PRENTICE HALL

MATHEMATICS
COURSE 1

Guided Problem Solving

All-In-One
Workbook

1-1 • Guided Problem Solving

GPS **Student Page 7, Exercise 27:**

Apples Order the apple types by number of cartons from least to greatest.

Understand

1. Where is the information you need to do the exercise?

   _____

2. How do you determine which number is the least?

   _____

   _____

   _____

   _____

Yearly Apple Production in the United States

Type of Apple	Cartons
Ida Red	2,753,000
Empire	2,739,000
Braeburn	2,198,000
McIntosh	3,304,000
York	3,212,000

Plan and Carry Out

3. Which apple type has the least number of cartons? _____

4. Which apple type has the greatest number of cartons? _____

5. Which apple type has the second greatest number of cartons? _____

6. Which apple type has the second least number of cartons? _____

7. Order the apple types from least to greatest by name.

   _____

8. Order the apple types from least to greatest by number of cartons.

   _____

Check

9. Explain another way to do this problem.

   _____

   _____

Solve Another Problem

10. Order the cities by population from least to greatest.

Philadelphia	New York City	Chicago	Los Angeles	San Francisco
1,470,151	8,104,079	2,862,244	3,845,541	744,230

   _____

   _____

1-2 • Guided Problem Solving

GPS **Student Page 11, Exercise 32:**

There are three small piñatas and two large piñatas at a festival. Each small piñata contains 85 prizes. Each large piñata contains 178 prizes. Estimate the total number of prizes.

Understand

1. What are you being asked to do?

   _____

2. What numbers will you have to round to estimate the total number of prizes?

   _____

3. Does the problem tell what place to round to? If not, what place do you plan to round to?

   _____

Plan and Carry Out

4. About how many prizes are in a small piñata? _____

5. About how many prizes are in 3 small piñatas? _____

6. About how many prizes are in a large piñata? _____

7. About how many prizes are in 2 large piñatas? _____

8. About how many prizes are there in 3 small piñatas and 2 large

   piñatas? _____

Check

9. Should your answer be greater than or less than the numbers in the word problem?

   _____

Solve Another Problem

10. Chelsea has 4 large piles and 3 smaller piles of pennies. The large piles each have 312 pennies, and the smaller piles each have 193 pennies. About how many pennies does Chelsea have?

    _____

1-3 • Guided Problem Solving

GPS **Student Page 15, Exercise 32:**

Art Class In a student art contest there are 14 drawings, 22 sculptures, and some paintings. There are 18 more paintings than sculptures. What is the total number of art pieces?

Understand

1. What are you being asked to do?

   _____

2. Circle the information you will need to solve this problem.

3. Estimate what you expect the answer to be.

   _____

Plan and Carry Out

4. How many drawings are there? _____

5. How many sculptures are there? _____

6. How many more paintings are there than sculptures? _____

7. What will you have to do to find the number of paintings?

   _____

8. How many paintings are there? _____

9. What is the total number of art pieces in the contest?

   _____

Check

10. Is your answer close to your original estimate? Why or why not?

    _____

Solve Another Problem

11. Janelle has 10 marbles. Ralph has 13 marbles, and Jennifer has 17 more marbles than Ralph has. What is the total number of marbles Janelle, Ralph, and Jennifer have?

    _____

1-4 • Guided Problem Solving

GPS **Student Page 19, Exercise 32:**

Coins There are 300 coins of the same type in two stacks. One stack is 380 millimeters tall. The other is 220 millimeters tall. Find the thickness of one coin.

Understand

1. What are you being asked to find?

   _____

2. What will you need to know to find this information?

   _____

3. What operations will you have to perform to answer the question?

   _____

Plan and Carry Out

4. How will you find the total height of the 300 coins?

   _____

5. What is the total height of the 300 coins? _____

6. Will you have to multiply or divide to find the height of one coin?

   _____

7. How thick is one coin? _____

Check

8. Based on your answer, how tall is a stack of 300 coins?

   _____

9. Does this match the height given in the problem? _____

Solve Another Problem

10. Georgia walks 325 meters to an intersection, and then another 125 meters to the store. If she spends a total of 9 minutes walking, how many meters does she walk in one minute?

   _____

1-5 • Guided Problem Solving

GPS **Student Page 25, Exercise 43:**

Heights Artists use a ratio called the Golden Mean to describe a person's height. Your height from the floor to your waist is usually six hundred eighteen thousandths of your total height. Round this number to the nearest hundredth.

Understand

1. Is the number more or less than 1? Explain.

   _____

   _____

2. The word *thousandths* represents how many decimal places to the right of the decimal point?

   _____

Plan and Carry Out

3. Write six hundred eighteen thousandths in standard form.

   _____

4. What digit is in the hundredths place?

   _____

5. What digit is to the right of the hundredths place?

   _____

6. Based on the number above, should you round up or down?

   _____

7. Round this number to the nearest hundredth.

   _____

Check

8. Did you round up or down? Why?

   _____

   _____

Solve Another Problem

9. Liz has a height of five feet and two and forty-five hundredths of an inch. Round Liz's height to the nearest inch.

   _____

1-6 • Guided Problem Solving

GPS **Student Page 30, Exercise 27:**

Population About 11.4 million people live in Jakarta, Indonesia. Roughly 13.0 million people live in Delhi, India. About 10.4 million people live in Karachi, Pakistan. Order the cities from least to greatest population.

Understand

1. How many cities are discussed in the problem? _____

2. What are you asked to do?

   _____

3. Circle the populations that you need to order.

Plan and Carry Out

4. Use placeholders to write the three numbers with the same number of decimal places.

   _____

5. Which number is the least?

   _____

6. Which number is the greatest?

   _____

7. Write the numbers in order from least to greatest.

   _____

8. Order the cities from least to greatest population.

   _____

Check

9. Do the least and middle populations have smaller decimal values than the greatest number?

   _____

Solve Another Problem

10. Jessie ran 3 miles in 20.53 minutes. Anne ran the same distance in 20.02 minutes. Kara ran the same distance in 20.96 minutes. Order the runners from fastest to slowest.

    _____

1-7 • Guided Problem Solving

GPS **Student Page 35, Exercise 33:**

Population In 2000, the New England states had a total population of about 13.92 million. Find the population of Maine.

State	Population
Connecticut	3.42 million
Maine	?
Massachusetts	6.35 million
New Hampshire	1.24 million
Rhode Island	1.05 million
Vermont	0.61 million

Understand

1. What are you being asked to do?

   _____

2. How will you use the total population of the New England states to answer the question?

   _____

Plan and Carry Out

3. Find the sum of the populations of the other states.

   _____

4. What is the total population of all the New England states?

   _____

5. Write an expression to find the population of Maine.

   _____

6. Evaluate the expression to find the population of Maine.

   _____

7. Find the population of Maine.

   _____

Check

8. How can you check your answer?

   _____

   _____

Solve Another Problem

9. You and a friend calculate your grade for a class. You have an 83.5 and your friend has an 85.65. Who has the higher grade? How much higher is it?

   _____

1-8 • Guided Problem Solving

GPS **Student Page 41, Exercise 36:**

Nutrition There is 0.2 gram of calcium in 1 serving of cheddar cheese. How much calcium is in 3.25 servings of cheddar cheese?

Understand

1. What is being compared in the exercise?

   _____

   _____

   _____

2. What are you being asked to do?

   _____

   _____

3. Will you multiply or divide to determine the answer? Explain.

   _____

   _____

   _____

Plan and Carry Out

4. How much calcium is in one serving? _____

5. How many servings do you want? _____

6. Write an expression to answer the exercise. _____

7. How many grams of calcium are in 3.25 servings of cheddar

   cheese? _____

Check

8. Should there be more or less than 0.2 gram of calcium in 3.25 servings of cheddar cheese? Explain.

   _____

Solve Another Problem

9. There is 0.5 gram of fat in one serving of a breakfast cereal. How many grams of fat are in 4.25 servings?

   _____

1-9 • Guided Problem Solving

GPS **Student Page 46, Exercise 23:**

School Supplies A stack of paper measures 0.9 centimeter thick. Each piece of paper is 0.01 centimeter thick.

  a. How many pieces of paper are in the stack?

  b. Could each of 25 students get three pieces of paper?

Understand

  1. Circle the information you will need to solve.

  2. What are you being asked to do in part (a)?

    _____

  3. What are you being asked to do in part (b)?

    _____

    _____

Plan and Carry Out

  4. How thick is one piece of paper? _____

  5. How thick is the stack of paper? _____

  6. Do you multiply or divide to answer part (a)? _____

  7. Write an expression to answer part (a). _____

  8. How many pieces of paper are in the stack? _____

  9. How many pieces of paper are needed for each of 25 students to get three pieces of paper?

    _____

  10. Is there enough paper? _____

Check

  11. Why is the number of pieces of paper 100 times more than the height of the stack of paper?

    _____

Solve Another Problem

  12. A stack of baseball cards measures 5.4 centimeters thick. Each baseball card is 0.1 centimeter thick. How many baseball cards are in the stack?

    _____

2-1 • Guided Problem Solving

GPS **Student Page 64, Exercise 23:**

Shelby made a list of her test scores: 88, 100, 92, 80, 85, 94, and 90. What is the lowest score she can get on her next test to have a mean score of 90?

Understand

1. What are you being asked to do?

   _____

   _____

2. If you already know the mean and all her test scores but one, how can you find the missing test score?

   _____

   _____

Plan and Carry Out

3. What is her mean score right now?

   _____

4. Does her next test score need to be higher or lower than 90?

   _____

5. How many tests will there be, including the next test? Multiply that number by 90.

   _____

6. Subtract the first seven scores from your answer to Step 5.

   _____

Check

7. Take all her test scores, including the one that you found, and find the mean. Is it 90?

   _____

Solve Another Problem

8. The mean of five numbers is 55. If four of the numbers are 86, 77, 14, and 12, what is the other number?

   _____

2-2 • Guided Problem Solving

GPS **Student Page 69, Exercise 21:**

Number Sense The median of four numbers is 48. Three of the numbers are 42, 51, and 52. What is the other number?

Understand

1. What are you being asked to do?

   _____

2. What is the median?

   _____

3. How do you find the median when there is an even number of data items?

   _____

Plan and Carry Out

4. Order the three numbers. _____

5. Between which two numbers does the missing number belong?

   _____

6. 48 is the number between the missing number and which other

   number? _____

7. What is the difference between the answer to Step 6 and 48?

   _____

8. What is the difference between the missing number and 48? Why?

   _____

9. What is the missing number? _____

Check

10. Explain how to check your answer.

    _____

    _____

Solve Another Problem

11. The median of six numbers is 37. If five of the numbers are 29, 38, 34, 38, and 40, what is the other number?

    _____

2-3 • Guided Problem Solving

GPS **Student Page 73, Exercise 13:**

Speed Limits On a highway, the minimum speed allowed is 40 miles per hour. The maximum speed is 65 miles per hour. What is the range of speeds allowed on the highway?

Understand

1. Underline the words that indicate which numbers you are to use to answer this question.

2. What is the range?

   _____

   _____

Plan and Carry Out

3. What is the least possible highway speed allowed?

   _____

4. What is the greatest possible highway speed allowed?

   _____

5. Write a subtraction expression to answer the question.

   _____

6. What is the range?

   _____

Check

7. How can you check your answer? Does your answer check?

   _____

   _____

Solve Another Problem

8. You have to be at least 36 inches tall to ride the rides at Kiddie Land, but you cannot be any taller than 48 inches. What is the range of heights for these rides?

