HOUGHTON MIFFLIN HARCOURT

NSF

MATH
Expressions
Common Core

GRADE
4

CONTENTS

CONTENTS *(continued)*

Family Letter

Dear Family,

Your child is learning math in an innovative program called *Math Expressions*. In Unit 1, your child will use place value drawings and charts to understand that the value of each place is 10 times greater than the value of the place to its right. This understanding is essential when comparing, rounding, or adding multidigit numbers. *Math Expressions* encourages children to think about "making new groups" to help them understand place values.

We call the method below "New Groups Above". The numbers that represent the new groups are written above the problem.

1. Add the ones:

5 + 7 = 12 ones
12 = 2 ones + 10 ones,
and 10 ones = 1 new ten.

$$\begin{array}{r} \overset{1}{} \\ 5,17\,5 \\ +\,3,96\,7 \\ \hline 2 \end{array}$$

2. Add the tens:

1 + 7 + 6 = 14 tens
14 = 4 tens + 10 tens,
and 10 tens = 1 new hundred.

$$\begin{array}{r} \overset{1\ 1}{} \\ 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline 4\,2 \end{array}$$

3. Add the hundreds:

1 + 1 + 9 = 11 hundreds
11 = 1 hundred + 10 hundreds,
and 10 hundreds = 1 new thousand.

$$\begin{array}{r} \overset{1\ \ 1\ \ 1}{} \\ 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline 1\,4\,2 \end{array}$$

4. Add the thousands:

1 + 5 + 3 = 9 thousands

$$\begin{array}{r} \overset{1\ \ 1\ \ 1}{} \\ 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline 9,1\,4\,2 \end{array}$$

We call the following method "New Groups Below." The steps are the same, but the new groups are written below the addends.

It is easier to see the totals for each column (12 and 14) and adding is easier because you add the two numbers you see and then add the 1.

1.
$$\begin{array}{r} 5,17\,5 \\ +\,3,96\,7 \\ \hline \overset{1}{2} \end{array}$$

2.
$$\begin{array}{r} 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline \overset{1\ 1}{4}\,2 \end{array}$$

3.
$$\begin{array}{r} 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline \overset{1\ 1\ 1}{1}\,4\,2 \end{array}$$

4.
$$\begin{array}{r} 5,1\,7\,5 \\ +\,3,9\,6\,7 \\ \hline \overset{1\ 1\ 1}{9},1\,4\,2 \end{array}$$

It is important that your child maintains his or her home practice with basic multiplication and division.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Number and Operations in Base Ten and Measurement and Data, 4.NBT.1, 4.NBT.2, 4.NBT.3, 4.NBT.4, 4.MD.2 and all Mathematical Practices.

Estimada familia,

Su niño está aprendiendo matemáticas mediante el programa *Math Expressions*. En la Unidad 1, se usarán dibujos y tablas de valor posicional para comprender que el valor de cada lugar es 10 veces mayor que el valor del lugar a su derecha. Comprender esto es esencial para comparar, redondear o sumar números de varios dígitos. *Math Expressions* enseña a pensar en "formar grupos nuevos" para comprender los valores posicionales.

Este método se llama "Grupos nuevos arriba". Los números que representan los grupos nuevos se escriben arriba del problema:

1. Suma las unidades:

5 + 7 = 12 unidades
12 = 2 unidades + 10 unidades,
y 10 unidades = 1 nueva decena.

$$
\begin{array}{r}
^1 \\
5,17\,5 \\
+\ 3,96\,7 \\
\hline
2
\end{array}
$$

2. Suma las decenas:

1 + 7 + 6 = 14 decenas
14 = 4 decenas + 10 decenas,
y 10 decenas = 1 nueva centena.

$$
\begin{array}{r}
^{1\ 1} \\
5,17\,5 \\
+\ 3,96\,7 \\
\hline
4\,2
\end{array}
$$

3. Suma las centenas:

1 + 1 + 9 = 11 centenas
11 = 1 centenas + 10 centenas,
y 10 centenas = 1 nuevo millar.

$$
\begin{array}{r}
^{1\ 1\ 1} \\
5,17\,5 \\
+\ 3,96\,7 \\
\hline
1\,4\,2
\end{array}
$$

4. Suma los millares:

1 + 5 + 3 = 9 millares

$$
\begin{array}{r}
^{1\ \ 1\ 1} \\
5,17\,5 \\
+\ 3,96\,7 \\
\hline
9,14\,2
\end{array}
$$

Este método se llama "Grupos nuevos abajo". Los pasos son iguales, pero los nuevos grupos se escriben abajo de los sumandos:

Es más fácil ver los totales de cada columna (12 y 14) y es más fácil sumar porque sumas los dos números que ves, y luego sumas 1.

1.
$$
\begin{array}{r}
5,17\,5 \\
+\ 3,96\,7 \\
\hline
2
\end{array}
$$

2.
$$
\begin{array}{r}
5,17\,5 \\
+\ 3,96\,7 \\
\hline
4\,2
\end{array}
$$

3.
$$
\begin{array}{r}
5,17\,5 \\
+\ 3,96\,7 \\
\hline
1\,4\,2
\end{array}
$$

4.
$$
\begin{array}{r}
5,17\,5 \\
+\ 3,96\,7 \\
\hline
9,14\,2
\end{array}
$$

Es importante que su niño siga practicando las multiplicaciones y divisiones básicas en casa.

Atentamente,
El maestro de su niño

COMMON CORE

Esta unidad incluye los Common Core Standards for Mathematical Content for Number and Operations in Base Ten and Measurement and Data, 4.NBT.1, 4.NBT.2, 4.NBT.3, 4.NBT.4, 4.MD.2 and all Mathematical Practices.

Name   **Date**

▶ **Whole Number Secret Code Cards**

1,000	100	10	1
1,000	100	10	1
2,000	200	20	2
2,000	200	20	2
3,000	300	30	3
3,000	300	30	3
4,000	400	40	4
4,000	400	40	4
5,000	500	50	5
5,000	500	50	5
6,000	600	60	6
6,000	600	60	6
7,000	700	70	7
7,000	700	70	7
8,000	800	80	8
8,000	800	80	8
9,000	900	90	9
9,000	900	90	9

► Whole Number Secret Code Cards

one	ten (teen) (one ten)	one hundred	one thousand
two	twenty (two tens)	two hundred	two thousand
three	thirty (three tens)	three hundred	three thousand
four	forty (four tens)	four hundred	four thousand
five	fifty (five tens)	five hundred	five thousand
six	sixty (six tens)	six hundred	six thousand
seven	seventy (seven tens)	seven hundred	seven thousand
eight	eighty (eight tens)	eight hundred	eight thousand
nine	ninety (nine tens)	nine hundred	nine thousand

► Summarize Rounding Rules

Use these rounding frames as a visual aid when rounding
to the nearest 10, 100, 1,000.

Nearest 10	Nearest 100	Nearest 1,000
100	1,000	10,000
90	900	9,000
80	800	8,000
70	700	7,000
60	600	6,000
50	500	5,000
40	400	4,000
30	300	3,000
20	200	2,000
10	100	1,000

Round to the nearest ten.

1. 87 _____   **2.** 16 _____   **3.** 171 _____

4. 2,165 _____   **5.** 5,114 _____   **6.** 3,098 _____

Round to the nearest hundred.

7. 734 _____   **8.** 363 _____   **9.** 178 _____

10. 6,249 _____   **11.** 8,251 _____   **12.** 8,992 _____

Round to the nearest thousand.

13. 1,275 _____   **14.** 8,655 _____   **15.** 5,482 _____

16. 3,804 _____   **17.** 1,501 _____   **18.** 9,702 _____

▶ Discuss and Summarize

Patterns to Millions

Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
100,000,000	10,000,000	1,000,000	100,000	10,000	1,000	100	10	1
millions			*thousands*			*[ones]*		

The Patterns to Millions chart shows that each digit in the number has a place value name. When we read a number, we do not say the place value name. We say the group name.

We say the word *million* after the digits in the millions group.

We say the word *thousand* after the digits in the thousands group.

We do not say the word *ones* after the digits in the ones group.

To read greater numbers, say each group of digits as if they were in the hundreds, tens, and ones places and then add the special name for that group.

▶ Read Numbers

Use your Whole Number Secret Code cards to make the groups of digits as shown below. Put them in the spaces on the Reading Millions Frame below to read them.

28,374   123,456   458,726   654,321   92,148   789,321

Reading Millions Frame

million	*thousand*	*[ones]*

Dear Family,

Your child is now learning about subtraction. A common subtraction mistake is subtracting in the wrong direction. Children may think that they always subtract the smaller digit from the larger digit, but this is not true. To help children avoid this mistake, the *Math Expressions* program encourages children to "fix" numbers first and then subtract.

$$\begin{array}{r} \cancel{1,634} \\ -\ \cancel{158} \\ \hline \cancel{1,524} \end{array}$$

When one or more digits in the top number are smaller than the corresponding digits in the bottom number, fix the numbers by "ungrouping." For example, 1,634 − 158 is shown below:

1. We cannot subtract 8 ones from 4 ones. We get more ones by ungrouping 1 ten to make 10 ones.

We now have 14 ones and only 2 tens.

$$\begin{array}{r} {}^{2\ 14} \\ 1,6\cancel{3}\ \cancel{4} \\ -\ 1\ 5\ 8 \\ \hline \end{array}$$

2. We cannot subtract 5 tens from 2 tens. We get more tens by ungrouping 1 hundred to make 10 tens.

We now have 12 tens and only 5 hundreds.

$$\begin{array}{r} {}^{12} \\ {}^{5\ \cancel{2}14} \\ 1,\cancel{6}\ \cancel{3}\ \cancel{4} \\ -\ 1\ 5\ 8 \\ \hline \end{array}$$

3. Now we can subtract:
$1 - 0 = 1$ thousand
$5 - 1 = 4$ hundreds
$12 - 5 = 7$ tens
$14 - 8 = 6$ ones

$$\begin{array}{r} {}^{12} \\ {}^{5\ \cancel{2}14} \\ 1,\cancel{6}\ \cancel{3}\ \cancel{4} \\ -\ 1\ 5\ 8 \\ \hline 1,4\ 7\ 6 \end{array}$$

In the method above, the numbers are ungrouped from right to left, but students can also ungroup from left to right. Children can choose whichever way works best for them.

