• Adding Numbers with More Than Three Digits
• Checking One-Digit Division

Power Up
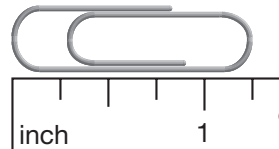
facts	Power Up H
count aloud	Count by hundreds from 100 to 1000.
mental math	**a. Number Sense:** $100 - 40$
	b. Number Sense: $346 + 29$
	c. Number Sense: $465 + 175$
	d. Powers/Roots: Compare: $\sqrt{64}$ ◯ $100 - 36$
	e. Measurement: What is the length of this paper clip?

f. Measurement: Recall that 1 liter is slightly more than 1 quart. Is 1 liter slightly more than 4 pints?

g. Percent: What is 50% of $14?

h. Calculation: $21 \div 3 \times 9 + 19$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. On New Year's Day, 2007, M'Kayla's brother turned eighteen months old. What was the date of her brother's birth?

Adding Numbers with More Than Three Digits

When using pencil and paper to add numbers that have more than three digits, we add in the ones column first. Then we add in the tens column, the hundreds column, the thousands column, the ten-thousands column, and so on. When the sum of the digits in a column is a two-digit number, we record the second digit below the line. We write the first digit above (or below) the column to the left.

Example 1

A park ranger used a measuring wheel to find the length of trails in the park. Two routes to a lake from the campground measured 43,287 feet and 68,595 feet. If a hiker takes one route to the lake and takes the other route back to the campground, then the round trip is how many feet?

We add the digits in the ones column first. Then we add the digits in the other columns. When the sum is a two-digit number, we write the second digit below the line and the first digit above (or below) the column to the left. The round trip is **111,882 feet.**

$$\begin{array}{r} 1\ \ 11 \\ 43{,}287 \\ +\ 68{,}595 \\ \hline 111{,}882 \end{array}$$

Estimate There are 5280 feet in one mile. About how many miles is 111,882 feet? Explain your thinking.

Example 2

Dale bought a used pick-up truck for his business for $4950. The taxes and registration cost $483. Then Dale paid $525 to have a toolbox installed in the bed of the truck. The tax on the toolbox was $37. Altogether, how much did Dale spend?

When we write the numbers in columns, we are careful to line up the last digit in each number. We add the digits one column at a time, starting from the right. In this example we show the carried numbers written below the columns. We find that Dale spent **$5995.**

$$\begin{array}{r} \$4950 \\ \$\ \ 483 \\ \$\ \ 525 \\ +\ \$\ \ \ 37 \\ \hline {\scriptstyle 1\ 1\ 1} \\ \$5995 \end{array}$$

We can also check our answer by using a calculator. When we use our calculator, we see that the sum is $5995.

Checking One-Digit Division

We can check a division answer by multiplying the numbers outside the division box:

$$\begin{array}{c} 4 \\ 3\overline{)12} \end{array} \longrightarrow \begin{array}{r} 4 \\ \times\ 3 \\ \hline 12 \end{array} \text{ check}$$

We see that the product matches the number inside the division box. We usually show this by writing the product under the number in the division box.

$$\begin{array}{c} 4 \\ 3\overline{)12} \\ 12 \end{array}$$

⟵ **Step 1:** Divide 12 by 3 and write "4."

⟵ **Step 2:** Multiply 4 by 3 and write "12."

Example 3

Divide. Check the answer by multiplying.

    a. $3\overline{)18}$ **b.** $4\overline{)32}$

First we divide and write the answer above the box. Then we multiply and write the product below the box.

    a. $\begin{array}{c} 6 \\ 3\overline{)18} \\ 18 \end{array}$ **b.** $\begin{array}{c} 8 \\ 4\overline{)32} \\ 32 \end{array}$

Practice using multiplication to check all your division answers in the problem sets.

Lesson Practice

Add:

    a. $\begin{array}{r} 4356 \\ +\ 5644 \end{array}$ **b.** $\begin{array}{r} 46{,}027 \\ +\ 39{,}682 \end{array}$ **c.** $\begin{array}{r} 360{,}147 \\ +\ \ 96{,}894 \end{array}$

Find each sum. Check each answer using a calculator.

    d. $436 + 5714 + 88$ **e.** $43{,}284 + 572 + 7635$

Divide. Check each answer by multiplying.

    f. $3\overline{)21}$ **g.** $7\overline{)42}$ **h.** $6\overline{)48}$

Written Practice   *Distributed and Integrated*

Formulate Write and solve equations for problems **1–3.**

＊1. In the P.E. class there were four teams. Each team had eight players.
(49)   How many players were on all four teams?

*2. There were 7 pennies in each stack. There were 6 stacks of pennies.
(49) How many pennies were there in all?

*3. Lalo ran the first lap in 63.4 seconds and the second lap in 65.3 seconds.
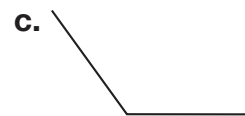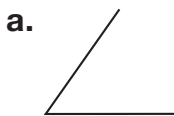*(31, 43)* Lalo ran the first lap how much faster than the second lap?

*4. (Connect) Write four multiplication/division facts using the numbers
(47) 6, 7, and 42.

5. Compare: $1 + 3 + 5 + 7 + 9$ ◯ five squared
(7, Inv. 3)

6. a. Round 367 to the nearest hundred.
(20, 42)

   b. Round 367 to the nearest ten.

*7. (Represent) Draw a circle and shade 50% of it.
(Inv. 5)

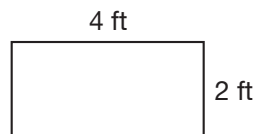**8.** (Classify) Name each type of angle shown below:
(23)

a.   **b.**   **c.**

*9. A rectangle is shown at right: 4 ft
(Inv. 2, Inv. 3) **a.** What is its length?

   b. What is its width?   2 ft

   c. What is its perimeter?

   d. What is its area?

10. (Represent) The amount of liquid in a container is 2.75 quarts. Use
(Inv. 4) words to write that amount.

*11. (Estimate) The land area of Grand Portage National Monument in
(30, 42) Minnesota is 710 acres. The land area of Oregon Caves National
Monument in Arizona is 488 areas. Estimate the difference of those
areas by first rounding each area to the nearest hundred acres.

* 12. Describe the order of operations in this expression and find the number
(50)   it equals.

$$15.24 + (19.6 - 1.1)$$

* 13.   63,285
(51)   + 97,642

14. $5.00
(41)   − $4.81

15.   *n*
(24, 43)   + 39.8
            61.4

* 16.   85
(48)   × 5

17.   37
(48)   × 7

18.   40
(42)   × 8

19.   *f*
(41)   × 8
          72

20.   47.8
(24, 43)   − *c*
            20.3

* 21.   462,586
(51)   + 39,728

22.   *z*
(16, 43)   − 4.78
            2.63

Divide. Check each answer by multiplying.

* 23. 2)‾18‾
(51)

* 24. 7)‾21‾
(51)

* 25. $\frac{56}{8}$
(51)

26. The length of $\overline{AB}$ is 7 cm. The length of $\overline{AC}$ is 12 cm. How long is $\overline{BC}$?
(45)

   A   *B*   *C*

* 27. If half the students are boys, then what percent of the students are
(Inv. 5)   girls?

* 28. (**Connect**) If 5*n* = 0, then what does 6*n* equal?
(28, 41)

* 29. Multiple Choice Which of the following does *not* name
(Inv. 4,
Inv. 5)   the shaded portion of the large square?

   A $\frac{11}{100}$ **B** 0.11   **C** 11%   **D** 11
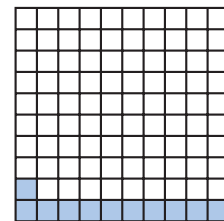
* 30. (**Explain**) In 1980, the median age of a resident of the United States
(50)   was 30 years. By 2000, the median age had increased 5.3 years. What
       was the median age of a resident of the United States in the year 2000?
       Explain why your answer is reasonable.

• Subtracting Numbers with More Than Three Digits
• Word Problems About Equal Groups, Part 2

Power Up

facts   Power Up H

count aloud Count by hundreds from 100 to 1000 and back down to 100.

mental math

   a. **Number Sense:** $200 - 30$

   b. **Number Sense:** $400 - 90$

   c. **Money:** $\$2.48 + \$2.99$

   d. **Time:** The casserole must cook in the oven for 1 hour 30 minutes. J'Meika wants the casserole to be ready to eat by 6:45 p.m. At what time does J'Meika need to put the casserole in the oven?

   e. **Percent:** 50% of $22

   f. **Measurement:** True or False: 1 liter is slightly more than 4 cups.

   g. **Estimation:** Choose the more reasonable estimate for the temperature of a bowl of hot soup: 120°F or 60°F.

   h. **Calculation:** $\sqrt{25} + 9 + 110 + 32$

problem solving Choose an appropriate problem-solving strategy to solve this problem. A loop is worth five points, and a tip is worth three points. L'Shawn made four loops and two tips. Carlotta made three loops and five tips. How many points did each person earn?

Subtracting Numbers with More Than Three Digits

When using pencil and paper to subtract numbers with more than three digits, we begin by subtracting in the ones column. We regroup if necessary. Then we move one column to the left and subtract in the tens column, regrouping if necessary. Then we subtract in the hundreds column, the thousands column, the ten-thousands column, and so on. Sometimes we must subtract across several zeros.

Example 1

Thirty-six thousand, one hundred fifty-two tickets were sold for the first baseball game of the year. Nine thousand, four hundred fifteen fewer tickets were sold for the second game of the year. How many tickets were sold for the second game of the year?

We write the first number above the second number. We line up digits with the same place value. First we subtract in the ones column. Then we subtract in the other columns. We find that **26,737 tickets** were sold for the second game.

$$\begin{array}{r} 2\,{}^{1}5\;\;{}_{1}4\;\;{}_{1} \\ \cancel{3}\cancel{6},1\,\cancel{5}\,2 \\ -\;\;9,4\,1\,5 \\ \hline 26,7\,3\,7 \end{array}$$

Discuss Explain how to check the answer.

Example 2

A charity received a contribution of $5000. In the first month after the contribution was received, the charity spent $2386. How much of the contribution remained after the first month?

Thinking Skill

Analyze

Explain why 5000 is equal to 499 tens + 10 ones.