   _____

2-4 • Guided Problem Solving

GPS **Student Page 77, Exercise 11:**

Prime Ministers Make a bar graph to show how many years each prime minister was in office.

Understand

1. What is a bar graph?

   _____

   _____

Plan and Carry Out

2. If the bars are to be vertical, what should go along the horizontal axis?

   _____

3. What should go along the vertical axis? _____

4. What is the maximum number of years?

   What scale should you use? _____

   _____

5. Draw the bar graph.

Gro Harlem Brundtland
Norway 10 years

Indira Gandhi
India 18 years

Golda Meir
Israel 5 years

Check

6. What should you title your graph?

   _____

Solve Another Problem

7. Draw a bar graph to show how many of each pet the students at Moore Middle School have. 52 students have dogs, 68 students have cats, 22 students have birds, 15 students have lizards, and 4 students have rabbits.

Margaret Thatcher
UK 11 years

2-5 • Guided Problem Solving

GPS **Student Page 82, Exercise 16:**

Wages Suppose your cousin works part-time and earns $7 per hour. The spreadsheet shows a typical schedule for a week.

Write a formula for cell D2. Then calculate the value in cell D2.

	A	B	C	D	E
1	Day	Time In (P.M.)	Time Out (P.M.)	Hours Worked	Amount Earned
2	9/15	3	8	?	?
3	9/17	4	8	?	?
4	9/19	3	6	?	?
5			Total:	?	?

Understand

1. What are you being asked to do?

   _____

   _____

2. What does column D represent? _____

3. What does row 2 represent?

   _____

   _____

Plan and Carry Out

4. What operation do you use to figure the number of hours worked? _____

5. What cells do you need for the formula? _____

6. Write the formula for D2. _____

7. Calculate the value of D2. _____

Check

8. Explain how you can check your answer.

   _____

   _____

Solve Another Problem

9. Your cousin's friend worked from 12 noon to 9 P.M. on 9/15. Create a row like your cousin's row 2 for his friend.

2-6 • Guided Problem Solving

GPS Student Page 90, Exercise 14:

The heights of nine people are below. Use a stem-and-leaf plot to find the median, the mode, and any outliers.

Heights in inches:

70	59	64
66	79	67
82	68	61

Understand

1. Looking at the data, which numbers should be the stems? Explain.

   _____

Plan and Carry Out

2. Order the heights from least to greatest.

   _____

   _____

3. Write the stems in order. Draw a vertical line next to the stems.

4. Write the leaves in order for each stem.

5. Include a key to explain what the stems and leaves represent. _____

Check

6. How can you check to make sure you used all the data values?

   _____

   _____

Solve Another Problem

7. Eight friends were in a race. Their times in seconds are given below.

   108 114 140 118 182 165 150 123

   Make a stem-and-leaf plot for the data.

2-7 • Guided Problem Solving

GPS Student Page 96, Exercise 10:

Reasoning How does the impression made by a line graph change when you make the horizontal scale shorter but keep the vertical scale the same?

Understand

1. What does a line graph look like?

   _____

2. What does it mean to "make the horizontal scale shorter"?

   _____

   _____

Plan and Carry Out

3. Graph the points $(1, 1)$ and $(2, 3)$ on the top graph to the right.

4. Graph the points $(1, 1)$ and $(2, 3)$ on the bottom graph to the right.

5. Compare the two lines from Steps 3 and 4.

   _____

6. How does the impression made by a line graph change when you make the horizontal scale shorter but keep the vertical scale the same?

   _____

   _____

Check

7. How did the scale on the *x*-axis change in Step 4?

   _____

Solve Another Problem

8. How does the impression made by a line graph change when you make the horizontal scale longer but keep the vertical scale the same?
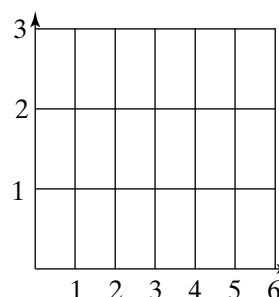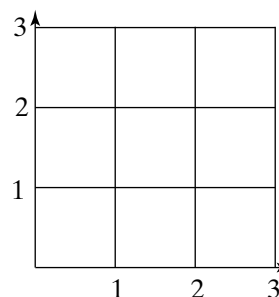
   _____

   _____

3-1 • Guided Problem Solving

GPS Student Page 111, Exercise 18:

Business A dry cleaner charges $5.00 to clean one item. She offers to clean a second item for $4.50 and a third item for $4.00.

  a. If she continues to subtract $.50 for each additional item, how much will it cost to clean six items?

  b. If the pattern continues, which item will be cleaned for free?

Understand

  1. What are you being asked to do in part (a)?

  _____

  2. What are you being asked to do in part (b)?

  _____

  3. What problem solving strategy will best solve this problem?

  _____

Plan and Carry Out

  4. What is the price of cleaning the 4th item? _____

  5. What is the price for the 5th item? _____

  6. What is the price for the 6th item? _____

  7. Write and evaluate an expression for the total cost of cleaning six items.

  _____

  8. What are the prices for the 7th, 8th, 9th, and 10th items?

  _____

  9. Which item will be cleaned for free? _____

Check

  10. Can you think of another way to solve the problem? Explain.

  _____

Solve Another Problem

  11. Susie is trying to increase the distance she runs. The first week she runs $\frac{1}{2}$ mile. The second week she runs $\frac{3}{4}$ mile. The third week she runs 1 mile. If the pattern continues, how far will she run during the sixth week? _____

3-2 • Guided Problem Solving

GPS **Student Page 116, Exercise 28:**

Dogs A dog walker charges $10 to walk a large dog and $6 to walk a small dog. She uses $10d + 6s$ to calculate her earnings, where d is the number of large dogs and s is the number of small dogs. How much does she earn for walking each group?

  a. 4 large and 2 small dogs

  b. 6 small dogs

Understand

  1. What are you being asked to do?

  _____

  _____

Plan and Carry Out

  2. What is the expression for calculating the dog walker's earnings?

  _____

  3. What do you replace d and s with in part (a)? _____

  4. Replace d and s with the values and simplify the expression.

  _____

  5. How much does she earn to walk 4 large dogs and 2 small dogs?

  _____

  6. Repeat Steps 3–5 to determine the dog walker's earnings for

  walking 6 small dogs. _____

Check

  7. How can you check your answer? Use your method to see if your answer is correct.
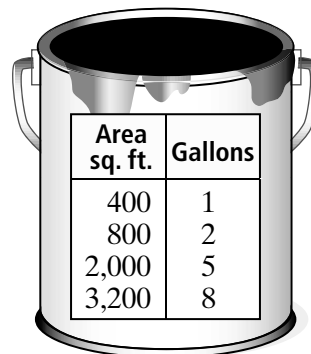
  _____

  _____

Solve Another Problem

  8. The sum of the interior angles of a polygon can be found using the formula $S = (N - 2) \times 180°$, where N is the number of sides of the polygon. What is the sum of the interior angles of a polygon with 8 sides?

  _____

3-3 • Guided Problem Solving

GPS Student Page 122, Exercise 28

Painting Customers in a paint store use the table at the right to decide how much paint they need.

a. Write an expression for the number of gallons of paint needed for an area of *A* square feet.

b. Paint costs $17.95 per gallon. Write an expression to find the cost of the paint needed for an area of *A* square feet.

Area sq. ft.	Gallons
400	1
800	2
2,000	5
3,200	8

Understand

1. What are you being asked to do?

_____

_____

_____

2. Circle the information you will need to solve the problem.

Plan and Carry Out

3. How much does paint cost per gallon?

_____

4. Write an expression for the number of gallons of paint needed for an area of *A* square feet.

_____

5. Write an expression to find the cost of the paint needed for an area of *A* square feet.

_____

Check

6. Use your expression to find out how much it would cost a customer to paint an area of 2,000 square feet. Does your answer make sense?

_____

Solve Another Problem

7. Anna and Tom are window washers. They are working on a house that has *r* rooms, with 4 windows in each room. They have 2 windows left to wash before the job is complete. Write an expression for the number of windows they have already washed.

_____

3-4 • Guided Problem Solving

GPS **Student Page 127, Exercise 29**

You have c pounds of cashews and 2.7 pounds of peanuts. You have 6 pounds of nuts altogether. Solve the equation $c + 2.7 = 6$ to find out how many pounds of cashews you have.

Understand

1. What are you being asked to do?

   _____

   _____

2. How can mental math help you to solve this problem?

   _____

   _____

Plan and Carry Out

3. What does the equation $c + 2.7 = 6$ mean?

   _____

   _____

4. What is $6 - 2.7$? _____

5. How many pounds of cashews do you have?

   _____

Check

6. Explain how you can check your answer. Then check your answer.

   _____

   _____

Solve Another Problem

7. At a school, there are 60 teachers for 1,500 students. Each teacher has the same number of students. Use the equation $60n = 1{,}500$ to find how many students each teacher has.

   _____

3-5 • Guided Problem Solving ·······································

GPS **Student Page 133, Exercise 21**

Music You add a 4-minute song to your digital music player.
The player now has 2 hours of music. Use an equation to find out
how much music was on the player before you added the song.

Understand

1. What are you being asked to do? _____

   _____

2. What will the variable represent in the equation?

   _____

3. Circle the information you will need to solve.

Plan and Carry Out

4. How long was the song that you added? _____

5. Write an expression for the length of the song you added plus
   the amount of music that was on the player before you added the
   new song. Choose any variable for the amount of music that was
   on the player. _____

6. How much music (in minutes)   7. Write an equation comparing
   was on the player after you   the amounts in Steps 5 and 6.

   added the song? _____   _____

8. What do you do to both sides of   9. Solve the equation.
   the equation to isolate the variable?
                                        _____

   _____   _____

10. How much music was on the player before you added the song?

    _____

Check

11. Explain how you can check your answer. Then check your answer.

    _____

Solve Another Problem

12. The book *A Tree Grows in Brooklyn* has 420 pages. It is 206
    pages longer than *The Catcher in the Rye*. Use an equation to
    find the number of pages in *The Catcher in the Rye*.

    _____

3-6 • Guided Problem Solving

GPS **Student Page 136, Exercise 20:**

You buy several posters. The total cost is $18.95. You have $7.05 left after you pay. Write and solve an equation to find how much money you had before this purchase.

Understand

1. What are you being asked to do?

    _____

2. What will the variable represent in the equation?

    _____

3. Circle the information you will need to solve.

Plan and Carry Out

4. How much did you pay for the posters? _____

5. Write an expression for the amount of money you had before the purchase minus the amount you paid for the posters. Choose any variable for the amount of money you had.

    _____

6. How much money did you have left after the purchase?

    _____

7. Write an equation comparing the amounts in Steps 5 and 6.

    _____

8. What do you do to both sides of the equation to isolate the variable?

    _____

9. Solve the equation.

    _____

    _____

10. How much money did you have before the purchase?

    _____

Check

11. Check your answer by substituting the result in step 10 into the equation you wrote in step 7. Does it check?

    _____

Solve Another Problem

12. Jim has saved $78. This is $23 less than his sister has saved. Write and solve an equation to find how much his sister has saved.