Your child should also continue to practice multiplication and division skills at home.

If you have any questions or comments, please call or write me.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Number and Operations in Base Ten and Measurement and Data 4.NBT.3, 4.NBT.4, 4.MD.2 and all Mathematical Practices.

Estimada familia:

Ahora su niño está aprendiendo a restar. Un error muy común al restar, es hacerlo en la dirección equivocada. Los niños pueden pensar que siempre se resta el dígito más pequeño del dígito más grande, pero no es verdad. Para ayudar a los niños a no cometer este error, el programa *Math Expressions* les propone "arreglar" los números primero y luego restar.

$$
\begin{array}{r}
1{,}634 \\
-\ 158 \\
\hline
1{,}524
\end{array}
$$

Cuando uno o más dígitos del número de arriba son más pequeños que los dígitos correspondientes del número de abajo, se arreglan los números "desagrupándolos". Por ejemplo, $1{,}634 - 158$ se muestra abajo:

1. No podemos restar 8 unidades de 4 unidades. Obtenemos más unidades al desagrupar 1 decena para formar 10 unidades.

Ahora tenemos 14 unidades y solamente 2 decenas.

$$
\begin{array}{r}
1{,}6\overset{2}{\cancel{3}}\overset{14}{\cancel{4}} \\
-\ \ 1\,5\,8 \\
\hline
\end{array}
$$

2. No podemos restar 5 decenas de 2 decenas. Obtenemos más decenas al desagrupar 1 centena para formar 10 decenas.

Ahora tenemos 12 decenas y solamente 5 centenas.

$$
\begin{array}{r}
1{,}\overset{5}{\cancel{6}}\overset{\overset{12}{\cancel{2}}}{\cancel{3}}\overset{14}{\cancel{4}} \\
-\ \ 1\,5\,8 \\
\hline
\end{array}
$$

3. Ahora podemos restar:
$1 - 0 = 1$ millar
$5 - 1 = 4$ centenas
$12 - 5 = 7$ decenas
$14 - 8 = 6$ unidades

$$
\begin{array}{r}
1{,}\overset{5}{\cancel{6}}\overset{\overset{12}{\cancel{2}}}{\cancel{3}}\overset{14}{\cancel{4}} \\
-\ \ 1\,5\,8 \\
\hline
1{,}4\,7\,6
\end{array}
$$

En el método de arriba se desagrupan los números de derecha a izquierda, pero también se pueden desagrupar de izquierda a derecha. Los niños pueden escoger la manera que les resulte más fácil.

Su niño también debe seguir practicando las destrezas de multiplicación y de división en casa.

Si tiene alguna pregunta, por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

COMMON CORE

Subtract From Thousands

Subtract. Show your new groups.

10. $\begin{array}{r} 7{,}919 \\ -\ 3{,}846 \\ \hline \end{array}$

11. $\begin{array}{r} 8{,}502 \\ -\ 3{,}749 \\ \hline \end{array}$

12. $\begin{array}{r} 4{,}221 \\ -\ 2{,}805 \\ \hline \end{array}$

13. $\begin{array}{r} 7{,}000 \\ -\ \ \ \ 572 \\ \hline \end{array}$

14. $\begin{array}{r} 4{,}650 \\ -\ 2{,}793 \\ \hline \end{array}$

15. $\begin{array}{r} 4{,}605 \\ -\ 1{,}711 \\ \hline \end{array}$

16. $\begin{array}{r} 3{,}120 \\ -\ \ \ \ \ 38 \\ \hline \end{array}$

17. $\begin{array}{r} 6{,}082 \\ -\ \ \ \ \ 95 \\ \hline \end{array}$

18. $\begin{array}{r} 2{,}107 \\ -\ \ \ \ 428 \\ \hline \end{array}$

19. $\begin{array}{r} 1{,}852 \\ -\ \ \ \ 964 \\ \hline \end{array}$

20. $\begin{array}{r} 3{,}692 \\ -\ 2{,}704 \\ \hline \end{array}$

21. $\begin{array}{r} 8{,}715 \\ -\ 6{,}742 \\ \hline \end{array}$

22. $\begin{array}{r} 6{,}000 \\ -\ 4{,}351 \\ \hline \end{array}$

23. $\begin{array}{r} 7{,}400 \\ -\ 1{,}215 \\ \hline \end{array}$

24. $\begin{array}{r} 3{,}583 \\ -\ 1{,}794 \\ \hline \end{array}$

Solve.

25. Jake has 647 pennies in his penny collection album. The album has space for 1,000 pennies. How many more pennies can Jake place in his album?

_____

26. A ship is making an 8,509-mile voyage. So far, it has sailed 2,957 miles. How many miles of the voyage remain?

_____

▶ Math and Bridges

Bridges are structures that are built to get over obstacles like water, a valley, or roads. Bridges can be made of concrete, steel, or even tree roots. Engineers and designers do a lot of math to be sure a bridge will stand up to its use and the forces of nature that affect it.

Lengths of Bridges		
Bridge	**Length Over Water (ft)**	
Manchac Swamp Bridge, U.S.A.	121,440	
Hangzhou Bay Bridge, China	117,057	
Lake Pontchartrain Causeway, U.S.A.	125,664	
Jiaozhou Bay Bridge, China	139,392	

1. Use the data in the table above to make a bar graph.
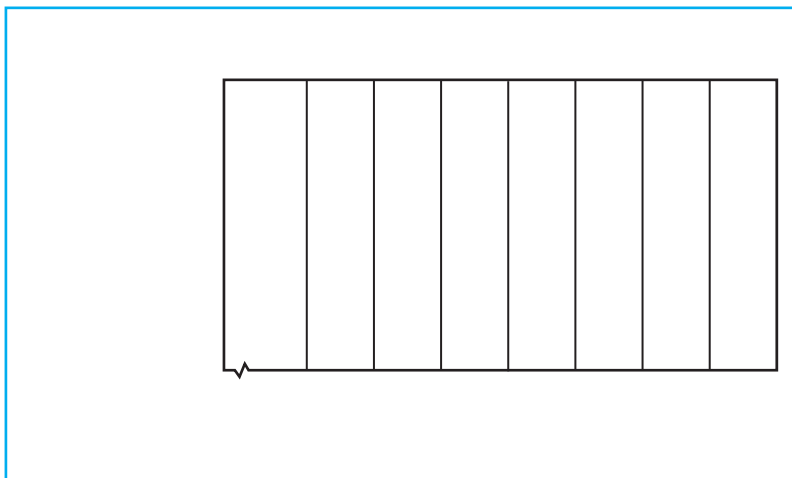
Focus on Mathematical Practices

▶ Vocabulary

Choose the best term from the box.

1. Addition and subtraction are _____
because one operation undoes the other. **(Lesson 1-10)**

2. 3,957 and 4,218 are the _____ in the
problem 3,957 + 4,218. **(Lessons 1-11, 1-13)**

▶ Concepts and Skills

3. Use expanded form to explain how the value of the digit 4 in
the number 4,444 changes for each place value. **(Lesson 1-2)**

_____

_____

4. Which is greater, the value of the digit 6 in 650 or the
value of the digit 6 in 760? Explain. **(Lesson 1-2)**

_____

_____

5. Which of these numbers has the digit 7 with a value of
700: 7,352, 720, 270, 357? Explain. **(Lesson 1-2)**

_____

_____

Read and write the number in another form. (Lesson 1-4)

6. 453,208 in word form: _____

7. ninety thousand, thirty-three in standard form: _____

8. 680,742 in expanded form _____

Compare using >, <, or =. (Lesson 1-3, 1-5)

9. 84,055 ◯ 84,505   10. 7,862 ◯ 7,826   11. 369,125 ◯ 396,124

Round each number to the place value of the underlined digit.
(Lesson 1-3, 1-5)

12. 3<u>3</u>,875 _____   **13.** 9<u>2</u>0,812 _____

Add or subtract. (Lessons 1-6, 1-7, 1-9, 1-10, 1-11, 1-12)

14.   1,472
      + 5,178
      _____

15.   58,290
       − 31,602
       _____

16.   483,958
      + 126,081
      _____

17.   795,236
       − 478,517
       _____

▶ Problem Solving

Solve.

18. There were 3,982 people at the soccer game on Thursday. There were 1,886 more people at the soccer game on Saturday. How many people in all attended both games? **(Lessons 1-6, 1-12)**

_____

19. One machine makes 125,200 small paper clips in one day. Another machine makes 83,650 large paper clips in one day. How many fewer large paper clips than small paper clips are made in one day? **(Lessons 1-11, 1-12, 1-13)**

_____

20. Extended Response Determine whether the following statement is true or false. Explain your thinking. **(Lessons 1-6, 1-9, 1-10)**

$6,421 − (284 + 653) = (6,421 − 284) + 653$

_____

_____

Dear Family,

In this unit, your child will be learning about the common multiplication method that most adults know. However, they will also explore ways to draw multiplication. *Math Expressions* uses area of rectangles to show multiplication.

