 6\frac{4}{5} = 11\frac{7}{5}$$

$$11\frac{7}{5} = \mathbf{12\frac{2}{5}}$$

Example 5 Subtract: $6\frac{5}{8} - 1\frac{3}{8}$

Solution We subtract and get $5\frac{2}{8}$. Notice that $\frac{2}{8}$ can be reduced. We reduce $\frac{2}{8}$ to $\frac{1}{4}$ and get $5\frac{1}{4}$ for our answer.

$$6\frac{5}{8} - 1\frac{3}{8} = 5\frac{2}{8}$$

$$5\frac{2}{8} = \mathbf{5\frac{1}{4}}$$

LESSON PRACTICE

Practice set* Simplify the answer to each sum or difference:

a. $\frac{4}{5} + \frac{4}{5}$

b. $\frac{5}{6} - \frac{1}{6}$

c. $3\frac{2}{3} + 1\frac{2}{3}$

d. $5\frac{1}{4} + 6\frac{3}{4}$

e. $7\frac{7}{8} - 1\frac{1}{8}$

f. $5\frac{3}{5} + 1\frac{3}{5}$

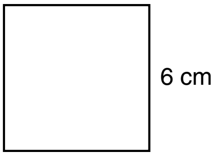
MIXED PRACTICE

Problem set

1. (83) Sharon made 70 photocopies. If she paid 6¢ per copy and the total tax was 25¢, how much change should she have gotten back from a $5 bill?

2. (Inv. 2, Inv. 3) (a) What is the area of this square?

(b) What is the perimeter of the square?



Use the information below to answer problems 3 and 4.

Walker has $9. David has twice as much money as Walker. Chris has $6 more than David.

3. (94) How much money does Chris have?

4. (96) What is the average amount of money each boy has?

5. (94) There are 40 quarters in a roll of quarters. What is the value of 2 rolls of quarters?

6. (93, 113) Estimate the product of 29 and 312. Then find the actual product.

7. (112) Write the reduced form of each fraction:

(a) $\frac{2}{12}$ (b) $\frac{6}{8}$ (c) $\frac{3}{9}$

8. (107, 109) Find a fraction equal to $\frac{1}{3}$ by multiplying $\frac{1}{3}$ by $\frac{2}{2}$. Write that fraction; then add it to $\frac{3}{6}$. What is the sum?

9. (72) Draw diagrams to help solve this problem: The racehorses wore black, red, and green. Green finished one place ahead of black, and red was not last. Who finished first?

10. (Inv. 10) If an event cannot happen, its probability is 0. If an event is certain to happen, its probability is 1. What is the probability of rolling a 7 with one roll of a standard number cube?

11. (Inv. 5, 70) Dresses were on sale for 50% off. If the regular price was $40, what was the sale price?

12. (50) $4.62 + 16.7 + 9.8$

13. (45, 91) $14.62 - (6.3 - 2.37)$

14. (114) $\frac{3}{5} + \frac{4}{5}$

15. (107) $16 + 3\frac{3}{4}$

16. (114) $1\frac{2}{3} + 3\frac{1}{3}$

17. (114) $\frac{2}{5} + \frac{3}{5}$

18. (114) $7\frac{4}{5} + 7\frac{1}{5}$

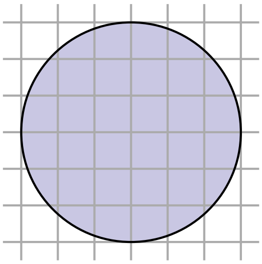
19. (114) $6\frac{2}{3} + 3\frac{2}{3}$

20. (113) 372×39

21. (113) 47×142

22. (Inv. 3, 58) $360 \times \sqrt{36}$

23. (111) Estimate the area of this circle. Each small square represents one square centimeter.

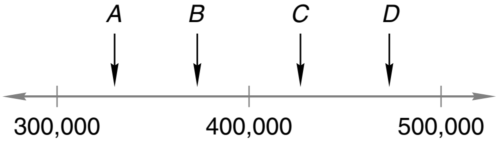


24. (80) $8\overline{)4834}$

25. (62, 76) $\frac{2840}{2^3}$

26. (110) $30\overline{)963}$

27. (Inv. 1) Which arrow could be pointing to 427,063?



28. (Inv. 2, 114) If the length of each side of a square is $1\frac{1}{4}$ inches, then what is the perimeter of the square?

29. (98) What is the geometric shape of a volleyball?

30. (108) Use the distributive property to multiply:

$$5(20 + 6)$$

LESSON

115 Renaming Fractions

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

a. 25% of 36 **b.** 75% of 36 **c.** 100% of 36

Review:

d. 4×250 **e.** \$5.00 − \$4.25 **f.** $156 + 29$

Roman numerals:

g. Write MDL in our number system.

h. Compare: 65 ○ LXIV

Patterns:

What are the next three terms in this sequence?

…, \$1000.00, \$100.00, \$10.00, ___, ___, ___, …

NEW CONCEPT

Remember that when we multiply a fraction by a fraction name for 1, the result is an equivalent fraction. For example, if we multiply $\frac{1}{2}$ by $\frac{2}{2}$, we get $\frac{2}{4}$. The fractions $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions because they have the same value.

$$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$$

Sometimes we must choose a particular multiplier that is equal to 1.

Example 1 Find the equivalent fraction for $\frac{1}{4}$ whose denominator is 12.

Solution To change 4 to 12, we must multiply by 3. So we multiply $\frac{1}{4}$ by $\frac{3}{3}$.

$$\frac{1}{4} \times \frac{3}{3} = \frac{3}{12}$$

The fraction $\frac{1}{4}$ is equivalent to $\mathbf{\frac{3}{12}}$.

Example 2 Complete the equivalent fraction: $\frac{2}{3} = \frac{?}{15}$

Solution The denominator changed from 3 to 15. Since the denominator was multiplied by 5, the correct multiplier is $\frac{5}{5}$.

$$\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$$

Thus, the missing numerator of the equivalent fraction is **10.**

LESSON PRACTICE

Practice set* Complete each equivalent fraction:

a. $\frac{1}{4} = \frac{?}{12}$ **b.** $\frac{2}{3} = \frac{?}{12}$ **c.** $\frac{5}{6} = \frac{?}{12}$

d. $\frac{3}{5} = \frac{?}{10}$ **e.** $\frac{2}{3} = \frac{?}{9}$ **f.** $\frac{3}{4} = \frac{?}{8}$

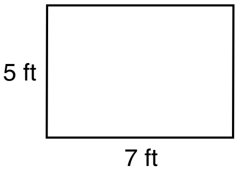
MIXED PRACTICE

Problem set

1. *(94)* If a can of soup costs $1.50 and serves 3 people, how much would it cost to serve soup to 12 people?

2. *(Inv. 2, Inv. 3)* (a) What is the perimeter of this rectangle?

(b) What is the area of the rectangle?

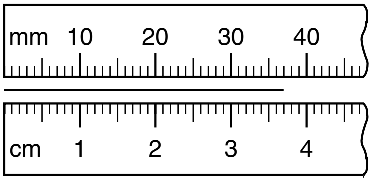


3. *(94)* What number is eight less than the product of nine and ten?

4. *(95)* The woodpecker found 3069 bugs in the tree and ate $\frac{2}{3}$ of them. How many bugs were left in the tree? Draw a picture to illustrate the problem.

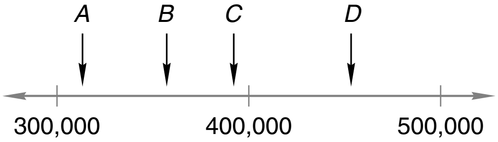
5. *(69)* (a) Find the length of the line segment in centimeters.

(b) Find the length of the segment in millimeters.



6. Use words to write 356,420.
(33)

7. Which arrow could be pointing to 356,420?
(Inv. 1)



8. Complete each equivalent fraction:
(115)

(a) $\frac{1}{2} = \frac{?}{6}$ (b) $\frac{1}{3} = \frac{?}{6}$ (c) $\frac{2}{3} = \frac{?}{6}$

9. Write the reduced form of each fraction:
(112)

(a) $\frac{2}{6}$ (b) $\frac{6}{9}$ (c) $\frac{9}{16}$

10. There were 40 workers on the job. Of those workers, 10 had worked overtime. What fraction of the workers had worked overtime? (Remember to reduce the fraction.)
(112)

11. What percent of the workers in problem 10 had worked overtime?
(Inv. 5)

12. Bill received \$10 for his tenth birthday. Each year after that, he received \$1 more than he did on his previous birthday. He saved all his birthday money. In all, how much birthday money did Bill have on his fifteenth birthday?
(94)

13. Every morning Marta walks $2\frac{1}{2}$ miles. How many miles does Marta walk in two mornings?
(114)

14. $9.36 - (4.37 - 3.8)$
(45, 50)

15. $24.32 - (8.61 + 12.5)$
(45, 50)

16. $5\frac{5}{8} + 3\frac{3}{8}$
(114)

17. $6\frac{3}{10} + 1\frac{2}{10}$
(114)

18. $8\frac{2}{3} - 5\frac{1}{3}$
(107)

19. $4\frac{3}{4} - 2\frac{1}{4}$
(114)

20. 125×16
(113)

21. $12 \times \$1.50$
(113)

22. $6\overline{)3642}$
(80)

23. $\$125 \div 5$
(65, 76)

24. $40\overline{)645}$
(110)

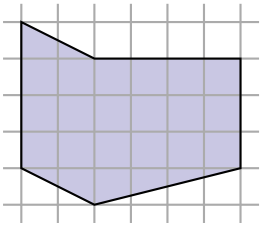
25. $3m = 6^2$
(61, 62)

26. If n is 16, then what does $3n$ equal?
(106)

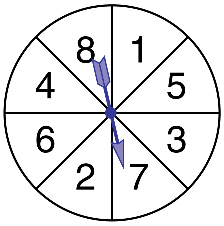
27. In three classrooms there were 18, 21, and 21 students. What was the average number of students per classroom?
(96)

28. Dion's temperature is 99.8°F. Normal body temperature is about 98.6°F. Dion's temperature is how many degrees above normal body temperature?
(31, 43)

29. Estimate the area of this piece of land. Each small square represents one square mile.
(111)



30. If the arrow is spun, what is the probability that it will stop on a number greater than 5?
(Inv. 10)



LESSON

116 Common Denominators

WARM-UP

Facts Practice: 100 Multiplication Facts (Test H)

Mental Math:

a. 10% of 60 **b.** 20% of 60 **c.** 30% of 60

Review:

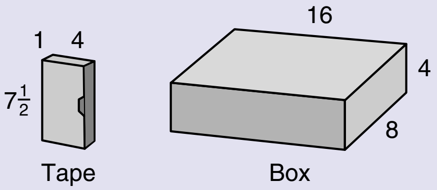
d. 8 × 25 **e.** \$4.63 + \$3.98 **f.** 84 − 45

Roman numerals:

g. Write CM in our number system.
h. Write LXIX in our number system.

Problem Solving:

Samantha keeps videotapes in a box that is 16 inches long, 8 inches wide, and 4 inches tall. The tapes are $7\frac{1}{2}$ inches long, 4 inches wide, and 1 inch thick. What is the greatest number of tapes she can fit into the box?



NEW CONCEPT

Two or more fractions have **common denominators** if their denominators are equal.

$\frac{3}{8}$ $\frac{5}{8}$

These two fractions have common denominators.

$\frac{3}{8}$ $\frac{5}{9}$

These two fractions do **not** have common denominators.

In this lesson we will use common denominators to rename fractions whose denominators are not equal.

Example 1 Rename $\frac{2}{3}$ and $\frac{3}{4}$ so that they have a common denominator of 12.

Solution To rename a fraction, we multiply the fraction by a fraction name for 1. To change the denominator of $\frac{2}{3}$ to 12, we multiply $\frac{2}{3}$ by $\frac{4}{4}$. To change the denominator of $\frac{3}{4}$ to 12, we multiply $\frac{3}{4}$ by $\frac{3}{3}$.

$$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12} \qquad \frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$

$$\frac{2}{3} = \mathbf{\frac{8}{12}} \qquad \frac{3}{4} = \mathbf{\frac{9}{12}}$$

Example 2 Rename $\frac{1}{2}$ and $\frac{1}{3}$ so that they have a common denominator.

Solution This time we need to find a common denominator before we can rename the fractions. The denominators are 2 and 3. We will list some multiples of 2 and of 3 to find multiples they have in common.

Multiples of 2: 2, 4, ⑥, 8, 10, ⑫, ...

Multiples of 3: 3, ⑥, 9, ⑫, 15, 18, ...

We see that 6 and 12 are both multiples of 2 and 3. Since 6 is less than 12, we will use 6 as our common denominator. To get denominators of 6, we multiply $\frac{1}{2}$ by $\frac{3}{3}$. We multiply $\frac{1}{3}$ by $\frac{2}{2}$.

$$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6} \qquad \frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$$

$$\frac{1}{2} = \mathbf{\frac{3}{6}} \qquad \frac{1}{3} = \mathbf{\frac{2}{6}}$$

Note: If we had used 12 for the common denominator, our fractions would have been $\frac{6}{12}$ and $\frac{4}{12}$. Usually, however, we rename fractions using their **least common denominator.**

LESSON PRACTICE

Practice set

a. Rename $\frac{1}{2}$ and $\frac{1}{5}$ so that they have a common denominator of 10.

b. Rename $\frac{3}{4}$ and $\frac{5}{6}$ so that they have a common denominator of 12.

Rename each pair of fractions using their least common denominator.

c. $\frac{1}{2}$ and $\frac{2}{3}$

d. $\frac{1}{3}$ and $\frac{1}{4}$

e. $\frac{1}{2}$ and $\frac{3}{5}$

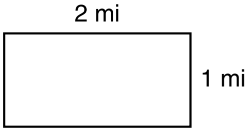
f. $\frac{2}{3}$ and $\frac{2}{5}$

MIXED PRACTICE

Problem set

1. (95) Mona caught 24 polliwogs. If she let one fourth of them go, how many did she keep? Draw a picture to illustrate the problem.

2. (Inv. 2) Rectangular Park was 2 miles long and 1 mile wide. Gordon ran around the park twice. How many miles did he run?



3. (94) If 2 oranges cost 42¢, how much would 8 oranges cost?

4. (95) Three fourths of the 64 baseball cards showed players from the American League. How many of the baseball cards showed American League players? Draw a picture to illustrate the problem.

5. (Inv. 5, 95) What percent of the baseball cards in problem 4 showed players from the American League?

6. (103, 109) Which of these fractions is not equivalent to $\frac{1}{2}$?

A. $\frac{3}{6}$ B. $\frac{5}{10}$ C. $\frac{10}{21}$ D. $\frac{50}{100}$

7. (115) Complete each equivalent fraction:

(a) $\frac{1}{2} = \frac{?}{12}$ (b) $\frac{1}{3} = \frac{?}{12}$ (c) $\frac{1}{4} = \frac{?}{12}$

8. (112) Write the reduced form of each fraction:

(a) $\frac{5}{10}$ (b) $\frac{8}{15}$ (c) $\frac{6}{12}$

9. (94) Randy paid 42¢ for 6 clips and 64¢ for 8 erasers. What was the cost of each clip and each eraser? What would be the total cost of 10 clips and 20 erasers?

10. (3, 72) There were 14 volunteers the first year, 16 volunteers the second year, and 18 volunteers the third year. If the number of volunteers continued to increase by 2 each year, how many volunteers would there be in the tenth year?

11. (116) (a) Rename $\frac{1}{4}$ and $\frac{2}{3}$ so that they have a common denominator of 12.

(b) Rename $\frac{1}{3}$ and $\frac{3}{4}$ using their least common denominator.

12. (Inv. 10) A standard number cube is rolled. What is the probability that the number rolled will be less than seven?