    _____

3-7 • Guided Problem Solving

GPS Student Page 141, Exercise 29

Biology An elephant's height is about 5.5 times the length of her hind footprint. Use an equation to find the approximate height of an elephant whose hind footprint is 1.5 feet long.

Understand

1. What are you being asked to do?

   _____

   _____

   _____

2. Circle the information you will need to solve.

3. The phrase "*5.5 times*" tells you to perform what operation?

   _____

Plan and Carry Out

4. What is the length of the hind footprint
   of this particular adult female elephant? _____

5. Write an expression to represent the phrase
   "*5.5 times the length of the hind footprint.*"

   _____

6. Write an equation for the height of the elephant. _____

7. What is the height of the elephant? _____

Check

8. Explain how you can check your answer. Does your answer check?

   _____

   _____

Solve Another Problem

9. Angela makes 1.75 times the amount of money that Janet makes.
   If Janet makes $38,200, how much does Angela make? Write and
   solve an equation.

   _____

3-8 • Guided Problem Solving

GPS **Student Page 147, Exercise 22:**

Gardening Your school's ecology club plants 8 rows of trees in a vacant lot. Each row has 27 trees. Find the total number of trees that the ecology club plants.

Understand

1. What are you being asked to do?

_____

2. Circle the information you will need to solve.

Plan and Carry Out

3. How many rows of trees are there?

_____

4. How many trees are there in each row?

_____

5. Write an expression for the total number of trees.

_____

6. Use the Distributive Property to simplify the expression.

_____

7. How many trees are there total?

_____

Check

8. Explain how you can check your answer. Does your answer check?

_____

_____

Solve Another Problem

9. Alyce is tiling her living room. There are 29 rows of tiles, with 9 tiles in each row. How many tiles are there total?

_____

4-1 • Guided Problem Solving

GPS **Student Page 161, Exercise 31:**

Money Elissa and eight friends have lunch at a restaurant. The bill is $56.61. Can the friends split the bill into nine equal shares? Use the divisibility rule for 9 to explain your answer.

Understand

1. What are you being asked to do?

   _____

   _____

2. What do you have to use to explain your answer?

   _____

3. What is the divisibility rule for 9?

   _____

   _____

Plan and Carry Out

4. How much is the bill? _____

5. What are the digits? _____

6. What is the sum of the digits? _____

7. Does 9 divide evenly into the sum? _____

8. Can the friends split the bill into nine equal shares?_____

Check

9. How can you check that your answer is correct?

   _____

   _____

Solve Another Problem

10. Melissa, Dyanna, and Cristina are counselors at a summer camp. They want to divide the campers evenly among them. If there are 137 campers, use the rule for divisibility by 3 to detemine if this is possible.

    _____

4-2 • Guided Problem Solving

GPS Student Page 165, Exercise 33:

Biology A single-celled animal splits in two after one hour. Each new cell also splits in two after one hour. How many cells will there be after eight hours? Write your answer using an exponent.

Understand

1. What are you being asked to do?

_____

_____

2. Explain what it means to write a number with an exponent.

_____

_____

Plan and Carry Out

3. How many cells are there after 3 hours?
Write the number using an exponent.

_____

4. How many cells are there after 4 hours?
Write the number using an exponent.

_____

5. How many cells are there after 6 hours?
Write the number using an exponent.

_____

6. How many cells are there after 8 hours?
Write the number using an exponent.

_____

Check

7. Why is the exponent 8?

_____

Solve Another Problem

8. An organism divides into 3 different organisms after the first hour. Each of those 3 organisms divide into 3 different organisms after the second hour. If this pattern continues, how many organisms are there after 4 hours? Write the number using an exponent.

_____

4-3 • Guided Problem Solving

GPS **Student Page 169, Exercise 30:**

Parades A group has 36 ceremonial guards. When they march, they form rows of equal numbers of guards. What numbers of rows can they make? How many guards will be in each row?

Understand

1. What are you being asked to do?

   _____

   _____

2. What do you have to know to do this problem?

   _____

3. How many answers are there to this question?

   _____

Plan and Carry Out

4. List the factors of 36.

   _____

5. What are the possible numbers of rows?

   _____

6. For each number of rows, how many guards are in each row?

   _____

   _____

Check

7. How can you check your answer?

   _____

   _____

Solve Another Problem

8. Louise is planting 30 bunches of pansies in her garden. She wants to put them in rows of equal numbers of bunches. What numbers of rows can they make? How many bunches will be in each row?

   _____

4-4 • Guided Problem Solving

GPS Student Page 174, Exercise 30:

Three friends pool their money to buy baseball cards. Brand A has 8 cards in each pack, Brand B has 12 cards, and Brand C has 15 cards. If they want to split each pack of cards equally, which two brands should they buy? Explain.

Understand

1. What does *split each pack of cards equally* mean?

   _____

Plan and Carry Out

2. How many cards will they have if they buy Brand A and Brand B?

   _____

3. Is the number you found in Step 2 divisible by 3? Why or why not?

   _____

4. How many cards will they have if they buy Brand A and Brand C?

   _____

5. How many cards will they have if they buy Brand B and Brand C?

   _____

6. Which of the answers to Steps 4 and 5 is divisible by 3? _____

7. Which two brands should they buy?

   _____

Check

8. Explain your decision.

   _____

Solve Another Problem

9. Carrie is lining up 45 students in the drill team and 25 students in the color guard. She wants each row to have the same number of students in both groups. How many rows are there, and how many students are in each row?

   _____

   _____

4-5 • Guided Problem Solving

GPS Student Page 179, Exercise 28:

Traffic Planning Two traffic engineers are writing about the average driving time between two towns. One engineer writes the time as 45, but the other writes it as $\frac{3}{4}$. What could explain the difference?

Understand

1. What are you being asked to do?

   _____

   _____

2. What is the relationship between the two measurements?

   _____

Plan and Carry Out

3. Name some units in which time can be measured.

   _____

   _____

4. What is a reasonable unit for the engineer who wrote 45?

   _____

5. What is a reasonable unit for the engineer who wrote $\frac{3}{4}$?

   _____

6. What explains the difference?

   _____

   _____

Check

7. Why did you choose those units?

   _____

   _____

Solve Another Problem

8. A scientist measured the time it took for a reaction to take place as $\frac{1}{4}$ hour. To use the results, he needs to write the numbers as minutes. How many minutes did it take for the reaction to take place?

   _____

4-6 • Guided Problem Solving

GPS **Student Page 185, Exercise 30:**

Catering A caterer plans to serve two slices of melon to each of 50 guests. She estimates getting 12 slices from each melon. Write the number of melons she will use as a mixed number. How many whole melons does she need?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

   _____

Plan and Carry Out

3. How many slices does she need to feed 50 guests?

   _____

4. How many slices does she get from each melon?

   _____

5. What operation do you use to find the number of melons she needs?

   _____

6. Write the number of melons she will use as a mixed number.

   _____

7. How many *whole* melons does she need?

   _____

Check

8. Why does she need to know how many whole melons are needed?

   _____

Solve Another Problem

9. Three hundred twenty-one students are going on a field trip. One bus can seat 48 students. Write the number of buses needed as a mixed number. How many whole buses are needed?

   _____

4-7 • Guided Problem Solving

GPS Student Page 190, Exercise 29:

Business During a promotion, a music store gives a free CD to every fifteenth customer and a free DVD to every fortieth customer. Which customer will be the first to get both gifts?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

   _____

Plan and Carry Out

3. Which customers will receive a free CD?

   _____

   _____

4. Which customers will receive a free DVD?

   _____

5. Which customer will be the first to get both gifts?

   _____

Check

6. Explain how you can check your answer.

   _____

   _____

Solve Another Problem

7. Emanuel, Michelle, and Kim volunteer at the swimming pool. Emanuel works every 5 days. Michelle works every 6 days. Kim works every 15 days. They are working together today. How many days will it be until the next time they work together?

   _____

   _____

   _____

   _____

4-8 • Guided Problem Solving

GPS **Student Page 195, Exercise 34:**

Two sports drinks have the same price. The cherry-flavored drink contains $12\frac{9}{20}$ ounces. The blueberry-flavored drink contains $12\frac{7}{16}$ ounces. Which drink is the better buy?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

3. Since both drinks are priced the same, what do you have to determine?

   _____

Plan and Carry Out

4. What is the common denominator for $12\frac{9}{20}$ and $12\frac{7}{16}$? _____

5. Rewrite the fractional part of each mixed number with the common denominator. _____

6. Which fraction is bigger? _____

7. Which drink is the better buy? _____

Check

8. What is another way you could answer this question?

   _____

   _____

Solve Another Problem

9. Mary, Ana, and Tim shared the driving on a trip. Mary drove $\frac{1}{8}$ of the distance. Ana drove $\frac{1}{4}$ of the distance. Did Mary or Ana drive more miles? Explain how you know.

   _____

Name _____ Class _____ Date _____

4-9 • Guided Problem Solving

GPS **Student Page 201, Exercise 34:**

Shopping You order $1\frac{1}{4}$ pounds of cheese at a delicatessen. What decimal number appears on the digital scale?

Understand

1. What are you being asked to do?

_____

2. How do you read $\frac{1}{4}$ as a division problem?

_____

Plan and Carry Out

3. How do you write 1 as a decimal?

_____

4. Divide 1 by 4.

_____

5. Write $1\frac{1}{4}$ as a decimal.

_____

6. What decimal number appears on the digital scale?

_____

Check

7. How can you check your answer?

_____

_____

Solve Another Problem

8. A recipe calls for $3\frac{3}{4}$ pounds of flour. Your scale only measures in decimals. What will the scale read?

_____

_____

Guided Problem Solving

5-1 • Guided Problem Solving

GPS Student Page 215, Exercise 27:

Coins Use the table at the right to estimate the total width of the coins.

U.S. Coins

Coin	Diameter (inches)
Dime	$\frac{11}{16}$
Penny	$\frac{3}{4}$
Nickel	$\frac{13}{16}$
Quarter	$\frac{15}{16}$

Understand

1. What are you being asked to do?

   _____

2. How are you supposed to use the table?

   _____

Plan and Carry Out

3. What is the actual width of the dime? _____

4. Is this fraction closer to $0, \frac{1}{2}$, or 1? _____

5. What are the actual widths of the dime, nickel, penny, and quarter?

   _____

6. Is the nickel's width closer to $0, \frac{1}{2}$, or 1? _____

7. Is the penny's width closer to $0, \frac{1}{2}$, or 1? _____

8. Is the quarter's width closer to $0, \frac{1}{2}$, or 1? _____

9. Estimate the total width of the coins. _____

Check

10. Do you expect that your estimate is more or less than the actual length? Explain.

    _____

Solve Another Problem

11. The table shows the average precipitation for four months. Estimate the total amount of precipitation.

January	February	March	April
$3\frac{2}{3}$ in.	$1\frac{4}{7}$ in.	$2\frac{7}{8}$ in.	$4\frac{1}{2}$ in.

5-2 • Guided Problem Solving

GPS **Student Page 220, Exercise 28:**

Biology Plasma makes up $\frac{11}{20}$ of your blood. Blood cells make up the other $\frac{9}{20}$. How much more of your blood is plasma than blood cells?