We need to find some ones for the ones place before we can subtract. We may do this in one step by thinking of the "500" in 5000 as 500 tens. We exchange one of these tens for ten ones, leaving 499 tens. Then we subtract. We find that **$2614** remained.

$$\begin{array}{r} 4\,9\,9 \\ \$\cancel{5}\cancel{0}\cancel{0}\,{}^{1}0 \\ -\;\$2\,3\,8\,6 \\ \hline \$2\,6\,1\,4 \end{array}$$

Word Problems About Equal Groups, Part 2

"Equal groups" word problems have a multiplication formula. If we know the number of groups and the number in each group, we multiply to find the total. However, if we know the total, then we need to *divide* to find the number of groups or the number in each group.

Example 3

MarVel has 21 tennis balls in cans. There are 3 tennis balls in each can. How many cans does he have?

There are two numbers in this problem. The words *in each* are a clue. They show us the number of objects in each group (3 tennis balls). The other number is 21. We need to decide whether this is the number of groups or the total. Altogether, MarVel has 21 tennis balls. This is the total.

Formula	Problem
Number **in each** group	3 tennis balls in each can
$\times$ Number **of** groups	$\times$ *n* cans
Total	21 tennis balls

Since we know the total, we divide the total by the number in each group to find the number of groups.

$$\begin{array}{r} 7 \\ 3\overline{)21} \\ 21 \end{array}$$

We check our answer by multiplying: 7×3 tennis balls = 21 tennis balls. Our answer is correct. MarVel has **7 cans.**

Example 4

Trushna has 5 large cans of racquetballs. She has 40 racquetballs in all. If each can contains the same number of racquetballs, how many racquetballs are in each can?

The words *in each* show us that this is an "equal groups" problem. However, we are not given an *in each* number.

Formula
Number of groups $\times$ Number in each group = Total

Problem:
5 cans $\times$ *n* racquetballs in each can = 40 racquetballs

We may abbreviate the equation this way:

$$5n = 40$$

To find the number in each can, we divide 40 by 5.

$$\begin{array}{r} 8 \\ 5\overline{)40} \\ 40 \end{array}$$

We see that 5 times 8 racquetballs equals 40 racquetballs, so our answer is correct. There are **8 racquetballs** in each can.

Marsha found a length of fabric marked 16 feet. She needs 4 yards of fabric to make a costume for a school play. Can the costume be made from the length of fabric Marsha found?

We can convert 16 feet to yards by dividing by 3. Since 16 does not divide evenly by 3, we look for a nearby number compatible with 3. We choose 15 and divide 15 feet by 3.

$$15 \div 3 = 5$$

We find that 16 ft is about 5 yards, so **there is enough fabric to make a costume.**

Verify Describe a different way Marsha can decide if there is enough fabric.

Lesson Practice

Subtract:

a. 4783
− 2497

b. 4000
− 527

c. $20.00
− $12.25

Formulate Write and solve equations for problems **d** and **e.**

d. There were 35 people. There were 7 cars. The number of people in each car was the same. How many people were in each car?

e. Thirty students were arranged in rows. Six students were in each row. How many rows were there?

f. Mr. Tran wants to arrange his 29 students into 5 groups. About how many students will be in each group? Explain how you found your answer.

Written Practice

Distributed and Integrated

Write and solve equations for problems **1–5.**

*1. There were 8 buses. Each bus could seat 60 students. How many students could ride in all the buses?
(49)

*2. Each van could carry 9 students. There were 63 students. How many vans were needed to carry all of the students?
(52)

*3. The coach separated 28 players into 4 equal teams. How many players were on each team?
(52)

4. There are 10 swimmers in the race. Only 3 can be awarded medals.
(25) How many swimmers will not win a medal?

5. Hermelinda finished first in the 100-meter freestyle race with a time of
(31, 43) 57.18 seconds. Tanya finished second in 58.26 seconds. Hermelinda
finished the race how many seconds sooner than Tanya?

6. (**Connect**) Write four multiplication/division facts using the numbers
(47) 7, 8, and 56.

7. Compare: $1 + 2 + 3 + 4 \bigcirc \sqrt{100}$
(Inv. 1, Inv. 3)

*8. (**Conclude**) What are the next three numbers in this sequence?
(3)

$$\ldots, 6000, 7000, 8000, \underline{\quad}, \underline{\quad}, \underline{\quad}, \ldots$$

*9. There were two hundred sixty-seven apples in the first bin. There were
(31) four hundred sixty-five apples in the second bin. How many fewer
apples were in the first bin?

*10. $8.49 + 7.3 + 6.15$ **11.** $6n = 42$
(50)   (41)

*12.   47,586   **13.** $5.00   **14.** n
(51) $+ 23,491$ (41) $- \$3.26$ (24, 43) $+ 25.8$
                                                                  60.4

*15.   49   **16.**   84   **17.**   70
(48) $\times\ 6$ (48) $\times\ 5$ (42) $\times\ 8$

18.   35   **19.**   400   ***20.** $40.00
(48) $\times\ 9$ (24, 41) $-\quad n$ (52) $- \$24.68$
                                         256

21. a. Round 639 to the nearest hundred.
(20, 42)

   b. Round 639 to the nearest ten.

*22. (**Conclude**) Which side of this triangle appears to be
(23, 45) perpendicular to $\overline{PR}$?
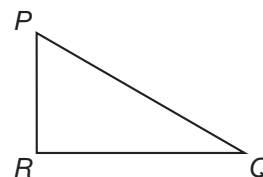
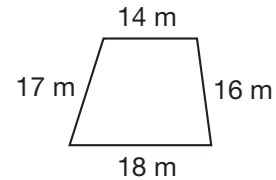**23.** Compare: $49\% \bigcirc \frac{1}{2}$
(Inv. 5)

*24. Divide. Check each answer by multiplying.
(51)
   a. $3\overline{)27}$ **b.** $7\overline{)28}$ **c.** $8\overline{)72}$

*25. This figure has four sides, but it is not a rectangle.
(Inv. 2) What is the perimeter of this figure?

14 m

17 m

16 m

18 m

26. (Estimate) **a.** Is $24.10 closer to $24 or to $25?
(20, Inv. 4)
   b. Is 24.1 closer to 24 or to 25?

*27. **Multiple Choice** If $\triangle = \square$, which of these is *not* necessarily
(1, 41) true?
   A $\triangle + 2 = \square + 2$ **B** $2 \times \triangle = 2 \times \square$
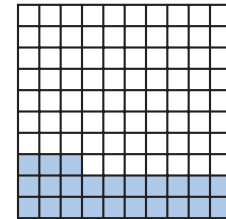   **C** $\triangle - 2 = \square - 2$ **D** $2 \times \triangle = \square + 2$

*28. **a.** What fraction of the large square is shaded?
(Inv. 4, Inv. 5)
   b. The shaded part of the large square represents what
   decimal number?

   c. What percent of the large square is shaded?

*29. ✎ (Explain) The answer to $33 \div 8$ is not a whole number. What whole
(52) number represents a reasonable estimate of the answer? Explain why
you chose that number.

*30. Look at these coins. List all of the different amounts you could make
(22, 43) using exactly two coins. Arrange the amounts in order from least to
greatest and write each amount with a dollar sign.

• One-Digit Division with a Remainder

Power Up

<table>
<tr><td>**facts**</td><td>Power Up I</td></tr>
<tr><td>**count aloud**</td><td>Count by thousands from 1000 to 10,000.</td></tr>
<tr><td>**mental math**</td><td>Nine dimes plus ten pennies totals one dollar. We can use this fact to find change back from a dollar. For example, if you pay a dollar for an item that costs 47¢, you should get 53¢ back. Notice that the 4 of 47¢ and the 5 of 53¢ equal 9 dimes. The 7 and the 3 equal 10 pennies. Find the change back from a dollar for items with these prices:</td></tr>
</table>

    a. Money: 46¢

    b. Money: 64¢

    c. Money: 28¢

    d. Money: 52¢

    e. Money: 17¢

    f. Money: 85¢

    g. Estimation: Is $32.45 closer to $32 or to $33?

   **h. Calculation:** $42 \div 7 + 26 + 110 + 38$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Dakota wants to participate in two sports at her school. She can choose from four different sports that are offered—track, soccer, tennis, and basketball. What combinations of two sports can Dakota choose?

We can divide 12 objects into equal groups of four. Here we show 12 dots divided into three equal groups of four:

12 dots   3 equal groups
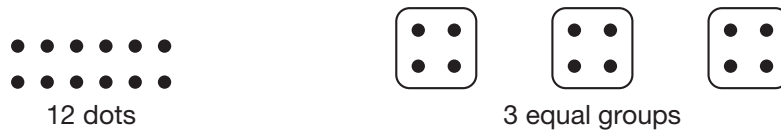
However, we cannot divide 13 dots into equal groups of four, because there is one dot too many. We call the extra dot the **remainder.**

13 dots   3 equal groups   Remainder
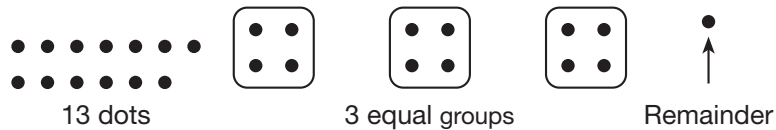
We can show that 13 is to be divided into groups of four by writing

$$4\overline{)13}$$

As we look at this problem, we may wonder what to write for the answer. The answer is not exactly 3 because 3 × 4 is 12, which is less than 13. However, the answer cannot be 4 because 4 × 4 is 16, which is more than 13. Since we *can* make three groups of four, we write "3" as our answer. Then we multiply 3 by 4 and write "12" below the 13.

$$\begin{array}{r} 3 \\ 4\overline{)13} \\ 12 \end{array}$$ ← three groups

We see that 13 is more than 12. Now we find how much is left over after making three groups of four. To do this, we subtract 12 from 13.

$$\begin{array}{r} 3 \\ 4\overline{)13} \\ -12 \\ \hline 1 \end{array}$$
← three groups

subtract
← 1 left over (remainder)

There is one left over. The amount left over is the remainder. Using the letter R for "remainder," we write the answer to the division problem as "3 R 1."

$$\begin{array}{r} 3\ R\ 1 \\ 4\overline{)13} \\ -12 \\ \hline 1 \end{array}$$
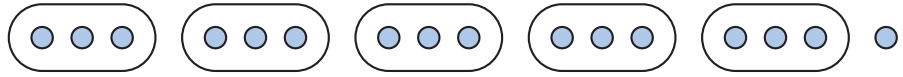
Example 1

Thinking Skill

Generalize

How can we use multiplication to check a division problem that has a remainder?