	30	+	7
20	20 × 30 = 600		20 × 7 = 140
+			
4	4 × 30 = 120		4 × 7 = 28

Area Method:

$20 \times 30 = 600$
$20 \times 7 = 140$
$4 \times 30 = 120$
$4 \times 7 = 28$
Total $= 888$

Shortcut Method:

$$\begin{array}{r} \overset{1}{}\overset{2}{} \\ 37 \\ \times\ 24 \\ \hline 148 \\ 74 \\ \hline 888 \end{array}$$

Area drawings help all students see multiplication. They also help students remember what numbers they need to multiply and what numbers make up the total.

Your child will also learn to find products involving single-digit numbers, tens, and hundreds by factoring the tens or hundreds. For example,

$$200 \times 30 = 2 \times 100 \times 3 \times 10$$
$$= 2 \times 3 \times 100 \times 10$$
$$= 6 \times 1,000 = 6,000$$

By observing the zeros patterns in products like these, your child will learn to do such multiplications mentally.

If your child is still not confident with single-digit multiplication and division, we urge you to set aside a few minutes every night for multiplication and division practice. In a few more weeks, the class will be doing multidigit division, so it is very important that your child be both fast and accurate with basic multiplication and division.

If you need practice materials, please contact me.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Operations and Algebraic Thinking, Number and Operations in Base Ten and Measurement and Data, 4.OA.3, 4.NBT.1, 4.NBT.2, 4.NBT.3, 4.NBT.5, 4.MD.2 and all Mathematical Practices.

Estimada familia:

En esta unidad, su niño estará aprendiendo el método de multiplicación común que la mayoría de los adultos conoce. Sin embargo, también explorará maneras de dibujar la multiplicación. Para mostrar la multiplicación, *Math Expressions* usa el método del área del rectángulo.

	30	+	7
20	$20 \times 30 = 600$		$20 \times 7 = 140$
+			
4	$4 \times 30 = 120$		$4 \times 7 = 28$

Método del área

$20 \times 30 = 600$
$20 \times 7 = 140$
$4 \times 30 = 120$
$4 \times 7 = 28$
Total $= 888$

Método más corto

$$\begin{array}{r} \overset{1}{\underset{2}{}} \\ 37 \\ \times\ 24 \\ \hline 148 \\ 74 \\ \hline 888 \end{array}$$

Los dibujos de área ayudan a los estudiantes a visualizar la multiplicación. También los ayuda a recordar cuáles números tienen que multiplicar y cuáles números forman el total.

Su niño también aprenderá a hallar productos relacionados con números de un solo dígito, con decenas y con centenas, factorizando las decenas o las centenas. Por ejemplo:

$200 \times 30 = 2 \times 100 \times 3 \times 10$
$\qquad\quad = 2 \times 3 \times 100 \times 10$
$\qquad\quad = 6 \times 1{,}000 = 6{,}000$

Al observar los patrones de ceros en productos como estos, su niño aprenderá a hacer dichas multiplicaciones mentalmente.

Si su niño todavía no domina la multiplicación y la división con números de un solo dígito, le sugerimos que dedique algunos minutos todas las noches para practicar la multiplicación y la división. Dentro de pocas semanas, la clase hará divisiones con números de varios dígitos, por eso es muy importante que su niño haga las operaciones básicas de multiplicación y de división de manera rápida y exacta.

Si necesita materiales para practicar, comuníquese conmigo.

Atentamente,
El maestro de su niño

► Model a Product of Tens

Olivia wants to tile the top of a table. The table is 20 inches by 30 inches. Olivia needs to find the area of the table in inches.

2. Find the area of this 20 × 30 rectangle by dividing it into 10-by-10 squares of 100.
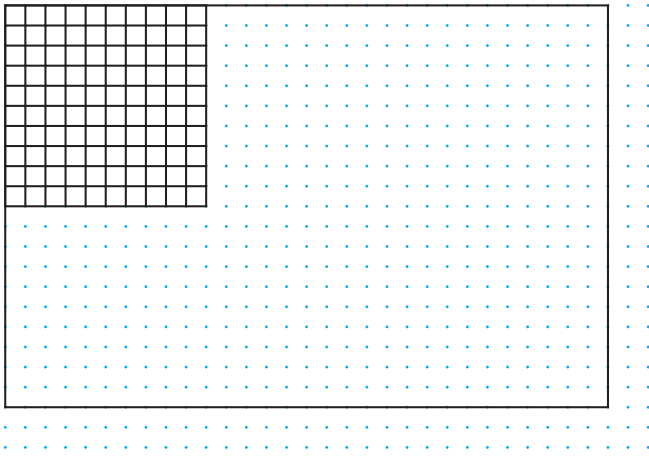
3. Each tile is a 1-inch square. How many tiles does Olivia need to cover the tabletop? _____

4. Each box of tiles contains 100 tiles. How many boxes of tiles does Olivia need to buy? _____

► Factor the Tens

5. Complete the steps to show your work in Exercise 2 numerically.

$20 \times 30 = ($_____ $\times 10) \times ($_____ $\times 10)$

$= ($_____ $\times$ _____$) \times (10 \times 10)$

$=$ _____ $\times 100$

$= 600$

6. Is it true that $20 \times 30 = 30 \times 20$? Explain how you know.

_____

▶ Look for Patterns

Multiplying greater numbers in your head is easier when you learn patterns of multiplication with tens.

Start with column A and look for the patterns used to get the expressions in each column. Copy and complete the table.

Table 1

A	B	C	D
2×3	$2 \times 1 \times 3 \times 1$	6×1	6
1. 2×30	$2 \times 1 \times 3 \times 10$	6×10	_____
2. 20×30	$2 \times 10 \times 3 \times 10$	_____	_____

3. How are the expressions in column B different from the expressions in column A?

_____

_____

_____

4. In column C, we see that each expression can be written as a number times a place value. Which of these **factors** gives more information about the size of the **product**?

_____

5. Why is 6 the first digit of the products in column D?

_____

6. Why are there different numbers of zeros in the products in column D?

_____

_____

► **Compare Tables**

Copy and complete each table.

Table 2

A	B	C	D
6 × 3	6 × 1 × 3 × 1	18 × 1	18
7. 6 × 30	6 × 1 × 3 × 10	18 × 10	_____
8. 60 × 30	6 × 10 × 3 × 10	_____	_____

Table 3

A	B	C	D
5 × 8	5 × 1 × 8 × 1	40 × 1	40
9. 5 × 80	5 × 1 × 8 × 10	40 × 10	_____
10. 50 × 80	_____	_____	_____

11. Why do the products in Table 2 have more digits than the products in Table 1?

_____

_____

12. Why are there more zeros in the products in Table 3 than the products in Table 2?

_____

_____

► Explore the Area Model


```
         20              +    6
  ┌─────────────────────────┬───────────┐
4 │ . . . . . . . . . . . . │ . . . . . │
  │ . . . . . . . . . . . . │ . . . . . │
  │ . . . . . . . . . . . . │ . . . . . │
  └─────────────────────────┴───────────┘
```
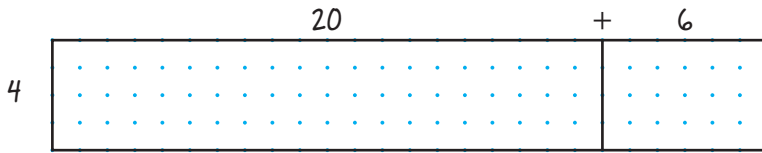
1. How many square units of area are there in the tens part of the drawing? _____

2. What multiplication equation gives the area of the tens part of the drawing? Write this equation in its rectangle.

_____

3. How many square units of area are there in the ones part? _____

4. What multiplication equation gives the area of the ones part? Write this equation in its rectangle. _____

5. What is the total of the two areas? _____

6. How do you know that 104 is the correct product of 4×26?

_____

7. Read problems A and B.
   A. Al's photo album has 26 pages. Each page has 4 photos. How many photos are in Al's album?

   B. Nick took 4 photos. Henri took 26 photos. How many more photos did Henri take than Nick?

   Which problem could you solve using the multiplication you just did? Explain why.

   _____

   _____

   _____

Name _____ **Date** _____

▶ Use the Place Value Sections Method

You can use an area model to demonstrate the
Place Value Sections Method. This strategy is
used below for multiplying a one-digit number
by a two-digit number.

Complete the steps.

$$27 = \quad 20 \quad + \quad 7$$

5	$5 \times 20 = 100$	$5 \times 7 = 35$

5    $+\ \underline{\quad}$
   $\underline{}$

**Use the Place Value Sections Method to solve the problem.
Complete the steps.**

1. The fourth-grade class is participating in a walk-a-thon.
Each student will walk 8 laps around the track. There
are 92 fourth-grade students. How many laps will the
fourth-grade class walk?

_____

$$92 = \quad 90 \quad + \quad 2$$

8	___ × ___ = ___	___ × ___ = ___

8    $+\ \underline{\quad}$

**Draw an area model and use the Place Value Sections
Method to solve the problem.**

2. A football coach is ordering 3 shirts for each football player.
There are 54 players in the football program. How many
shirts does the coach need to order for the entire program?

_____

▶ Use the Expanded Notation Method

You can also use an area model to show how to use the **Expanded Notation Method**. Use the Expanded Notation Method to solve 5 × 27 below.

Complete the steps.

3.

```
27 =        20        +   7
   ┌──────────────────┬──────────┐
5  │                  │          │ 5
   └──────────────────┴──────────┘
```

$$27 = \underline{\quad} + \underline{\quad}$$
$$\times \, 5 = \underline{\quad}$$
$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$
$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$
$$\underline{\quad}$$

Use the Expanded Notation Method to solve the problem. Complete the steps.

4. A farm stand sold 4 bushels of apples in one day. Each bushel of apples weighs 42 pounds. How many pounds of apples did the farm stand sell?