Understand

1. What are you being asked to do?

   _____

2. What operation do you have to use to answer this question?

   _____

Plan and Carry Out

3. How much of your blood is plasma?

   _____

4. How much of your blood is blood cells?

   _____

5. Write an expression you can use to answer the question.

   _____

6. How much more of your blood is plasma than blood cells?

   _____

Check

7. How can you check your answer?

   _____

   _____

Solve Another Problem

8. Maddie has a window that is $15\frac{3}{8}$ inches long. She bought blinds that are $16\frac{5}{8}$ inches. How much longer are the blinds than the window?

   _____

5-3 • Guided Problem Solving

GPS **Student Page 225, Exercise 27:**

Weather A meteorologist records the rainfall as $\frac{3}{10}$ inch from 9:00 to 10:00. You measure $\frac{7}{8}$ inch of rain from 10:00 to 11:00.

  a. **Estimation** Estimate the rainfall from 9:00 to 11:00.

  b. Find the total rainfall from 9:00 to 11:00.

Understand

  1. What is the difference between part (a) and part (b)?

  _____

  _____

Plan and Carry Out

  2. Estimate $\frac{3}{10}$ and $\frac{7}{8}$ separately. _____

  3. Use the answers to Step 2 to estimate
the total rainfall between 9:00 and 11:00. _____

  4. What do you need to find the sum of the two measurements?

  _____

  5. What is the least common denominator for $\frac{3}{10}$ and $\frac{7}{8}$? _____

  6. Rewrite each fraction using the answer to Step 5. _____

  7. What is the total rainfall from 9:00 to 11:00?

  _____

Check

  8. Does your answer match your estimate? Explain.

  _____

Solve Another Problem

  9. A recipe for party mix calls for $\frac{3}{4}$ cup of cereal, $\frac{1}{4}$ cup of walnuts, $\frac{5}{8}$ cup of crackers, and $\frac{1}{2}$ cup of raisins. Estimate the number of cups in the mix. Determine the actual number of cups in the mix.

  _____

5-4 • Guided Problem Solving

GPS **Student Page 231, Exercise 23a:**

Tides At low tide, the depth of the water is $4\frac{11}{12}$ feet. At high tide, the water depth increases by $2\frac{3}{4}$ feet. How deep is the water at high tide?

Understand

1. Circle the information you will need to solve.

2. What operation do you need to answer the question?

   _____

Plan and Carry Out

3. What is the least common denominator for $4\frac{11}{12}$ feet and $2\frac{3}{4}$ feet?

   _____

4. Rewrite both fractions using the least common denominator.

   _____

5. Write an expression you can use to answer the question.

   _____

6. How deep is the water at high tide?

   _____

Check

7. How can you check your answer?

   _____

   _____

Solve Another Problem

8. Suppose Don will need to leave his fishing spot when the river reaches 30 feet. The river is predicted to rise $5\frac{7}{12}$ feet from its present level of $21\frac{7}{10}$ feet. Will he need to leave?

   _____

5-5 • Guided Problem Solving

GPS **Student Page 235, Exercise 23:**

Weather On Monday, the snowfall in the mountains was $15\frac{3}{4}$ inches. On Tuesday, the snowfall was $18\frac{1}{2}$ inches. How much more snow fell on Tuesday?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

   _____

Plan and Carry Out

3. How many inches fell on Monday?

   _____

4. How many inches fell on Tuesday?

   _____

5. What common denominator do you need to use?

   _____

6. Rewrite each fraction using the least common denominator.

   _____

7. What was the difference in snowfall?

   _____

Check

8. How can you check your answer?

   _____

Solve Another Problem

9. The perimeter of the lid to a rectangular box is $\frac{14}{6}$ yards. If the longer sides are $\frac{5}{6}$ yard, how long are the shorter sides? Explain.

   _____

5-6 • Guided Problem Solving

GPS **Student Page 243, Exercise 27:**

Landscaping The Service Club buys a 10-yard roll of edging to put around two trees in front of the school. The club uses $5\frac{2}{3}$ yards of edging for one tree and $3\frac{1}{2}$ yards for the other tree. How much edging is left?

Understand

1. Circle the information you will need to solve.

2. How do you plan to solve this problem?

   _____

   _____

Plan and Carry Out

3. How much of the edging has been used?

   _____

4. Add these amounts together using a common denominator.

   _____

5. How much edging did the club purchase?

   _____

6. How much edging is left over?

   _____

Check

7. Explain how you can check your answer.

   _____

Solve Another Problem

8. Linda bought a 15-yard roll of fabric to make a suit. She used $8\frac{1}{3}$ yards of fabric for the blouse and $5\frac{1}{4}$ yards for the pants. How much fabric is left?

   _____

5-7 • Guided Problem Solving

GPS **Student Page 250, Exercise 27:**

Clowns A clown wants to perform a 45-minute show at three birthday parties. The first party begins at 10:00 A.M. He needs to leave the third party by 2:15 P.M. He wants to allow one hour between each party. Make a schedule for the clown.

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

3. What problem-solving method can you use to help create the schedule?

   _____

Plan and Carry Out

4. If the clown starts the first show at 10:00 A.M. when will he finish?

   _____

5. If he allows an hour between each show, when will the next show begin?

   _____

6. When will he finish the second show? _____

7. If he allows an hour between each show, when will the next show begin?

   _____

8. When will he finish the third show? _____

Check

9. Did the clown finish when he was supposed to? _____

Solve Another Problem

10. If the clown's schedule changed and he doesn't have to leave until 6:00 P.M., how many more shows with breaks can the clown have?

    _____

6-1 • Guided Problem Solving ....

GPS **Student Page 264, Exercise 30:**

Monuments The width of the base of the Washington Monument is about $\frac{1}{10}$ of its height. The height of the monument is about 555 feet tall. Find the width of the base.

Understand

1. What are you being asked to do?

   _____

2. Which word group tells you what operation to perform?

   _____

Plan and Carry Out

3. When multiplying a fraction by a whole number how do you rewrite the whole number?

   _____

4. Write an expression to solve the problem. _____

5. Simplify the expression. _____

6. Multiply the numerators, multiply the denominators, and simplify. _____

7. What is the width of the base of the monument? _____

Check

8. To estimate $\frac{1}{10}$ of 555, use compatible numbers. Find $\frac{1}{10}$ of 600. Is your answer reasonable?

   _____

Solve Another Problem

9. A concert hall has 12,360 seats. For the last concert, only $\frac{2}{3}$ of the hall was full. How many seats were unused?

   _____

6-2 • Guided Problem Solving

GPS **Student Page 270, Exercise 28a:**

A mother is $1\frac{3}{8}$ times as tall as her daughter. The girl is $1\frac{1}{3}$ times as tall as her brother. The mother is how many times as tall as her son?

Understand

1. What are you being asked to do?

   _____

2. What do you do first when you multiply mixed numbers?

   _____

Plan and Carry Out

3. Write an equation for the sentence "A mother is $1\frac{3}{8}$ times as tall as her daughter," where *m* represents the height of the mother and *d* represents the height of the daughter.

   _____

4. Write an equation for the sentence "The girl is $1\frac{1}{3}$ times as tall as her brother," where *d* represents the height of the girl and *b* represents the height of the brother.

   _____

5. Substitute the expression for *d* from Step 4 for *d* in the equation you wrote in Step 3. _____

6. Simplify by multiplying the two mixed numbers. _____

7. The mother is how many times as tall as her son? _____

Check

8. Divide $1\frac{5}{6}$ by either $1\frac{3}{8}$ or $1\frac{1}{3}$.

   _____

Solve Another Problem

9. Nora is building a birdhouse. The height of the birdhouse is $2\frac{1}{2}$ times the length of the birdhouse. If the length is $8\frac{2}{3}$ in., how tall is the birdhouse?

   _____

6-3 • Guided Problem Solving

GPS **Student Page 275, Exercise 30:**

Baking A recipe for a loaf of banana bread requires $\frac{2}{3}$ cup of vegetable oil. You have 3 cups of oil. How many loaves of banana bread can you make with the oil?

Understand

1. What are you being asked to do?

   _____

   _____

2. Explain how to divide fractions.

   _____

   _____

Plan and Carry Out

3. What number are you dividing by? Why?

   _____

4. How many cups of oil are available
   to make the banana bread? _____

5. What number are you dividing? Why?

   _____

6. Write a division expression to solve the problem. _____

7. Re-write the expression using multiplication. _____

8. Evaluate the expression. _____

9. How many loaves of banana bread can
   you make with the oil? _____

Check

10. Multiply $\frac{2}{3} \times 4\frac{1}{2}$. Does your answer check? _____

Solve Another Problem

11. Greg bought 24 bags of mulch for the planters in his front yard. If each
    planter uses $\frac{3}{4}$ bag, how many planters can he fill with mulch?

    _____

6-4 • Guided Problem Solving

GPS **Student Page 279, Exercise 22:**

Construction An attic ceiling 24 feet wide needs insulation. Each strip of insulation is $1\frac{1}{3}$ feet wide. Estimate the number of insulation strips that are needed.

Understand

1. What are you being asked to do?

   _____

   _____

2. Which number(s) will you round to estimate?

   _____

Plan and Carry Out

3. To what number do you round $1\frac{1}{3}$?

   _____

4. Divide 24 by the rounded number. What is the result?

   _____

5. Approximately how many strips do you need?

   _____

Check

6. How do you check your answer?

   _____

   _____

Solve Another Problem

7. A closet bar is $8\frac{3}{4}$ in. long. If a standard shirt is $1\frac{1}{2}$ in. wide, estimate how many shirts can you hang on the bar?

   _____

6-5 • Guided Problem Solving

GPS **Student Page 285, Exercise 26:**

Shopping The price of a shirt is $\frac{5}{6}$ the price of a pair of pants. The shirt costs $12.50. How much do the pants cost?

Understand

1. What are you being asked to do?

   _____

2. Define a variable to represent the unknown.

   _____

3. Fill in the boxes with the correct information.

   ☐ · ☐ = ☐

Plan and Carry Out

4. Write an expression for the phrase
   "$\frac{5}{6}$ the price of the pants" if the pants cost p dollars. _____

5. How much does the shirt cost? _____

6. Write an equation to solve the problem. _____

7. What do you do to both sides of the
   equation to solve for p? _____

8. Solve the equation. _____

9. How much did the pants cost? _____

Check

10. Determine if 12.50 is $\frac{5}{6}$ of 15.

    _____

Solve Another Problem

11. Lupe and Carlos are $\frac{1}{4}$ of the way done painting their new house. So
    far they have used $6\frac{2}{3}$ cans of paint. How many cans of paint will they
    use to paint the entire house?

    _____

6-6 • Guided Problem Solving ·····································

GPS **Student Page 290, Exercise 18:**

Prehistoric Creatures Scientists discovered the fossil of a huge African crocodile that was more than 40 feet long. About how many door widths are equal to the length of the crocodile?