13. (45, 50) $47.14 - (3.63 + 36.3)$

14. (45, 91) $50.1 + (6.4 - 1.46)$

15. (114) $\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$

16. (114) $4\frac{1}{6} + 1\frac{1}{6}$

17. (114) $5\frac{3}{5} + 1\frac{2}{5}$

18. (114) $\frac{5}{6} + \frac{1}{6}$

19. (114) $12\frac{3}{4} - 3\frac{1}{4}$

20. (114) $6\frac{1}{5} - 1\frac{1}{5}$

21. (113) 340×15

22. (113) 26×307

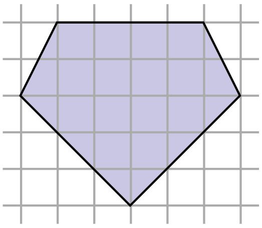
23. (113) 70×250

24. (80) $\frac{3550}{5}$

25. (110) $432 \div 30$

26. (76) $9\overline{)5784}$

27. (111) Estimate the area of this pentagon. Each small square represents one square inch.



Karen is planning a trip to Los Angeles from Chicago for her vacation. She finds the following two round-trip flight schedules. Use the information to answer problems 28–30.

Passengers: 1 Price: $246.00

Flight number	Departure city	Date Time	Arrival city	Date Time
12A	ORD Chicago	7/21 06:11 PM	LAX Los Angeles	7/21 08:21 PM
46	LAX Los Angeles	7/28 06:39 PM	ORD Chicago	7/29 12:29 AM

Passengers: 1 Price: $412.00

Flight number	Departure city	Date Time	Arrival city	Date Time
24	ORD Chicago	7/21 08:17 AM	LAX Los Angeles	7/21 10:28 AM
142	LAX Los Angeles	7/28 03:28 PM	ORD Chicago	7/28 09:18 PM

28. (101) If Karen wants to arrive in Los Angeles in the morning, how much will she pay for airfare?

29. (101) If Karen chooses the more economical round trip, when is her return flight scheduled to land?

30. (59, 101) There is a 2-hour time difference between Chicago and Los Angeles. So a flight between these cities lasts about how long?

A. 2 hours B. 4 hours C. 6 hours D. 8 hours

LESSON 117

Rounding Whole Numbers Through Hundred Millions

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

a. 10% of 70 **b.** 20% of 70 **c.** 30% of 70
d. 40% of 70 **e.** 60% of 70 **f.** 100% of 70

Roman numerals:

g. Compare: CXC ◯ 120
h. Write LXXIX in our number system.

Patterns:

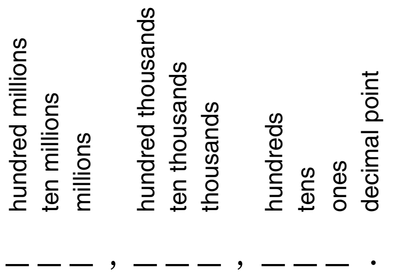
The fractions in the sequence below all equal one fourth. Write the next four fractions in this sequence.

$\frac{1}{4}, \frac{2}{8}, \frac{3}{12}$, ___, ___, ___, ___, …

NEW CONCEPT

We have rounded whole numbers to the nearest hundred and to the nearest thousand. In this lesson we will practice rounding numbers to the nearest ten thousand, the nearest hundred thousand, and so on through the nearest hundred million.

Recall the locations of the whole-number place values through hundred millions:



After rounding to the nearest ten thousand, each place to the right of the ten-thousands place will be zero.

Example 1 Round 38,274 to the nearest ten thousand.

Solution Counting by ten thousands, we say "ten thousand, twenty thousand, thirty thousand, forty thousand," and so on. We know that 38,274 is between 30,000 and 40,000. Halfway between is 35,000. Since 38,274 is greater than 35,000, we round up to **40,000.**

After rounding to the nearest hundred thousand, each place to the right of the hundred-thousands place will be zero.

Example 2 Round 427,063 to the nearest hundred thousand.

Solution Counting by hundred thousands, we say "one hundred thousand, two hundred thousand, three hundred thousand, four hundred thousand," and so on. We know that 427,063 is between 400,000 and 500,000. Halfway between is 450,000. Since 427,063 is less than halfway between 400,000 and 500,000, we round down to **400,000.**

Example 3 Round 12,876,250 to the nearest million.

Solution The number begins with "twelve million." Counting by millions from 12 million, we say "twelve million, thirteen million," and so on. So 12,876,250 is between 12,000,000 and 13,000,000. Since 12,876,250 is more than halfway to 13,000,000, we round up to **13,000,000.**

LESSON PRACTICE

Practice set Round each number to the nearest ten thousand:

a. 19,362

b. 31,289

Round each number to the nearest hundred thousand:

c. 868,367

d. 517,867

e. Round 2,156,324 to the nearest million.

f. Round 28,376,000 to the nearest ten million.

g. Round 412,500,000 to the nearest hundred million.

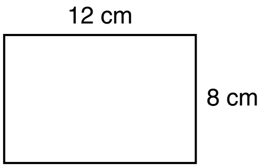
MIXED PRACTICE

Problem set

1. *(88)* Robin separated his 45 merry men as equally as possible into 4 groups. How many merry men were in the largest group?

2. *(Inv. 2, Inv. 3)* (a) What is the area of this rectangle?

(b) What is the perimeter of this rectangle?



3. *(95)* Julio answered $\frac{5}{6}$ of the 90 questions correctly. How many questions did Julio answer correctly? Draw a picture to illustrate the problem.

4. *(98)* Name the shape of each object:

(a) roll of paper towels (b) baseball

5. *(112)* Write the reduced form of each fraction:

(a) $\frac{3}{6}$ (b) $\frac{5}{15}$ (c) $\frac{8}{12}$

6. *(116)* Rename $\frac{3}{4}$ and $\frac{5}{6}$ using their least common denominator.

7. *(33)* Which digit is in the ten-millions place in 328,496,175?

8. *(25)* Draw a picture to help you solve this problem: Winder is on the road from Atlanta to Athens. It is 73 miles from Athens to Atlanta. It is 23 miles from Winder to Athens. How many miles is it from Winder to Atlanta?

9. *(Inv. 10)* The chance of rain is 80%. What is the chance that it will not rain?

10. *(Inv. 5)* A nickel is what percent of a dime?

11. *(50)* $4.36 + 12.7 + 10.72$

12. *(45, 91)* $8.54 - (4.2 - 2.17)$

13. *(114)* $\frac{5}{9} + \frac{5}{9}$

14. *(114)* $3\frac{2}{3} + 1\frac{2}{3}$

15. *(107)* $4\frac{5}{8} + 1$

16. *(114)* $7\frac{2}{3} + 1\frac{2}{3}$

17. *(107)* $4\frac{4}{9} + 1\frac{1}{9}$

18. *(114)* $\frac{11}{12} + \frac{1}{12}$

19. *(113)* 570×64

20. *(113)* 382×31

21. *(90)* 54×18

22. *(76)* $\frac{3731}{7}$

23. *(80)* $9\overline{)5432}$

24. *(110)* $60\overline{)548}$

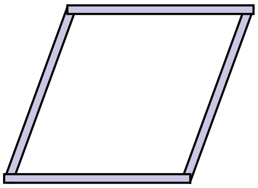
25. *(Inv. 3)* Below are the first five square numbers:

1, 4, 9, 16, 25

What are the next five square numbers?

26. (117) In the year 2000 the population of Texas was 20,851,820. Round that number to the nearest million.

27. (92) Jim built a square frame using two-by-fours, but when he leaned against it, the frame shifted to this shape. What word does *not* name this shape?



A. quadrilateral

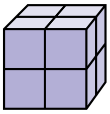
B. parallelogram

C. rhombus

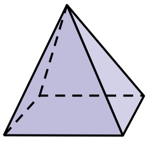
D. trapezoid

28. (Inv. 2, 69) If the perimeter of a square is 6 centimeters, then each side is how many millimeters long?

29. (98) This cube is made up of how many smaller cubes?



30. (98) A cube has how many more vertices than this pyramid?



LESSON

118 Dividing by Two-Digit Numbers

WARM-UP

Facts Practice: 90 Division Facts (Test I)

Mental Math:

Find the stated percent of each number:

a. 50% of 34 **b.** 50% of 25 **c.** 100% of 25

Review:

d. 5×66 **e.** $\$10.00 - \$9.13$ **f.** $67 + 29 + 200$

Roman numerals:

g. Write CCLX in our number system.
h. Write XCI in our number system.

Problem Solving:

The weather forecast stated that the chance of rain is 30%. What is the chance that it will not rain? Is it more likely to rain or not to rain? If it were as likely to rain as not to rain, what would be the chance of rain?

NEW CONCEPT

We have divided by two-digit numbers that are multiples of 10. In this lesson we will begin dividing by other two-digit numbers. When dividing by two-digit numbers, we sometimes accidentally choose an "answer" that is too large. If this happens, we start over and try a smaller number.

Example 1 Divide: $31\overline{)95}$

Solution **Step 1:** To help us divide $31\overline{)95}$, we may think "$3\overline{)9}$." We write "3" above the 5 in 95.

$$\begin{array}{r} \mathbf{3\ R\ 2} \\ 31\overline{)95} \\ \underline{93} \\ 2 \end{array}$$

Step 2: We multiply 3 by 31 and write "93."

Step 3: We subtract 93 from 95 and write "2."

Step 4: There are no digits to bring down. The answer is **3 R 2.**

Example 2 Divide: $43\overline{)246}$

Solution **Step 1:** To help us divide $43\overline{)246}$, we may think "$4\overline{)24}$." We write "6" above the 6 in 246.

$$\begin{array}{r} 6 \\ 43\overline{)246} \\ \underline{258} \end{array} \longleftarrow \text{too large}$$

Step 2: We multiply 6 by 43 and write "258." We see that 258 is greater than 246, so 6 is too large for our answer.

START OVER:

Step 1: This time we try 5 as our answer.

Step 2: We multiply 5 by 43 and write "215."

$$\begin{array}{r} \mathbf{5\ R\ 31} \\ 43\overline{)246} \\ \underline{215} \\ 31 \end{array}$$

Step 3: We subtract 215 from 246 and write "31."

Step 4: There are no digits to bring down. The answer is **5 R 31.**

Example 3 Divide: $21\overline{)487}$

Solution This problem has a two-digit answer. We continue to follow the four steps: divide, multiply, subtract, and bring down.

Step 1: We break the problem into a smaller division problem. We think "$21\overline{)48}$" and write "2" above the 8 in 487.

$$\begin{array}{r} 2 \\ 21\overline{)487} \\ \underline{42} \\ 67 \end{array}$$

Step 2: We multiply 2 by 21 and write "42."

Step 3: We subtract 42 from 48 and write "6."

Step 4: We bring down the 7, making 67.

REPEAT:

Step 1: We divide 67 by 21 and write "3" above the division box.

Step 2: We multiply 3 by 21 and write "63."

$$\begin{array}{r} \mathbf{23\ R\ 4} \\ 21\overline{)487} \\ \underline{42} \\ 67 \\ \underline{63} \\ 4 \end{array}$$

Step 3: We subtract 63 from 67 and write "4."

Step 4: There are no digits to bring down. The answer is **23 R 4.**

LESSON PRACTICE

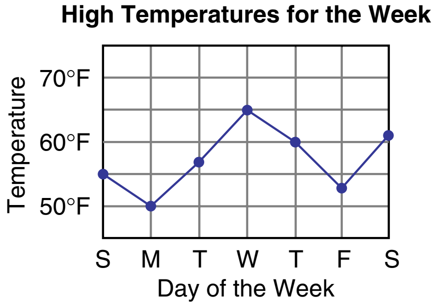
Practice set* Divide:

a. $32\overline{)128}$ **b.** $21\overline{)90}$ **c.** $25\overline{)68}$

d. $42\overline{)250}$ **e.** $41\overline{)880}$ **f.** $11\overline{)555}$

MIXED PRACTICE

Problem set Use the information in the graph to answer problems 1–3.



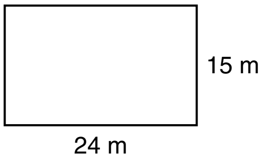
1. *(Inv. 6)* On which day was the temperature the highest?

2. *(Inv. 6)* What was the high temperature on Tuesday?

3. *(Inv. 6)* From Monday to Wednesday, the high temperature went up how many degrees?

4. *(Inv. 2, Inv. 3, 90)* (a) What is the perimeter of this rectangle?

(b) What is the area of the rectangle?

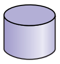


5. *(96)* The first five square numbers are 1, 4, 9, 16, and 25, and their average is 11. What is the average of the next five square numbers?

6. *(Inv. 5, 54)* What percent of the months of the year begin with the letter J?

7. *(Inv. 10, 112)* What is the probability of drawing an ace from a full deck of cards? (There are 52 cards in a deck. Four of the cards are aces.)

8. *(98)* Name each shape:

(a) 

(b) 

(c) 

9. *(112)* Write the reduced form of each fraction:

(a) $\frac{6}{8}$ (b) $\frac{4}{9}$ (c) $\frac{4}{16}$

10. *(116)* Rename $\frac{2}{3}$ and $\frac{3}{4}$ using their least common denominators.

11. *(33)* Use words to write the number 27386415.

12. *(114)* $4\frac{4}{5} + 3\frac{3}{5}$

13. *(114)* $5\frac{1}{6} + 1\frac{2}{6}$

14. *(114)* $7\frac{3}{4} + \frac{1}{4}$

15. *(118)* $13\overline{)50}$

16. *(17)*

$$\begin{array}{r} 28 \\ 47 \\ 74 \\ 36 \\ 91 \\ 87 \\ 21 \\ 12 \\ +\ 14 \\ \hline \end{array}$$

17. *(2)*

$$\begin{array}{r} 5 \\ 2 \\ 4 \\ 7 \\ 3 \\ 5 \\ 3 \\ 6 \\ 5 \\ N \\ +\ 4 \\ \hline 55 \end{array}$$

18. *(118)* $72\overline{)297}$

19. *(114)* $5\frac{3}{8} + 5\frac{1}{8}$

20. *(114)* $4\frac{1}{6} + 2\frac{1}{6}$

21. *(113)* 720×36

22. *(113)* 147×54

23. *(80)* $8\overline{)5766}$

24. *(118)* $21\overline{)441}$

25. *(50)* $4.75 + 16.14 + 10.9$

26. *(45, 91)* $18.4 - (4.32 - 2.6)$

27. *(117)* In the year 2000 the population of the state of New York was 18,976,457. Round that number to the nearest million.

28. *(117)* Round 297,576,320 to the nearest hundred million.

On Gabriella's first nine tests she earned these scores:

90, 95, 80, 85, 100, 95, 75, 95, 90

Use this information to answer problems 29 and 30.

29. *(97)* What is the median and range of Gabriella's scores?

30. *(97)* What is the mode of Gabriella's scores?

LESSON

119

Adding and Subtracting Fractions with Different Denominators

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Find the stated percent of 90:

a. 50% of 90 **b.** 10% of 90 **c.** 90% of 90

Review:

d. 5 × 84 **e.** \$2.75 + \$3.76 **f.** 66 − 48

Roman numerals:

g. Write MDCLXVII in our number system.
h. Compare: XCIV ○ 110

Problem Solving:

The wall is four cubits tall. A cubit is about 18 inches. So the wall is about how many feet tall?

NEW CONCEPT

In order to add or subtract fractions that have different denominators, we must first rename the fractions so that they have common denominators. Recall that we rename a fraction by multiplying it by a fraction name for 1.