_____

```
42 =        40        +  2
   ┌──────────────────┬──────────┐
4  │                  │          │ 4
   └──────────────────┴──────────┘
```

$$\underline{\quad} = \underline{\quad} + \underline{\quad}$$
$$\underline{\quad} = $$
$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$
$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$
$$\underline{\quad}$$

Draw an area model and use the Expanded Notation Method to solve the problem.

5. A marina needs to replace the boards on their pier. The pier is 7 feet by 39 feet. What is the area of the boards that need to be replaced?

_____

▶ Use the Algebraic Notation Method to Multiply

Another numerical multiplication method that can be represented by an area model is the **Algebraic Notation Method**. This method also decomposes the two-digit factor into tens and ones and then uses the Distributive Property.

Use the Algebraic Notation Method to solve each problem. Complete the steps.

4. 8 · 62

$62 =$ _____ + _____

_____

$8 \cdot 62 =$ ___ · (___ + ___)
   $= 480 + 16$
   $= 496$

5. 2 · 97

$97 =$ _____ + _____

_____

$2 \cdot 97 =$ ___ · (___ + ___)
   $= 180 + 14$
   $= 194$

Draw an area model and use the Algebraic Notation Method to solve the problem.

6. There are 9 members on the school's golf team. Each golfer hit a bucket of 68 golf balls at the driving range. How many golf balls did the entire team hit?

_____

7. What is the first step in the Algebraic Notation Method?

_____

▶ Practice Different Methods

Fill in the blanks in the following solutions.

3. 4 × 86

Expanded Notation

86 = _____ + 6

× 4 = _____ _____

4 × _____ = _____

_____ × 6 = 24
_____

_____

Algebraic Notation

4 · 86 = _____ · (80 + 6)

= 320 + _____

= _____

4. 4 × 68

Expanded Notation

_____ = 60 + 8

× 4 = _____ _____

4 × _____ = _____

_____ × 8 = 32
_____

_____

Algebraic Notation

4 · 68 = 4 · (_____ + _____)

= 240 + _____

= _____

Solve using a numerical method. Draw the related area model.

5. 5 × 64 = _____

6. 6 × 72 = _____

7. 7 × 92 = _____

8. 8 × 53 = _____

9. 5 × 46 = _____

10. 6 × 27 = _____

Compare Methods of One-Digit by Two-Digit Multiplication

► Vocabulary

Choose the best term from the box.

1. _____ are the products of the ones, tens, hundreds, and so on in multidigit multiplication. **(Lessons 2-7)**

2. An _____ is a number close to an exact amount. **(Lesson 2-5)**

3. The _____ lets you find a number times a sum by multiplying the number by each addend and then adding the products. **(Lessons 2-7)**

► Concepts and Skills

4. Write the steps for finding 50×30 by factoring the tens. **(Lesson 2-2)**

_____

_____

5. Explain how you know that $10 \times 60 = 600$. **(Lesson 2-2)**

_____

_____

6. Explain how the Expanded Notation Method is similar to the Place Value Sections Method when multiplying a one-digit number by a two-digit number. **(Lesson 2-6)**

_____

_____

7. Use mental math to find each product. **(Lesson 2-3)**

4×7 _____ 4×700 _____

4×70 _____ $4 \times 7,000$ _____

40×70 _____

Name _____ Date _____

Multiply using any method. Show your work.
(Lessons 2-8, 2-10, 2-14)

8. 3×68 _____

9. 5×84 _____

10. 3×506 _____

11. 9×265 _____

12. 16×50 _____

13. 12×32 _____

14. $6 \times 4,518$ _____

15. $4 \times 2,706$ _____

Estimate each product. Solve to check your estimate.
(Lessons 2-5, 2-14, 2-17)

16. 7 × 82

_____

_____

_____

17. 33 × 66

_____

_____

_____

18. 46 × 20

_____

_____

_____

19. 9 × 3,276

_____

_____

_____

▶ Problem Solving

Find the exact cost. (Lessons 2-4, 2-10)

20. A rental car costs $63 per day. If someone rents the car for 6 days, how much will be the total cost?

_____

21. The Adventure Club is going skating. The price of admission to the skating rink is $3 per person. If there are 214 people in the club, how much will it cost the club to skate?

_____

22. A travel agent is booking flights for a group of 9 people. If each airplane ticket costs $184, how much will their tickets cost altogether?

_____

Solve each problem. List any extra numerical information.
(Lesson 2-15)

show your work.

23. Mariah is painting wall murals in the cafeteria. One
mural is 12 feet by 28 feet. The other mural is 12 feet
by 32 feet. What is the total area of the cafeteria that
Mariah is painting?

_____

24. A family spent 7 hours at the zoo. They bought
2 adult tickets for $20 each and 3 child tickets for
$10 each. They bought lunch for $23. How much did
the tickets cost?

_____

25. Extended Response Sketch an area model for the
product 6 × 3,243. Explain how the area model can be
used to find the product. **(Lesson 2-16)**

_____

_____

_____

_____

_____

_____

_____

Dear Family,

Your child is familiar with multiplication from earlier units. Unit 3 of *Math Expressions* extends the concepts used in multiplication to teach your child division. The main goals of this unit are to:

• Learn methods for dividing whole numbers up to four digits.

• Use estimates to check the reasonableness of answers.

• Solve problems involving division and remainders.

Your child will learn and practice techniques such as the Place Value Sections, Expanded Notation, and Digit-by-Digit methods to gain speed and accuracy in division. At first, your child will learn to use patterns and multiplication to divide. Later, your child will learn to use the methods with divisors from 2 to 9. Then your child will learn to divide when there is a zero in the quotient or dividend and to watch out for potential problems involving these situations.

Examples of Division Methods:

Place Value Sections Method	Expanded Notation Method	Digit-by-Digit Method

Your child may use whatever method he or she chooses as long as he or she can explain it. Some children like to use different methods.

$$60 + 6 = 66$$

$$
5\overline{\begin{array}{|c|c|} 330 & 30 \\ -300 & 30 \\ \hline 30 & 0 \end{array}}
$$

$$
\begin{array}{r}
6 \rceil \\
60 \rfloor \ 66 \\
5\overline{)330} \\
-300 \\
\hline
30 \\
-30 \\
\hline
0
\end{array}
$$

$$
\begin{array}{r}
66 \\
5\overline{)330} \\
-30 \\
\hline
30 \\
-30 \\
\hline
0
\end{array}
$$

Your child will also learn to interpret remainders in the context of the problem being solved; for example, when the remainder alone is the answer to a word problem.

Finally, your child will apply this knowledge to solve mixed problems with one or more steps and using all four operations.

If you have questions or problems, please contact me.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Numbers and Operations in Base Ten, 4.NBT.6 and all Mathematical Practices.

Estimada familia:

En unidades anteriores su niño se ha familiarizado con la multiplicación. La Unidad 3 de *Math Expressions* amplía los conceptos usados en la multiplicación para que su niño aprenda la división. Los objetivos principales de esta unidad son:

• aprender métodos para dividir números enteros de hasta cuatro dígitos.

• usar la estimación para comprobar si las respuestas son razonables.

• resolver problemas que requieran división y residuos.

Su niño aprenderá y practicará técnicas tales como las de Secciones de valor posicional, Notación extendida y Dígito por dígito, para adquirir rapidez y precisión en la división. Al principio, su niño aprenderá a usar patrones y la multiplicación para dividir. Más adelante, usará los métodos con divisores de 2 a 9. Luego, aprenderá a dividir cuando haya un cero en el cociente o en el dividendo, y a detectar problemas que pueden surgir en esas situaciones.

Ejemplos de métodos de división:

Su niño puede usar el método que elija siempre y cuando pueda explicarlo. A algunos niños les gusta usar métodos diferentes.

Secciones de valor posicional	Notación extendida	Dígito por dígito

$$
\begin{array}{c}
60 + \quad 6 = 66 \\
5\ \overline{\begin{array}{c|c} 330 & 30 \\ -300 & 30 \\ \hline 30 & 0 \end{array}}
\end{array}
\qquad
\begin{array}{r}
6 \\
60 \,]\,66 \\
5\overline{)330} \\
-300 \\
\hline
30 \\
-30 \\
\hline
0
\end{array}
\qquad
\begin{array}{r}
66 \\
5\overline{)330} \\
-30 \\
\hline
30 \\
-30 \\
\hline
0
\end{array}
$$

Su niño también aprenderá a interpretar los residuos en el contexto del problema que se esté resolviendo; por ejemplo, cuando solamente el residuo es la respuesta a un problema.

Por último, su niño aplicará este conocimiento para resolver problemas mixtos de uno o más pasos, usando las cuatro operaciones.

Si tiene alguna pregunta o comentario, por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

► Divide with Remainders

The remainder must be less than the divisor.
If it is not, increase the quotient.

$$\begin{array}{r} 3 \\ 5\overline{)23} \\ -15 \\ \hline 8 \text{ no} \\ 8 > 5 \end{array} \longrightarrow \begin{array}{r} 4 \text{ R3} \\ 5\overline{)23} \\ -20 \\ \hline 3 \text{ yes} \\ 3 < 5 \end{array}$$

$$\begin{array}{r} 8 \\ 9\overline{)87} \\ -72 \\ \hline 15 \text{ no} \\ 15 > 9 \end{array} \longrightarrow \begin{array}{r} 9 \text{ R6} \\ 9\overline{)87} \\ -81 \\ \hline 6 \text{ yes} \\ 6 < 9 \end{array}$$

Divide with remainders.

1. $2\overline{)19}$ **2.** $7\overline{)50}$ **3.** $9\overline{)48}$

4. $5\overline{)48}$ **5.** $6\overline{)19}$ **6.** $3\overline{)25}$

Divide. Multiply to check the last problem in each row.