Understand
·················

1. What are you being asked to do?

   _____

   _____

2. What information do you need to answer the question?

   _____

   _____

Plan and Carry Out
··························

3. What is a reasonable estimate for the width of a door? _____

4. What units should you use when estimating a door's width in this problem? Explain. _____

   _____

   _____

5. Divide the length of the crocodile by the width of the door.

   _____

Check
·········

6. Use a yardstick to measure the width of your classroom's door. Was your estimate close?

   _____

Solve Another Problem

7. Marie is 68 in. tall and her boyfriend Mario is 6 ft 2 in. tall. Who is taller? Explain.

   _____

6-7 • Guided Problem Solving

GPS **Student Page 295, Exercise 32:**

Costume Design A costume designer makes a figure skater's costume. The designer needs two 34-inch strips of fabric. How many yards of fabric does the designer need?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

   _____

3. How many inches are in a yard?

   _____

Plan and Carry Out

4. How many strips of fabric does she need? _____

5. How long does each strip need to be? _____

6. How many inches of fabric do you need total? _____

7. How do you convert this into yards? _____

8. How many yards is it exactly?

   _____

9. How many whole yards of fabric does she need? _____

Check

10. Approximately how many yards is each strip? Is your answer reasonable? Explain.

    _____

    _____

Solve Another Problem

11. Jessica is making fruit juice and it calls for 6 pints of water. Jessica only has a 2-quart pitcher. Will her fruit juice fit in the pitcher? Explain.

    _____

    _____

7-1 • Guided Problem Solving

GPS **Student Page 309, Exercise 29:**

A typical adult cat has 12 fewer teeth than a typical adult dog. An adult dog has 42 teeth. Write the ratio of an adult cat's teeth to an adult dog's teeth in simplest form.

Understand

1. What are you being asked to do?

   _____

   _____

2. What does "in simplest form" mean?

   _____

   _____

Plan and Carry Out

3. Which number goes in the numerator,
   cat's teeth or dog's teeth? _____

4. How many teeth does
   a typical adult cat have? _____

5. Write the ratio of cat's teeth to dog's teeth. _____

6. What is the greatest common factor
   of the numerator and denominator? _____

7. Rewrite the ratio using the greatest common factor. _____

8. Simplify the ratio. _____

Check

9. Which have fewer teeth, cats or dogs? Does this agree with your ratio? Explain.

   _____

   _____

Solve Another Problem

10. The faculty softball league has 56 female players and 84 male players. Write the ratio of female players to male players in simplest form.

    _____

7-2 • Guided Problem Solving

GPS **Student Page 315, Exercise 22:**

Jump Rope Crystal jumps 255 times in 3 minutes. The United States record for 11-year-olds is 882 jumps in 3 minutes.

a. Find Crystal's unit rate for jumps per minute.

b. Find the record holder's unit rate for jumps per minute.

c. How many more times per minute did the record holder jump than Crystal?

Understand

1. What are you being asked to do in part (a) and part (b)?

   _____

   _____

2. What is a unit rate?

   _____

   _____

Plan and Carry Out

3. What is Crystal's rate? _____

4. What is Crystal's unit rate? _____

5. What is the record holder's rate? _____

6. What is the record holder's unit rate? _____

7. How many more times did the record holder jump per minute?

   _____

Check

8. How can you check your answer for parts (a) and (b)?

   _____

   _____

Solve Another Problem

9. Mike can make 60 egg sandwiches in 1.25 hours. What is his unit rate?

   _____

7-3 • Guided Problem Solving

GPS Student Page 318, Exercise 21:

Cooking A recipe calls for 2 cups of flour to make 3 dozen cookies. Is 3 cups of flour enough to make 60 cookies? Explain.

Understand

1. Circle the relevant information in the problem.

2. What are you being asked to do?

   _____

Plan and Carry Out

3. How many cookies are in 3 dozen? _____

4. Write a ratio comparing 2 cups of flour and the number of cookies in 3 dozen.

   _____

5. Write a ratio comparing 3 cups of flour and an unknown number of cookies.

   _____

6. Write a proportion using the ratios from Steps 4 and 5.

   _____

7. Find the value that completes the proportion. _____

8. How many cookies will 3 cups of flour make? _____

9. Are 3 cups of flour enough to make 60 cookies? Explain.

   _____

Check

10. Write a proportion between the ratio in Step 4 and a ratio comparing an unknown amount of flour to 60 cookies. Solve this proportion. How many cups of flour are needed to make 60 cookies? Is this number greater than 3?

    _____

Solve Another Problem

11. Twelve cans of chicken soup contain 48 servings. How many servings do 8 cans of soup contain?

    _____

7-4 • Guided Problem Solving ························

GPS **Student Page 323, Exercise 25:**

Printing Your friend has a poster printed from a photograph that is 4 inches wide by 6 inches long. The poster is 22 inches wide and is proportional to the photograph. What is the length of the poster?

Understand

1. Circle the information you will need to solve.

2. What does it mean to be *proportional* to the photograph?

   _____

   _____

Plan and Carry Out

3. Write a ratio comparing 4 inches and 6 inches. _____

4. Write a ratio comparing 22 inches
   and an unknown length. _____

5. Write a proportion using the
   two ratios from Steps 3 and 4. _____

6. Use cross products to find the value
   that completes the proportion. _____

7. How long will the poster be? _____

Check

8. How can you check your answer? Does your answer check?

   _____

Solve Another Problem

9. You need to have a picture enlarged for a birthday party. The original picture is 3 inches long by 5 inches wide. You need the enlarged picture to be 15 inches wide. How long should the picture be if it is going to be proportional to the original picture?
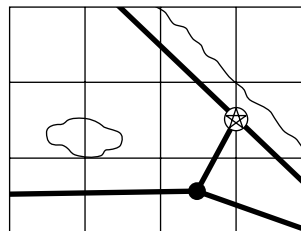
   _____

7-5 • Guided Problem Solving

GPS **Student Page 329, Exercise 21a:**

Number Sense Suppose you redraw the map at the right using a scale of 0.5 centimeter : 1 centimeter. Does your drawing enlarge or reduce the size of the map? Explain.

Understand

1. What are you being asked to do?

  _____

  _____

2. What is a scale?

  _____

  _____

3. What scale are you going to use to redraw the map?

  _____

Plan and Carry Out

4. Does *0.5 centimeter* refer to the original map or the new map?

  _____

5. Does *1 centimeter* refer to the original map or the new map?

  _____

6. A length of 0.5 centimeter on the original map will be how long on your map?

  _____

7. Does your drawing enlarge or reduce the size of the map?

  _____

Check

8. Suppose a road is 3 cm long on the original map. How long would it be on your map? Does that agree with your answer?

  _____

Solve Another Problem

9. You are going to redraw a painting exactly as it is in the original. What is the scale?

  _____

7-6 • Guided Problem Solving

GPS **Student Page 334, Exercise 46:**

Biology At least ninety-nine percent of all the kinds of plants and animals that have ever lived are now extinct. Write ninety-nine percent as a fraction and as a decimal.

Understand

1. What percent of plants and animals are extinct?

   _____

2. A percent is a ratio of a number to what other number?

   _____

Plan and Carry Out

3. Ninety-nine percent means 99 out of what number?

   _____

4. Write this number as a fraction.

   _____

5. Which decimal place is the hundredths place?

   _____

6. Write ninety-nine percent as a decimal.

   _____

Check

7. Explain how you can check your answer.

   _____

   _____

Solve Another Problem

8. Sixty-one percent of a school's students participate in extra-curricular activities. Write this number as a fraction and as a decimal.

   _____

7-7 • Guided Problem Solving

GPS **Student Page 339, Exercise 34a:**

Vision In the United States, about 46% of the population wear glasses or contact lenses. A sample of 85 people is taken.

a. About how many people would you expect to wear glasses or contact lenses?

Understand

1. Circle the information you will need to solve.

2. What are you being asked to do?

   _____

   _____

3. What method can you use to solve this problem?

   _____

Plan and Carry Out

4. Write 46% as a ratio. _____

5. Write a ratio comparing the
   unknown out of 85 people. _____

6. Write a proportion using the
   two ratios from Steps 4 and 5. _____

7. Solve the proportion for the unknown. _____

8. About how many people would you expect
   to wear glasses or contact lenses? _____

Check

9. How can you check your answer? Does your answer check?

   _____

   _____

Solve Another Problem

10. About 77% of all band members received either an A or a B on the last test. If this trend continues throughout the entire school of 1,260 students, about how many students do you expect to receive A's or B's?

    _____

7-8 • Guided Problem Solving

GPS **Student Page 343, Exercise 16:**

Science The human body is made up of 21 chemical elements. Use the table at the right to make a circle graph.

Human Body Composition

Element	Percent
Oxygen	65
Carbon	18
Hydrogen	10
Nitrogen	3
Other	4

Understand

1. How do you determine how much of the circle each element gets?

_____

Plan and Carry Out

2. Approximately how much of the circle should oxygen represent?

_____

3. Approximately how much of the circle should carbon represent?

_____

4. Approximately how much of the circle should hydrogen represent?

_____

5. Draw the circle graph.

Check

6. Why should oxygen take up most of the graph?

_____

Solve Another Problem

7. The bake sale profits came from the sale of cookies (52%), brownies (24%), pies (12%), and cupcakes (12%). Make a circle graph to show the components of the bake sale's profits.

7-9 • Guided Problem Solving

GPS **Student Page 350, Exercise 20:**

Jobs You get the following tips. Estimate the value of each tip.

a. 20% of $14.20   b. 10% of $24.75

c. 15% of $19.70   d. Which tip has the greatest value?

Understand

1. What is the easiest way to find 10% of an amount?

   _____

Plan and Carry Out

2. Estimate 10% of $24.75. _____

3. What is the relationship
   between 10% and 20%? _____

4. How do you use 10% in order to find 20%?

   _____

5. Estimate 20% of $14.20. _____

6. What is the relationship between 10%, 20%, and 15%?

   _____

7. How can you use 10% and 20% of an amount to find 15% of an
   amount?

   _____

   _____

8. Estimate 15% of $19.70.

   _____

   _____

Check

9. Which tip had the greatest value? Explain.

   _____

Solve Another Problem

10. Estimate 15% of $24.80 and determine if it is more or less than
    20% of $22.40.

    _____

8-1 • Guided Problem Solving

GPS **Student Page 365, Exercise 19:**

Writing in Math Explain why $\overleftrightarrow{AB}$ represents a line and $\overline{AB}$
represents a line segment.

Understand

1. What is a line segment?

   _____

   _____

2. What is a line?

   _____

   _____

Plan and Carry Out

3. What must you include on a line when drawing a line in a plane?

   _____

4. Why does $\overleftrightarrow{AB}$ represent a line?

   _____

5. How is a line segment drawn differently?

   _____

6. Why does $\overline{AB}$ represent a line segment?

   _____

Check

7. What facts should you use in explaining your answer?

   _____

Solve Another Problem

8. Explain why a ray is represented as $\overrightarrow{AB}$.

   _____

   _____

8-2 • Guided Problem Solving

GPS **Student Page 371, Exercise 25:**

Photography A 35-mm camera lens has a 45° field of view. What kind of angle is this?

Understand

1. Underline the number(s) to use to answer this question.

2. List some different types of angles.

   _____

Plan and Carry Out

3. What is an acute angle?

   _____

4. What is a right angle?

   _____

5. What is an obtuse angle?

   _____

   _____

6. What is a straight angle?

   _____

7. What is the viewing angle of the 35-mm camera lens?

   _____

8. What kind of angle is this?

   _____

Check

9. Why did you choose this type of angle?

   _____

Solve Another Problem

10. Chrissy is using brick pavers to line one corner of her front yard. The corner has a 120° angle. What type of angle is this? Explain.