Example 1 Add: $\frac{1}{4} + \frac{3}{8}$

Solution The denominators are different. We rename $\frac{1}{4}$ by multiplying it by $\frac{2}{2}$. The product is $\frac{2}{8}$. This gives us common denominators, so now we can add.

$$\begin{array}{rcccl} & & \xrightarrow{\text{Rename.}} & & \\ \frac{1}{4} & \times & \frac{2}{2} & = & \frac{2}{8} \\ + \frac{3}{8} & & & = & \frac{3}{8} \\ \hline & & & & \mathbf{\frac{5}{8}} \end{array} \quad \downarrow \text{Add.}$$

Example 2 Subtract: $\frac{5}{6} - \frac{1}{2}$

Solution The denominators are different. We rename $\frac{1}{2}$ as a fraction whose denominator is 6. Then we subtract and reduce the answer.

$$\begin{array}{rcccl} & \xrightarrow{\text{Rename.}} & & & \\ \frac{5}{6} & & = \frac{5}{6} & \Big\downarrow & \text{Subtract.} \\ -\ \frac{1}{2} & \times \frac{3}{3} & = \frac{3}{6} & & \\ \hline & & \frac{2}{6} = \mathbf{\frac{1}{3}} & & \\ & & \xrightarrow{} & & \\ & & \text{Reduce.} & & \end{array}$$

LESSON PRACTICE

Practice set* Find each sum or difference. Reduce when possible.

a. $\frac{1}{2} + \frac{2}{6}$

b. $\frac{1}{3} + \frac{1}{9}$

c. $\frac{1}{8} + \frac{1}{2}$

d. $\frac{3}{8} - \frac{1}{4}$

e. $\frac{2}{3} - \frac{2}{9}$

f. $\frac{7}{8} - \frac{1}{2}$

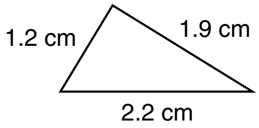
MIXED PRACTICE

Problem set

1. *(Inv. 3, 90)* Clotilda used 1-foot-square floor tiles to cover the floor of a room 15 feet long and 12 feet wide. How many floor tiles did she use?

2. *(Inv. 2, 43, 78)* (a) What is the perimeter of this triangle?

(b) Is this triangle equilateral, isosceles, or scalene?

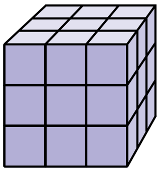


3. *(95)* Tim found that $\frac{3}{8}$ of the 32 pencils in the room had no erasers. How many pencils had no erasers? Draw a picture to illustrate the problem.

4. *(41)* Seventy-two eggs is how many dozen eggs?

5. *(Inv. 5)* How many eggs is 50% of one dozen eggs?

6. *(Inv. 11)* This cube is constructed of smaller cubes that are each one cubic centimeter in volume. What is the volume of the larger cube?



7. (83) Farmica bought 2 DVDs priced at \$21.95 each and 2 CDs priced at \$14.99 each. The tax was \$4.62. What was the total cost of the items?

8. (96) Roger drove 285 miles in 5 hours. What was his average speed in miles per hour?

9. (103, 109) Which of these fractions is not equivalent to $\frac{1}{2}$?

A. $\frac{4}{8}$ B. $\frac{11}{22}$ C. $\frac{15}{30}$ D. $\frac{12}{25}$

10. (112) Write the reduced form of each fraction:

(a) $\frac{8}{10}$ (b) $\frac{6}{15}$ (c) $\frac{8}{16}$

11. (33) Use words to write the number 123415720.

12. (50) $8.3 + 4.72 + 0.6 + 12.1$

13. (45, 91) $17.42 - (6.7 - 1.23)$

14. (114) $3\frac{3}{8} + 3\frac{3}{8}$ **15.** (119) $\frac{1}{4} + \frac{1}{8}$ **16.** (119) $\frac{1}{2} + \frac{1}{6}$

17. (114) $5\frac{5}{6} - 1\frac{1}{6}$ **18.** (119) $\frac{1}{4} - \frac{1}{8}$ **19.** (119) $\frac{1}{2} - \frac{1}{6}$

20. (90) 87×16 **21.** (113) 49×340 **22.** (113) 504×30

23. (76, 80) $\$35.40 \div 6$ **24.** (76) $\frac{5784}{4}$ **25.** (80) $7\overline{)2385}$

26. (110) $30\overline{)450}$ **27.** (118) $32\overline{)450}$ **28.** (118) $15\overline{)450}$

29. (Inv. 10, 112) What is the probability of drawing a heart from a full deck of cards? (There are 13 hearts in a deck.)

30. (Inv. 3, Inv. 5) Draw a rectangle that is 5 cm long and 2 cm wide, and divide the rectangle into square centimeters. Then shade 30% of the rectangle.

LESSON

120

Adding and Subtracting Mixed Numbers with Different Denominators

WARM-UP

Facts Practice: 90 Division Facts (Test J)

Mental Math:

Find the stated percent of 100:

a. 75% of 100 **b.** 70% of 100 **c.** 100% of 100

Review:

d. 20 × 23 **e.** \$20.00 − \$12.75 **f.** 127 + 35

Roman numerals:

g. Write MCM in our number system.
h. Write XCIX in our number system.

Patterns:

Find the next eight numbers in this sequence:

$\frac{1}{8}, \frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{5}{8}, \frac{3}{4}, \frac{7}{8}, 1,$ ___, ___, ___, ___, ___, ___, ___, ___, ...

NEW CONCEPT

To add or subtract mixed numbers, we first make sure the fractions have common denominators.

Example 1 Add: $4\frac{1}{6} + 2\frac{1}{2}$

Solution The denominators of the fractions are not the same. We can rename $\frac{1}{2}$ so that it has a denominator of 6 by multiplying $\frac{1}{2}$ by $\frac{3}{3}$. Then we add, remembering to reduce the fraction part of our answer.

$$\begin{array}{rcl} 4\frac{1}{6} & = & 4\frac{1}{6} \\ + \; 2\frac{1}{2} & = & 2\frac{3}{6} \\ \hline & & 6\frac{4}{6} = \mathbf{6\frac{2}{3}} \end{array}$$

Example 2 Subtract: $5\frac{3}{4} - 3\frac{5}{8}$

Solution We first rewrite the problem so that the fractions have common denominators. We can rename $\frac{3}{4}$ so that it has a denominator of 8 by multiplying $\frac{3}{4}$ by $\frac{2}{2}$. Then we subtract.

$$\begin{array}{rcl} 5\frac{3}{4} & = & 5\frac{6}{8} \\ -\ 3\frac{5}{8} & = & 3\frac{5}{8} \\ \hline & & \mathbf{2\frac{1}{8}} \end{array}$$

LESSON PRACTICE

Practice set Add. Reduce when possible.

a. $3\frac{1}{2} + 1\frac{1}{4}$

b. $4\frac{3}{4} + 1\frac{1}{8}$

c. $4\frac{1}{5} + 1\frac{3}{10}$

d. $6\frac{1}{6} + 1\frac{1}{3}$

Subtract. Reduce when possible.

e. $3\frac{7}{8} - 1\frac{1}{4}$

f. $2\frac{3}{5} - 2\frac{1}{10}$

g. $6\frac{7}{12} - 1\frac{1}{6}$

h. $4\frac{3}{4} - 1\frac{1}{2}$

MIXED PRACTICE

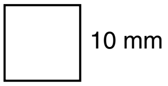
Problem set

1. *(40)* The Martins drank 11 gallons of milk each week. How many quarts of milk did they drink each week?

2. *(95)* Sixty fleas leaped onto Rover as he ran through the field. If one fourth of them perished from flea powder, how many survived? Draw a picture to illustrate the problem.

3. *(Inv. 2, Inv. 3)* (a) What is the area of this square?

(b) What is the perimeter of the square?

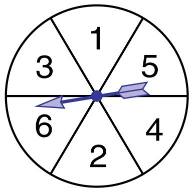


4. *(94)* Maria is 8 inches taller than Jermaine. Jermaine is 5 inches taller than Jan. Maria is 61 inches tall. How many inches tall is Jan?

5. *(96)* What is the average height of the three children in problem 4?

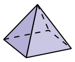
6. *(25)* Mayville is on the road from Altoona to Watson. It is 47 miles from Mayville to Altoona. It is 24 miles from Mayville to Watson. How far is it from Altoona to Watson?

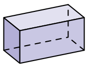
7. *(Inv. 10)* If the arrow is spun, what is the probability that it will stop on a number greater than 4?



8. *(117)* The asking price for the new house was $298,900. Round that amount of money to the nearest hundred thousand dollars.

9. *(98)* Name each shape:

(a) 

(b) 

(c) 

10. *(112)* Write the reduced form of each fraction:

(a) $\frac{9}{15}$ (b) $\frac{10}{12}$ (c) $\frac{12}{16}$

11. *(34)* Use digits to write one hundred nineteen million, two hundred forty-seven thousand, nine hundred eighty-four.

12. *(45, 50)* $14.94 - (8.6 - 4.7)$

13. *(45, 91)* $6.8 - (1.37 + 2.2)$

14. *(114)* $3\frac{2}{5} + 1\frac{4}{5}$

15. *(119)* $\frac{5}{8} + \frac{1}{4}$

16. *(120)* $1\frac{1}{3} + 1\frac{1}{6}$

17. *(120)* $5\frac{9}{10} - 1\frac{1}{5}$

18. *(119)* $\frac{5}{8} - \frac{1}{4}$

19. *(119)* $\frac{1}{3} - \frac{1}{6}$

20. *(113)* 38×217

21. *(113)* 173×60

22. *(86)* 90×500

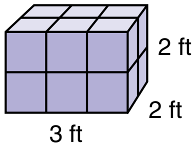
23. *(80)* $7\overline{)2942}$

24. *(105)* $10\overline{)453}$

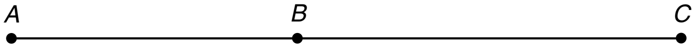
25. *(118)* $11\overline{)453}$

26. *(106, 120)* Evaluate $m + n$ when m is $3\frac{2}{5}$ and n is $2\frac{1}{10}$.

27. *(Inv. 11)* What is the volume of this rectangular solid?



28. *(45, 114)* Segment *AC* is $3\frac{1}{2}$ inches long. Segment *AB* is $1\frac{1}{2}$ inches long. How long is segment *BC*?



29. *(117)* Fewer people live in Wyoming than in any other state. According to the 2000 U.S. census, 493,782 people lived in Wyoming. Round this number of people to the nearest hundred thousand.

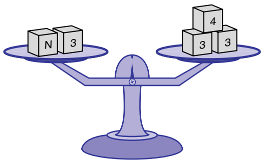
30. *(36, Inv. 5)* One half of a dollar plus $\frac{1}{4}$ of a dollar totals what percent of a dollar?

INVESTIGATION 12

Focus on

Solving Equations

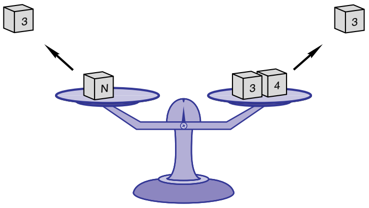
An **equation** states that two quantities are equal. One model for an equation is a balanced scale. The scale below is balanced because the combined weight on one side of the scale equals the combined weight on the other side. The weight of each block is given by its number. We do not know the weight of the block labeled N. Below the scale we have written an equation for the illustration.



$$N + 3 = 10$$

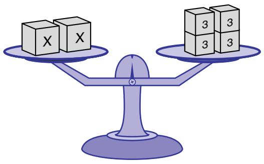
We can find the weight N by removing a weight of 3 from each side of the scale. Then N is alone on one side of the scale, and the weight on the other side of the scale must equal N.

Remove 3 from each side of the scale:



$$N = 7$$

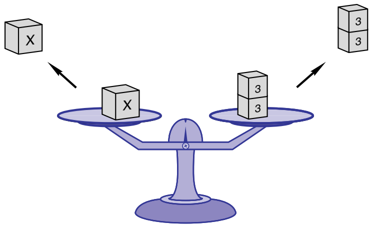
Here is another balanced scale. We see that two blocks of weight X balance four blocks of weight 3.



$$2X = 12$$

We can find the weight X by removing half of the weight from each side of the scale. Now one block of weight X balances two blocks of weight 3.

Remove half the weight from each side of the scale.



$X = 6$

Activity: *Solving Equations*

Materials needed by each student:

- 1 copy of Activity Master 23 (masters available in *Saxon Math 5/4 Assessments and Classroom Masters*)

As a class, work problems 1–8 on Activity Master 23. Write an equation for each illustration, and discuss how to get the lettered block alone on one side of the scale while keeping the scale balanced.

Extension Have each student create an equation for the class to solve using the model of a balanced scale and an unknown weight.

APPENDIX

Additional Topics and Supplemental Practice

TOPIC

A

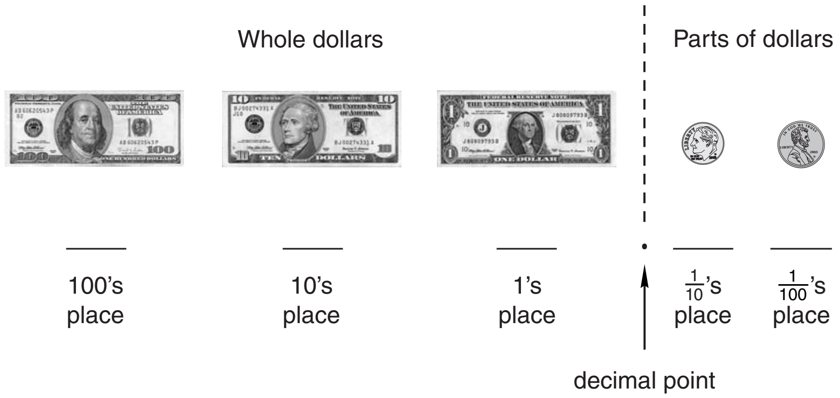
Using Money Manipulatives to Represent Decimal Place Value

NEW CONCEPT

Materials needed for each student:

- money manipulatives ($100, $10, and $1 bills, dimes, and pennies)
- zip-top plastic bags to store manipulatives for later use

In this activity we will use bills, dimes, and pennies to illustrate place value.



The bills and coins shown above can be combined to illustrate different amounts of money. For example, we can show $234.21 like this:

Arrange bills and coins to form the following money amounts. Place each denomination of bills and coins in a separate stack. The stacks should be arranged so that they go from the largest denomination on the left to the smallest on the right.

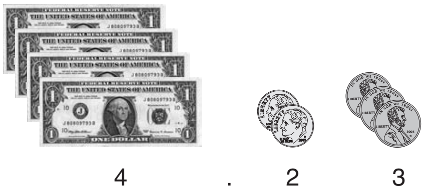
a. $345.23

b. $0.42

c. \$5.20

d. \$3.02

Now we will use bills and coins to represent decimal numbers that are not money amounts. Below we show an example of money representing the number 4.23 (four and twenty-three hundredths).



Use bills and coins to represent these decimal numbers:

e. 3.42 (three and forty-two hundredths)

f. 0.24 (twenty-four hundredths)

g. 12.03 (twelve and three hundredths)

h. 1.3 (one and three tenths)

TOPIC B

Roman Numerals Through 39

NEW CONCEPT

Roman numerals were used by the ancient Romans to write numbers. Today Roman numerals are still used to number such things as book chapters, movie sequels, and Super Bowl games. We might also find Roman numerals on clocks and buildings.

Some Roman numerals are

I which stands for 1

V which stands for 5

X which stands for 10

The Roman numeral system does not use place value. Instead, the values of the numerals are added or subtracted, depending on their position. For example,

II means 1 plus 1, which is 2 (II does not mean "11")

Below we list the Roman numerals for the numbers 1 through 20. Study the patterns.

1 = I

2 = II

3 = III

4 = IV

5 = V

6 = VI

7 = VII

8 = VIII

9 = IX

10 = X

11 = XI

12 = XII

13 = XIII

14 = XIV

15 = XV

16 = XVI

17 = XVII

18 = XVIII

19 = XIX

20 = XX

The multiples of 5 are 5, 10, 15, 20, …. The numbers that are one less than these (4, 9, 14, 19, …) have Roman numerals that involve subtraction.

4 = IV (“one less than five”)
9 = IX (“one less than ten”)
14 = XIV (ten plus “one less than five”)
19 = XIX (ten plus “one less than ten”)

In each case where a smaller Roman numeral (I) precedes a larger Roman numeral (V or X), we subtract the smaller number from the larger number.