7. $6\overline{)27}$ **8.** $4\overline{)30}$ **9.** $\begin{array}{r} 5 \text{ R4} \\ 7\overline{)39} \\ -35 \\ \hline 4 \end{array}$ $7 \cdot 5 + 4 =$
$35 + 4 = 39$

10. $8\overline{)43}$ **11.** $5\overline{)26}$ **12.** $9\overline{)41}$

13. $5\overline{)32}$ **14.** $4\overline{)21}$ **15.** $3\overline{)22}$

▶ Multiplying and Dividing

Complete the steps.

1. Sam divides 738 by 6. He uses the Place Value
   Sections Method and the Expanded Notation Method.

   a. Sam thinks: I'll draw the Place Value Sections that I know from
      multiplication. To divide, I need to find how many hundreds,
      tens, and ones to find the unknown factor.

   Place Value Sections Method   **Expanded Notation Method**

   __ hundreds + __ tens + __ ones
   __00   __0   __

   | 6 | 738 | | |

   $$6\overline{)738}$$

   b. $6 \times 100 = 600$ will fit. $6 \times 200 = 1{,}200$ is too big.

   __00   +   __0   +   __

   | 6 | 738 | | |

   $$6\overline{)738}$$

   c. I have 138 left for the other sections.
      $6 \times 20 = 120$ will fit. $6 \times 30 = 180$ is too big.

   100   +   __0   +   __

   | 6 | 738
−600
138 | 138 | |

   $$\begin{array}{r} 100 \\ 6\overline{)738} \\ -\ 600 \\ \hline 138 \end{array}$$

   d. $6 \times 3 = 18$

   100   +   20   +   __   = _____

   | 6 | 738
−600
138 | 138
−120
18 | 18

0 |

   $$\begin{array}{r} 20 \\ 100 \\ 6\overline{)738} \\ -\ 600 \\ \hline 138 \\ -\ 120 \\ \hline 18 \end{array}$$

► Practice the Place Value Sections Method

Solve. Use Place Value Sections Method for division.

1. The sidewalk crew knows that the new sidewalk at the mall will be 3,915 square feet. It will be 9 feet wide. How long will it be? _____

$$\underline{4}00 + \underline{3}0 + \underline{5} = 435$$

	$400+$	$30+$	5
9 ft	3,915 −3,600	315 −270	45 −45
	315	45	0

2. The sidewalk at the theater will be 2,748 square feet. It will be 6 feet wide. How long will it be?

_____

$$\underline{\ }00 + \underline{\ }0 + \underline{\ } = \underline{\ \ \ }$$

3. Pens are packaged in boxes of 8. The store is charged for a total of 4,576 pens. How many boxes of pens did they receive?_____

$$\underline{\ }00 + \underline{\ }0 + \underline{\ } = \underline{\ \ \ }$$

4. A factory has 2,160 erasers. They package them in groups of 5. How many packages of erasers does the factory have? _____

$$\underline{\ \ } + \underline{\ \ } + \underline{\ } = \underline{\ \ \ }$$

5. A party planner has 834 small flowers to make party favors. She will put 3 flowers in each party favor. How many party favors can she make? _____

$$\underline{\ \ } + \underline{\ \ } + \underline{\ } = \underline{\ \ \ }$$

6. An artist has 956 tiles to use in a design. He plans to arrange the tiles in group of 4 tiles. How many groups of 4 tiles can he make?

_____

$$\underline{\ \ } + \underline{\ \ } + \underline{\ } = \underline{\ \ \ }$$

Name _____   **Date** _____

▶ 2-Digit and 4-Digit Quotients

Solve. Use the Place Value Sections and the Expanded Notation Methods for division.

1.

$$20 + 8 = 28$$

9	252	72
	− 180	− 72
	72	0

$9\overline{)252}$

2.

$$\_0 + \quad = \_\_$$

6	162	

$6\overline{)162}$

3.

$$\_,000 + \quad \_00 + \quad \_0 + \quad \_ = \_\_\_\_$$

8	8,984			

$8\overline{)8,984}$

4.

$$\_,000 + \quad \_00 + \quad \_0 + \quad \_ = \_\_\_\_$$

3	7,722			

$3\overline{)7,722}$

Discuss 2-Digit and 4-Digit Quotients

▶ **Practice**

Divide.

6. $4\overline{)868}$

7. $6\overline{)5,142}$

8. $3\overline{)4,395}$

9. $4\overline{)332}$

10. $7\overline{)1,617}$

11. $7\overline{)939}$

12. $2\overline{)4,276}$

13. $6\overline{)2,576}$

14. $7\overline{)441}$

15. $9\overline{)3,735}$

16. $7\overline{)406}$

17. $3\overline{)9,954}$

▶ Practice

Divide.

6. $5\overline{)965}$

7. $8\overline{)128}$

8. $8\overline{)928}$

9. $3\overline{)716}$

10. $4\overline{)4,596}$

11. $4\overline{)982}$

12. $3\overline{)6,342}$

13. $8\overline{)578}$

14. $5\overline{)1,155}$

15. $6\overline{)3,336}$

16. $7\overline{)672}$

17. $3\overline{)4,152}$

► **Vocabulary**

Choose the best term from the box.

1. A _____ is an answer to a division problem.
(Lesson 3-1)

2. The number 7 is the _____ in the division problem
548 ÷ 7. **(Lesson 3-1)**

3. In the division problem 548 ÷ 7, the number 548 is the _____.
(Lesson 3-1)

► **Concepts and Skills**

4. List the three methods suggested in this Unit for solving division
problems. Which division method would you use to solve 728 ÷ 6?
Explain why you chose that method and how you would use it to
solve the problem. **(Lessons 3-2, 3-3, 3-4, 3-5)**

_____

_____

5. Explain why you need to write a zero in the tens place of the
quotient when you divide 829 by 4. **(Lesson 3-7)**

_____

_____

_____

_____

6. For what types of real world division problems might you use the
quotient alone? When might you use only the remainder? **(Lesson 3-9)**

_____

_____

**Use rounding and estimation to decide whether each quotient
makes sense. (Lesson 3-8)**

<div style="display:flex">

$$\begin{array}{r} 49 \text{ R3} \\ 6\overline{)297} \end{array}$$

7.

$$\begin{array}{r} 814 \\ 4\overline{)3,256} \end{array}$$

8.

$$\begin{array}{r} 528 \text{ R5} \\ 8\overline{)4,229} \end{array}$$

9.

</div>

Use any method to solve. (Lessons 3-1, 3-2, 3-3, 3-4, 3-5, 3-6, 3-7)

10. $4\overline{)716}$ **11.** $9\overline{)959}$ **12.** $3\overline{)6{,}243}$ **13.** $7\overline{)940}$

14. $4\overline{)2{,}203}$ **15.** $7\overline{)8{,}659}$ **16.** $5\overline{)7{,}534}$ **17.** $6\overline{)9{,}915}$

► Problem Solving

Solve.

18. There are 185 students going to a museum. Each van can hold 9 students. How many vans of 9 students will there be? How many students will ride in a van that is not full? **Lesson 3-9**

_____

19. Joshua pulls 52 loads of sand on his wagon to make a play area. He pulls 21 pounds of sand on each load. How many pounds of sand does Joshua use to make a play area? **Lesson 3-10**

_____

20. Extended Response Kayla and her father baked 256 banana nut muffins and 298 chocolate chip muffins to sell at their family restaurant. They plan to place the muffins in boxes that hold 6 muffins each. What is the greatest number of boxes that can be filled with muffins? Explain how you found your answer. **Lessons 3-9, 3-10**

_____

_____

Family Letter

Dear Family,

In Unit 4 of Math Expressions, your child will apply the skills he or she has learned about operations with whole numbers while solving real world problems involving addition, subtraction, multiplication, and division.

Your child will simplify and evaluate expressions. Parentheses will be introduced to show which operation should be done first. The symbols "=" and "≠" will be used to show whether numbers and expressions are equal.

Other topics of study in this unit include situation and solution equations for addition and subtraction, as well as multiplication and division. Your child will use situation equations to represent real world problems and solution equations to solve the problems. This method of representing a problem is particularly helpful when the problems contain greater numbers and students cannot solve mentally.

Your child will also solve multiplication and addition comparison problems and compare these types of problems identifying what is the same or different.

Addition Comparison	Multiplication Comparison
Angela is 14 years old. She is 4 years older than Damarcus. How old is Damarcus?	Shawn colored 5 pages in a coloring book. Anja colored 4 times as many pages as Shawn colored. How many pages did Anja color?

Students learn that in the addition problem they are adding 4, while in the multiplication problem, they are multiplying by 4.

Your child will apply this knowledge to solve word problems using all four operations and involving one or more steps.

Finally, your child will find factor pairs for whole numbers and generate and analyze numerical and geometric patterns.

If you have any questions or comments, please call or write to me.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Operations and Algebraic Thinking 4.OA.1, 4.OA.2, 4.OA.3, 4.OA.4, 4.OA.5, Number and Operations in Base Ten 4.NBT.4, 4.NBT.5, 4.NBT.6, Measurement and Data 4.MD.2, and all Mathematical Practices.

Estimada familia:

En la Unidad 4 de Math Expressions, su hijo aplicará las destrezas relacionadas con operaciones de números enteros que ha adquirido, resolviendo problemas cotidianos que involucran suma, resta, multiplicación y división.

Su hijo simplificará y evaluará expresiones. Se introducirán los paréntesis como una forma de mostrar cuál operación deberá completarse primero. Los signos "=" y "≠" se usarán para mostrar si los números o las expresiones son iguales o no.