   _____

   _____

8-3 • Guided Problem Solving

GPS **Student Page 377, Exercise 24:**

Architecture Before renovations, the Leaning Tower of Pisa stood at an angle of about 5° from vertical. What was the measure of the acute angle that the tower made with the ground? What was the measure of the obtuse angle?

Understand

1. What is the first thing you are being asked to do?

   _____

   _____

2. What is the second thing you are being asked to do?

   _____

   _____

Plan and Carry Out

3. If the tower did not lean, what angle would the tower form with the ground?

   _____

4. By what angle measure from the vertical line was the tower leaning before the renovations?

   _____

5. Write a subtraction expression that you can use to find the acute angle.

   _____

6. What was the acute angle the tower made with the ground?

   _____

7. What was the obtuse angle the other side of the tower made with the ground?

   _____

Check

8. How can you check your answer?

   _____

   _____

Solve Another Problem

9. A stop sign stands at an angle of 90° with the ground. During a snowstorm, a car slid off the road and hit the sign so that it now forms a 62° angle with the ground. What is the obtuse angle formed on the other side of the sign?

   _____

8-4 • Guided Problem Solving

GPS **Student Page 383, Exercise 24:**

A designer for a boat company describes the sail shown in the photo at the right. Describe the triangle, classifying it by its angles.

Understand

1. Name the three ways you can classify a triangle by its angle measures.

   _____

2. Name the three ways you can classify a triangle by the number of congruent segments or sides.

   _____

Plan and Carry Out

3. Can a triangle be classified in more than one way? _____

4. Look at the picture of the sailboat. What appears to be true about the angle measures of the sail?

   _____

5. What appears to be true about the measures of the side lengths of the sail?

   _____

6. Classify the sail by the measures of its angles. _____
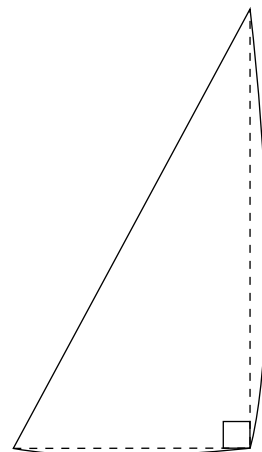
7. Classify the sail by the number of congruent sides.

   _____

8. Give all possible names for the triangular sail.

   _____

Check

9. Did you classify the triangular sail correctly?

   _____

Solve Another Problem

10. A sailboat has a sail shaped as shown. Judging by *its appearance,* give all names possible for the triangle in the diagram.

    _____

8-5 • Guided Problem Solving

GPS **Student Page 390, Exercise 23:**

Draw a parallelogram that has a 30° angle.

Understand

1. What type of tool do you need to use to draw a 30° angle?

   _____

2. What do you know about the measures of opposite angles in a parallelogram?

   _____

Plan and Carry Out

3. What is the sum of the angles in a parallelogram? _____

4. How many 30° angles are there in the parallelogram? _____

5. What is the sum of the other two angle measures?

   _____

6. What is the measure of the two other angles?

   _____

7. Use a protractor to draw the parallelogram.

Check

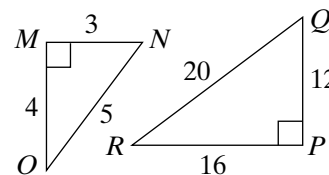8. How can you be sure your drawing is a parallelogram?

   _____

Solve Another Problem

9. Draw a parallelogram that has a 110° angle.

8-6 • Guided Problem Solving

GPS **Student Page 395, Exercise 17a:**

Triangles *MNO* and *PQR* at the right are similar.

a. List the pairs of congruent angles.

Understand

1. What does it mean to be *congruent*?

_____

2. How do you know if the angles in triangles *MNO* and *PQR* are right angles?

_____

_____

Plan and Carry Out

3. Name the right angle in each triangle.

_____

4. Name the angle opposite the shortest side in each triangle.

_____

5. Name the angle opposite the second-longest side in each triangle.

_____

Check

6. How do you know if you paired the correct angles together?

_____

Solve Another Problem

7. List the pairs of corresponding sides in the figure above.

_____

8-7 • Guided Problem Solving

GPS **Student Page 401, Exercise 16:**

Reasoning How many lines of symmetry does a circle have? Explain your reasoning.

Understand

1. What is a line of symmetry?

   _____

   _____

Plan and Carry Out

2. Draw a circle with a line through the center.

3. Into how many equal parts did your line divide the circle?

   _____

4. If you had drawn a different line through the center of the circle, would it have produced the same number of equal sections?

   _____

5. Can you find a way to draw a line through the center of the circle that produces a different number of equal sections?

   _____

6. Is there a limit to the number of lines that go through the center of the circle and divide it into equal sections?

   _____

7. How many lines of symmetry does a circle have?

   _____

Check

8. How do you determine if each line is a line of symmetry?

   _____

   _____

Solve Another Problem

9. How many lines of symmetry does an equilateral triangle have?

   _____

8-8 • Guided Problem Solving

GPS **Student Page 405, Exercise 21:**

Reasoning What transformations can you use to change the image of the letter C so that it faces left?

Understand

1. What are you being asked to find?

   _____

   _____

2. What three transformations have you learned how to perform?

   _____

3. In the space at the right, make a sketch of a right triangle. Sketch the image of the triangle after each of the three transformations.

Plan and Carry Out

4. Draw the letter C in the space at the right. Attempt to make a translation of the letter so that it faces left.

5. Draw the letter C again. Attempt to make a reflection of the letter so that it faces left.

6. Draw the letter C again. Attempt to rotate the letter so that it faces left.

7. Look at the results of Steps 4, 5, and 6. Which transformations can make the letter C face left?

   _____

Check

8. Which transformation could not make the letter C face left? Why not?

   _____

   _____

   _____

Solve Another Problem

9. What transformations can you use to change the letter A so that it points down?

   _____

9-1 • Guided Problem Solving

GPS Student Page 419, Exercise 31:

Estimation The width of a door is about 1 meter. How can you estimate the length of a wall that contains the door?

Understand

1. What are you being asked to do?

   _____

Plan and Carry Out

2. How wide is the door?

   _____

3. How can you use the width of the door to estimate the length of the wall?

   _____

   _____

   _____

   _____

   _____

Check

4. What would be an approximate length of a wall in terms of the width of the door if about 6 doors would fit along the length of the wall?

   _____

Solve Another Problem

5. The height of a window is approximately 3 feet. How can you estimate the height of a wall that contains the window?

   _____

   _____

   _____

9-2 • Guided Problem Solving

GPS **Student Page 423, Exercise 25:**

Science Light travels at approximately 299,792,458 meters per second. Approximately how many kilometers does light travel in one second?

Understand

1. What are you being asked to do?

   _____

   _____

2. Which is larger, a meter or a kilometer?

   _____

Plan and Carry Out

3. How many meters does light travel in one second?

   _____

4. Will the number of kilometers light travels in one second be bigger or smaller than the answer in Step 3?

   _____

5. What number do you divide meters by to get kilometers?

   _____

6. Divide the answer in Step 3 by the answer in Step 5.

   _____

7. Approximately how many kilometers does light travel in one second?

   _____

Check

8. How can you check your answer?

   _____

Solve Another Problem

9. A boulder weighs 44,320 grams. Approximately how many kilograms does the boulder weigh?

   _____

9-3 • Guided Problem Solving

GPS **Student Page 429, Exercise 18:**

Stamps The world's smallest postage stamp, shown at the right, measures 0.31 inch by 0.37 inch. Find the area of the stamp.

Understand

1. What are you being asked to find?

   _____

2. What is the formula for the area of a rectangle?

   _____

Plan and Carry Out

3. What is the length of the stamp?

   _____

4. What is the width of the stamp?

   _____

5. Substitute the values into the formula.

   _____

6. What is the area of the stamp?

   _____

Check

7. Explain how to check your answer.

   _____

   _____

Solve Another Problem

8. A window measures 28 in. wide by 36 in. tall. What is the area of the window?

   _____

9-4 • Guided Problem Solving

GPS **Student Page 435, Exercise 19:**

Algebra A parallelogram has an area of 66 in.^{2} and a base length of 5 inches. What is the height of the parallelogram?

Understand

1. What are you being asked to find?

_____

2. What information are you given?

_____

_____

Plan and Carry Out

3. Write the formula you will use to find the area of a parallelogram.

_____

4. Substitute the values you know into the formula.

_____

5. What operation do you use to find the height?

_____

6. What is the height of the parallelogram?

_____

Check

7. Check your answer. Explain your method.

_____

_____

Solve Another Problem

8. A parallelogram has an area of 96 cm^2 and a height of 4 cm. What is the base length of the parallelogram?

_____

9-5 • Guided Problem Solving

GPS **Student Page 441, Exercise 23:**

Trainers A dog trainer uses hoops with diameters of 24 and 30 inches. What is the difference between their circumferences? Use 3 for π.

Understand

1. What do you need to know in order to answer the question?

   _____

2. How do you find the circumference of a circle when you know the diameter?

   _____

Plan and Carry Out

3. What is the diameter of each hoop?

   _____

4. What is the circumference of the 24-in. hoop?

   _____

5. What is the circumference of the 30-in. hoop?

   _____

6. What is the difference between their circumferences?

   _____

Check

7. What unit should your final answer have? Why?

   _____

   _____

Solve Another Problem

8. Included in the china Jill and Ed received for their wedding were dinner plates and salad plates. The dinner plates have a diameter of 10 in. and the salad plates have a diameter of 7 in. What is the difference between their circumferences? Use 3 for π.

   _____

9-6 • Guided Problem Solving

GPS **Student Page 447, Exercise 24:**

You can pick up the signal of one radio station, within 45 miles of the station. Find the approximate area of the broadcast region.

Understand

1. What are you being asked to find?

   _____

2. Write the formula you use to find the area of a circle.

   _____

Plan and Carry Out

3. What is the radius of the broadcast area?

   _____

4. Substitute the values into the area formula.

   _____

5. Evaluate the formula to find the area of the broadcast region to the nearest square mile.

   _____

Check

6. Use a radius of 50 and 3 for π to estimate the area. Then use a radius of 40 and 3 for π to estimate the area. Is your answer reasonable? Why?

   _____

   _____

   _____

Solve Another Problem

7. The lead investigator in a search for a boat tells the coast guard to search everywhere within 5 miles of the last known location of the boat. What is the area of the search region? Use 3.14 for π.
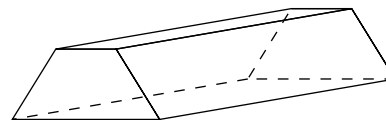
   _____

   _____

9-7 • Guided Problem Solving

GPS **Student Page 452, Exercise 17:**

Name the figure. Then find the number of faces, vertices, and edges in the figure.