Divide: $3\overline{)16}$

This problem tells us to divide 16 into groups of three. We can use a sketch to help us with the problem. Draw 16 dots and make groups of three dots.

We can make five groups of three. One dot is not in a group of three. We write "5" above the division box, as shown below.

$$3\overline{)16}^{\;5}$$

Since three groups of five is 15, we write "15" below the 16. Then we subtract and find that the remainder is 1.

$$
\begin{array}{r}
5 \\
3\overline{)16} \\
-15 \\
\hline
1 \;\leftarrow \text{ remainder}
\end{array}
$$

We write the answer as **5 R 1.**

Verify How can we check the answer?

Activity

Finding Equal Groups with Remainders

Materials needed:
- counters

We often use division to solve problems with an "equal groups" plot. We might be looking for the number of groups of a given size, or we might be looking for the size of a given number of groups. In this activity we will solve both types of problems. Use counters (or draw dots) to illustrate each problem.

1. There are 25 students in a classroom. The teacher wants to make groups with four students in each group. How many groups can be made? Explain how to deal with the remainder.

2. In the same class, the teacher wants to make three equal groups of students. How many students will be in each group? Explain how to deal with the remainder.

Example 2

The science club will take 20 members to the museum. Vans and a car will be used to take the members to the museum. Each van can carry 6 members. How many vans can be filled? How many members will ride in the car?

First we divide 20 by 6 to find the number of groups of 6.

$$6\overline{)20}$$

We can draw 20 dots and make groups of six, or we can think, "What number times six is close to but not more than 20?" We might start by thinking, "Six times *four* equals 24"; but 24 is too much, so we think, "Six times *three* equals eighteen." Eighteen is less than 20. We write "3" as shown below.

$$\begin{array}{r} 3 \\ 6\overline{)20} \end{array}$$

Next we multiply, and then we subtract.

$$\begin{array}{r} 3 \\ 6\overline{)20} \\ -18 \\ \hline 2 \end{array}$$

— 3 groups of 6
— 20 members
— 18 members in vans
— remainder of 2 members

Three vans can be filled. If each van carries six members, then **2 members** will ride in the car.

Verify How can we check the answer?

Example 3

Lucius needs at least 18 quarts of apple cider to make punch for a school party. Apple cider is sold only in gallons. How many gallons should he buy?

Four quarts equals a gallon, so if we divide 18 by 4 we can find the number of gallons. However, 18 is not a multiple of 4, so we pick a nearby number that is compatible with 4. Both 16 and 20 are close to 18 and are multiples of 4. Lucius wants to have enough so we pick 20 and divide by 4 ($20 \div 4 = 5$). Lucius should buy **5 gallons** of apple cider.

Analyze How many 8-oz cups does Lucius need so that he can serve 18 quarts of cider mixed with 3 quarts of club soda? Explain your reasoning.

Lesson Practice

a. (**Represent**) Draw dots and make groups to show 14 ÷ 4. Write the answer shown by your sketch.

Divide. Write each answer with a remainder.

b. $3\overline{)17}$ **c.** $5\overline{)12}$ **d.** $4\overline{)23}$

e. 15 ÷ 2   **f.** 20 ÷ 6   **g.** 25 ÷ 3

h. Nina threw the shot put 28 feet. About how many yards is 28 feet? Sketch the division using dots.

Written Practice

Distributed and Integrated

(**Formulate**) Write and solve equations for problems **1** and **2**.

*1. Evita had 56 beads that she was putting into bags. She wanted to put
(52) them into equal groups of 8 beads. How many bags will she need?

*2. There were 42 children waiting for a ride. There were 7 cars available. If
(52) the same number of children rode in each car, then how many would be in each car?

*3. (**Connect**) Write four multiplication/division facts using the numbers 4,
(47) 7, and 28.

4. Which months have exactly 30 days?
(5)

*5. Consider this sequence:
(3)

$$\dots, 16{,}000, 17{,}000, 18{,}000, 19{,}000, \dots$$

a. (**Generalize**) Write a rule that describes how to find the next term of the sequence.

b. (**Predict**) What is the next term of the sequence?

6. a. Round 4728 to the nearest hundred.
(20, 42)

b. Round 4728 to the nearest ten.

7. Write the time "a quarter after four in the afternoon" in digital form.
(19)

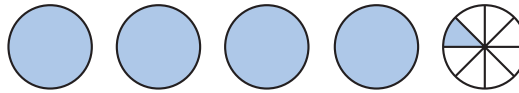***8.** **Model** One side of a square is 4 feet long. You may use tiles to solve.
(Inv. 2)

    a. What is the perimeter of the square?

    b. What is the area?

9. How many circles are shaded?
(35)

*1 **Explain** Describe the order of operations in this expression and
(Inv. 3, 45) find the number it equals.

$$\sqrt{64} + (42 \div 6)$$

11 $6.35 + $12.49 + 42¢
(43)

*1 $100.00 − $59.88
(43, 52)

*13
(52)
   51,438
 − 47,495

1
(42, 48)
  60
× 9

1
(48)
  57
× 4

*16 **Represent** Draw dots and make groups to show 22 ÷ 5. Write the
(53) answer next to your drawing.

Divide for problems **17– 19** Write each answer with a remainder.

*17 25 ÷ 4
(53)

*18 6)39
(53)

*19 7)30
(53)

20
(48)
  46
× 8

21.
(48)
  38
× 7

22 .
(24, 43)
     z
− 16.5
 40.2

*23. 6.75 + 4.5 + 12.5
(50)

*24 **Represent** Use digits to write seven million, two hundred sixty
*(34)* thousand.

25 A half-gallon container holds about 1.89 L of fluid. Use words to
(40) write 1.89 L.

*26. Multiple Choice Shakir said, "I am thinking of two numbers. Their
(28)   product is 6." The two numbers Shakir was thinking of could *not* be ____.

   A 1 and 6   **B** 2 and 3   **C** 3 and 2   **D** 6 and 0

*27. a. A quarter is what percent of a dollar?
(40,
Inv. 5)   **b.** A quart is what percent of a gallon?

*28. a. What fraction of the large square is shaded?
(Inv. 4,
Inv. 5)
   b. The shaded part of the large square represents what
      decimal number?

   c. What percent of the large square is shaded?
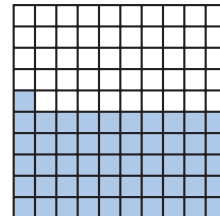
*29. [Estimate] Brandon purchased 1 liter of juice, which is about
(53)   67.6 fluid ounces. Estimate the number of cups of juice that Brandon
      purchased. Explain your thinking.

*30. [Explain] The 900 North Michigan Avenue Building in Chicago is
(25, 30)   871 feet tall. The 181 West Madison Street Building is 680 feet tall. How
      many feet taller is the 900 North Michigan Avenue Building? Explain
      how you found your answer.

Early Finishers

Real-World Connection

Ellen needs at least 25 feet of ribbon to make bows. The ribbon she
uses is sold only in yards. How many yards should she buy? Explain
how compatible numbers can be used to solve the problem.

• The Calendar
• Rounding Numbers to the Nearest Thousand

Power Up

facts	Power Up I
count aloud	Count by thousands from 1000 to 10,000 and back down to 1000.
mental math	Find the change back from a dollar for items with these prices:

   a. Money: 41¢

   b. Money: 89¢

   c. Money: 34¢

   d. Money: 62¢

   e. Percent: 50% of 18

   f. Time: What is the time 30 minutes after 3:19 a.m.?

   g. Estimation: Tarana was trying to guess the number of jelly beans in the small jar. She estimated that 10 jelly beans could fit in one "layer" along the bottom of the jar. She also estimated that the jar was about 8 layers tall. What might be Tarana's estimate for the number of jelly beans?

   h. Calculation: $10 \times 7 + 35 + 53 + 134$

problem solving	Choose an appropriate problem-solving strategy to solve this problem. One way to make a dollar with seven coins is with two quarters and five dimes. Can you find three more ways to make a dollar with seven coins? (Remember to consider half-dollars.)

The Calendar

A year is the length of time it takes the Earth to travel around the sun. A day is the length of time it takes the Earth to spin around once on its axis. It takes the Earth almost exactly $365\frac{1}{4}$ days to travel around the sun. To make the number of days in every year a whole number, we have three years in a row that have 365 days each. These years are called **common years.** Then we have one year that has 366 days. A year with 366 days is called a **leap year.**

Math Language

Sometimes there are 7 years in a row without a leap year. This happens around "century years" that are not multiples of 400. For example, the 7-year span 1897–1903 contained no leap years, since 1900 is not a multiple of 400.

A year is divided into 12 months. The month February has 28 days in common years and 29 days in leap years. Four months have 30 days each. All the rest have 31 days. If we know the four months that have 30 days, we can remember the number of days in the other months. The following jingle helps us remember which months have 30 days:

> Thirty days have September,
> April, June, and November.
> February has twenty-eight alone,
> All the rest have thirty-one.
> Excepting leap year,
> That's when February's days are twenty-nine.

A **decade** is ten years. A **century** is one hundred years.

Example 1

How many days does December have?

"Thirty days have September, April, June, and November. February has twenty-eight alone" tells us that December does not have 30 days. December must have **31 days.**

Example 2

Thinking Skill

Connect

What day is the first day of the week?

According to this calendar, May 10, 2014, is what day of the week?

The letters across the top of the calendar stand for Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday. We see that May 10 is a **Saturday,** the second Saturday of the month.

MAY 2014

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Example 3

The Pilgrims sailed to America and landed at Cape Cod in 1620. The colonies adopted the Declaration of Independence in 1776. Write a *later − earlier = difference* equation and solve it to find the number of years between those two historic events.

This is a problem about comparing two numbers (the years 1620 and 1776). To find the amount of time between two years, we subtract. Instead of thinking "larger-smaller-difference," we think of "later-earlier-difference." We subtract the earlier date from the later date. In this problem, that means we subtract 1620 from 1776.

	Formula	Problem
	Later	1776
	− Earlier	− 1620
	Difference	156

We find that there were **156 years** from 1620 to 1776.

Rounding Numbers to the Nearest Thousand

To round a number to the nearest thousand, we find the multiple of 1000 to which the number is closest. The multiples of 1000 are the numbers in this sequence:

1000, 2000, 3000, …

A number line can help us understand rounding.

Example 4

Seven thousand, eight hundred thirty-six tickets were sold for the first professional indoor soccer game of the season. Round the number of tickets sold to the nearest thousand.