Example (a) Write XXVII in our number system.[†]

(b) Write 34 in Roman numerals.

Solution (a) We can break up the Roman numeral and see that it equals 2 tens plus 1 five plus 2 ones.

XX V II

20 + 5 + 2 = **27**

(b) We think of 34 as “30 plus 4.”

30 + 4

XXX IV

So the Roman numeral for 34 is **XXXIV.**

LESSON PRACTICE

Practice set Write the Roman numerals for 1 to 39 in order.

[†] The modern world has adopted the Hindu-Arabic number system with the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and base 10 place value. For simplicity we refer to the Hindu-Arabic system as “our number system.”

TOPIC

C

Roman Numerals Through Thousands

NEW CONCEPT

We have practiced using these Roman numerals:

I V X

With these numerals we can write counting numbers up to XXXIX (39). To write larger numbers, we must use the Roman numerals L (50), C (100), D (500), and M (1000). The table below shows the different Roman numeral "digits" we have learned, as well as their respective values.

NUMERAL	VALUE
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Example Write each Roman numeral in our number system:

(a) LXX (b) DCCL (c) XLIV (d) MMI

Solution (a) LXX is $50 + 10 + 10$, which is **70.**

(b) DCCL is $500 + 100 + 100 + 50$, which is **750.**

(c) XLIV is "10 less than 50" plus "1 less than 5"; that is, $40 + 4 =$ **44.**

(d) MMI is $1000 + 1000 + 1$, which is **2001.**

LESSON PRACTICE

Practice set Write each Roman numeral in our number system:

a. CCCLXII **b.** CCLXXXV **c.** CD

d. XLVII **e.** MMMCCLVI **f.** MCMXCIX

TOPIC D

Base 5

NEW CONCEPT

Our **base 10 number system** uses place value and the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 to write numbers. The value of each place is ten times the value of the next-smaller place. Some U.S. coins and bills match our base 10 system. Ten pennies equals a dime; ten dimes equals a dollar, and so on. Using no more than nine of each of the coins and bills shown below, we can make any money amount from 1¢ to 99,999¢ ($999.99).

A different set of U.S. money matches the **base 5 number system.** Five pennies equals a nickel, and five nickels equals a quarter.

A base 5 system uses only the digits 0, 1, 2, 3, and 4 to write numbers, and the value of each place is only five times the value of the next-smaller place. Using no more than four pennies, four nickels, and four quarters, we can make any money amount from 1¢ to 124¢. However, when we write 124¢ in base 5 we do not use the number 124. Here is why. The first three places in base 5 are the ones place, the fives place, and the twenty-fives place. (It may be easier to think of these places as the pennies place, the nickels place, and the quarters place.)

Base 5 Place Values

25's place	5's place	1's place
________	________	________
(quarters)	(nickels)	(pennies)

To make 124¢ requires 4 quarters, 4 nickels, and 4 pennies. So the number 124 changed to the base 5 system looks like this:

444 (base 5)

To change a number to base 5, think of how many pennies, nickels, and quarters it would take to make the same number of cents. Remember to use no more than four of any coin. Also remember that you may need to use one or more zeros when you write a number in base 5, just as in base 10.

Example Change the number 15 from base 10 to base 5.

Solution We think of 15 as the money amount 15¢. We can make 15¢ by using 3 nickels and 0 pennies. So 15 in base 5 is written as **30 (base 5).**

LESSON PRACTICE

Practice set Change each of these base 10 numbers to base 5.

a. 31
b. 51
c. 10
d. 100
e. 38
f. 86

Supplemental Practice Problems for Selected Lessons

This appendix contains additional practice problems for concepts presented in selected lessons. It is very important that no problems in the regular problem sets be omitted to make room for these problems. Saxon math is designed to produce long-term retention through repeated exposure to concepts in the problem sets. The problem sets provide enough initial exposure to concepts for most students. However, if a student continues to have difficulty with certain concepts, some of the problems in this appendix can be assigned as remedial exercises.

Lesson 16

Subtract:

1. $\begin{array}{r} 42 \\ -\ 23 \\ \hline \end{array}$ **2.** $\begin{array}{r} 30 \\ -\ 16 \\ \hline \end{array}$ **3.** $\begin{array}{r} 24 \\ -\ 17 \\ \hline \end{array}$ **4.** $\begin{array}{r} 54 \\ -\ 27 \\ \hline \end{array}$

5. $\begin{array}{r} 31 \\ -\ 24 \\ \hline \end{array}$ **6.** $\begin{array}{r} 60 \\ -\ 36 \\ \hline \end{array}$ **7.** $\begin{array}{r} 23 \\ -\ B \\ \hline 6 \end{array}$ **8.** $\begin{array}{r} D \\ -\ 19 \\ \hline 21 \end{array}$

9. $\begin{array}{r} 57 \\ -\ F \\ \hline 29 \end{array}$ **10.** $\begin{array}{r} H \\ -\ 36 \\ \hline 34 \end{array}$ **11.** $\begin{array}{r} 42 \\ -\ J \\ \hline 5 \end{array}$ **12.** $\begin{array}{r} L \\ -\ 47 \\ \hline 27 \end{array}$

13. $36 - 18$ **14.** $24 - 7$ **15.** $40 - 23$

16. $60 - R = 33$ **17.** $P - 39 = 18$ **18.** $72 - 64$

19. $T - 46 = 28$ **20.** $35 - W = 7$

Lesson 17

Add:

1. $\begin{array}{r} 12 \\ 8 \\ 15 \\ +\ 7 \\ \hline \end{array}$ **2.** $\begin{array}{r} 36 \\ 8 \\ 24 \\ +\ 16 \\ \hline \end{array}$ **3.** $\begin{array}{r} 12 \\ 23 \\ 24 \\ +\ 20 \\ \hline \end{array}$ **4.** $\begin{array}{r} 16 \\ 36 \\ 54 \\ +\ 32 \\ \hline \end{array}$

5. $\begin{array}{r} 74 \\ 37 \\ 60 \\ +\ 46 \\ \hline \end{array}$ **6.** $\begin{array}{r} 57 \\ 24 \\ 38 \\ +\ 83 \\ \hline \end{array}$ **7.** $\begin{array}{r} 95 \\ 9 \\ 78 \\ +\ 35 \\ \hline \end{array}$ **8.** $\begin{array}{r} 47 \\ 58 \\ 62 \\ +\ 55 \\ \hline \end{array}$

9. $\begin{array}{r} 34 \\ 27 \\ 8 \\ +\ 27 \\ \hline \end{array}$ **10.** $\begin{array}{r} 67 \\ 15 \\ 436 \\ +\ 25 \\ \hline \end{array}$ **11.** $\begin{array}{r} 314 \\ 28 \\ 116 \\ +\ 42 \\ \hline \end{array}$ **12.** $\begin{array}{r} 9 \\ 32 \\ 154 \\ +\ 97 \\ \hline \end{array}$

13. $\begin{array}{r} 374 \\ 257 \\ 38 \\ +\ 146 \\ \hline \end{array}$ **14.** $\begin{array}{r} 66 \\ 207 \\ 84 \\ +\ 259 \\ \hline \end{array}$ **15.** $\begin{array}{r} 360 \\ 45 \\ 179 \\ +\ 78 \\ \hline \end{array}$ **16.** $\begin{array}{r} 40 \\ 95 \\ 379 \\ +\ 86 \\ \hline \end{array}$

17. $\begin{array}{r} 36 \\ 275 \\ 175 \\ +\ 384 \\ \hline \end{array}$ **18.** $\begin{array}{r} 436 \\ 39 \\ 147 \\ +\ 88 \\ \hline \end{array}$ **19.** $\begin{array}{r} 363 \\ 247 \\ 152 \\ +\ 148 \\ \hline \end{array}$ **20.** $\begin{array}{r} 273 \\ 54 \\ 106 \\ +\ 50 \\ \hline \end{array}$

Lesson 30 Subtract:

1. $\begin{array}{r} 263 \\ -\ 147 \\ \hline \end{array}$ **2.** $\begin{array}{r} 432 \\ -\ 141 \\ \hline \end{array}$ **3.** $\begin{array}{r} 520 \\ -\ 336 \\ \hline \end{array}$ **4.** $\begin{array}{r} 287 \\ -\ 179 \\ \hline \end{array}$

5. $\begin{array}{r} 196 \\ -\ 57 \\ \hline \end{array}$ **6.** $\begin{array}{r} 479 \\ -\ 286 \\ \hline \end{array}$ **7.** $\begin{array}{r} 360 \\ -\ 134 \\ \hline \end{array}$ **8.** $\begin{array}{r} 424 \\ -\ 254 \\ \hline \end{array}$

9. $\begin{array}{r} 316 \\ -\ 79 \\ \hline \end{array}$ **10.** $\begin{array}{r} 260 \\ -\ 146 \\ \hline \end{array}$ **11.** $\begin{array}{r} 415 \\ -\ 387 \\ \hline \end{array}$

12. 247 − 79 **13.** 163 − 127 **14.** 459 − 367

15. 770 − 287 **16.** 612 − 78 **17.** 340 − 149

18. 210 − 86 **19.** 436 − 156 **20.** 520 − 417

Lesson 34 Use words to write each number:

1. 363

2. 1246

3. 12,280

4. 25,362

5. 123,570

6. 253,500

7. 112,060

8. 220,405

9. 204,050

10. 546,325

Use digits to write each number:

11. one thousand, two hundred seventy-eight

12. eleven thousand, five hundred forty-four

13. twenty-two thousand, four hundred thirty

14. fifty-seven thousand, nine hundred

15. one hundred seventy-one thousand, two hundred thirty

16. two hundred ten thousand, nine hundred

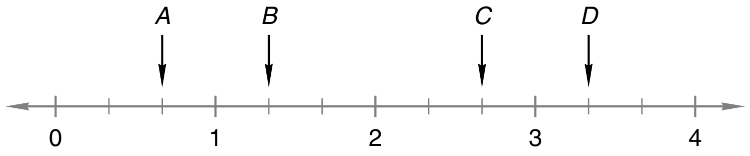
17. five hundred sixty-three thousand, fifty-eight

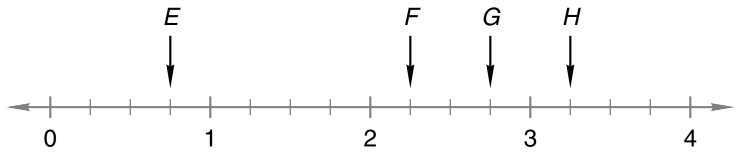
18. nine hundred eighty-seven thousand, six hundred fifty-four

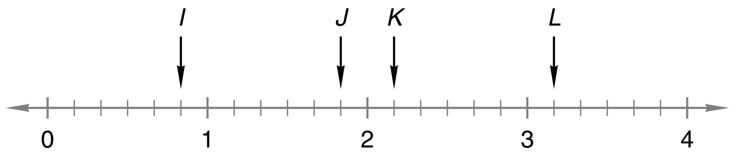
19. one hundred five thousand, seventy

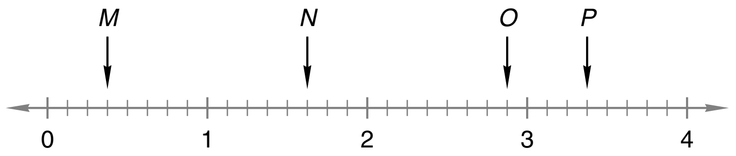
20. six hundred fifty thousand, four hundred three

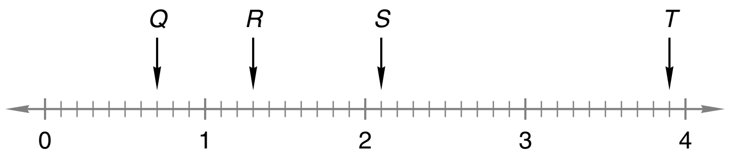
Lesson 37 Name the fraction or mixed number marked by each arrow on these number lines:











Lesson 41

Subtract:

1. $\begin{array}{r} 300 \\ -\ 136 \\ \hline \end{array}$ **2.** $\begin{array}{r} 403 \\ -\ 257 \\ \hline \end{array}$ **3.** $\begin{array}{r} 200 \\ -\ 143 \\ \hline \end{array}$ **4.** $\begin{array}{r} 306 \\ -\ 157 \\ \hline \end{array}$

5. $\begin{array}{r} 600 \\ -\ 249 \\ \hline \end{array}$ **6.** $\begin{array}{r} 201 \\ -\ 165 \\ \hline \end{array}$ **7.** $\begin{array}{r} 100 \\ -\ 36 \\ \hline \end{array}$ **8.** $\begin{array}{r} 405 \\ -\ 229 \\ \hline \end{array}$

9. $\begin{array}{r} 400 \\ -\ 349 \\ \hline \end{array}$ **10.** $\begin{array}{r} 101 \\ -\ 94 \\ \hline \end{array}$ **11.** $\begin{array}{r} 700 \\ -\ 436 \\ \hline \end{array}$ **12.** $\begin{array}{r} 501 \\ -\ 127 \\ \hline \end{array}$

13. $\begin{array}{r} 100 \\ -\ 79 \\ \hline \end{array}$ **14.** $\begin{array}{r} 907 \\ -\ 65 \\ \hline \end{array}$ **15.** $\begin{array}{r} 500 \\ -\ 249 \\ \hline \end{array}$ **16.** $\begin{array}{r} 804 \\ -\ 756 \\ \hline \end{array}$

17. $\begin{array}{r} 800 \\ -\ 48 \\ \hline \end{array}$ **18.** $\begin{array}{r} 602 \\ -\ 575 \\ \hline \end{array}$ **19.** $\begin{array}{r} 900 \\ -\ 617 \\ \hline \end{array}$ **20.** $\begin{array}{r} 107 \\ -\ 28 \\ \hline \end{array}$

Lesson 43

Find each sum or difference:

1. \$6.35 + \$4
2. \$4.84 − \$3

3. 48¢ + 67¢
4. \$0.49 − 15¢

5. \$0.36 + 85¢
6. \$1.25 − 8¢

7. \$2.45 + 6¢
8. 75¢ − \$0.67

9. 98¢ + \$12
10. \$1.00 − 95¢

11. \$3.46 + \$2 + 49¢
12. 50¢ − \$0.07

13. 36¢ + \$0.12 + \$2.14
14. \$2 − \$1.37

15. \$15 + \$1.50 + 15¢
16. \$1 − 37¢

17. 36¢ + 24¢ + 78¢
18. \$5 − \$4.63

19. \$5 + \$0.36 + 9¢
20. 87¢ − 78¢

Lesson 48 Multiply:

1. $\begin{array}{r} 36 \\ \times\ \ 2 \\ \hline \end{array}$ **2.** $\begin{array}{r} 43 \\ \times\ \ 5 \\ \hline \end{array}$ **3.** $\begin{array}{r} 57 \\ \times\ \ 3 \\ \hline \end{array}$ **4.** $\begin{array}{r} 24 \\ \times\ \ 6 \\ \hline \end{array}$

5. $\begin{array}{r} 38 \\ \times\ \ 4 \\ \hline \end{array}$ **6.** $\begin{array}{r} 52 \\ \times\ \ 7 \\ \hline \end{array}$ **7.** $\begin{array}{r} 27 \\ \times\ \ 5 \\ \hline \end{array}$ **8.** $\begin{array}{r} 19 \\ \times\ \ 8 \\ \hline \end{array}$

9. 28 × 6 **10.** 9 × 56 **11.** 47 × 7

12. 4 × 89 **13.** 64 × 8 **14.** 5 × 75

15. 63 × 9 **16.** 4 × 76 **17.** 97 × 6

18. 2 × 68 **19.** 54 × 7 **20.** 3 × 45

Lesson 50 Find each sum or difference:

1. 3.6 + 2.17 **2.** 5.28 + 12.4

3. 15.4 + 23.56 **4.** 6.7 + 15.8

5. 16.36 + 14.7 **6.** 45.3 + 2.91

7. 0.4 + 45.91 **8.** 3.71 + 6.3

9. 103.7 + 7.41 **10.** 9.09 + 90.9

11. 1.3 + 4.26 + 2.7 **12.** 12.4 + 1.5 + 3.3

13. 2.1 + 1.91 + 12.12 **14.** 6.58 + 3.7 + 0.4

15. 29.6 + 2.96 + 29.62 **16.** 3.4 + 4.56 + 1.41

17. 36.4 + 6.4 + 0.64

18. 1.2 + 0.21 + 12.1 + 10.21

19. 3.5 + 0.35 + 5.03 + 35.53 + 35.0

20. 2.4 + 4.12 + 20.4 + 42.21 + 1.2

21. 3.45 − 1.2 **22.** 23.1 − 2.2

23. 14.25 − 1.6 **24.** 15.3 − 4.4

25. 7.59 − 1.8

26. 25.34 − 1.21

27. 16.25 − 1.9

28. 8.19 − 0.4

29. 13.26 − 12.2

30. $\begin{array}{r} 3.4 \\ -\ 1.26 \\ \hline \end{array}$

31. $\begin{array}{r} 4.0 \\ -\ 2.14 \\ \hline \end{array}$

32. $\begin{array}{r} 12.4 \\ -\ 1.24 \\ \hline \end{array}$

33. 7.4 − 1.22

34. 3.68 − 1.7

35. 12.1 − 1.21

36. 30.1 − 3.01

37. 34.05 − 6.4

38. 58.0 − 2.14

39. 3.09 − 1.8

40. 20.1 − 3.19

Lesson 52

Subtract:

1. $\begin{array}{r} 3486 \\ -\ 1687 \\ \hline \end{array}$

2. $\begin{array}{r} 2175 \\ -\ 1346 \\ \hline \end{array}$

3. $\begin{array}{r} 3747 \\ -\ 1654 \\ \hline \end{array}$

4. $\begin{array}{r} 4403 \\ -\ 1475 \\ \hline \end{array}$

5. $\begin{array}{r} 6300 \\ -\ 3149 \\ \hline \end{array}$

6. $\begin{array}{r} 2048 \\ -\ 1951 \\ \hline \end{array}$

7. $\begin{array}{r} 3000 \\ -\ 1346 \\ \hline \end{array}$

8. $\begin{array}{r} 4005 \\ -\ 2418 \\ \hline \end{array}$

9. $\begin{array}{r} 3040 \\ -\ 1535 \\ \hline \end{array}$

10. $\begin{array}{r} 6000 \\ -\ 2164 \\ \hline \end{array}$

11. $\begin{array}{r} 8010 \\ -\ 7825 \\ \hline \end{array}$

12. $\begin{array}{r} 5007 \\ -\ 1838 \\ \hline \end{array}$

13. $\begin{array}{r} 36{,}247 \\ -\ 1{,}456 \\ \hline \end{array}$

14. $\begin{array}{r} 30{,}148 \\ -\ 23{,}109 \\ \hline \end{array}$

15. $\begin{array}{r} 40{,}015 \\ -\ 16{,}438 \\ \hline \end{array}$

16. $\begin{array}{r} 30{,}000 \\ -\ 256 \\ \hline \end{array}$

17. $\begin{array}{r} 30{,}604 \\ -\ 1{,}915 \\ \hline \end{array}$

18. $\begin{array}{r} 90{,}040 \\ -\ 37{,}478 \\ \hline \end{array}$

19. $\begin{array}{r} 376{,}142 \\ -\ 36{,}174 \\ \hline \end{array}$

20. $\begin{array}{r} 403{,}700 \\ -\ 394{,}672 \\ \hline \end{array}$

Lesson 53

Divide:

1. $2\overline{)15}$

2. $5\overline{)23}$

3. $3\overline{)25}$

4. $26 \div 6$

5. $31 \div 4$

6. $50 \div 7$

7. $5\overline{)37}$

8. $8\overline{)35}$

9. $6\overline{)43}$

10. $30 \div 9$

11. $45 \div 7$

12. $17 \div 2$

13. $8\overline{)49}$

14. $3\overline{)25}$

15. $9\overline{)60}$

16. $27 \div 4$

17. $15 \div 8$

18. $32 \div 5$

19. $3\overline{)20}$

20. $6\overline{)34}$

Lesson 58

Multiply:

1. $\begin{array}{r} 136 \\ \times \quad 2 \\ \hline \end{array}$

2. $\begin{array}{r} 235 \\ \times \quad 5 \\ \hline \end{array}$

3. $\begin{array}{r} 430 \\ \times \quad 3 \\ \hline \end{array}$

4. 216×6

5. 450×4

6. 7×642

7. $\begin{array}{r} 307 \\ \times \quad 5 \\ \hline \end{array}$

8. $\begin{array}{r} 458 \\ \times \quad 8 \\ \hline \end{array}$

9. $\begin{array}{r} 740 \\ \times \quad 6 \\ \hline \end{array}$

10. 368×7

11. 9×403

12. 490×8

13. $\begin{array}{r} 609 \\ \times \quad 2 \\ \hline \end{array}$

14. $\begin{array}{r} 470 \\ \times \quad 9 \\ \hline \end{array}$

15. $\begin{array}{r} 518 \\ \times \quad 3 \\ \hline \end{array}$

16. 2×296

17. 708×4

18. 3×430

19. 275×5

20. 4×308

Lesson 64

Divide:

1. $3\overline{)48}$
2. $2\overline{)56}$
3. $4\overline{)72}$
4. $7\overline{)98}$
5. $5\overline{)80}$
6. $8\overline{)96}$
7. $6\overline{)90}$
8. $3\overline{)81}$
9. $7\overline{)91}$
10. $4\overline{)68}$
11. $2\overline{)76}$
12. $5\overline{)90}$
13. $3\overline{)54}$
14. $6\overline{)84}$
15. $3\overline{)78}$
16. $7\overline{)84}$
17. $4\overline{)84}$
18. $5\overline{)85}$
19. $6\overline{)72}$
20. $5\overline{)65}$

Lesson 65

Divide:

1. $2\overline{)110}$
2. $9\overline{)126}$
3. $3\overline{)222}$
4. $8\overline{)432}$
5. $4\overline{)256}$
6. $7\overline{)455}$
7. $5\overline{)320}$
8. $2\overline{)192}$
9. $6\overline{)342}$
10. $3\overline{)204}$
11. $7\overline{)266}$
12. $4\overline{)100}$
13. $8\overline{)456}$
14. $5\overline{)365}$
15. $9\overline{)468}$
16. $6\overline{)162}$
17. $4\overline{)252}$
18. $7\overline{)665}$
19. $8\overline{)600}$
20. $5\overline{)245}$

Lesson 67

Multiply:

1. $\begin{array}{r} 32 \\ \times\ \ 20 \\ \hline \end{array}$
2. $\begin{array}{r} 43¢ \\ \times\ \ 30 \\ \hline \end{array}$
3. $\begin{array}{r} 56 \\ \times\ \ 40 \\ \hline \end{array}$
4. $\begin{array}{r} \$0.68 \\ \times\ \ \ \ \ \ 20 \\ \hline \end{array}$
5. $\begin{array}{r} 47 \\ \times\ \ 60 \\ \hline \end{array}$
6. $\begin{array}{r} \$1.68 \\ \times\ \ \ \ \ \ 20 \\ \hline \end{array}$

7. 20 × 75
8. 30 × 49¢
9. 40 × 87
10. $0.97 × 50
11. 70 × $1.49
12. 60 × 38

13. 80 × 76
14. 48¢ × 90
15. 20 × 89
16. $2.25 × 50
17. $0.39 × 60
18. 30 × 78
19. 40 × 67¢
20. 84 × 70

Lesson 68

Divide:

1. $4\overline{)93}$
2. $2\overline{)115}$
3. $5\overline{)182}$
4. $3\overline{)173}$
5. $6\overline{)289}$
6. $4\overline{)181}$
7. $7\overline{)164}$
8. $5\overline{)319}$
9. $8\overline{)218}$
10. $6\overline{)235}$
11. $9\overline{)220}$
12. $7\overline{)442}$
13. $2\overline{)189}$
14. $8\overline{)595}$
15. $3\overline{)109}$
16. $9\overline{)892}$
17. $4\overline{)218}$
18. $2\overline{)55}$
19. $5\overline{)232}$
20. $3\overline{)220}$

Lesson 76

Divide:

1. $3\overline{)700}$
2. $6\overline{)738}$
3. $4\overline{)892}$
4. $7\overline{)868}$
5. $5\overline{)1606}$
6. $8\overline{)915}$
7. $6\overline{)1275}$
8. $9\overline{)1926}$
9. $7\overline{)2415}$
10. $3\overline{)1603}$
11. $8\overline{)1161}$
12. $4\overline{)1111}$
13. $9\overline{)3000}$
14. $5\overline{)625}$
15. $3\overline{)1333}$
16. $6\overline{)1518}$
17. $4\overline{)2250}$
18. $7\overline{)1162}$
19. $8\overline{)1000}$
20. $5\overline{)3743}$

Lesson 80

Divide:

1. $4\overline{)960}$
2. $5\overline{)1600}$
3. $3\overline{)1206}$
4. $9\overline{)936}$
5. $4\overline{)2082}$
6. $6\overline{)1820}$
7. $7\overline{)2801}$
8. $2\overline{)1819}$
9. $5\overline{)3404}$

10. $3\overline{)2712}$

11. $6\overline{)3000}$

12. $4\overline{)2681}$

13. $7\overline{)5650}$

14. $8\overline{)3275}$

15. $3\overline{)450}$

16. $5\overline{)2001}$

17. $2\overline{)381}$

18. $8\overline{)6080}$

19. $9\overline{)3686}$

20. $6\overline{)4202}$

Lesson 90 Multiply:

1. 12×36

2. 46×15

3. 31×27

4. $\begin{array}{r} 74 \\ \times\ 16 \\ \hline \end{array}$

5. $\begin{array}{r} 36 \\ \times\ 63 \\ \hline \end{array}$

6. $\begin{array}{r} 35 \\ \times\ 35 \\ \hline \end{array}$

7. 14×63

8. 78×22

9. 25×37

10. $\begin{array}{r} 74 \\ \times\ 58 \\ \hline \end{array}$

11. $\begin{array}{r} 63 \\ \times\ 49 \\ \hline \end{array}$

12. $\begin{array}{r} 18 \\ \times\ 65 \\ \hline \end{array}$

13. 96×32

14. 51×76

15. 38×24

16. $\begin{array}{r} 38 \\ \times\ 47 \\ \hline \end{array}$

17. $\begin{array}{r} 49 \\ \times\ 86 \\ \hline \end{array}$

18. $\begin{array}{r} 29 \\ \times\ 31 \\ \hline \end{array}$

19. 33×79

20. 57×42

Lesson 104 Change each improper fraction to a mixed number or to a whole number:

1. $\frac{3}{2}$

2. $\frac{9}{3}$

3. $\frac{4}{3}$

4. $\frac{7}{4}$

5. $\frac{12}{5}$

6. $\frac{4}{2}$

7. $\frac{5}{4}$

8. $\frac{7}{5}$

9. $\frac{3}{3}$

10. $\frac{9}{5}$

11. $\frac{5}{2}$

12. $\frac{8}{4}$

13. $\frac{15}{15}$

14. $\frac{5}{3}$

15. $\frac{9}{4}$

16. $\frac{6}{2}$

17. $\frac{6}{3}$

18. $\frac{10}{3}$

19. $\frac{7}{2}$

20. $\frac{7}{3}$

Lesson 107

Find each sum or difference:

1. $3\frac{1}{2} + 1$

2. $3\frac{1}{3} + 1\frac{1}{3}$

3. $1\frac{1}{5} + \frac{3}{5}$

4. $4 + \frac{1}{2}$

5. $6\frac{3}{5} + 1\frac{1}{5}$

6. $5\frac{5}{8} + 6$

7. $3\frac{3}{7} + 2\frac{2}{7}$

8. $6 + 7\frac{1}{2}$

9. $\frac{5}{9} + 3\frac{2}{9}$

10. $3\frac{3}{10} + 6\frac{6}{10}$

11. $5\frac{2}{3} - 1\frac{1}{3}$

12. $3\frac{3}{4} - 2$

13. $6\frac{1}{2} - \frac{1}{2}$

14. $8\frac{3}{4} - 1\frac{3}{4}$

15. $2\frac{5}{8} - 2\frac{2}{8}$

16. $4\frac{4}{5} - \frac{1}{5}$

17. $4\frac{4}{9} - 3$

18. $1\frac{4}{5} - \frac{4}{5}$

19. $3\frac{1}{2} - 1\frac{1}{2}$

20. $4\frac{5}{7} - 1\frac{3}{7}$

Lesson 110

Divide:

1. $20\overline{)460}$

2. $30\overline{)630}$

3. $40\overline{)520}$

4. $50\overline{)1600}$

5. $60\overline{)720}$

6. $70\overline{)1470}$

7. $80\overline{)1700}$

8. $90\overline{)1200}$

9. $20\overline{)680}$

10. $40\overline{)1325}$

11. $60\overline{)1450}$

12. $70\overline{)2177}$

13. $80\overline{)2001}$

14. $90\overline{)1359}$

15. $20\overline{)920}$

16. $40\overline{)2088}$

17. $60\overline{)2640}$

18. $70\overline{)1624}$

19. $30\overline{)1680}$

20. $50\overline{)2710}$

Lesson 112

Reduce each fraction:

1. $\frac{5}{10}$

2. $\frac{2}{4}$

3. $\frac{6}{8}$

4. $\frac{2}{6}$

5. $\frac{3}{9}$

6. $\frac{4}{10}$

7. $\frac{3}{6}$

8. $\frac{2}{12}$

9. $\frac{9}{12}$

10. $\frac{4}{6}$

11. $\frac{6}{9}$

12. $\frac{8}{10}$

13. $\frac{2}{8}$ **14.** $\frac{3}{12}$ **15.** $\frac{2}{10}$ **16.** $\frac{4}{8}$

17. $\frac{8}{12}$ **18.** $\frac{6}{10}$ **19.** $\frac{4}{12}$ **20.** $\frac{6}{12}$

Lesson 113

Multiply:

1. 320×12 **2.** 132×21 **3.** 143×23

4. $\begin{array}{r} 150 \\ \times\ \ 32 \\ \hline \end{array}$ **5.** $\begin{array}{r} 304 \\ \times\ \ 13 \\ \hline \end{array}$ **6.** $\begin{array}{r} 315 \\ \times\ \ 24 \\ \hline \end{array}$

7. 42×163 **8.** 230×15 **9.** 25×402

10. $\begin{array}{r} 357 \\ \times\ \ 34 \\ \hline \end{array}$ **11.** $\begin{array}{r} 780 \\ \times\ \ 56 \\ \hline \end{array}$ **12.** $\begin{array}{r} 406 \\ \times\ \ 17 \\ \hline \end{array}$

13. 28×196 **14.** 460×39 **15.** 43×179

16. $\begin{array}{r} 108 \\ \times\ \ 39 \\ \hline \end{array}$ **17.** $\begin{array}{r} 349 \\ \times\ \ 74 \\ \hline \end{array}$ **18.** $\begin{array}{r} 470 \\ \times\ \ 68 \\ \hline \end{array}$

19. 29×357 **20.** 186×37

Lesson 114

Simplify the answer to each sum or difference:

1. $\frac{1}{2} + \frac{1}{2}$ **2.** $\frac{1}{3} - \frac{1}{3}$ **3.** $\frac{1}{4} + \frac{1}{4}$

4. $\frac{3}{8} - \frac{1}{8}$ **5.** $\frac{1}{6} + \frac{2}{6}$ **6.** $\frac{5}{6} - \frac{1}{6}$

7. $\frac{2}{3} + \frac{2}{3}$ **8.** $\frac{7}{8} - \frac{1}{8}$ **9.** $\frac{4}{5} + \frac{3}{5}$