Understand

1. What is a face?

   _____

2. What is a vertex?

   _____

   _____

3. What is an edge?

   _____

   _____

Plan and Carry Out

4. How many bases does the figure have? _____

5. Does this make the figure a pyramid or a prism? _____

6. What is the shape of the bases? _____

7. Name the figure. _____

8. How many faces are there total? _____

9. How many vertices are there? _____

10. How many edges are there? _____

Check

11. How do you know the figure is not a pyramid?

    _____

Solve Another Problem

12. Name the figure. Then find the number of faces, vertices, and edges in the figure.

    _____

    _____
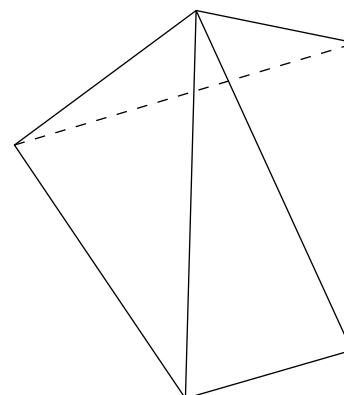
9-8 • Guided Problem Solving

GPS Student Page 455, Exercise 15:

Writing in Math Suppose each dimension of a rectangular prism is doubled. How is the surface area affected?

Understand

1. Write the formula used to find the surface area of a rectangular prism.

    _____

2. To double a number means to multiply that number by what value?

    _____

Plan and Carry Out

3. Multiply each dimension by 2 and substitute it into the surface area formula from Step 1.

    _____

4. Simplify the formula.

    _____

5. Instead of multiplying the area of each face by 2, multiply by what number?

    _____

6. How is the surface area affected when each dimension is doubled?

    _____

Check

7. Explain another way to solve this problem.

    _____

    _____

Solve Another Problem

8. Suppose each dimension of a rectangular prism is tripled. How is the surface area affected?

    _____

    _____

9-9 • Guided Problem Solving

GPS **Student Page 460, Exercise 14:**

A truck trailer has a length of 20 feet, a width of 8 feet, and a height of 7 feet. A second trailer has a base area of 108 square feet and a height of 8 feet. Which trailer has a greater volume? How much greater is it?

Understand

1. Circle the information you will need to solve the problem.

2. Write the formula used to find the volume of a rectangular solid.

   _____

Plan and Carry Out

3. Substitute the values for the length, width, and height of the first trailer into the formula for the volume of a rectangular solid. What is the volume? _____

4. Repeat Step 3 for the second trailer.

   _____

5. What are the units for the volume of this solid? _____

6. Which trailer has the greater volume? _____

Check

7. How can you check your answer?

   _____

   _____

   _____

   _____

Solve Another Problem

8. A building is 32 feet tall and has a base area of 420 square feet. What is the volume of the building?

   _____

9-10 • Guided Problem Solving

GPS **Student Page 465, Exercise 16:**

Packaging A cardboard mailing tube is 3 inches in diameter and 20 inches long. The tube is open at both ends. Find the surface area and volume of the mailing tube.

Understand

1. Circle the information you will need to solve the problem.

2. How will the fact that the ends of the tube are open affect the surface area? How will it affect the volume?

   _____

   _____

Plan and Carry Out

3. Find the area of the circular base of the tube. ($A = \pi r^2$)

   _____

4. Find the circumference of the circular base of the tube. ($C = 2\pi r$)

   _____

5. Multiply the circumference of the tube's base by the height of the tube to find the tube's surface area. _____

6. Multiply the area of the circular base by the height of the tube to find the tube's volume. _____

7. What are the surface area and the volume of the tube?

   _____

Check

8. Divide the surface area of the tube by π and then divide the quotient by the height of the tube. Is your answer the same as the tube's diameter?

   _____

Solve Another Problem

9. A drinking cup has a diameter of 4 in. and a height of 8 in. The cup has a base but no lid. What are the surface area and the volume of the cup?

   _____

10-1 • Guided Problem Solving ···

GPS **Student Page 480, Exercise 12a:**

Games To play a game, you spin a spinner and draw a card. The spinner tells you to move 1, 2, 3, or 4 spaces. The cards read *Free Turn, Lose a Turn,* or *No Change.* It is your turn.

a. Construct a sample space for the possible outcomes.

Understand

1. What is a sample space? How do you construct a sample space?

   _____

   _____

2. How many outcomes are possible with the spinner? How many outcomes are possible with the cards?

   _____

Plan and Carry Out

3. List all the possible outcomes on the spinner. _____

   List all the possible outcomes with the cards. _____

   _____

4. In the space at the right, list the first possible spinner outcome three times.

5. Next to each copy of the first spinner outcome, write one of the possible card outcomes.

6. Repeat Steps 4 and 5 for each of the other possible spinner outcomes. Now you have a sample space.

Check

7. Use a tree diagram to organize the information from the question. Does your tree diagram match the sample space you found?

   _____

Solve Another Problem

8. You decide to make some changes to the game. You use a new spinner that tells you to move 1, 2, 3, 4, 5, or 6 spaces. You decide not to use the cards that read *No Change,* and you remove them from the stack of cards. Construct a sample space for the possible outcomes of the new game.

10-2 • Guided Problem Solving

GPS **Student Page 485, Exercise 18:**

Baseball A baseball team has the starting and relief pitchers shown in the table. The manager selects a pitcher at random. Find the probability that the pitcher is left-handed.

Pitchers	Number
Left-Handed Starters	1
Right-Handed Starters	4
Left-Handed Relievers	2
Right-Handed Relievers	1

Understand

1. What are you being asked to do?

   _____

2. What is *probability*?

   _____

Plan and Carry Out

3. What is the formula for determining probability?

   _____

4. How many left-handed pitchers are there? _____

5. How many total pitchers are there? _____

6. What is the probability that the pitcher will be left-handed?

   _____

7. Write the probability from step 6 as a decimal.

   _____

8. Write the probability from step 6 as a percent.

   _____

Check

9. How can you check your answer?

   _____

   _____

Solve Another Problem

10. Find the probability that the pitcher selected will be a starting pitcher.

   _____

10-3 • Guided Problem Solving

GPS **Student Page 491, Exercise 15:**

Basketball A player makes 4 of 12 free throws. Find the experimental probability of the player missing a free throw.

Understand

1. What are you being asked to do?

   _____

   _____

2. What is *experimental probability*?

   _____

   _____

Plan and Carry Out

3. What is the formula for determining experimental probability?

   _____

4. How many trials are there?

   _____

5. How many times did he miss?

   _____

6. What is the experimental probability of the player missing a free throw?

   _____

   _____

Check

7. Does the basketball player miss more or make more free throws? Does this agree with the probability you found?

   _____

   _____

Solve Another Problem

8. What is the experimental probability that he makes the free throw?

   _____

   _____

10-4 • Guided Problem Solving

GPS **Student Page 497, Exercise 19:**

A sample of 100 gadgets is selected from one day's production of 5,000 gadgets. In the sample, 7 are defective. Predict the number of gadgets in the day's production that are *not* defective.

Understand

1. What are you being asked to find?

   _____

2. What do you need to use to solve this problem?

   _____

Plan and Carry Out

3. Write a ratio of the number of gadgets that are not defective to the number in the sample.

   _____

4. Let *n* represent the number of gadgets that are not defective in the day's production. Write a ratio of the number of gadgets that are not defective to the total number of gadgets in the day's production.

   _____

5. Write a proportion with the two ratios in Steps 3 and 4. Then solve the proportion.

   _____

6. Predict the number of gadgets that are not defective in the day's production.

   _____

Check

7. Explain how to check your answer.

   _____

Solve Another Problem

8. A sample of 50 CDs is selected from the day's production of 300 CDs. In the sample, 4 are defective. Predict the number of defective CDs in the day's production.

   _____

10-5 • Guided Problem Solving

GPS Student Page 503, Exercise 21:

Biology Assume that parents are equally likely to have a boy or a girl. Find P(girl, then boy).

Understand

1. What does it mean for two events to be equally likely?

   _____

2. How would you describe the events of having a girl and then having a boy?

   _____

Plan and Carry Out

3. What is the probability of a couple having a girl?

   _____

4. What is the probability of a couple having a boy?

   _____

5. Write an expression to find the probability of a couple having a girl and then having a boy.

   _____

6. Find the probability that a couple will have a girl and then have a boy.

   _____

Check

7. List all of the possible outcomes of a couple having two children. What is the probability that they will have a girl and then a boy? Does your answer check?

   _____

Solve Another Problem

8. Find the probability that a couple will have a girl, a boy, and then another girl.

   _____

11-1 • Guided Problem Solving

GPS **Student Page 518, Exercise 30:**

Starting at the fourth floor, an elevator goes down 3 floors and then up 8 floors. At which floor does the elevator stop?

Understand

1. Circle the information you will need to solve the problem.

2. What are you being asked to do?

   _____

3. What is a good way to set up the problem visually?

   _____

Plan and Carry Out

4. At which floor does the elevator start?

   _____

5. When the elevator goes down 3 floors, at which floor does it stop?

   _____

6. When the elevator goes up 8 floors, at which floor does it stop?

   _____

7. At which floor does the elevator stop?

   _____

Check

8. Write a numerical expression you can use to check your answer.

   _____

Solve Another Problem

9. A football team is on their opponents' 15-yard line. The quarterback throws a pass, but his team gets a penalty of 10 yards. During the next play, the quarterback passes the ball and the player runs the ball 8 yards. Which yard line is the team on for the next play?

   _____

11-2 • Guided Problem Solving

GPS **Student Page 522, Exercise 24:**

Weather Order the temperatures below from least to greatest.

- Normal body temperature is about 37°C.

- An average winter day on the polar ice cap is –25°C.

- The warmest day on record in Canada was 45°C.

- The coldest day on record in Texas was –31°C.

Understand

1. What are you being asked to do?

   _____

2. Are the integers all positive, all negative, or are they a mix of positive and negative?

   _____

Plan and Carry Out

3. What are the positive integers?

   _____

4. What are the negative integers?

   _____

5. Order each group of integers separately.

   _____

6. Combine the lists, ordering from least to greatest.

   _____

Check

7. Plot the integers on a number line to check the order.

   _____

Solve Another Problem

8. A porpoise dives 300 meters below the ocean's surface.
   A Weddell seal dives 600 meters below the ocean's surface.
   Which dives farther below the ocean's surface?

   _____

11-3 • Guided Problem Solving

GPS **Student Page 526, Exercise 25:**

Temperature At 7:30 A.M. on January 22, 1943, the temperature was
−4°F in Spearfish, South Dakota. At 7:32 A.M. the temperature
had risen 49 degrees. What was the temperature at 7:32 A.M.?

Understand

1. Circle the information you will need to solve the problem.

2. What are you being asked to do?

   _____

3. Which word tells you what operation to perform?

   _____

Plan and Carry Out

4. What was the temperature at 7:30 A.M.?

   _____

5. How many degrees did the temperature rise?

   _____

6. What was the final temperature at 7:32 A.M.?

   _____

Check

7. What is the difference between 45°F and −4°F?

   _____

Solve Another Problem

8. Jerry has a golf score of −3, or three under par. Sherry's score is
   15 strokes, or points, *worse* than Jerry's score. What is Sherry's
   score? (*Hint:* In golf, a *low* score is better than a *high* score.)

   _____

11-4 • Guided Problem Solving

GPS **Student Page 532, Exercise 23:**

Hiking You are at the highest point of Lost Mine Trail. The elevation
is 6,850 feet. You hike down the trail to an elevation of 5,600 feet.
What is your change in elevation?