We know that 7836 is more than 7000 but less than 8000. Halfway from 7000 to 8000 is 7500. Since 7836 is more than halfway from 7000 to 8000, it is nearer to 8000.
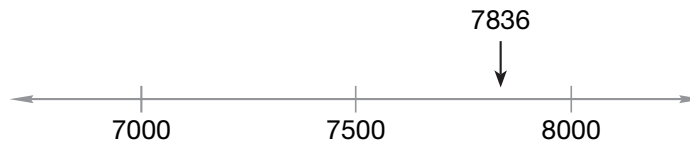

To the nearest thousand, 7836 rounds to **8000.**

Example 5

A special exhibit at a museum was seen by 34,186 visitors. To the nearest thousand, how many visitors saw the exhibit?

One way to round 34,186 is to see that 34,186 is between 34,000 and 35,000. Halfway from 34,000 to 35,000 is 34,500. Since 34,186 is less than halfway to 35,000, we know that 34,186 is nearer 34,000. **About 34,000 visitors** saw the exhibit.

Another way to round to the nearest thousand is to focus on the digit in the hundreds place.

34,①86
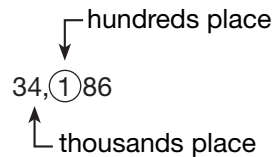
If the digit in the hundreds place is 5 or more, we add 1 to the digit in the thousands place. If the digit in the hundreds place is 4 or less, we leave the thousands digit unchanged. In either case, all digits to the right of the thousands place become zeros. Here the digit in the hundreds place is 1, so 34,186 rounds down to 34,000.

Example 6

Round 5486 to the nearest

    a. thousand.   **b. hundred.**   **c. ten.**

a. To round to the nearest thousand, we look at the hundreds place.

$$5\textbf{4}86 \text{ rounds to } \textbf{5000.}$$

b. To round to the nearest hundred, we look at the tens place.

$$54\textbf{8}6 \text{ rounds to } \textbf{5500.}$$

c. To round to the nearest ten, we look at the ones place.

$$548\textbf{6} \text{ rounds to } \textbf{5490.}$$

Lesson Practice

a. How many days are in a leap year?

b. According to the calendar in Example 2, what is the date of the fourth Friday of the month?

c. How many years were there from 1918 to 1943? Write an equation using the *later − earlier = difference* formula.

d. A century is how many decades?

Round each number to the nearest thousand in **e–j.**

    e. 6746   **f.** 5280   **g.** 12,327

   **h.** 21,694   **i.** 9870   **j.** 27,462

k. Round 6472 to the nearest thousand, to the nearest hundred, and to the nearest ten.

*1. In Mr. Jensen's math class, 24 students are seated in 4 rows of desks.
(52) The same number of students are in each row. Write and solve a
division equation to find the number of students in each row.

*2. An art teacher works with 42 different students each day. During the
(44) school year, each student will complete 9 art projects. Write and solve a
multiplication equation to find the total number of projects the students
will complete.

*3. Write and solve a subtraction equation to find the number of years from
(54) 1921 to 1938.

*4. **Multiple Choice** How many years is 5 decades?
(54)
   A 5 years   **B** 50 years   **C** 500 years   **D** 5000 years

*5. According to this calendar, what day of the week was
(54) December 25, 1957?

DECEMBER 1957						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

*6. Round 5236 to the nearest thousand. Round 6929 to the nearest
(54) thousand. Then add the rounded numbers.

7. One side of a rectangle is 10 miles long. Another side is 20 miles long.
(Inv. 2,
21)   **a.** Draw the rectangle and write the lengths of the sides.

   b. What is the perimeter of the rectangle?

   c. What is the area of the rectangle?

*8. **a.** What fraction of this circle is shaded?
(22,
Inv. 5)   **b.** What percent of this circle is shaded?
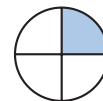
*9. **Represent** To what number is the arrow pointing? Write the number
(Inv. 1) two different ways.
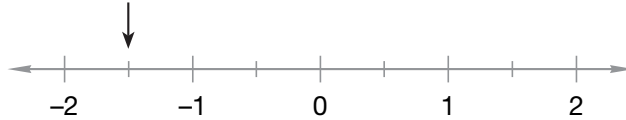
*10. **Analyze** When T'Von emptied his bank, he found 17 pennies,
(35) 4 nickels, 5 dimes, and 2 quarters. What was the value of the coins in
his bank?

*11.   794,150
(51) $+$ 9,863

12. $51,786
(51) $+$ $36,357

13.   87.6
(17, 50)   4.0
          31.7
           5.5
           1.1
    $+$ 0.5

*14. $20.00
(52) $-$ $18.47

*15.   41,315
(52) $-$ 29,418

16.   46
(48) $\times$ 7

17.   54
(48) $\times$ 8

18.   39
(48) $\times$ 9

19.   40
(42) $\times$ 9

*20. $3.68 + 2.4 + 15.2$
(50)

21. $4y = 32$
(41)

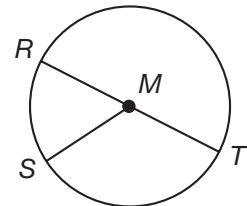***22.** $43 \div 7$
(53)

*23. $9\overline{)64}$
(53)

*24. **Represent** One inch equals 2.54 cm. Use words to write 2.54 cm.
(Inv. 4)

*25. **Explain** The answer to $52 \div 9$ is not a whole number. What whole
(52) number represents a reasonable estimate of the answer? Explain why
you chose that number.

26. a. Which line segment is the diameter of the circle?
(21, 45)

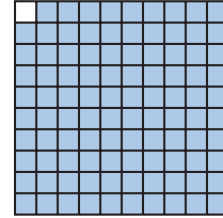**b.** **Explain** Name two intersecting line segments.
Explain your answer.

27. a. Is $136.80 closer to $136 or to $137?
(20)

b. Is 136.8 closer to 136 or to 137?

*28. **a.** What fraction of the large square is shaded?

    b. The shaded part of the large square represents what decimal number?

    c. What percent of the large square is shaded?

*29. ✎ (Generalize) Write a rule that describes the relationship of the data in the table.

Number of $1 Bills	10	20	30	40	50
Number of $10 Bills	1	2	3	4	5

*30. Show all of the different ways these bills can be arranged in a row.

Early Finishers

Real-World Connection

Five friends played a video game. Aureli scored 7305 points, Brett scored 3595 points, Sarah scored 2039 points, Jamin scored 9861 points, and Danielle scored 1256 points.

    a. Who had the highest score?

    b. Use words to write the highest score.

    c. Round each score to the nearest thousand.

• Prime and Composite Numbers

Power Up

     Power Up I

count aloud   Count by halves from $\frac{1}{2}$ to 10 and back down to $\frac{1}{2}$.

mental math   **Money:** Find the change back from a dollar for items with these prices:

     a. 26¢   **b.** 92¢   **c.** 31¢

     d. Time: How many years are in one decade?

     e. Money: Autumn paid $4 for the box of cereal and received 50¢ back in change. How much did the cereal cost?

     f. Measurement: Four meters is how many centimeters?

     g. Estimation: Choose the more reasonable estimate for the length of a banana: 8 inches or 8 feet.

     h. Calculation: $48 + 29 + 210$

problem solving   Choose an appropriate problem-solving strategy to solve this problem. Majeed was thinking of a two-digit number. He gave this clue: "You say the number when you count by threes from three, by fours from four, and by fives from five." What was Majeed's number?

New Concept

> **Math Language**
>
> A *multiple* is a product of a given number and a counting number.
>
> For example, the first four multiples of 3 are 3, 6, 9, and 12.

If we multiply 4 by the numbers 1, 2, 3, 4, 5, 6, …, we get

$$4, 8, 12, 16, 20, 24, \ldots$$

Recall that these numbers are multiples of 4. The multiples of 4 are the numbers we say if we count by fours, starting from 4.

The following numbers are the multiples of 6:

6, 12, 18, 24, 30, 36, ...

The multiples of any counting number are the products we get when we multiply the number by 1, 2, 3, 4, 5, 6, and so on.

Example 1

List the first four multiples of 7.

To find the first four multiples of 7, we multiply 7 by 1, then by 2, then by 3, and then by 4.

$$\begin{array}{cccc} 7 & 7 & 7 & 7 \\ \times\ 1 & \times\ 2 & \times\ 3 & \times\ 4 \\ \hline 7 & 14 & 21 & 28 \end{array}$$

The first four multiples of 7 are **7, 14, 21,** and **28.** The multiples of 7 are the numbers we say when we count by sevens.

Example 2

a. What is the fourth multiple of 6?

b. What is the third multiple of 8?

a. To find the fourth multiple of 6, we multiply 6 by 4. The fourth multiple of 6 is **24.**

b. To find the third multiple of 8, we multiply 8 by 3. The third multiple of 8 is **24.**

Example 3

Math Language

Since 12 is a multiple of 1, 2, 3, 4, 6, and 12, it is also **divisible** by 1, 2, 3, 4, 6, and 12.

Twelve is a multiple of which whole numbers?

A multiplication table can help us answer this question. We find 12 at each of these locations on a multiplication table:

$$1 \times 12 \qquad 12 \times 1$$
$$2 \times 6 \qquad\ \ 6 \times 2$$
$$3 \times 4 \qquad\ \ 4 \times 3$$

So 12 is a multiple of **1, 2, 3, 4, 6,** and **12.**

In Example 3, we found that 12 is a multiple of 1, 2, 3, 4, 6, and 12. Each of these numbers is a factor of 12. On a multiplication table, the factors are the numbers that may be multiplied to produce a multiple.

Multiplication Table

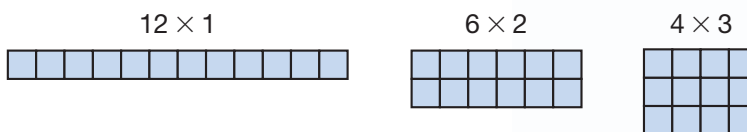|	factors
factors	multiples

Activity

Using Arrays to Find Factors

Materials needed:
- counters or tiles

We can find the factors of a number by forming arrays. The number of columns and rows in an array are factors of the number. For example, here we show three arrays for 12.

12×1 6×2 4×3

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆   ☆ ☆ ☆ ☆ ☆ ☆   ☆ ☆ ☆ ☆
                                  ☆ ☆ ☆ ☆ ☆ ☆   ☆ ☆ ☆ ☆
                                                     ☆ ☆ ☆ ☆

These arrays show us that 1, 2, 3, 4, 6, and 12 are factors of 12.