10. $3\frac{1}{2} - 1\frac{1}{2}$ **11.** $2\frac{2}{3} + 1\frac{1}{3}$ **12.** $3\frac{3}{4} - 1\frac{1}{4}$

13. $4\frac{2}{3} + 5\frac{2}{3}$ **14.** $3\frac{4}{9} - 1\frac{1}{9}$ **15.** $1\frac{1}{6} + 1\frac{1}{6}$

16. $6\frac{7}{10} - 4\frac{1}{10}$ **17.** $4\frac{5}{12} - 1\frac{1}{12}$ **18.** $5\frac{3}{4} + 4\frac{1}{4}$

19. $7\frac{4}{5} + 4\frac{4}{5}$ **20.** $7\frac{7}{8} - 3\frac{3}{8}$

Lesson 115

In problems 1–8, find the fraction name for 1 used to make the equivalent fraction:

1. $\frac{1}{2} \times \frac{?}{?} = \frac{3}{6}$

2. $\frac{1}{2} \times \frac{?}{?} = \frac{5}{10}$

3. $\frac{1}{2} \times \frac{?}{?} = \frac{6}{12}$

4. $\frac{1}{3} \times \frac{?}{?} = \frac{3}{9}$

5. $\frac{1}{6} \times \frac{?}{?} = \frac{2}{12}$

6. $\frac{3}{4} \times \frac{?}{?} = \frac{9}{12}$

7. $\frac{2}{5} \times \frac{?}{?} = \frac{4}{10}$

8. $\frac{2}{3} \times \frac{?}{?} = \frac{8}{12}$

In problems 9–20, complete the equivalent fraction:

9. $\frac{1}{4} = \frac{?}{8}$

10. $\frac{1}{3} = \frac{?}{6}$

11. $\frac{1}{2} = \frac{?}{4}$

12. $\frac{1}{2} = \frac{?}{8}$

13. $\frac{3}{4} = \frac{?}{8}$

14. $\frac{2}{3} = \frac{?}{9}$

15. $\frac{2}{5} = \frac{?}{10}$

16. $\frac{1}{2} = \frac{?}{12}$

17. $\frac{5}{6} = \frac{?}{12}$

18. $\frac{1}{2} = \frac{?}{4}$

19. $\frac{3}{4} = \frac{?}{12}$

20. $\frac{2}{3} = \frac{?}{12}$

Lesson 118

Divide:

1. $12\overline{)72}$

2. $31\overline{)124}$

3. $11\overline{)100}$

4. $41\overline{)125}$

5. $13\overline{)91}$

6. $21\overline{)107}$

7. $52\overline{)212}$

8. $25\overline{)130}$

9. $32\overline{)130}$

10. $22\overline{)135}$

11. $51\overline{)310}$

12. $14\overline{)80}$

13. $42\overline{)180}$

14. $23\overline{)161}$

15. $34\overline{)175}$

16. $15\overline{)105}$

17. $43\overline{)150}$

18. $24\overline{)200}$

19. $33\overline{)300}$

20. $19\overline{)100}$

21. $11\overline{)253}$

22. $21\overline{)672}$

23. $31\overline{)682}$

24. $12\overline{)504}$

25. $32\overline{)992}$

26. $21\overline{)483}$

27. $11\overline{)165}$

28. $22\overline{)924}$

29. $12\overline{)181}$

30. $31\overline{)963}$

31. $23\overline{)760}$

32. $41\overline{)945}$

33. $15\overline{)375}$

34. $25\overline{)555}$

35. $11\overline{)375}$

36. $21\overline{)924}$

37. $22\overline{)489}$

38. $12\overline{)600}$

39. $33\overline{)1000}$

40. $25\overline{)800}$

Lesson 119

Find each sum or difference:

1. $\frac{1}{4} + \frac{1}{2}$

2. $\frac{1}{4} + \frac{1}{8}$

3. $\frac{1}{2} + \frac{1}{8}$

4. $\frac{1}{4} - \frac{1}{8}$

5. $\frac{1}{2} - \frac{1}{8}$

6. $\frac{1}{3} - \frac{1}{6}$

7. $\frac{2}{3} + \frac{1}{6}$

8. $\frac{3}{4} + \frac{1}{8}$

9. $\frac{1}{3} + \frac{2}{9}$

10. $\frac{5}{6} - \frac{2}{3}$

11. $\frac{7}{8} - \frac{3}{4}$

12. $\frac{9}{10} - \frac{4}{5}$

13. $\frac{5}{6} + \frac{1}{12}$

14. $\frac{3}{10} + \frac{2}{5}$

15. $\frac{1}{3} + \frac{1}{12}$

16. $\frac{4}{5} - \frac{1}{10}$

17. $\frac{8}{9} - \frac{2}{3}$

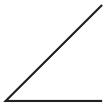
18. $\frac{7}{8} - \frac{1}{4}$

19. $\frac{3}{5} + \frac{3}{10}$

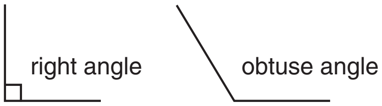
20. $\frac{2}{3} - \frac{7}{12}$

GLOSSARY

acute angle An angle whose measure is more than 0° and less than 90°.



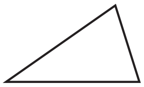
acute angle



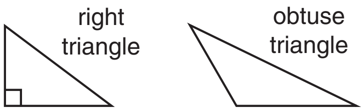
not **acute angles**

*An **acute angle** is smaller than both a right angle and an obtuse angle.*

acute triangle A triangle whose largest angle measures more than 0° and less than 90°.



acute triangle



not **acute triangles**

addend Any one of the numbers in an addition problem that are combined to form a sum.

2 + 3 = 5 *The **addends** in this problem are 2 and 3.*

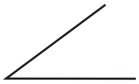
addition An operation that combines two or more numbers to find a total number.

7 + 6 = 13 *We use **addition** to combine 7 and 6.*

a.m. The period of time from midnight to just before noon.

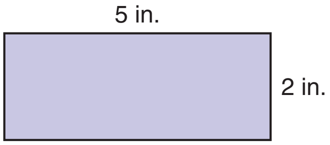
*I get up at 7 **a.m.** I get up at 7 o'clock in the morning.*

angle The opening that is formed when two lines or line segments intersect.



*These line segments form an **angle.***

area The number of square units needed to cover a surface.



*The **area** of this rectangle is 10 square inches.*

arithmetic The branch of mathematics involving addition, subtraction, multiplication, and division.

$6 + 12 \qquad 7 - 4 \qquad 8 \times 3 \qquad 35 \div 5$

Addition, subtraction, multiplication, and division are the four operations of ***arithmetic.***

array A rectangular arrangement of numbers or symbols in columns and rows.

X X X
X X X
X X X
X X X

This is a 3-by-4 ***array*** *of X's.*
It has 3 columns and 4 rows.

associative property of addition The grouping of addends does not affect their sum. In symbolic form, $a + (b + c) = (a + b) + c$. Unlike addition, subtraction is not associative.

$(8 + 4) + 2 = 8 + (4 + 2)$ *Addition is* ***associative.***

$(8 - 4) - 2 \neq 8 - (4 - 2)$ *Subtraction is not* ***associative.***

associative property of multiplication The grouping of factors does not affect their product. In symbolic form, $a \times (b \times c) = (a \times b) \times c$. Unlike multiplication, division is not associative.

$(8 \times 4) \times 2 = 8 \times (4 \times 2)$ *Multiplication is* ***associative.***

$(8 \div 4) \div 2 \neq 8 \div (4 \div 2)$ *Division is not* ***associative.***

average The number found when the sum of two or more numbers is divided by the number of addends in the sum; also called *mean.*

To find the ***average*** *of the numbers 5, 6, and 10, first add.*

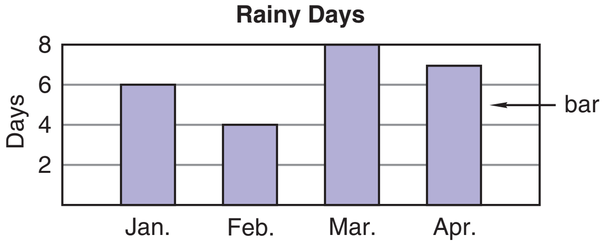
$$5 + 6 + 10 = 21$$

Then, since there were three addends, divide the sum by 3.

$$21 \div 3 = 7$$

The ***average*** *of 5, 6, and 10 is 7.*

bar graph A graph that uses rectangles (bars) to show numbers or measurements.



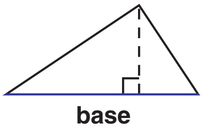
This ***bar graph*** *shows how many rainy days there were in each of these four months.*

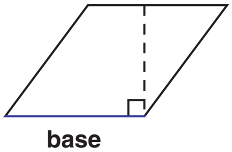
base (1) The lower number in an exponential expression.

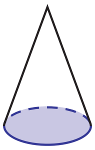
$$\textbf{\textit{base}} \longrightarrow 5^3 \longleftarrow \textit{exponent}$$

5^3 means $5 \times 5 \times 5$ and its value is 125.

(2) A designated side or face of a geometric figure.







bias Favoring one choice over another in a survey.

"Which do you prefer with lunch: cool, sweet lemonade or milk that has been out of the refrigerator for an hour?"

Words like "cool" and "sweet" ***bias*** *this survey question to favor the choice of lemonade.*

borrowing *See* **regrouping.**

calendar A chart that shows the days of the week and their dates.

September 2004

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

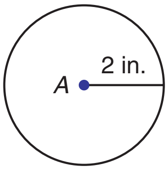
capacity The amount of liquid a container can hold.

Cups, gallons, and liters are units of ***capacity.***

Celsius A scale used on some thermometers to measure temperature.

On the ***Celsius*** *scale, water freezes at 0°C and boils at 100°C.*

center The point inside a circle from which all points on the circle are equally distant.



The ***center*** *of circle A is 2 inches from every point on the circle.*

century A period of one hundred years.

The years 2001–2100 make up one ***century.***

chance A way of expressing the likelihood of an event; the probability of an event expressed as a percent.

The ***chance*** *of rain is 20%. It is not likely to rain.*

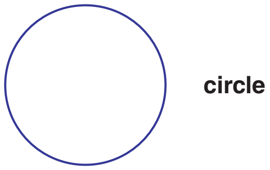
There is a 90% ***chance*** *of snow. It is likely to snow.*

chronological order The order of dates or times when listed from earliest to latest.

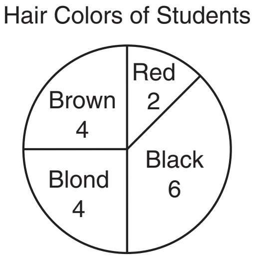
1951, 1962, 1969, 1973, 1981, 2001

These years are listed in ***chronological order.*** *They are listed from earliest to latest.*

circle A closed, curved shape in which all points on the shape are the same distance from its center.

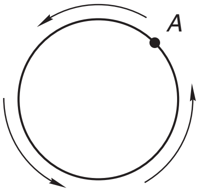


circle graph A graph made of a circle divided into sectors. Also called *pie graph.*



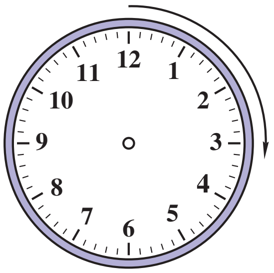
This ***circle graph*** *displays data on students' hair color.*

circumference The distance around a circle; the perimeter of a circle.

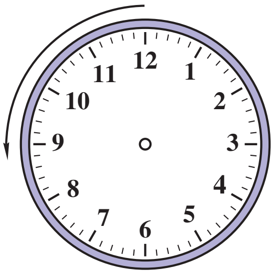


If the distance from point A around to point A is 3 inches, then the ***circumference*** *of the circle is 3 inches.*

clockwise The same direction as the movement of a clock's hands.



clockwise turn



counterclockwise turn

common denominators Denominators that are the same.

The fractions $\frac{2}{5}$ *and* $\frac{3}{5}$ *have* ***common denominators.***

common year A year with 365 days; not a leap year.

The year 2000 is a leap year, but 2001 is a ***common year.*** *In a* ***common year*** *February has 28 days. In a leap year it has 29 days.*

commutative property of addition Changing the order of addends does not affect their sum. In symbolic form, $a + b = b + a$. Unlike addition, subtraction is not commutative.

$8 + 2 = 2 + 8$

Addition is ***commutative.***

$8 - 2 \neq 2 - 8$

Subtraction is not ***commutative.***

commutative property of multiplication Changing the order of factors does not affect their product. In symbolic form, $a \times b = b \times a$. Unlike multiplication, division is not commutative.

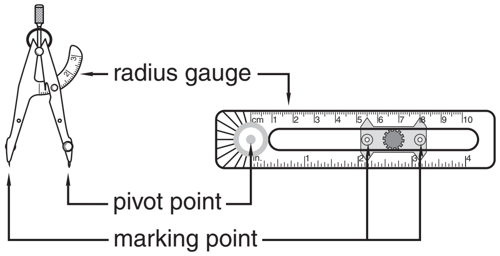
$8 \times 2 = 2 \times 8$

Multiplication is ***commutative.***

$8 \div 2 \neq 2 \div 8$

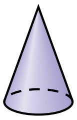
Division is not ***commutative.***

compass A tool used to draw circles and arcs.



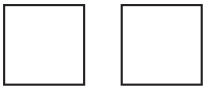
two types of **compasses**

cone A three-dimensional solid with a circular base and a single vertex.



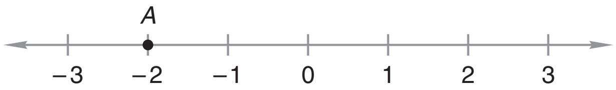
cone

congruent Having the same size and shape.



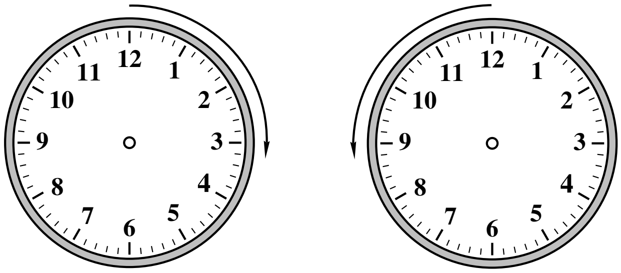
These polygons are ***congruent.*** *They have the same size and shape.*

coordinate A number used to locate a point on a number line.



The ***coordinate*** *of point A is –2.*

counterclockwise The direction opposite of the movement of a clock's hands.

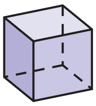


clockwise turn counterclockwise turn

counting numbers The numbers used to count; the numbers in this sequence: 1, 2, 3, 4, 5, 6, 7, 8, 9, ...

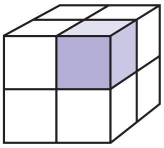
The numbers 12 and 37 are ***counting numbers,*** *but 0.98 and* $\frac{1}{2}$ *are not.*

cube A three-dimensional solid with six square faces. Adjacent faces are perpendicular and opposite faces are parallel.



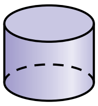
cube

cubic unit A cube with edges of designated length. Cubic units are used to measure volume.



*The shaded part is 1 **cubic unit.** The volume of the large cube is 8 **cubic units.***

cylinder A three-dimensional solid with two circular bases that are opposite and parallel to each other.



cylinder

data (Singular: *datum*) Information used to make observations or calculations.

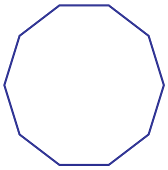
82, 76, 95, 62, 98, 97, 93

*These **data** are Schuyler's first 7 test scores.*

decade A period of ten years.

*The years 2001–2010 make up one **decade.***

decagon A polygon with ten sides.



decagon

decimal number A numeral that contains a decimal point.

*23.94 is a **decimal number** because it contains a decimal point.*

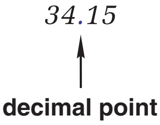
decimal places Places to the right of a decimal point.