Otros temas de estudio en esta unidad incluyen ecuaciones de situación y de solución para la suma y resta, así como para la multiplicación y división. Su hijo usará ecuaciones de situación para representar problemas de la vida cotidiana y ecuaciones de solución para resolver esos problemas. Este método para representar problemas es particularmente útil cuando los problemas involucran números grandes y los estudiantes no pueden resolverlos mentalmente.

Su hijo también resolverá problemas de comparación de multiplicación y suma, y comparará este tipo de problemas para identificar las semejanzas y diferencias.

Comparación de suma	Comparación de multiplicación
Ángela tiene 14 años. Ella es 4 años mayor que Damarcus. ¿Cuántos años tiene Damarcus?	Shawn coloreó 5 páginas de un libro. Ana coloreó 4 veces ese número de páginas. ¿Cuántas páginas coloreó Ana?

Los estudiantes aprenderán que en el problema de suma están sumando 4, mientras que en el problema de multiplicación, están multiplicando por 4.

Su hijo aplicará estos conocimientos para resolver problemas de uno o más pasos usando las cuatro operaciones.

Finalmente, su hijo hallará pares de factores para números enteros y generará y analizará patrones numéricos y geométricos.

Si tiene alguna pregunta por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

COMMON CORE

Esta unidad incluye los Common Core Standards for Mathematical Content for Operations and Algebraic Thinking 4.OA.1, 4.OA.2, 4.OA.3, 4.OA.4, 4.OA.5, Number and Operations in Base Ten 4.NBT.4, 4.NBT.5, 4.NBT.6, Measurement and Data 4.MD.2, and all Mathematical Practices.

▶ Discuss Inverse Operations

When you add, you put two groups together. When you subtract, you find an unknown addend or take away one group from another. Addition and subtraction are inverse operations. They undo each other.

Addends are numbers that are added to make a sum. You can find two addends for a sum by breaking apart the number.

Total (Sum)
Addend
Addend
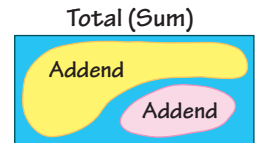
A break-apart drawing can help you find all eight related addition and subtraction equations for two addends.

Total (Sum)
81
72   9
Addend Addend
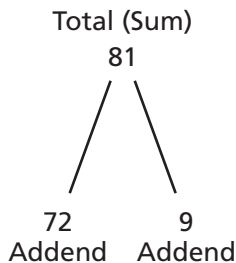
$81 = 72 + 9$ $72 + 9 = 81$

$81 = 9 + 72$ $9 + 72 = 81$

$72 = 81 - 9$ $81 - 9 = 72$

$9 = 81 - 72$ $81 - 72 = 9$

9. Which equations show the Commutative Property?

_____

10. What is the total in each equation? Where is the total in a subtraction equation?

_____

Solve each equation.
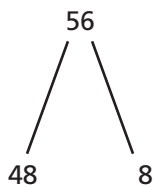
11. $50 = 30 + p$

$p =$ _____

12. $q + 20 = 60$

$q =$ _____

13. $90 - v = 50$

$v =$ _____

14. Write the eight related addition and subtraction equations for the break-apart drawing.

56
48   8

_____   _____

_____   _____

_____   _____

_____   _____

► Discuss the Steps

1. Mr. Stills makes bags of school supplies for the 9 students in his class. He has 108 pencils and 72 erasers. He puts the same number of pencils and the same number of erasers into each bag. How many more pencils than erasers are in each bag of school supplies?

   Solve the problem by finishing Nicole's and David's methods. Discuss what is alike and what is different about the methods.

Nicole's Method

Write an equation for each step.

Divide to find the number of pencils that Mr. Stills puts in each bag of school supplies.
$$108 \div 9 = \underline{\hspace{1cm}}$$

Divide to find the number of erasers that Mr. Stills puts in each bag of school supplies.
$$72 \div 9 = \underline{\hspace{1cm}}$$

Subtract the number of erasers in each bag from the number of pencils in each bag.
$$12 - 8 = \underline{\hspace{1cm}}$$

There are _____ more pencils than erasers in each bag of school supplies.

David's Method

Write an equation for the whole problem.

Let p = how many more pencils than erasers are in each bag of school supplies

The number of pencils in each bag of school supplies.   The number of erasers in each bag of school supplies.

$$\underline{\hspace{1cm}} \div 9 - \underline{\hspace{1cm}} \div 9 = p$$
$$12 - 8 = p$$
$$\underline{\hspace{1cm}} = p$$

There are _____ more pencils than erasers in each bag of school supplies.

Solve Multistep Problems

► Discuss the Steps (continued)

2. John is selling bags of popcorn for a school fundraiser. So far, John has sold 45 bags of popcorn for $5 each. His goal is to earn $300 for the school fundraiser. How many more bags of popcorn must John sell to reach his goal?

Solve the problem by writing an equation for each step. Then solve the problem by writing one equation for the whole problem.

Write an equation for each step.

Multiply to find how much money John has earned so far selling popcorn.

$$\underline{\hspace{3em}} \times \quad \$5 \quad = \quad \$\underline{\hspace{3em}}$$

Subtract to find how much money John has left to earn to reach his goal.

$$\$300 \quad - \quad \$\underline{\hspace{3em}} \quad = \quad \$\underline{\hspace{3em}}$$

Divide to find the number of bags of popcorn John must sell to reach his goal.

$$\$75 \quad \div \quad \$5 \quad = \quad \underline{\hspace{3em}}$$

John must sell _____ more bags of popcorn to reach his goal.

Write an equation for the whole problem.

Let b = the number of bags of popcorn John must sell to reach his goal.

John's fundraiser goal amount.   Amount of money John has raised so far.

$$(\underline{\hspace{3em}} \quad - \quad \underline{\hspace{3em}} \times \quad \$5) \quad \div \quad \$5 \quad = b$$

$$(\$300 \quad - \quad \$\underline{\hspace{2em}}) \quad \div \quad \$5 \quad = b$$

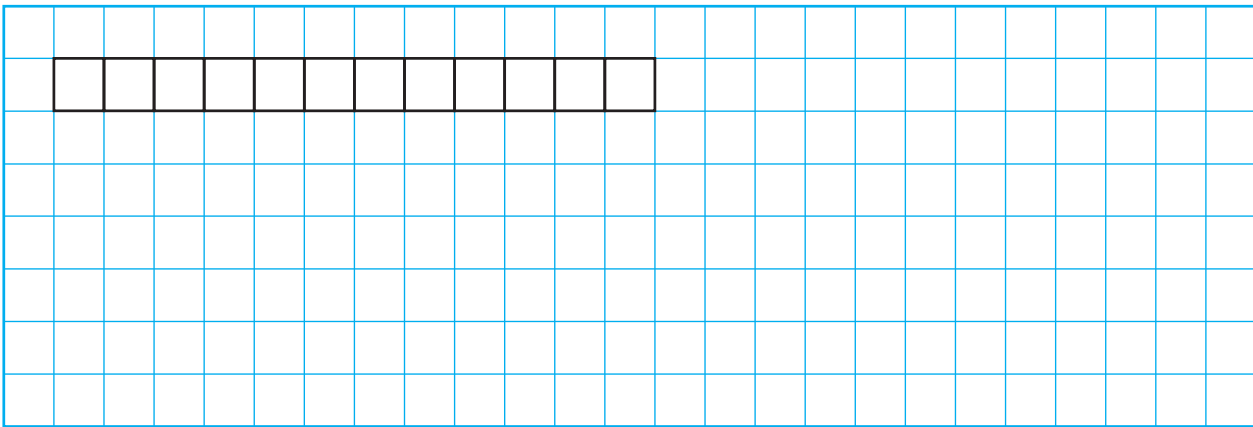$$\$\underline{\hspace{2em}} \div \quad \$5 \quad = b$$

$$\underline{\hspace{3em}} = b$$

John must sell _____ more bags of popcorn to reach his goal.

▶ Find Factor Pairs

A factor pair for a number is two whole numbers whose product is that number. For example, 2 and 5 is a factor pair for 10.

1. Draw arrays to show all the factor pairs for 12 on the grid below. The array for 1 and 12 is shown.

2. List all the factor pairs for 12. _____

Use the table to find all the factors pairs for each number.

3. 32

1	32
2	

4. 44

1	44

5. 100

1	100

List all the factor pairs for each number.

6. 29

_____

7. 63

_____

Factors and Prime Numbers

▶ Vocabulary

Choose the best term from the box.