We can also use an area model to represent the factors of 12.

12×1 6×2 4×3

1. **Model** Use 24 counters or tiles to form four different arrays that show the factors of 24. List the factors you find.

2. **Represent** On grid paper, draw rectangles that outline 24 squares to show four different factor pairs for 24. Label the length and width of each rectangle.

Analyze Each rectangle drawn on the grid paper has an area of 24 square units. How do the perimeters of the four rectangles compare? What generalization can you make about the perimeters of different rectangles with the same area?

Example 4

List the four factors of 6.

Six is the multiple. We are asked to find the factors. These whole-number multiplications produce 6:

$$1 \times 6 \qquad 6 \times 1$$
$$2 \times 3 \qquad 3 \times 2$$

So the factors of 6 are **1, 2, 3,** and **6.**

Example 5

List the factors of 9.

These multiplications produce 9:

$$1 \times 9 \qquad 3 \times 3 \qquad 9 \times 1$$

So the factors of 9 are **1, 3,** and **9.**

Example 6

List the factors of 7.

We find 7 as a multiple on a multiplication table twice.

$$1 \times 7 \qquad 7 \times 1$$

So 7 has only two factors, **1** and **7.**

Math Language

A **prime number** is a counting number that has exactly two different factors, itself and 1. A counting number with more than two factors is a **composite number.**

In Example 6, we found that the number 7 has two factors: 7 and 1. Counting numbers that have exactly two different factors are **prime numbers.**

The number 1 is not a prime number because its only factor is 1. The numbers 2 and 3 are prime numbers because the only factors of 2 are 1 and 2, and the only factors of 3 are 1 and 3. The number 4 is not a prime number because 4 has three factors: 1, 2, and 4. A number with more than two factors is a **composite number.** The number 4 is a composite number.

**Example 7**

Which of these numbers is a prime number?

A 8 **B** 9 **C** 10 **D** 11

One way to determine that a number is prime is to decide if the number can be divided by a number other than 1 and itself without a remainder.

A Since 8 can be divided by 2 and by 4, it is composite and not prime.

B Since 9 can be divided by 3, it is composite and not prime.

C Since 10 can be divided by 2 and by 5, it is composite and not prime.

D Only 1 and 11 can divide 11, so **11** is a prime number.

Lesson Practice

a. List the first five multiples of 6.

b. List the third, fourth, and fifth multiples of 9.

c. What is the seventh multiple of 8?

d. What is the class digit of any multiple of 10?

e. What two digits appear as the last digit of the multiples of 5?

f. What five digits appear as the last digit of the multiples of 2?

g. Ten is a multiple of which whole numbers?

h. On grid paper, draw two ways to make a rectangle with an area of 8.

i. The rectangle below shows one possible way to make a rectangle with an area of 10.
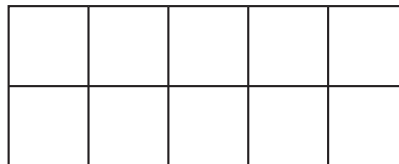
Draw all the other possible arrangements.

j. List the factors of 5.

k. Write all the prime numbers less than 10.

l. True or False: If a counting number is greater than 1 and is not prime, then it is composite.

Formulate Write and solve an equation for problems **1–3.**

1. Raimi bought a toy for $1.85 and sold it for 75¢ more. For what price
(1, 43) did he sell the toy?

*2. Two thousand people entered the contest. Only seven will win prizes.
(25, 52) How many entrants will not win prizes?

*3. A recent census in Arkansas showed that 11,003 people live in Scott
(31, 52) County and 8484 people live in Newton County. How many more
people live in Scott County than in Newton County?

*4. Sixty percent of the students in the class were boys. Were there more
(Inv. 5) girls or more boys in the class?

5. Draw a rectangle that is 4 cm long and 3 cm wide.
(Inv.2,
Inv. 3)
    a. What is the perimeter of the rectangle?

    b. What is the area of the rectangle?

*6. **Analyze** Fidelia found the third multiple of 4. Then she subtracted two
(55) from this number. What was her answer?

*7. Two factors of 15 are 1 and 15 because $1 \times 15 = 15$. Find two more
(55) factors of 15.

8. Brenda arrived home from school 30 minutes before the
(27) time shown on the clock. What time did Brenda arrive home
from school?
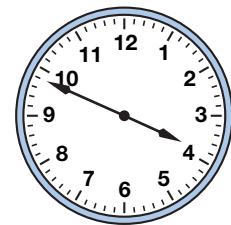
*9. George Washington became the first U.S. president in 1789. The
(54) Declaration of Independence was written in 1776. How many years after
the Declaration of Independence did Washington become president?

10. What is the length of $\overline{ST}$?
*(Inv. 2)*

11. 4.00
(50) $- 2.22$

12. 70.5
(50) $- 42.3$

13. $45.87
(43) $+ \$23.64$

*14. $25.42
(43) $- \$\ 7.25$

*15. 64
(48) $\times\ \ 5$

16. 70
(42) $\times\ \ 6$

17. 89
(48) $\times\ \ 4$

18. 63
(48) $\times\ \ 7$

19. $\dfrac{63}{7}$
(47)

*20. $8\overline{)15}$
(53)

21. $4.68 + 12.2 + 3.75$
(50)

*22. (Model) Draw dots and make groups to illustrate $15 \div 6$.
(53)

23. (Explain) Describe the order of operations in this expression and find
(45) the number it equals.

$$\sqrt{64} \div (4 + 4)$$

*24. (Connect) Write this addition problem as a multiplication problem:
(27)

$$\$0.75 + \$0.75 + \$0.75 + \$0.75$$

*25. a. Multiple Choice Which of these numbers can be divided by
(55) 5 without leaving a remainder?

    A 32   **B** 35   **C** 37   **D** 41

    b. (Explain) How can you find the answer for part **a** just by
looking?

*26. (Justify) One gallon is equal to 128 fluid ounces. Garrett estimates
(40) that four gallons is about 500 fluid ounces. Is Garrett's estimate
reasonable? Explain why or why not.

27. a. Is $2.54 closer to $2 or to $3?
(20, Inv.4)

    b. Is 2.54 closer to 2 or to 3?

28. **a.** What fraction of the large square is shaded?
(Inv. 4, Inv. 5)

   b. The shaded part of the large square represents what decimal number?

   c. What percent of the large square is shaded?
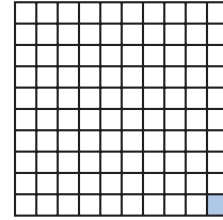
*29. **Multiple Choice** Which of these numbers is a composite number and
<superscript>(55)</superscript> *not* a prime number?

   A 2   **B** 3   **C** 4   **D** 5

30. How many different three-digit numbers can you write using the digits
<superscript>(3)</superscript> 8, 3, and 4? Each digit may be used only once in every number you write. Arrange the numbers in order from least to greatest.

Early Finishers

Real-World Connection

The marching band at one school has 36 members. The members can march in any arrangement in which all the rows have the same number of people. Use counters or tiles to form arrays to show all the possible marching arrangements. List each way you find.

• Using Models and Pictures to Compare Fractions

Power Up

facts	Power Up I
count aloud	Count by fourths from $\frac{1}{4}$ to 5 and back down to $\frac{1}{4}$.
mental math	Subtract cents from dollars in **a–c.**

    a. Money: $1.00 − $0.42

    b. Money: $1.00 − $0.67

    c. Money: $2.00 − $0.25

    d. Number Sense: 370 − 125

    e. Money: The bottle of shampoo costs $3.45 and the conditioner costs $4.65. What is the total cost of the two items?

    f. Time: How many years is one century?

    g. Estimation: Estimate the sum of $7.87 and $2.14 by rounding each amount to the nearest dollar and then adding.

    h. Calculation: $\sqrt{36} + \sqrt{81} + 4 + 178$

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Emiko paid a dollar for an item that cost 63 cents. If the cashier gives her back five coins, what coins should they be?

Activity

Comparing Fractions

Model One way to compare fractions is to use manipulatives. Use your fraction manipulatives to model these exercises.

1. Show that two fourths equals one half.

2. How many eighths equals one half?

3. How many tenths equals one half?

4. How many fourths equals two eighths?

5. How many halves equals five tenths?

6. How many fourths equals six eighths?

Model Compare. Write $>$, $<$, or $=$. Use your fraction manipulatives to model each exercise.

7. $\frac{3}{4} \bigcirc \frac{6}{8}$

8. $\frac{1}{4} \bigcirc \frac{3}{10}$

9. $\frac{1}{4} \bigcirc \frac{1}{5}$

10. $\frac{2}{3} \bigcirc \frac{6}{10}$

11. Use your fraction manipulatives to model three fifths, four tenths, one half, two eighths, and three fourths.

   a. Write the numbers in order from **greatest to least** using fractions.

   b. Write the numbers in order from **least to greatest** using decimals.

   c. Write the following fractions in order from **greatest to least** using decimals: $\frac{1}{2}, \frac{2}{8}, \frac{3}{5}$.

Another way to compare fractions is to draw pictures of the fractions and then compare the pictures. To illustrate, we will draw pictures to compare $\frac{1}{2}$ and $\frac{1}{3}$. We begin by drawing two circles of the same size. Then we shade $\frac{1}{2}$ of one circle and $\frac{1}{3}$ of the other circle.
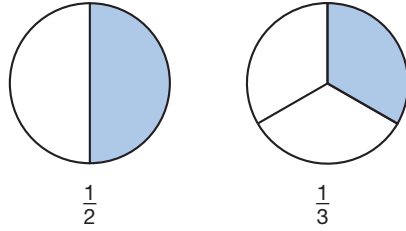
$$\frac{1}{2} \qquad \frac{1}{3}$$

We see that $\frac{1}{2}$ of a circle is larger than $\frac{1}{3}$ of the same-sized circle. So $\frac{1}{2}$ is greater than $\frac{1}{3}$.
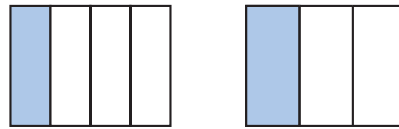
$$\frac{1}{2} > \frac{1}{3}$$

When we draw figures to compare fractions, the figures should be **congruent.** Congruent figures have the same shape and size.

Example

Compare: $\frac{1}{4} \bigcirc \frac{1}{3}$. Draw and shade two rectangles to show the comparison.