*5.47 has two **decimal places.***

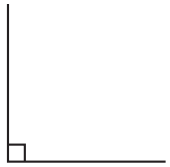
*6.3 has one **decimal place.***

*8 has no **decimal places.***

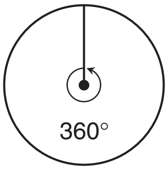
decimal point A dot used to separate the ones place from the tenths place in decimal numbers (or dollars from cents in money).



degree (°) (1) A unit for measuring angles.

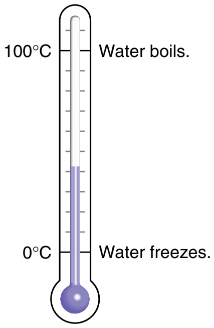


There are 90 ***degrees*** *(90°) in a right angle.*



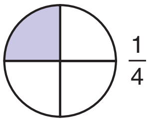
There are 360 ***degrees*** *(360°) in a circle.*

(2) A unit for measuring temperature.



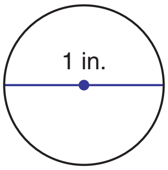
There are 100 ***degrees*** *between the freezing and boiling points of water on the Celsius scale.*

denominator The bottom number of a fraction; the number that tells how many parts are in a whole.



The ***denominator*** *of the fraction is 4.*
There are 4 parts in the whole circle.

diameter The distance across a circle through its center.



The ***diameter*** *of this circle is 1 inch.*

difference The result of subtraction.

$12 - 8 = 4$ *The* ***difference*** *in this problem is 4.*

digit Any of the symbols used to write numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

The last ***digit*** *in the number 2587 is 7.*

distributive property A number times the sum of two addends is equal to the sum of that same number times each individual addend: $a \times (b + c) = (a \times b) + (a \times c)$.

$$8 \times (2 + 3) = (8 \times 2) + (8 \times 3)$$

*Multiplication is **distributive** over addition.*

dividend A number that is divided.

$12 \div 3 = 4$ $\qquad$ $\begin{array}{r}4\\3\overline{)12}\end{array}$ $\qquad$ $\frac{12}{3} = 4$ $\qquad$ *The **dividend** is 12 in each of these problems.*

division An operation that separates a number into a given number of equal parts or into a number of parts of a given size.

$21 \div 3 = 7$ $\qquad$ *We use **division** to separate 21 into 3 groups of 7.*

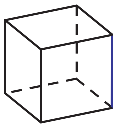
divisor A number by which another number is divided.

$12 \div 3 = 4$ $\qquad$ $\begin{array}{r}4\\3\overline{)12}\end{array}$ $\qquad$ $\frac{12}{3} = 4$ $\qquad$ *The **divisor** is 3 in each of these problems.*

dozen A group of twelve.

*The carton holds a **dozen** eggs.*
The carton holds 12 eggs.

edge A line segment formed where two faces of a polyhedron intersect.



*One **edge** of this cube is colored purple. A cube has 12 **edges.***

elapsed time The difference between the starting time and the ending time of an event.

*The race started at 6:30 p.m. and finished at 9:12 p.m. The **elapsed time** of the race was 2 hours 42 minutes.*

endpoints The points at which a line segment ends.

*Points A and B are the **endpoints** of line segment AB.*

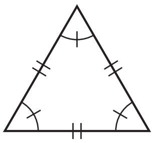
equals Has the same value as.

*12 inches **equals** 1 foot.*

equation A number sentence that uses the symbol “=” to show that two quantities are equal.

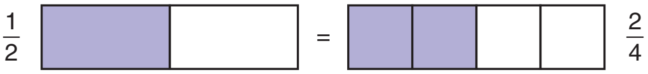
$x = 3$ $3 + 7 = 10$	$4 + 1$ $x < 7$
equations	not **equations**

equilateral triangle A triangle in which all sides are the same length.



*This is an **equilateral triangle.***
All of its sides are the same length.

equivalent fractions Different fractions that name the same amount.



$\frac{1}{2}$ *and* $\frac{2}{4}$ *are **equivalent fractions.***

estimate To find an approximate value.

*I **estimate** that the sum of 203 and 304 is about 500.*

evaluate To find the value of an expression.

*To **evaluate*** $a + b$ *for* $a = 7$ *and* $b = 13$*, we replace a with 7 and b with 13:*

$$7 + 13 = 20$$

even numbers Numbers that can be divided by 2 without a remainder; the numbers in this sequence: 0, 2, 4, 6, 8, 10, ….

***Even numbers** have 0, 2, 4, 6, or 8 in the ones place.*

exchanging *See* **regrouping.**

expanded form A way of writing a number that shows the value of each digit.

*The **expanded form** of 234 is* $200 + 30 + 4$.

exponent The upper number in an exponential expression; it shows how many times the base is to be used as a factor.

$$\text{base} \longrightarrow 5^{3} \longleftarrow \textbf{exponent}$$

5^3 *means* $5 \times 5 \times 5$ *and its value is 125.*

exponential expression An expression that indicates that the base is to be used as a factor the number of times shown by the exponent.

$$4^3 = 4 \times 4 \times 4 = 64$$

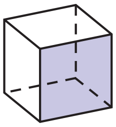
*The **exponential expression** 4^3 uses 4 as a factor 3 times. Its value is 64.*

expression Any combination of symbols, numerals, or operators.

$$17^4 \qquad 21 + 12 \qquad 432 \times (16 - 7)$$

*These three statements are **expressions.***

face A flat surface of a geometric solid.



*One **face** of the cube is shaded.*
*A cube has six **faces.***

fact family A group of three numbers related by addition and subtraction or by multiplication and division.

*The numbers 3, 4, and 7 are a **fact family.** They make these four facts:*

$$3 + 4 = 7 \qquad 4 + 3 = 7 \qquad 7 - 3 = 4 \qquad 7 - 4 = 3$$

factor Any one of the numbers multiplied in a multiplication problem.

$2 \times 3 = 6$ *The **factors** in this problem are 2 and 3.*

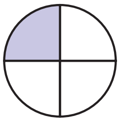
Fahrenheit A scale used on some thermometers to measure temperature.

*On the **Fahrenheit** scale, water freezes at 32°F and boils at 212°F.*

formula A rule, fact, or relationship expressed by an equation.

*The **formula** for the circumference of a circle is* $C = 2\pi r$.

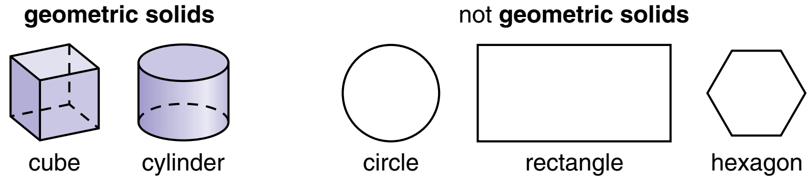
fraction A number that names part of a whole.



$\frac{1}{4}$ *of the circle is shaded.*

$\frac{1}{4}$ *is a **fraction.***

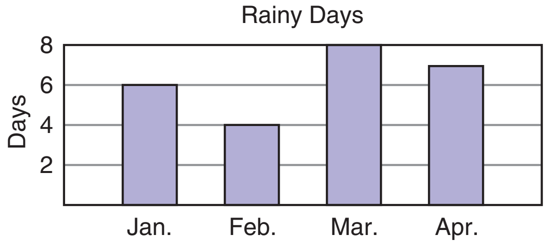
geometric solid A shape that takes up space.



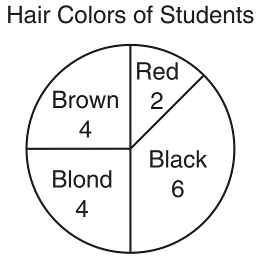
geometry A major branch of mathematics that deals with shapes, sizes, and other properties of figures.

> *Some of the figures we study in* ***geometry*** *are angles, circles, and polygons.*

graph A diagram that shows data in an organized way. *See also* **bar graph, circle graph, line graph,** *and* **pictograph.**



bar **graph**

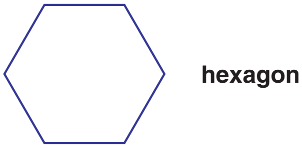


circle **graph**

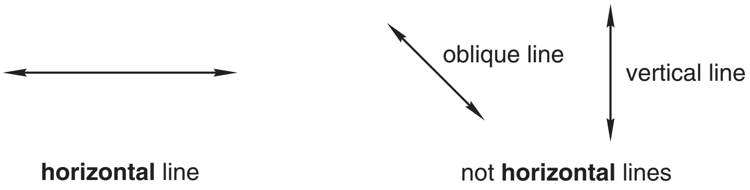
greater than Having a larger value than.

> *Five is* ***greater than*** *three* ($5 > 3$).

hexagon A polygon with six sides.



horizontal Side to side; perpendicular to vertical.



identity property of addition The sum of any number and 0 is equal to the initial number. In symbolic form, $a + 0 = a$. The number 0 is referred to as the *additive identity.*

> *The* ***identity property of addition*** *is shown by this statement:*
>
> $13 + 0 = 13$

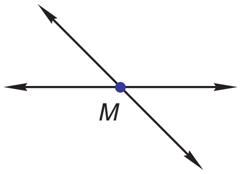
identity property of multiplication The product of any number and 1 is equal to the initial number. In symbolic form, $a \times 1 = a$. The number 1 is referred to as the *multiplicative identity.*

> *The* ***identity property of multiplication*** *is shown by this statement:*
>
> $$94 \times 1 = 94$$

improper fraction A fraction with a numerator greater than or equal to the denominator.

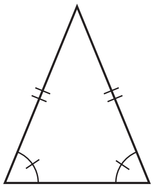
> $\frac{4}{3}$ $\frac{2}{2}$ *These fractions are* ***improper fractions.***

intersect To share a common point or points.



These two lines ***intersect.***
They share the common point M.

isosceles triangle A triangle with at least two sides of equal length.



Two of the sides of this ***isosceles triangle*** *have equal lengths.*

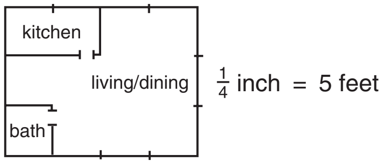
leap year A year with 366 days; not a common year.

> *In a* ***leap year*** *February has 29 days.*

least common denominator (LCD) The least common multiple of the denominators of two or more fractions.

> *The* ***least common denominator*** *of* $\frac{5}{6}$ *and* $\frac{3}{8}$ *is the least common multiple of 6 and 8, which is 24.*

legend A notation on a map, graph, or diagram that describes the meaning of the symbols and/or the scale used.



The ***legend*** *of this scale drawing shows that* $\frac{1}{4}$ *inch represents 5 feet.*

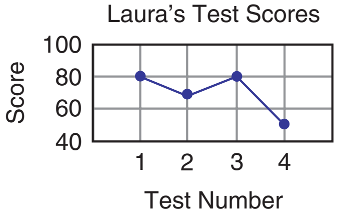
less than Having a smaller value than.

Three is ***less than*** *five* $(3 < 5)$.

line A straight collection of points extending in opposite directions without end.

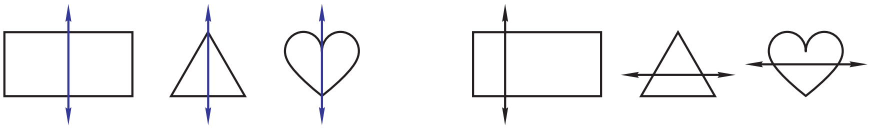
line *AB* or **line** *BA*

line graph A graph that connects points to show how information changes over time.



This ***line graph*** *shows Laura's first four test scores.*

line of symmetry A line that divides a figure into two halves that are mirror images of each other. *See also* **symmetry.**



lines of symmetry

not **lines of symmetry**

line segment A part of a line with two distinct endpoints.

$\overline{AB}$ *is a* ***line segment.***

lowest terms A fraction is in *lowest terms* if the only common factor of the numerator and the denominator is 1.

In ***lowest terms,*** *the fraction* $\frac{8}{20}$ *is* $\frac{2}{5}$.

mean *See* **average.**

median The middle number (or the average of the two central numbers) of a list of data when the numbers are arranged in order from the least to the greatest.

1, 1, 2, 4, 5, 7, 9, 15, 24, 36, 44

In this list of data 7 is the ***median.***

metric system An international system of measurement based on multiples of ten. Also called *International System.*

*Centimeters and kilograms are units in the **metric system.***

midnight 12:00 a.m.

***Midnight** is one hour after 11 p.m.*

mixed number A whole number and a fraction together.

*The **mixed number** $5\frac{3}{4}$ means "five and three fourths."*

mode The number or numbers that appear most often in a list of data.

5, 12, 32, 5, 16, 5, 7, 12

*In this list of data the number 5 is the **mode.***

multiple A product of a counting number and another number.

*The **multiples** of 3 include 3, 6, 9, and 12.*

multiplication An operation that uses a number as an addend a specified number of times.

$7 \times 3 = 21$	*We can use **multiplication** to*
$7 + 7 + 7 = 21$	*use 7 as an addend 3 times.*

negative numbers Numbers less than zero.

*–15 and –2.86 are **negative numbers.***

*19 and 0.74 are not **negative numbers.***

noon 12:00 p.m.

***Noon** is one hour after 11 a.m.*

number line A line for representing and graphing numbers. Each point on the line corresponds to a number.

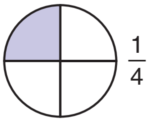
number sentence A complete sentence that uses numbers and symbols but not words. *See also* **equation.**

*The **number sentence** $4 + 5 = 9$ means "four plus five equals nine."*

numeral A symbol or group of symbols that represents a number.

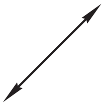
> *4, 72, and $\frac{1}{2}$ are examples of **numerals.***
> *"Four," "seventy-two," and "one half" are words that name numbers but are not **numerals.***

numerator The top number of a fraction; the number that tells how many parts of a whole are counted.

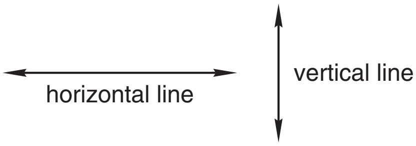


*The **numerator** of the fraction is 1. One part of the whole circle is shaded.*

oblique Slanted or sloping; not horizontal or vertical.

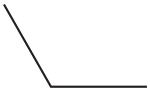


oblique line

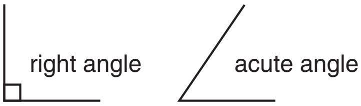


not **oblique** lines

obtuse angle An angle whose measure is more than 90° and less than 180°.



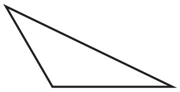
obtuse angle



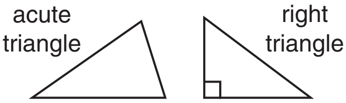
not **obtuse angles**

> *An **obtuse angle** is larger than both a right angle and an acute angle.*

obtuse triangle A triangle whose largest angle measures more than 90° and less than 180°.

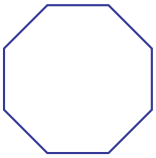


obtuse triangle



not **obtuse triangles**

octagon A polygon with eight sides.



octagon

odd numbers Numbers that have a remainder of 1 when divided by 2; the numbers in this sequence: 1, 3, 5, 7, 9, 11, ….

__Odd numbers__ have 1, 3, 5, 7, or 9 in the ones place.

ordinal numbers Numbers that describe position or order.

"First," "second," and "third" are __ordinal numbers.__

outlier A number in a list of data that is distant from the other numbers in the list.

In the data at right, the number 28 is an __outlier__ because it is distant from the other numbers in the list.

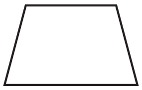
1, 5, 4, 3, 6, 28, 7, 2

parallel lines Lines that stay the same distance apart; lines that do not cross.

parallel lines

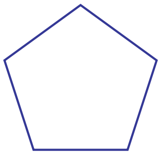
parallelogram A quadrilateral that has two pairs of parallel sides.

parallelograms



not a **parallelogram**

pentagon A polygon with five sides.