1. A _____ shows the operation that can
   be used to solve a problem. **(Lessons 4-2, 4-3)**

2. A number greater than 1 that has 1 and itself as its only
   factor pair is a _____ **(Lesson 4-10)**

3. A _____ shows the structure of the information
   in a problem. **(Lessons 4-2, 4-3)**

▶ Concepts and Skills

4. Explain how the equation for *4 is 2 more than 2* is different
   from the equation for *4 is 2 times as many as 2*.
   (Lessons 4-4, 4-5, 4-6)

   _____

   _____

   _____

5. Explain how you could use rectangles and circles to show
   the following pattern: A B B A B B A B B. **(Lesson 4-11)**

   _____

   _____

6. Dori wrote this problem: Mrs. Ramos has 1,352 stamps. She
   buys some more stamps. Now she has 1,943 stamps. How
   many stamps did she buy? Explain why the situation equation
   $1,352 + s = 1,943$ represents Dori's problem. **(Lesson 4-2)**

   _____

   _____

   _____

Solve for ☐ or *n*. (Lesson 4-1)

7. $(18 - 9) \cdot 3 = \boxed{} \cdot 3$

   $\boxed{} =$ _____

8. $(35 + 50) - (25 \div 5) = n$

   $n =$ _____

List all factor pairs for each number. (Lesson 4-10)

9. 47

   _____

10. 28

   _____

Write whether each number is *prime* or *composite*. (Lesson 4-10)

11. 98

   _____

12. 61

   _____

Tell whether each number is a multiple of 7. Write *yes* or *no*. (Lesson 4-10)

13. 36

   _____

14. 84

   _____

Use the rule to find the next three terms in the pattern. (Lesson 4-11)

15. 6, 12, 24, 48, …
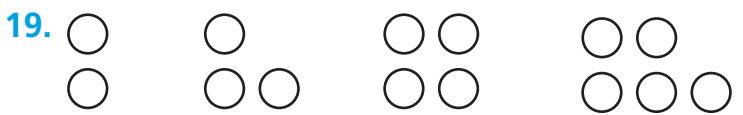   Rule: multiply by 2

   _____

16. 55, 95, 135, 175, …
    Rule: add 40

   _____

17. 4, 12, 36, 108, …
    Rule: multiply by 3

   _____

Describe the next term of each pattern. (Lesson 4-11)

18. ▲█☐▲█☐☐▲█☐☐▲

_____

19. ○ ○ ○○ ○○
○ ○○ ○○ ○○○

_____

▶ Problem Solving

For Problems 20–21, write an equation to solve the problem.
(Lessons 4-2, 4-3)

20. The Appalachian Trail is a hiking trail that runs from Maine to Georgia and is approximately 2,160 miles long. Suppose the Andersons want to hike 9 miles per day along an 864-mile section of the trail from New York to Georgia. On how many days will the Andersons hike 9 miles?

_____

_____

21. The library had a large collection of books. Then the librarian ordered 2,200 more books. Now there are 13,327 books. How many books did the library have at the start?

_____

_____

**For Problems 22–23, use the pictograph.
Write an equation to solve each
comparison problem. (Lessons 4-4, 4-5, 4-6)**

Students' Field Trip Choices	
Zoo	🙂 🙂 🙂
Science Center	🙂 🙂 🙂 🙂 🙂 🙂
Aquarium	🙂 🙂 🙂 🙂 🙂 🙂 🙂
Art Museum	🙂 🙂

🙂 = 4 votes

22. How many fewer students voted for
the zoo than voted for the aquarium?

_____

23. How many times as many students voted for the
science center as voted for the art museum?

_____

**For Problems 24–25, use an equation to solve.
(Lessons 4-7, 4-8, 4-9)**

24. Rita and Cody sold refreshments at the football
game. They sold 6 sandwiches, 8 bags of popcorn,
and 20 bottles of water. The sandwiches cost
$5 each. The bags of popcorn cost $2 each.
The bottles of water cost $1 each. How much
money in all did Rita and Cody make?

_____

25. Extended Response A bakery had 2 trays with
28 muffins on each tray. The bakery had 4 trays
of cupcakes with 12 cupcakes on each tray.
On Monday, the bakery sold 12 cupcakes.

a. How many muffins and cupcakes were left in all?
Explain.

_____

_____

_____

b. How can you determine if your answer is reasonable?

_____

_____

_____

Dear Family,

This unit is about the metric measurement system. During this unit, students will become familiar with metric units of length, capacity, mass, and time, as well as the size of each when compared to each other.

One **meter** is about the distance an adult man can reach, or a little longer than a yard.

One **liter** is about two large glasses of liquid, or a little more than a quart.

One **gram** is about the mass of a paper clip or a single peanut. One **kilogram** is a little more than 2 pounds.

Students will also discover that the metric system is based on multiples of 10. Prefixes in the names of metric measurements tell the size of a measure compared to the size of the base unit.

Units of Length						
kilometer	hectometer	decameter	meter	decimeter	centimeter	millimeter
km	hm	dam	m	dm	cm	mm
$10 \times 10 \times 10 \times$ larger	$10 \times 10 \times$ larger	$10 \times$ larger	1 m	$10 \times$ smaller	$10 \times 10 \times$ smaller	$10 \times 10 \times 10 \times$ smaller
1 km = 1,000 m	1 hm = 100 m	1 dam = 10 m		10 dm = 1 m	100 cm = 1 m	1,000 mm = 1 m

The most commonly used length units are the **kilometer, meter, centimeter**, and **millimeter**.

The most commonly used capacity units are the **liter** and **milliliter**.

The most commonly used units of mass are the **gram, kilogram**, and **milligram**.

If you have any questions or comments, please call or write to me.

Sincerely,
Your child's teacher

COMMON CORE

This unit includes the Common Core Standards for Mathematical Content for Measurement and Data, 4.MD.1, 4.MD.2, 4.MD.3, 4.MD.4 and all Mathematical Practices.

Estimada familia:

Esta unidad trata del sistema métrico de medidas. Durante esta unidad, los estudiantes se familiarizarán con unidades métricas de longitud, capacidad y masa, así como con el tamaño de cada una comparada con las otras.

Un **metro** es aproximadamente la distancia que un hombre adulto puede alcanzar extendiendo el brazo, o un poco más de una yarda.

Un **litro** es aproximadamente dos vasos grandes de líquido, o un poco más de un cuarto de galón.

Un **gramo** es aproximadamente la masa de un clip o un cacahuate. Un **kilogramo** es un poco más de 2 libras.

Los estudiantes también descubrirán que el sistema métrico está basado en múltiplos de 10. Los prefijos de los nombres de las medidas métricas indican el tamaño de la medida comparado con el tamaño de la unidad base.

Unidades de longitud						
kilómetro	hectómetro	decámetro	metro	decímetro	centímetro	milímetro
km	hm	dam	m	dm	cm	mm
10 × 10 × 10 × más grande	10 × 10 × más grande	10 × más grande	1 m	10 × más pequeño	10 × 10 × más pequeño	10 × 10 × 10 × más pequeño
1 km = 1,000 m	1 hm = 100 m	1 dam = 10 m		10 dm = 1 m	100 cm = 1 m	1,000 mm = 1 m

Las unidades de longitud más comunes son **kilómetro**, **metro**, **centímetro** y **milímetro**.

Las unidades de capacidad más comunes son **litro** y **mililitro**.

Las unidades de masa más comunes son **gramo**, **kilogramo** y **miligramo**.

Si tiene alguna pregunta o algún comentario, por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

Measure Length

► Convert Metric Units of Measure

You can use a table to convert measurements.

20. How many decimeters are in one meter? _____

**21.** Complete the equation.
1 meter = _____ decimeters

22. Complete the table. Explain how you found the number of decimeters in 8 meters.

_____

_____

Meters	Decimeters	
2	2 × 10	= 20
4	__ × 10	= ___
6	6 × ___	= ___
8	___	= ___

You can also use a number line to convert measurements.

23. Complete the equation. 1 kilometer = _____ meters

24. Label the double number line to show how kilometers (km) and meters (m) are related.

kilometers 0   1   2   3   4   5

meters 0   1,000   2,000   ___   ___   ___
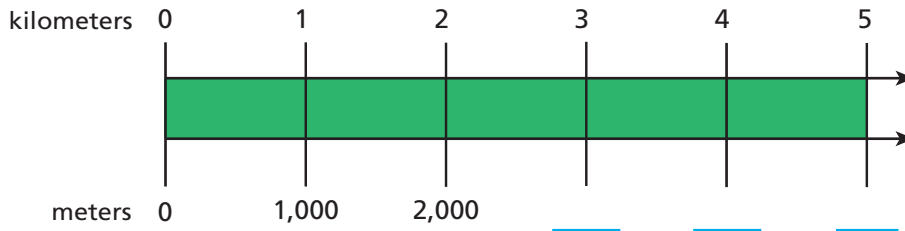
Solve each problem. Label your answers with the correct units.

25. Marsha drove her car 6,835 kilometers last year. How many meters did Marsha drive last year?

_____

26. John's television is 160 cm wide. How many millimeters wide is the television?

_____

Solve.

27. 5 m = _____ cm   **28.** 3 hm = _____ m   **29.** 7 km = _____ m

► **Measure Liquid Volume**

The base metric unit of **liquid volume** is a **liter**.

Units of Liquid Volume						
kiloliter	hectoliter	decaliter	liter	deciliter	centiliter	milliliter
kL	hL	daL	L	dL	cL	mL
10 × 10 × 10 × larger	10 × 10 × larger	10 × larger	1 L	10 × smaller	10 × 10 × smaller	10 × 10 × 10 × smaller
1 kL = 1,000 L	1 hL = 100 L	1 daL = 10 L		10 dL = 1 L	100 cL = 1 L	1,000 mL = 1 L

Ms. Lee's class cut a two-liter plastic bottle in half to make a one-liter jar. They marked the outside to show equal parts.

1. How many **milliliters** of water will fit in the jar?

_____

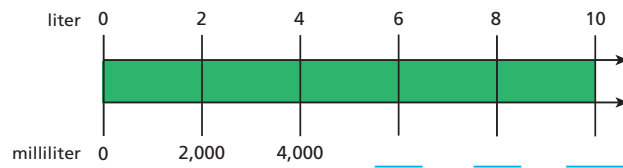**2.** How many of these jars will fill a **kiloliter** container? Explain why.

_____
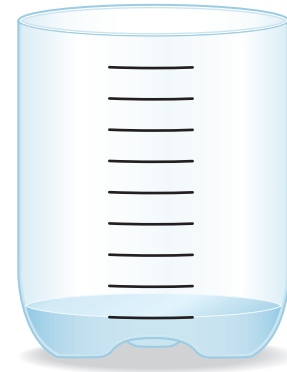
You can use a table or a double number line to convert units of liquid measure.