We draw two congruent rectangles. We shade $\frac{1}{4}$ of one rectangle and $\frac{1}{3}$ of the other. We see that $\frac{1}{4}$ is slightly less than $\frac{1}{3}$.

$$\frac{1}{4} < \frac{1}{3}$$

Lesson Practice

Represent Compare these fractions. Draw and shade a pair of congruent figures to illustrate each comparison.

a. $\frac{1}{2} \bigcirc \frac{2}{3}$ **b.** $\frac{1}{2} \bigcirc \frac{1}{4}$

Arrange the numbers in problems **c** and **d** in order from greatest to least. You may use your fraction manipulatives.

c. 0.5, 0.2, 0.25   **d.** 0.75, 0.9, 0.7

Written Practice   *Distributed and Integrated*

*1. Drew has fifty-six rolls. Seven rolls will fit on one tray. How many
(52) trays does he need to carry all of the rolls? Write an equation to solve the problem.

2. One gallon is about 3.78 L. About how many liters is two gallons? Use
(40) words to write the answer.

3. **Estimate** To estimate the sum of $6.87 and $5.92, Socorro rounded
(20) each number to the nearest dollar before adding. Write the numbers
Socorro added and their sum.

*** 4.** **Connect** Write four multiplication/division facts using the numbers 3,
(47) 8, and 24.

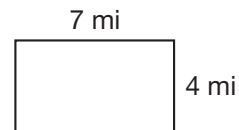*** 5.** **List** What are the seven months of the year that have 31 days?
(54)

*** 6.** **Analyze** Find the eighth multiple of six. Then add one. What is the
(Inv. 3) square root of the answer?

*** 7.** **Represent** Compare these fractions. Draw and shade two congruent
(56) rectangles to show the comparison.

$$\frac{1}{4} \bigcirc \frac{1}{6}$$

*** 8.** **Estimate** In the 2004 presidential election, 4651 residents of the state
(42, 54) of Rhode Island voted for candidate Ralph Nader. Round that number
of residents to the nearest thousand, to the nearest hundred, and to the
nearest ten.

9. a. What is the perimeter of the rectangle shown at
(Inv. 2,
Inv. 3) right?

   b. What is its area?

7 mi

4 mi

*** 10.** $10.00
(43, 52)   − $ 5.46

*** 11.**   36,024
(52)   − 15,539

12.   43,675
(51)   + 52,059

13.   73
(48)   × 9

14.   46
(48)   × 7

15.   84
(48)   × 6

16.   40
(42)   × 5

*** 17.** 7)48
(53)

18. $\frac{63}{7}$
(46, 47)

*** 19.** 3.75 + 2.5 + 0.4
(50)

*** 20.** 42.25 − 7.5
(50)

*21. a. Multiple Choice Which of these numbers is a multiple of 10?
(55)

      A 35   **B** 40   **C** 45   **D** 101

    b. How can you find the answer for part **a** just by looking?

22. a. A dime is what fraction of a dollar?
(36,
Inv. 5)

    b. A dime is what percent of a dollar?

23. (Represent) Washington School cost about \$12,350,000 to build. Use
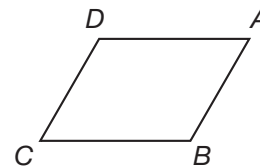(34)
words to write that amount of money.

*24. Two factors of 16 are 1 and 16 because $1 \times 16 = 16$. Find three more
(55)
factors of 16.

*25. ✏️ (Verify) Is 16 a prime number? Why or why not?
(55)

*26. (Conclude) Refer to figure *ABCD* to answer parts **a** and **b**.
(23, 45)

    a. Which segment appears to be parallel to $\overline{AB}$?

    b. Angle *B* is what type of angle?

*27. Multiple Choice Which of these numbers is a factor of 12?
(55)

      A 0   **B** 6   **C** 8   **D** 24

*28. Multiple Choice Which of these numbers is a multiple of 12?
(55)

      A 0   **B** 6   **C** 8   **D** 24

*29. a. A penny is what fraction of a dollar?
(36,
Inv. 5)

    b. Write the value of a penny as a decimal part of a dollar.

    c. A penny is what percent of a dollar?

*30. Write these numbers in order from greatest to least:
(Inv. 4)

$$\frac{3}{4} \quad 0.09 \quad \frac{2}{5} \quad 0.5 \quad \frac{1}{3}$$

• Rate Word Problems

Power Up

facts   Power Up J

count aloud   Count by threes from 60 to 90.

mental
math

a. **Money:** $1.00 − $0.85

b. **Money:** $2.00 − $0.63

c. **Money:** $5.00 − $1.25

d. **Number Sense:** 400 − 30

e. **Measurement:** What is the perimeter of a garden with the dimensions shown?

24 ft

36 ft
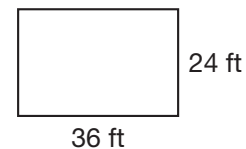
f. **Time:** How many years is two centuries plus four decades?

g. **Estimation:** Choose the more reasonable estimate for the distance between two cities: 120 miles or 120 feet.

h. **Calculation:** 349 − 199 + 50

problem
solving

Alegria solved an addition problem and then erased a digit from each number in the problem. She gave it to Jeff as a problem-solving exercise. Copy Alegria's problem on your paper, and find the missing digits for Adam.

```
  5_3
+ 28_
 _50
```

Focus Strategy: Work Backwards

(**Understand**) We are shown an addition problem with some digits missing. We are asked to find the missing digits.

(**Plan**) We will use our knowledge of addition facts to fill in the missing digits.

Solve We can begin in the ones column just as if we were adding two numbers. We think, "3 plus what number gives us a number that ends in 0?" Since $3 + 7 = 10$, we write a 7 in the bottom addend. We must remember to regroup a 1 in the tens column. Next we think, "1 plus what number plus 8 gives a number that ends in 5?" Since $1 + 6 + 8 = 15$, we write a 6 in the top addend. Next we think, "1 (regrouped from the tens) plus 5 plus 2 equals what number?" Since $1 + 5 + 2 = 8$, we write an 8 in the sum.

Check We know our answer is reasonable because the sum of 563 and 287 is 850, which is the number we have below the line. We *worked backwards* and used our knowledge of addition facts to find the missing digits in the tens and ones columns.

$$\begin{array}{r} 56\underline{3} \\ + \ 28\underline{7} \\ \hline \underline{850} \end{array}$$

New Concept

A **rate** shows a relationship between two different measurements. Here we relate the measurements "miles" and "hours":

The car went 30 miles per hour.

This statement tells us that the car's rate is 30 miles each hour. This means that for every hour the car travels at this rate, it travels 30 miles. We can make a table that shows how many miles the car travels in 1, 2, 3, and 4 hours.
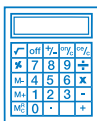
Visit www. SaxonMath.com/ Int4Activities for a calculator activity.

Word problems about rates have the same plot as "equal groups" problems. A plan that can help us solve word problems is to make a table. We do this by writing the numbers we know into a table. Then we can find the pattern and extend it.

Distance Traveled (at 30 miles per hour)

Hours	Miles
1	30
2	60
3	90
4	120

Example 1

Liam drove the car 30 miles per hour for 4 hours. How far did Liam drive?

This is a rate problem. We do not see the words *in each* in this rate problem, but there are words that mean *in each.* The words *miles per hour* in this problem mean "miles *in each* hour."

We translate a rate problem using a multiplication formula:

Miles **in each** hour: 30

Number **of** hours: 4

Total: 120 miles

Formula	Problem
Number **in each** time group	30 miles per hour
× Number **of** time groups	× 4 hours
Total	120 miles

We can write another equation to solve the problem.

Formula:

Number **of** time groups × Number **in each** time group = Total

Problem:

4 hours × 30 miles per hour = 120 miles

Liam drove **120 miles.**

Example 2

Nuru earns 3 dollars a week for helping around the house. Make a table for this rate that shows how much Nuru would earn in 1, 2, and 3 weeks. Then use a formula to find how much money he would earn in 7 weeks.

Thinking Skill

Verify

What problem-solving strategies did we use to solve this problem?

The phrase *3 dollars a week* means "3 dollars each week." We make a table for this rate with "dollars" and "weeks" at the top of the two columns.

We could extend this table to 7 weeks. Instead we analyze the pattern and see that we are multiplying 3 times the number of weeks to find the dollars.

Money Earned (at $3 each week)

Weeks	Dollars
1	3
2	6
3	9

Now we know we can use a multiplication formula to find how much Nuru earns in 7 weeks.

Formula:

Number **of** groups × Number **in each** group = Total

Problem:

7 weeks × 3 dollars per week = 21 dollars

Nuru earns **21 dollars** for 7 weeks of helping around the house.

Lesson Practice

a. **Formulate** Angela drove 55 miles in one hour. At that rate, how far can she drive in 6 hours? Write an equation to solve the problem.

b. **Analyze** Barak swims 20 laps every day. How many laps will he swim in one week? Make a table to solve the problem.

*1. **Formulate** Marybeth could jump 42 times each minute. At that rate,
(57) how many times could she jump in 8 minutes? Write an equation to
solve the problem.

*2. **Analyze** Rodolfo could run 7 miles in 1 hour. At that rate, how many
(57) miles could Rodolfo run in 3 hours? Make a table to solve.

*3. **Connect** Write four multiplication/division facts using 8, 9, and 72.
(47)

4. What is the sum of $\sqrt{36}$ and $\sqrt{64}$?
(Inv. 3)

*5. Compare: $\frac{1}{3}$ ◯ 50%
(Inv. 5,
56)

*6. a. **Estimate** Round 5280 to the nearest thousand.
(42, 54)

    b. Round 5280 to the nearest hundred.

*7. This array of 12 stars shows that 4 and 3 are factors of 12.
(55) Draw a different array of 12 stars that shows two other
factors of 12.

☆ ☆ ☆ ☆
☆ ☆ ☆ ☆
☆ ☆ ☆ ☆

*8. **Analyze** Find the fourth multiple of 6. Then find the third multiple of 8.
(55) Compare these two multiples.

*9. Juan Ponce de León explored the coast of Florida in 1513. In 1800,
(41, 54) the federal government of the United States moved to Washington,
DC. Write a *later − earlier = difference* equation and solve it to find the
number of years that elapsed from 1513 to 1800.

10. A square has one side that is 7 inches long.
(Inv. 2,
Inv. 3)

    a. What is the perimeter of the square?

    b. What is the area of the square?