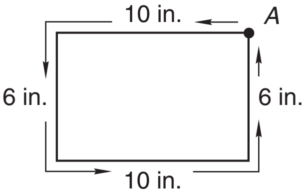
pentagon

percent A fraction whose denominator of 100 is expressed as a percent sign (%).

$$\frac{99}{100} = 99\% = 99 \textbf{ percent}$$

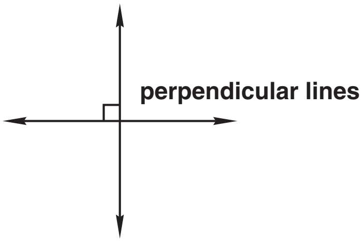
perfect square *See* **square number.**

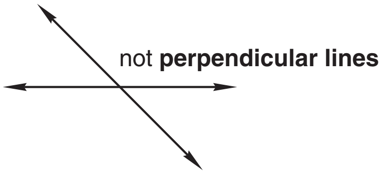
perimeter The distance around a closed, flat shape.



The __perimeter__ of this rectangle (from point A around to point A) is 32 inches.

perpendicular lines Two lines that intersect at right angles.





pictograph A graph that uses symbols to represent data.

This is a ***pictograph.***
It shows how many stars
each person saw.

pie graph *See* **circle graph.**

place value The value of a digit based on its position within a number.

$$\begin{array}{r} 341 \\ 23 \\ +\quad 7 \\ \hline 371 \end{array}$$

Place value *tells us that 4 in 341 is worth "4 tens." In addition problems we align digits with the same* ***place value.***

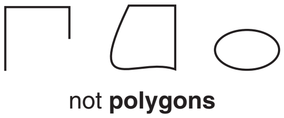
p.m. The period of time from noon to just before midnight.

I go to bed at 9 ***p.m.*** *I go to bed at 9 o'clock at night.*

point An exact position.

This dot represents ***point*** *A.*

polygon A closed, flat shape with straight sides.



population A group of people about whom information is gathered during a survey.

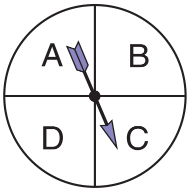
A soft drink company wanted to know the favorite beverage of people in Indiana. The ***population*** *they gathered information about was the people of Indiana.*

positive numbers Numbers greater than zero.

*0.25 and 157 are **positive numbers.***

*–40 and 0 are not **positive numbers.***

probability The likelihood that something will happen. Probability can be expressed as a fraction with the number of favorable outcomes as the numerator and the number of possible outcomes as the denominator.



*The **probability** of spinning C is* $\frac{1}{4}$.

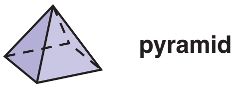
product The result of multiplication.

$5 \times 3 = 15$ *The **product** of 5 and 3 is 15.*

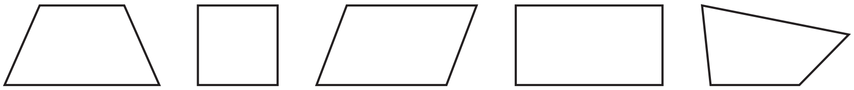
property of zero for multiplication Zero times any number is zero. In symbolic form, $0 \times a = 0$.

*The **property of zero for multiplication** tells us that* $89 \times 0 = 0$.

pyramid A three-dimensional solid with a polygon as its base and triangular faces that meet at a vertex.



quadrilateral Any four-sided polygon.



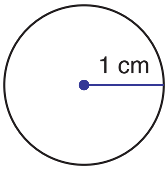
*Each of these polygons has 4 sides. They are all **quadrilaterals.***

quotient The result of division.

$12 \div 3 = 4$ $\begin{array}{r}4\\3\overline{)12}\end{array}$ $\frac{12}{3} = 4$

*The **quotient** is 4 in each of these problems.*

radius (Plural: *radii*) The distance from the center of a circle to a point on the circle.



*The **radius** of this circle is 1 centimeter.*

range The difference between the largest number and smallest number in a list.

5, 17, 12, 34, 28, 13

*To calculate the **range** of this list, we subtract the smallest number from the largest number. The **range** of this list is 29.*

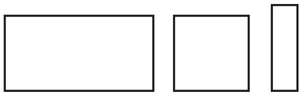
rate A measure of how far or how many are in one time group.

*The leaky faucet wasted water at the **rate** of 1 liter per hour.*

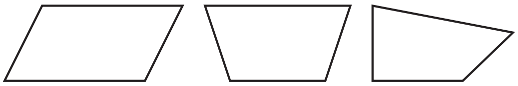
ray A part of a line that begins at a point and continues without end in one direction.

ray *AB*

rectangle A quadrilateral that has four right angles.



rectangles

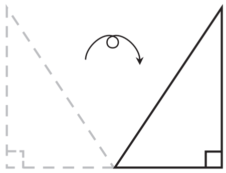


not **rectangles**

reduce To rewrite a fraction in lowest terms.

*If we **reduce** the fraction $\frac{9}{12}$, we get $\frac{3}{4}$.*

reflection Flipping a figure to produce a mirror image.



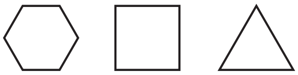
reflection

regrouping To rearrange quantities in place values of numbers during calculations.

$$\begin{array}{r} 214 \\ -\ \ 39 \\ \hline \end{array} \longrightarrow \begin{array}{r} \overset{1}{\cancel{2}}\,\overset{10}{\cancel{1}}\,{}^{1}4 \\ -\ \ 39 \\ \hline 175 \end{array}$$

*Subtraction of 39 from 214 requires **regrouping**.*

regular polygon A polygon in which all sides have equal lengths and all angles have equal measures.



regular polygons

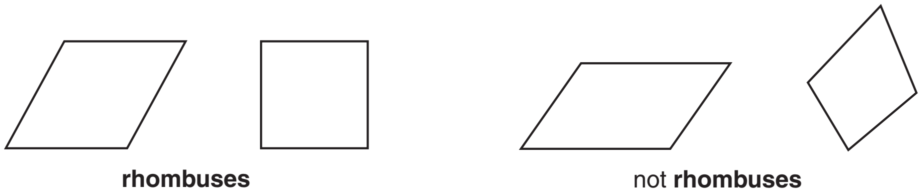
not **regular polygons**

remainder An amount that is left after division.

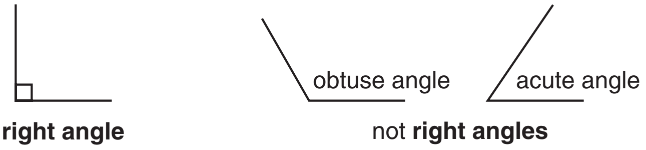
$$\begin{array}{r} 7\text{ R }1 \\ 2\overline{)15} \\ \underline{14} \\ 1 \end{array}$$

*When 15 is divided by 2, there is a **remainder** of 1.*

rhombus A parallelogram with all four sides of equal length.

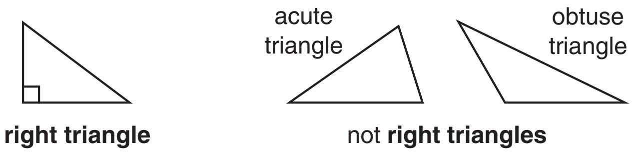


right angle An angle that forms a square corner and measures 90°. It is often marked with a small square.



*A **right angle** is larger than an acute angle and smaller than an obtuse angle.*

right triangle A triangle whose largest angle measures 90°.

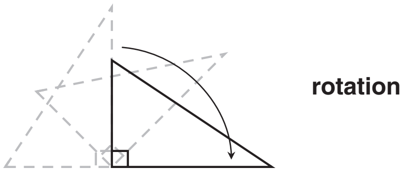


Roman numerals Symbols used by the ancient Romans to write numbers.

*The **Roman numeral** for 3 is III.*

*The **Roman numeral** for 13 is XIII.*

rotation Turning a figure about a specified point called the *center of rotation.*



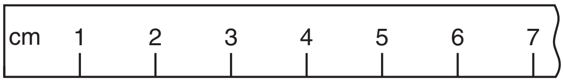
sales tax The tax charged on the sale of an item and based upon the item's purchase price.

*If the **sales-tax** rate is 7%, the **sales tax** on a \$5.00 item will be \$5.00 × 7% = \$0.35.*

sample A part of a population used to conduct a survey.

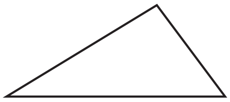
Mya wanted to know the favorite television show of the fourth-grade students at her school. She asked only the students in Room 3 her survey question. In her survey the population was the fourth-grade students at the school, and the ***sample*** *was the students in Room 3.*

scale A type of number line used to measure things.



The distance between each mark on this ruler's ***scale*** *is 1 centimeter.*

scalene triangle A triangle with three sides of different lengths.



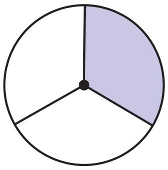
All three sides of this ***scalene triangle*** *have different lengths.*

schedule A list of events organized by the times at which they are planned to occur.

Sarah's Class **Schedule**

8:15 a.m.	Homeroom
9:00 a.m.	Science
10:15 a.m.	Reading
11:30 a.m.	Lunch and Recess
12:15 p.m.	Math
1:30 p.m.	English
2:45 p.m.	Art and Music
3:30 p.m.	End of School

sector A region bordered by part of a circle and two radii.



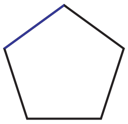
This circle is divided into 3 ***sectors.***

segment *See* **line segment.**

sequence A list of numbers arranged according to a certain rule.

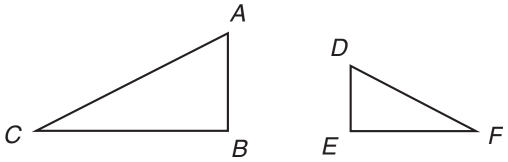
The numbers 5, 10, 15, 20, … form a ***sequence.*** *The rule is "count up by fives."*

side A line segment that is part of a polygon.



This pentagon has 5 ***sides.***

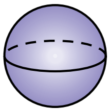
similar Having the same shape but not necessarily the same size. Similar figures have matching angles and proportional sides.



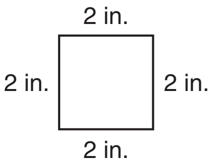
ΔABC and ΔDEF are ***similar.*** *They have the same shape, but they are not the same size.*

solid *See* **geometric solid.**

sphere A round geometric solid having every point on its surface at an equal distance from its center.



square (1) A rectangle with all four sides of equal length.



All four sides of this ***square*** *are 2 inches long.*

(2) The product of a number and itself.

The ***square*** *of 4 is 16.*

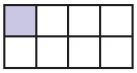
square number The product when a whole number is multiplied by itself.

The number 9 is a ***square number*** *because* $9 = 3^2$.

square root One of two equal factors of a number. The symbol for the principal, or positive, square root of a number is $\sqrt{\ }$.

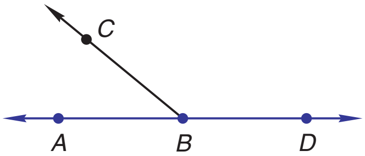
A ***square root*** *of 49 is 7 because* $7 \times 7 = 49$.

square unit A square with sides of designated length. Square units are used to measure area.



The shaded part is 1 ***square unit.*** *The area of the large rectangle is 8* ***square units.***

straight angle An angle that measures 180° and thus forms a straight line.



Angle ABD is a ***straight angle.*** *Angles ABC and CBD are not* ***straight angles.***

subtraction The arithmetic operation that reduces a number by an amount determined by another number

We use ***subtraction*** *to take 12 away from 15.* $15 - 12 = 3$

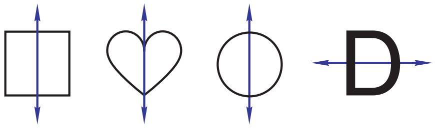
sum The result of addition.

$2 + 3 = 5$ *The* ***sum*** *of 2 and 3 is 5.*

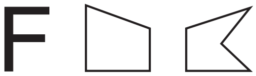
survey A method of collecting data about a particular population.

Mia conducted a ***survey*** *by asking each of her classmates the name of his or her favorite television show.*

symmetry Correspondence in size and shape on either side of a dividing line. This type of symmetry is known as *reflective symmetry. See also* **line of symmetry.**



These figures have **symmetry.**



These figures do not have **symmetry.**

table A way of organizing data in columns and rows.

Our Team's Grades

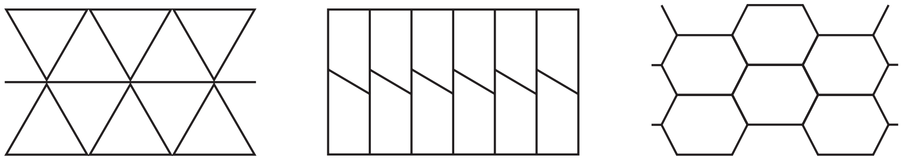
Name	Grade
Juan	98
Tim	72
Laura	85
Min	96

This ***table*** *shows the grades of four students.*

tally mark A small mark used to help keep track of a count.

*I used **tally marks** to count cars. I counted five cars.*

tessellation The repeated use of shapes to fill a flat surface without gaps or overlaps.



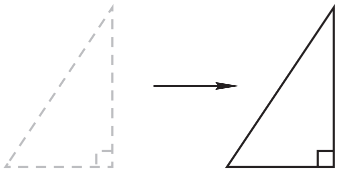
tessellations

transformation Changing a figure's position through rotation, reflection, or translation.

Transformations

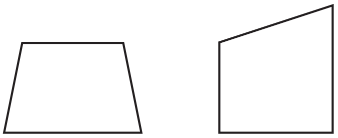
Movement	Name
flip	reflection
slide	translation
turn	rotation

translation Sliding a figure from one position to another without turning or flipping the figure.

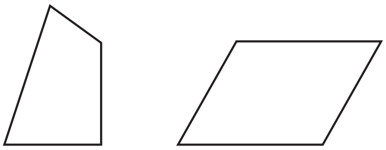


translation

trapezoid A quadrilateral with exactly one pair of parallel sides.

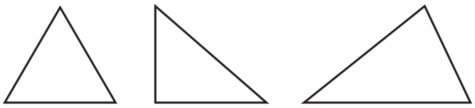


trapezoids



not **trapezoids**

triangle A polygon with three sides and three angles.



triangles

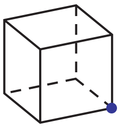
unit Any standard object or quantity used for measurement.

*Grams, pounds, liters, gallons, inches, and meters are all **units.***

U.S. Customary System A system of measurement used almost exclusively in the United States.

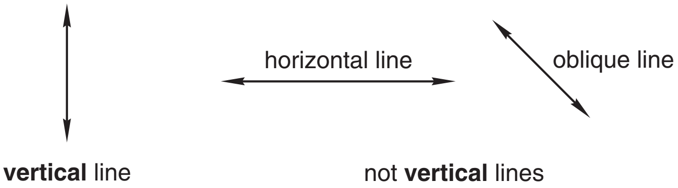
*Pounds, quarts, and feet are units in the **U.S. Customary System.***

vertex (Plural: *vertices*) A point of an angle, polygon, or polyhedron where two or more lines, rays, or segments meet.

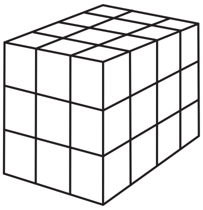


*One **vertex** of this cube is colored. A cube has eight **vertices.***

vertical Upright; perpendicular to horizontal.



volume The amount of space a solid shape occupies. Volume is measured in cubic units.



*This rectangular prism is 3 units wide, 3 units high, and 4 units deep. Its **volume** is 3 · 3 · 4 = 36 cubic units.*

whole numbers All the numbers in this sequence: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ….

*The number 35 is a **whole number,** but $35\frac{1}{2}$ and 3.2 are not.*
***Whole numbers** are the counting numbers and zero.*

INDEX

Note: Asterisks (*) indicate that the cited topic is covered in a lesson Warm-up.

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