3. Complete the table.

Liters	Deciliters	
3	3 × 10	= 30
5	___ × 10	= ___
7	7 × ___	= ___
12	___	= ___

4. Label the double number line to show how liters (L) and milliliters (mL) are related.

liter   0   2   4   6   8   10

milliliter   0   2,000   4,000   ___   ___   ___

▶ **Measure Mass**

The basic unit of **mass** is the **gram**.

Units of Mass

kilogram	hectogram	decagram	gram	decigram	centigram	milligram
kg	hg	dag	g	dg	cg	mg
10 × 10 × 10 × larger	10 × 10 × larger	10 × larger	1 g	10 × smaller	10 × 10 × smaller	10 × 10 × 10 × smaller
1 kg = 1,000 g	1 hg = 100 g	1 dag = 10 g		10 dg = 1 g	100 cg = 1 g	1,000 mg = 1 g

8. How many **milligrams** are equal to 1 gram?

_____

9. How many grams are equal to 1 kilogram?

_____

If you weighed 1 mL of water, you would find that its mass would be one gram (1 g).
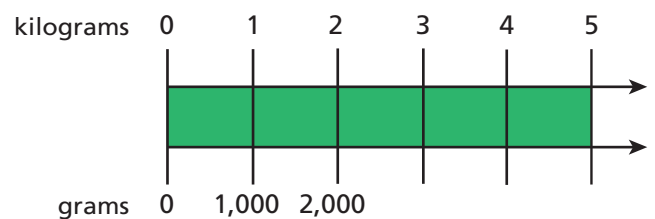
10. Is the gram a small or large unit of measurement? Explain your thinking.

_____

You can use a table or a double number line to convert units of mass.

11. Complete the table.

Grams	Centigrams	
4	4 × 10	= 40
8	___ × 10	= ___
12	12 × ___	= ___
15	___	= ___

12. Label the double number line to show how kilograms (kg) and grams (g) are related.

kilograms 0 1 2 3 4 5

grams 0 1,000 2,000 ___ ___ ___

▶ Practice Converting Metric Units

Solve.

13. Martin measured the mass in grams of four different objects and recorded the information in the table below. Complete the table to find the mass of each object in milligrams.

Grams	Milligrams
4	4,000
7	
11	
15	

14. Olivia bought four different-sized containers and filled them each with water. She recorded the liquid volume of each container in liters below. Complete the table to find the liquid volume of each container in centiliters.

Liters	Centiliters
1	
3	
4	400
6	

15. Hayden has a crayon with a mass of 8 grams. Complete the double number line to find the mass of the crayon in centigrams.

grams   0   2   4   6   8

centigrams   0   ___   ___   600   ___
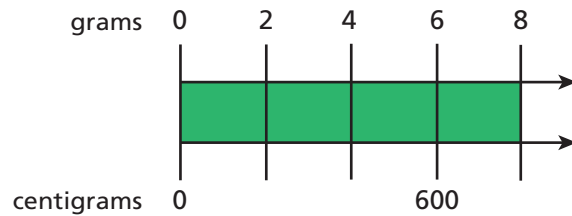
16. Jennifer buys a 2-liter bottle of apple juice and a 3-liter bottle of orange juice at the market. How many deciliters of juice does Jennifer buy in all?

_____

17. Elena has a cat with a mass of 4 kilograms. Ginger's cat has a mass that is 2 times as much as Elena's cat. What is the mass of Ginger's cat in grams?
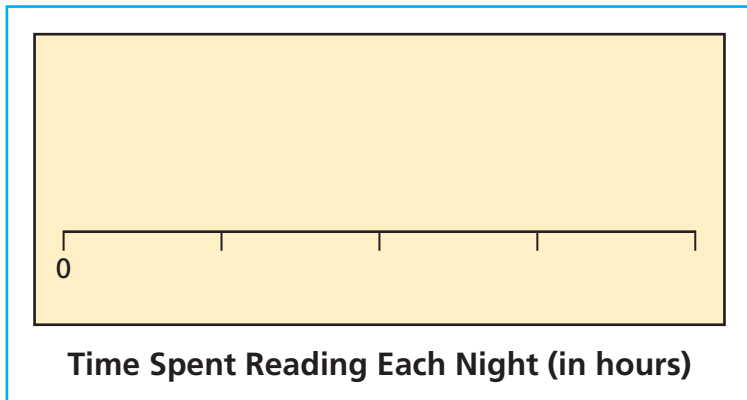
_____

▶ Make a Line Plot

A **line plot** displays data above a number line. Jamal asked his classmates about the time they spend reading. He organized the answers in the table.

Time Spent Reading	Number of Students
0 hour	0
$\frac{1}{4}$ hour	2
$\frac{1}{2}$ hour	5
$\frac{3}{4}$ hour	4
1 hour	4

19. Use the table to complete the line plot.

0

Time Spent Reading Each Night (in hours)

20. How many classmates did Jamal ask about time spent reading? _____

21. What amount of time had the most responses? _____

▶ Practice

Solve.

22. Fiona asked her friends how much time they spend using a computer at home each night. Use the information in the table to make a line plot.

Time Spent on Computer	Number of Students
0 hour	4
$\frac{1}{4}$ hour	4
$\frac{1}{2}$ hour	7
$\frac{3}{4}$ hour	3
1 hour	9

23. Marissa wants to know how many minutes she has practiced the piano. Label the double number line to show how hours and minutes are related. How many minutes has she practiced if she practiced for 4 hours?

_____

hours   0   1   2   3   4

minutes   0   ___ ___   180   ___
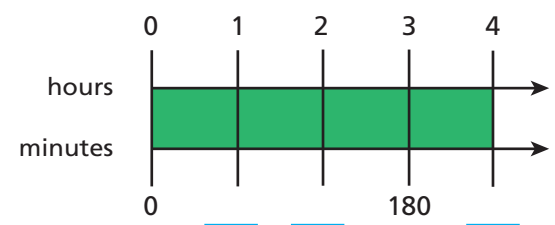
► **Liquid Volume**

In the customary system, the primary unit of liquid volume is a **cup**.

1 cup = 8 **fluid ounces**   4 cups = 1 **quart**

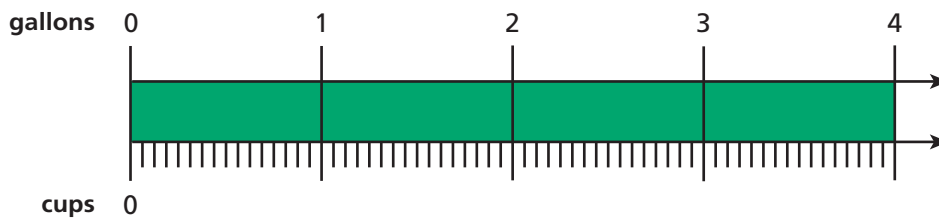2 cups = 1 **pint**   4 quarts = 1 **gallon**

15. Complete the table.

Quarts	Fluid Ounces
1	32
2	
3	
4	
5	
6	

16. Label the double number line to show how gallons (gal) and cups (c) are related.

gallons   0   1   2   3   4

cups   0   ____   ____   ____   ____

Solve.

17. 3 qt = _____ c   **18.** 10 c = _____ fl oz   **19.** 2 gal = _____ pt

Name _____ **Date** _____

► Vocabulary

Choose the best term from the box.

1. The _____ is the measurement of the distance around the outside of a figure. **(Lesson 5-6)**

2. One _____ is equal to 16 ounces. **(Lesson 5-5)**

3. The _____ is the total number of square units inside a figure. **(Lesson 5-6)**

► Concepts and Skills

4. Explain how to find how many cups are in 8 quarts. **(Lesson 5-5)**

_____

_____

_____

5. Explain why the formula for the perimeter of a rectangle and the formula for the perimeter of a square are different. **(Lesson 5-6)**

_____

_____
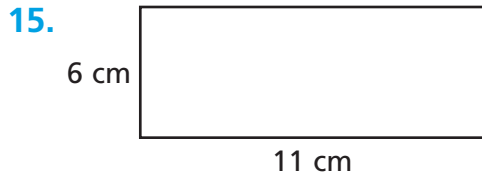
_____

Convert. (Lessons 5-1, 5-2, 5-3, 5-4, 5-5)

6. 40 m = _____ cm

7. 65 L = _____ cL

8. 3 kg = _____ g

9. 6 yd = _____ ft

10. 3 lb = _____ oz

11. 9 gal = _____ pt

12. 7 hours = _____ min

13. 8 years = _____ months

14. 21 min = _____ sec

Find the area and perimeter of each rectangle. (Lessons 5-6)

15.

6 cm

11 cm

$P =$ _____

$A =$ _____

16.

12 in.

19 in.

$P =$ _____

$A =$ _____
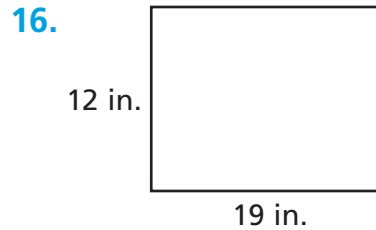
▶ Problem Solving

Solve.

Show your work.

17. A movie starts at 12:45 P.M. and is exactly 1 hour and 35 minutes long. What time does the movie end? **(Lessons 5-3, 5-7)**

_____

18. A rectangular kitchen has an area of 126 square feet. The length is 14 feet. What is the width? **(Lesson 5-6, 5-7)**

_____

19. Angie buys 6 feet of red ribbon and 8 feet of blue ribbon for a project. How many inches of ribbon did Angie buy in all? **(Lessons 5-2, 5-7)**

_____

20. Extended Response Jack buys some rocks. Each rock has a mass of 4 kilograms. He buys 19 rocks. How many grams of rock did Jack buy? Explain how you solve this problem. **(Lessons 5-2, 5-7)**

_____

_____