*11. 70,003
(52) − 36,418

12. n
(24, 43) − 4.32
              2.57

13. $861.34
(43, 51) + $764.87

14. 93
(48) × 5

15. 84
(48) × 6

16. 77
(48) × 7

17. 80
(42) × 8

18. $\dfrac{56}{8}$
(47)

19. $7\overline{)65}$
(53)

*20. $45 \div 6$
(53)

21. $7n = 42$
(41)

22. $1.75 + 17.5$
(50)

23. a. Which segment in this figure is a diameter?
(23, 45)

    b. **Classify** Segments *MW* and *MX* form an angle. What type of angle is it? Explain.
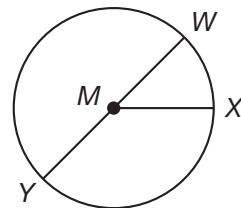
*24. **Represent** Compare these fractions. Draw and shade two congruent
(56) rectangles to show the comparison.

$$\dfrac{2}{3} \bigcirc \dfrac{3}{4}$$

*25. **Represent** Point *X* represents what mixed number and what decimal
(37) number on this number line?

*26. One inch is 2.54 centimeters, so two inches is 2.54 + 2.54 centimeters.
(Inv. 2) A segment that is 3 inches long is how many centimeters long?

*27. Write this addition problem as a multiplication problem:
(27)

$$2.54 + 2.54 + 2.54$$

*28. **a.** Three pennies are what fraction of a dollar?
(36,
Inv. 5)
　　b. Write the value of three pennies as a decimal part of a dollar.

　　c. Three pennies are what percent of a dollar?

*29. **Multiple Choice** Which of these numbers is a prime number?
(55)
　　A 6　　　　　　　**B** 7　　　　　　　**C** 8　　　　　　　**D** 9

*30. What is the sum of these lengths? Write three answers using different
(Inv. 2) units.

$$1 \text{ yard} + 2 \text{ feet} + 12 \text{ inches}$$

Early Finishers

Real-World Connection

Each day Jamaal delivers 30 newspapers in 1 hr 30 min. At this rate, how many newspapers would he deliver each hour? Explain your answer.

• Multiplying Three-Digit Numbers

Power Up

count aloud   Count by fours from 60 to 100.

mental math

   a. Money: $5.00 − $2.25

   b. Money: $5.00 − $1.63

   c. Money: $5.00 − $3.35

   d. Number Sense: 35 + 49 + 110

   e. Measurement: Compare: 1 mile ◯ 5000 feet

   f. Time: Tupac arrived at the bus stop at 4:45 p.m. The next bus is scheduled to arrive at 4:54 p.m. How long can Tupac expect to wait for the bus?

   g. Estimation: Jazzlyn has $20. Does she have enough money to purchase three tickets that each cost $6.99?

   h. Calculation: $25 \times 2 + 170 - 100$

problem solving   Choose an appropriate problem-solving strategy to solve this problem. Calida baked a cake that measured 12 inches by 9 inches. If the cake is cut into square pieces that are 3 inches on each side, how many pieces will be cut?
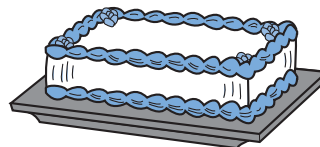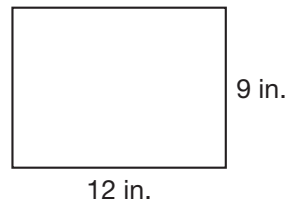
9 in.

12 in.

New Concept

When we multiply a three-digit number using pencil and paper, we multiply the ones digit first. Then we multiply the tens digit. Then we multiply the hundreds digit.

Multiply the ones digit.		Multiply the tens digit.		Multiply the hundreds digit.
123		123		123
× 3	→	× 3	→	× 3
9		69		369

In the problem below; we get 18 when we multiply the ones digit. We write the 8 in the ones column and carry the 1 above the tens column. Then we multiply the tens digit.

Multiply the ones digit.		Multiply the tens digit.		Multiply the hundreds digit.
1		11		11
456		456		456
× 3	→	× 3	→	× 3
8		68		1368

Three times five is 15, plus one is 16. We write the 6 below the bar and carry the 1 above the hundreds column. Then we multiply the hundreds. Three times four is 12, plus one is 13. The product is 1368.

Example 1

There are 365 days in a common year. Every fourth year is a leap year with 366 days. How many days is four years in a row?

We can multiply 4 times 365 and then add one day to the total for leap year. First we multiply the ones digit. Then we multiply the tens digit and then the hundreds digit. We write the first digit of any two-digit answer above the next column.

$$
\begin{array}{r}
22 \\
365 \\
\times4 \\
\hline
1460
\end{array}
\qquad 1460 + 1 = 1461
$$

In four years in a row, there are **1461 days.**

Example 2

Tickets to the school play were $3.75 each. How much money would 3 tickets cost?

Thinking Skill

Generalize

How is multiplying dollars and cents the same as multiplying whole numbers? How is it different?

We first multiply the pennies. Three times five pennies is 15 pennies, which equals one dime and five pennies. We write the 5 below the bar and the 1 above the dimes.

$$\begin{array}{r} 1 \\ \$3.75 \\ \times \quad 3 \\ \hline 5 \end{array}$$

Next we multiply the dimes. Three times seven dimes is 21 dimes. We add the one dime we carried to get a total of 22 dimes. Since 22 dimes equals two dollars and two dimes, we write a 2 below the bar and a 2 above the dollars.

$$\begin{array}{r} 2\ 1 \\ \$3.75 \\ \times \quad 3 \\ \hline 25 \end{array}$$

Finally, we multiply the dollars. Three times three dollars is nine dollars. We add the two dollars we carried to get a total of 11 dollars. Three tickets would cost **$11.25.**

$$\begin{array}{r} 2\ 1 \\ \$3.75 \\ \times \quad 3 \\ \hline \$11.25 \end{array}$$

Example 3

When the gate of a stadium was opened for a concert, people passed through the gate at a rate of 100 people per minute. At that rate, how many people passed through the gate in 10 minutes?

To find the answer, we can continue a table or we can multiply 100 by 10.

Minute	1	2	3	4	5	6	7	8	9	10
People	100	200	300	400						

$$10 \times 100 = 1000$$

Using either method, we find that **1000 people** could pass through the stadium gate in 10 minutes.

Generalize How could you write a rule for this pattern using a multiplication equation? How could you write a rule using a division equation?

Example 4

A landscape architect is designing a border of plants and trees for a parking area that has a perimeter of 256 yards. What is the approximate perimeter of the parking area in feet?

We will use mental math to estimate the number of feet. Each yard is 3 feet, so we multiply the number of yards by 3. A compatible number close to 256 that we can multiply mentally is 250.

$$250 \times 3 = 750$$

Since 256 yd is a little more than 250 yd, the actual perimeter is a little more than **750 ft.**

Estimate The parking area is shaped like a square. Estimate the length of each side of the parking area in feet. Explain your reasoning.

Lesson Practice Multiply:

a. 234
× 3

b. $340
× 4

c. $4.25
× 5

d. Explain the steps of multiplying 5 by $4.25, using the words *dollars, dimes,* and *pennies* (as in Example 2).

e. At $2.47 per gallon, what is the approximate cost of four gallons of milk?

Written Practice *Distributed and Integrated*

*1. Chazz pays $7.50 every week for a bus pass. How much does she pay
(57) for 4 weeks of bus passes? Write an equation to solve the problem.

*2. It takes 4 apples to make 1 pint of applesauce. How many apples
(49) does it take to make 5 pints? Make a table to solve the problem.

3. Calvin has to get up at 6 a.m. By what time should he go to bed in
(27) order to get 8 hours of sleep?

*4. **Explain** The store sells paint in quart cans, gallon cans, and
(40) 5-gallon cans. The price per quart is lower with larger cans. Hosni needs 8 quarts of paint. What containers of paint should he buy? Explain.

*5. **Represent** Write 8402 in expanded form. Then use words to write
(16, 33) the number.

*6. **Analyze** Find the fourth multiple of 7. Then find the sixth multiple of 6.
(Inv. 3, 55) Add these multiples. What is the square root of the answer?
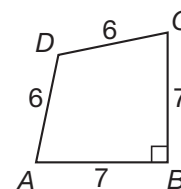
*7. According to this calendar, what is the date of the second
(54) Tuesday in September 2042?

SEPTEMBER 2042

S	M	T	W	T	F	S
		1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

8. If $5 + n = 23$, then what number does $n - 5$ equal?
(24)

*9. a. What is the perimeter of this figure? Measurements
(Inv. 2, 23) are in feet.

b. **Classify** Describe each angle an acute, obtuse, or
right.

*10. **Represent** Compare these fractions. Draw and shade two congruent
(26, 56) circles to show the comparison.

$$\frac{1}{2} \bigcirc \frac{2}{4}$$

11. To what mixed number is the arrow pointing?
(37)

*12. Which segment appears parallel to $\overline{AB}$?
(23)
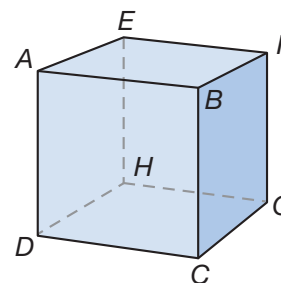
13. $0.47 + 3.62 + 0.85 + 4.54$
(50)

14. $3 + \$4.39 + \$12.62$ **15.** $36.47 - (3.5 + 12.6)$
(43)   *(45, 50)*

* 16. $20.00 − (29¢ + $7)
(45, 52)

* 17. 41,059 − 36,275
(52)

* 18. 768
(58) × 3

* 19. $2.80
(58) × 4

20. 436
(24, 30) − z
       252

* 21. $5\overline{)36}$
(53)

22. $7\overline{)45}$
(53)

23. $4\overline{)35}$
(53)

24. **Explain** How can you find the product of 4×100 using only
(42, 55) mental math?

* 25. **Analyze** Two factors of 20 are 1 and 20 because $1 \times 20 = 20$.
(55) Find four more factors of 20.

* 26. According to the census, the population of South Fork was 6781.
(42, 54)

    a. Round 6781 to the nearest thousand.

    b. Round 6781 to the nearest hundred.

* 27. **Multiple Choice** If $4n = 24$, then which of these equations is *not*
(47) true?

    A $\dfrac{24}{4} = n$ **B** $\dfrac{24}{n} = 4$

    C $2n = 12$ **D** $4n = 6$

28. **a.** Seven pennies are what fraction of a dollar?
(36,
Inv. 5)
    b. Write the value of seven pennies as a decimal part of a dollar.

    c. Seven pennies are what percent of a dollar?