Understand

1. What are you being asked to do?

   _____

2. What operation do you use to represent change?

   _____

Plan and Carry Out

3. What is the elevation of the highest point?

   _____

4. What is your elevation after hiking down?

   _____

5. Write an expression you can use to find the change in elevation.

   _____

6. What is your change in elevation?

   _____

Check

7. How can you check your answer?

   _____

   _____

Solve Another Problem

8. Sarah's savings account had $125 in it before she deposited her
   $255 paycheck. She then wrote the following checks: $20 for a
   parking ticket, $35 for her electric bill, $111 for her phone bill,
   $65 for her cable bill, and $89 for her new cell phone. Does Sarah
   have enough money left to buy a $50 DVD player? Explain.

   _____

11-5 • Guided Problem Solving

GPS **Student Page 537, Exercise 29:**

Ballooning Hot air balloons generally descend at a rate of 200 to 400 feet per minute. A balloon descends 235 feet per minute for 4 minutes. Write an integer to express the balloon's total movement.

Understand

1. What are you being asked to do?

   _____

   _____

2. Which word describes the direction of the balloon?

   _____

3. Will the integer be positive or negative?

   _____

Plan and Carry Out

4. Each minute the balloon descends how many feet?

   _____

5. How many minutes is the balloon descending?

   _____

6. What is $235\frac{\text{feet}}{\text{minute}} \cdot 4$ minutes?

   _____

7. Write an integer to express the balloon's movement.

   _____

Check

8. What is 940 feet $\div\ 235\frac{\text{feet}}{\text{minute}}$?

   _____

Solve Another Problem

9. A submarine dives for 5 seconds at 130 feet per second. Write an integer to express the submarine's movement.

   _____

11-6 • Guided Problem Solving

GPS **Student Page 542, Exercise 19:**

The value of a share of stock decreased $30 over the last 5 days. Find the average rate of change in dollars per day.

Understand

1. Circle the information you will need to solve the problem.

2. What are you being asked to do?

   _____

   _____

3. What operation will you perform to find the answer?

   _____

Plan and Carry Out

4. How much did the stock decrease in total?

   _____

5. How many days did you watch the stock?

   _____

6. What is the average decrease?

   _____

7. What integer represents the average decrease in dollars per day?

   _____

Check

8. What is $-6 \cdot 5$? Does the answer make sense?

   _____

Solve Another Problem

9. Emma makes $18 per hour for providing technical support for an Internet provider. Emma works 5 days a week for 6 hours. How much will she make in $2\frac{1}{2}$ months? (*Note*: Assume Emma works 20 days per month.)

   _____

11-7 • Guided Problem Solving

GPS **Student Page 545, Exercise 23:**

Four friends divided a restaurant bill evenly. Each owed $20. What was the total amount of the bill?

Understand

1. What are you being asked to determine?

   _____

2. Which word tells you what operation to perform?

   _____

Plan and Carry Out

3. What will the variable stand for?

   _____

4. What will you divide the variable by?

   _____

5. Write the equation.

   _____

6. Solve the equation by multiplying each side by 4.

   _____

Check

7. Substitute your answer for the variable to see if you get a true statement.

   _____

Solve Another Problem

8. You will make 5 payments on a loan of $75. How much will each payment be?

   _____

11-8 • Guided Problem Solving

GPS **Student Page 551, Exercise 31:**

Geometry A symmetrical four-pointed star has eight corner points. Seven of the points are $(-1, 1), (0, 3), (1, 1), (3, 0), (1, -1), (0, -3)$, and $(-1, -1)$. What are the coordinates of the missing point?

Understand

1. What does *symmetrical* mean?

   _____

   _____

2. What is a good way to set up the problem visually?

   _____

Plan and Carry Out

3. What point is symmetrical to $(-1, 1)$ over the *y*-axis?

   _____

4. What point is symmetrical to $(-1, -1)$ over the *y*-axis?

   _____

5. What point is symmetrical to $(3, 0)$ over the *y*-axis?

   _____

6. What is the missing point?

   _____

Check

7. Does the point $(-3, 0)$ form a four-point star with the other seven points?

   _____

Solve Another Problem

8. A five-pointed star that is symmetrical over the *y*-axis has ten corner points. Eight of the points are $(-1, 1), (0, 3), (1, 1)$, $(3, 1), (1, -1), (0, -1), (-2, -3)$, and $(-3, 1)$. What are the coordinates of the missing points?

   _____

11-9 • Guided Problem Solving

GPS **Student Page 556, Exercise 12:**

You receive a total of $125 for your birthday. You spend $20 on a sweater, $15 on a CD, $8 on a book, $12 on a pair of sunglasses, and $35 on a bicycle helmet. How much money do you have left?

Understand

1. Circle the information you will need to solve the problem.

2. What are you being asked to do?

_____

Plan and Carry Out

3. How much money did you receive?

_____

4. How much money did you spend?

_____

5. Write an expression for how much you have left.

_____

6. How much money do you have left?

_____

Check

7. How can you check your answer?

_____

_____

Solve Another Problem

8. Helen received some cash for her birthday. She spent $14.30 on a CD and donated $25 to a charity. She put half of what was left into her savings account. She has $17.85 left. How much money did she receive on her birthday?

_____

11-10 • Guided Problem Solving

GPS Student Page 562, Exercise 18:

Business You start a cookie business. You know that the oven and materials will cost $600. You decide to charge $.75 for each cookie. The function $p = 0.75c - 600$ relates profit p to the number of cookies c that you sell.

  a. What will be your profit or loss if you sell 400 cookies? If you sell 500 cookies?

  b. How many cookies must you sell to break even?

Understand

  1. What is *profit*?

  _____

  _____

  2. How will you use the equation to answer part (a) and part (b)?

  _____

  _____

  _____

Plan and Carry Out

  3. Substitute 400 for c and solve for p. What is the profit? _____

  4. Substitute 500 for c and solve for p. What is the profit? _____

  5. What value represents breaking even? _____

  6. Do you substitute this for p or c? _____

  7. How many cookies must you sell to break even? _____

Check

  8. What is $(0.75 \cdot 800) - 600$? _____

Solve Another Problem

  9. Distance is a function of time. Suppose you walk at a rate of 2 miles per hour. Write an equation for the distance d you walk in t hours, and use it to determine the distance you will have walked after 10 hours.

  _____

12-1 • Guided Problem Solving

GPS Student Page 576, Exercise 27:

Choose the correct equation. Then solve the equation.

Sales A sales representative earns weekly base salary of $250 and a commission of 8% on her weekly sales. (A commission is money earned that equals a percent of the sales.) At the end of one week, she earned $410. How much did she sell that week? Let s represent the total sales.

A. $250 + 0.08s = 410$ **B.** $250 + 410 = 0.08s$

Understand

1. What is a commission?

   _____

2. To choose the correct equation, determine which one represents
   weekly salary + commission = total earned.

   _____

Plan and Carry Out

3. What is the first step in solving the equation?

   _____

4. Simplify both sides of the equation. _____

5. What is the second step in solving the equation?

   _____

6. Simplify both sides of the equation. _____

7. What are her total sales for the week? _____

Check

8. How can you check your answer?

   _____

Solve Another Problem

9. A sales representative earns pay as described above. During a
   holiday promotion, he earned $650. What were his total sales for
   that week?

   _____

12-2 • Guided Problem Solving

GPS **Student Page 581, Exercise 16:**

Football You must weigh 120 pounds or less to play in a junior
football league. Use the table at the right. Who qualifies to play?

Name	Weight
Aaron	118 lb
Steve	109 lb
Mark	131 lb
James	120 lb

Understand

1. What are you being asked to determine?

   _____

2. What is the weight requirement for playing in the junior football
   league?

   _____

Plan and Carry Out

3. Write the weight requirement as an inequality. Use *p* to
   represent a player's weight.

   _____

4. Substitute each player's weight for the inequality's variable to
   determine if the weight makes the inequality true or false.

   _____

5. Which players' weights make the inequality true?

   _____

6. Who qualifies to play?

   _____

Check

7. Compare each player's weight to the weight requirement by
   plotting each weight on a number line.

   _____

Solve Another Problem

8. Dave ran less than 5 miles. How many miles could Dave have
   run? Define a variable and write an inequality.

   _____

   _____

12-3 • Guided Problem Solving ···

GPS **Student Page 584, Exercise 22:**

Budgeting You want to spend less than $30 on two T-shirts and a pair of shorts. The pair of shorts costs $13. Each of the T-shirts costs the same amount. Write and solve an inequality to find how much money you can spend on each T-shirt.

Understand
··················

1. What are you being asked to find?

   _____

   _____

2. Which symbol do you need to use in the inequality, $<$ or $>$? _____

Plan and Carry Out
····························

3. Given that shorts cost $13, write an expression for the phrase "2 T-shirts and a pair of shorts." Let t represent the cost of one T-shirt.

   _____

4. Use the expression in Step 3 to write an inequality for less than 30. _____

5. What do you do first to both sides of the inequality? _____

6. Simplify both sides of the inequality. _____

7. What do you do to both sides of the inequality to solve for t? _____

8. What is the solution? _____

9. How much money can you spend on each T-shirt? _____

Check
··········

10. Can you spend exactly the amount you found in Step 9? Explain.

    _____

    _____

Solve Another Problem

11. Suppose you are able to spend $10 more. How much money can you spend on each T-shirt now?

    _____

12-4 • Guided Problem Solving

GPS **Student Page 590, Exercise 37:**

Egyptian Pyramids The area of the square base of the Great Pyramid at Giza is 52,900 square meters. What is the length of each side of the base of the pyramid?

Understand

1. How do you find the area of a square if you are told the length of the side?

   _____

2. What information are you given? What are you being asked to find?

   _____

   _____

Plan and Carry Out

3. What is the area of the square?

   _____

4. What is the square root of the answer to Step 3?

   _____

5. What is the length of each side of the square base?

   _____

Check

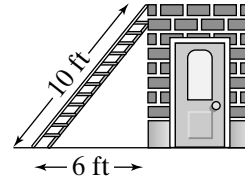6. How can you check your answer?

   _____

   _____

Solve Another Problem

7. The area of a square table is 1,296 in.^{2}. What is the length of each side of the table?

   _____

12-5 • Guided Problem Solving

GPS Student Page 593, Exercise 15:

A 10-foot ladder leans against a building. The base of the ladder is 6 feet from the building. How high is the point where the ladder touches the building?

Understand

1. Look at the drawing to the right. What kind of triangle is formed by the ladder, the ground, and the building?

   _____

2. Circle the part of the triangle whose length you are being asked to find.

Plan and Carry Out

3. Write the formula for the Pythagorean Theorem.

   _____

4. Replace *c* with the length of the hypotenuse in the drawing.

   _____

5. Replace *b* with the length of the leg given in the drawing.

   _____

6. Solve the equation for *a* to find the missing length.

   _____

7. How high is the point where the ladder touches the building?

   _____

Check

8. Substitute your answer along with the other values into the equation $a^2 + b^2 = c^2$ and solve. Does the equation hold true?

   _____

Solve Another Problem

9. The shadow of a polar bear is 24 feet long at dusk. The distance between the top of the bear's head and the end of its shadow is 25 feet. How tall is the bear?

   _____