* 29. **Multiple Choice** Which of these even numbers is a prime number?
(55)
    A 2   **B** 4   **C** 6   **D** 8

* 30. **Estimate** On a road trip across the country, Kwan drove 387 miles
(58) the first day and 409 miles the second day. If he drives about the same
distance each day, approximately how many miles will Kwan drive in
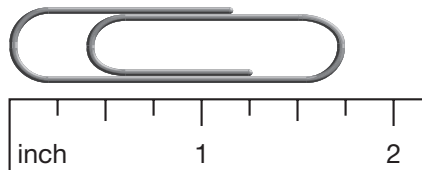5 days?

• Estimating Arithmetic Answers

Power Up

count aloud   Count down by hundreds from 2000 to 100.

mental math

   a. Money: $5.00 − $3.95

   b. Money: $5.00 − $1.39

   c. Money: $10.00 − $8.75

   d. Number Sense: 46 + 320 + 200

   e. Measurement: Find the length of the paper clip shown below.

   f. Percent: 50% of 50

   g. Estimation: Carter has $8.56. Cadric has $1.61. Round each amount to the nearest 25 cents and then add to estimate the total amount the boys have.

   h. Calculation: $\sqrt{36}$ + 75 + 319 + 223

problem solving   Choose an appropriate problem-solving strategy to solve this problem. Can you find three ways to make a dollar with eight coins?

New Concept

We can estimate arithmetic answers by rounding the numbers before doing the arithmetic. Estimating does not give us the exact answer, but it can give us an answer that is close to the exact answer. For some problems, an estimate is all that is necessary to solve the problem. When an exact answer is needed, estimating is a way to decide whether our exact answer is *reasonable.* Estimating is useful for many purposes, such as mentally adding price totals when shopping.

Example 1

Estimate the sum of 396 and 512.

To estimate, we first round the number to the nearest hundred. We round 396 to 400 and 512 to 500. Then we find the estimated sum by adding 400 and 500.

$$
\begin{array}{r}
400 \\
+\ 500 \\
\hline
900
\end{array}
$$

The estimated sum of 396 and 512 is **900.** The exact sum of 396 and 512 is 908. The estimated answer is not equal to the exact answer, but it is close.

Thinking Skill

Discuss

Which place is used to round a 3-digit number to the nearest hundred?

Example 2

Estimate the product of 72 and 5.

We round the two-digit number, but we generally do not round a one-digit number when estimating. The estimated product of 72 and 5 is **350.**

$$
\begin{array}{r}
70 \\
\times\ 5 \\
\hline
350
\end{array}
$$

The exact product of 72 and 5 is 360. The estimated product is a little less than the exact answer, 360, because 72 was rounded down to 70 for the estimate.

Thinking Skill

Connect

Which place is used to round a 2-digit number to the nearest ten?

Example 3

To estimate 7 × 365, Towanda multiplied 7 by 400. Was Towanda's estimate more than, equal to, or less than the actual product of 7 and 365?

Towanda's estimate was **more than the actual product** of 7 and 365 because she rounded 365 up to 400 before multiplying.

Example 4

Estimate the answer to 43 ÷ 8.

To estimate division answers, we want to use numbers that divide easily. So we change the problem slightly. We keep the number we are dividing by, which is 8, and we change the number that is being divided, which is 43, to a compatible number. We change 43 to a nearby number that can be divided easily by 8, such as 40 or 48. Using 40, we find that the estimated answer is **5.** Using 48, we find that the estimated answer is **6.** Since 43 is between 40 and 48, the actual answer is more than 5 but less than 6—that is, the exact answer is 5 plus a remainder.

Example 5

Nicola bought a box of cereal for $5.89, a gallon of milk for $3.80, and a half gallon of juice for $2.20. Estimate Nicola's grocery bill.

We round the prices of each item to the nearest dollar.

The cereal cost $5.89, which is closer to $6 than to $5.

The milk cost $3.80, which is closer to $4 than to $3.

The juice cost $2.20, which is closer to $2 than to $3.

Thinking Skill

Verify

How do we round $3.80 to the nearest dollar? Explain your thinking.

Item	Price	Rounded to the Nearest Dollar
Cereal	$5.89	$6
Milk	$3.80	$4
Juice	$2.20	$2

To estimate the total, we add the rounded numbers.

$$\$6 + \$4 + \$2 = \$12$$

Nicola's estimated grocery bill was **about $12.**

Evaluate Suppose that Nicola wanted to be sure he had enough money to purchase all of the items *before* he reached the checkout line. How should he round the prices? Explain your reasoning.

Lesson Practice Estimate the answer to each arithmetic problem. Then find the exact answer.

a. 59 + 68 + 81　　　　　　**b.** 607 + 891

c. 585 − 294　　　　　　　**d.** 82 − 39

e. 59 × 6　　　　　　　　　**f.** 397 × 4

g. 42 ÷ 5　　　　　　　　　**h.** 29 ÷ 7

i. (**Explain**) Dixie estimated the product of 5 and 5280 by multiplying 5 by 5000. Was Dixie's estimate more than, equal to, or less than the actual product? Why?

j. Mariano would like to purchase a notebook computer, a wireless mouse, and an accessory carrying bag. The cost of each item is shown in the table.

Item	Cost
Notebook computer	$845
Wireless mouse	$27.50
Accessory bag	$39.95

What is a reasonable estimate of the total cost? Explain your thinking.

Written Practice

Distributed and Integrated

*1. (**Analyze**) A comfortable walking pace is about 3 miles per hour. How
(57) far would a person walk in 4 hours at a pace of 3 miles per hour? Make a table to solve the problem.

*2. There were forty-eight pears in all. Six pears were in each box. How
(52) many boxes were there? Write an equation to solve the problem.

3. One mile is about 1.61 km.
(Inv. 2, Inv. 4)

    a. Use words to write 1.61 km.

    b. Compare: 1 mi $\bigcirc$ 1 km

*4. (**Estimate**) To estimate the product of 5 and 193, round 193 to the
(59) nearest hundred before multiplying.

5. Compare: 50% of 16 $\bigcirc$ $\sqrt{16}$
(Inv. 3, Inv. 5)

*6. (**Analyze**) Subtract the third multiple of four from the second multiple
(55) of six. What is the difference?

*7. In 1587, Virginia Dare was the first infant born to English parents in
(54) North America. Write a *later − earlier = difference* equation and solve it
to find the number of years that have elapsed from 1587 to the year of
your birth.

*8. a. (Classify) Which angle in this figure appears to be a
(23, 45) right angle?

b. Which segment in this figure does not appear to be
perpendicular to $\overline{AB}$?
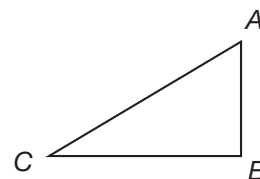
*9. Compare these fractions. Draw and shade two congruent rectangles to
(56) show the comparison.

$$\frac{2}{5} \bigcirc \frac{1}{4}$$

*10. Safara could pack 40 packages in 1 hour. At that rate, how many
(57) packages could she pack in 5 hours?

*11. (Represent) Use digits to write fifteen million, two hundred ten thousand.
(34)

12. (Represent) A town was on a rectangular plot of land 3 miles long and
(Inv. 2, 21) 2 miles wide. Draw the rectangle and show the length of each side.

a. What is the perimeter of the rectangle?

b. What is the area?

13. $37.75
(43, 51)   + $45.95

14.   43,793
(51)   + 76,860

15.   48.0
(50)   9.7
    12.6
     5.3
  + 236.2

*16. $50.00
(52)   − $42.87

*17.   43,793
(52)   − 26,860

*18. 483 × 4
(58)

*19. 360 × 4
(58)

*20. 207 × 8
(58)

21. 8)‾43‾
(53)

22. 5)‾43‾
(53)

23. 7)‾43‾
(53)

24. **a.** The thermometer at right shows the temperature at 3 p.m.
(18) What was the temperature at 3 p.m.?

     b. From 3 p.m. to 6 p.m., the temperature rose 4 degrees.
     What was the temperature at 6 p.m.?
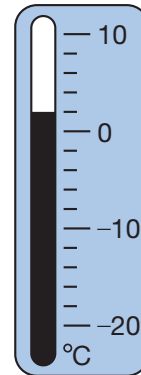
25. (**Represent**) Use a ruler to draw a line segment 4 in. long. Then draw a
(Inv. 2,
23) parallel segment 10 cm long.

*26. Each engine oil change in Francisco's car requires $3\frac{1}{2}$ quarts of new oil.
(40, 43) That number of quarts is the same as what number of pints?

*27. (**Explain**) On a playground, a rectangular basketball court measures
(Inv. 2) 58.5 feet long by 42.5 feet wide. What is a reasonable estimate of the
perimeter of the court? Explain your thinking.

*28. Write each decimal number illustrated, and then write the sum and the
(Inv. 4,
Inv. 5) difference of the numbers.
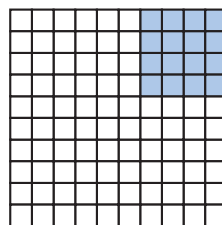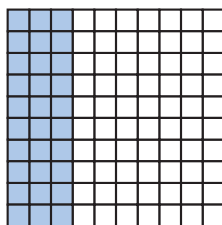
*29. **a.** **Multiple Choice** Which of these odd numbers is a composite
(55) number and *not* a prime number?

     A 5   **B** 7   **C** 9   **D** 11

     b. (**Verify**) Explain your answer in part **a.**

30. (**Estimate**) J'Neane would like to purchase a pair of in-line skates
(59) and accessories, including a helmet, knee pads, elbow pads, and wrist
guards. The skates cost $59.95, and the total cost of the accessories
is $44.50. What is a reasonable estimate of how much more the skates
cost than the accessories? Explain your thinking.

• Rate Problems with a Given Total

Power Up

facts   Power Up J

count aloud   Count by sevens from 7 to 70.

mental math

a. **Money:** $10.00 − $3.24

b. **Money:** Jade purchased a book that cost $7.25. She paid with a $10 bill. How much change should she receive?

c. **Money:** Lilah had $10.00. She spent $8.67. How much money does she have left?

d. **Fractional Parts:** How many inches is $\frac{1}{2}$ of a foot?

e. **Powers/Roots:** Compare: $\sqrt{81}$ ◯ 200 − 190

f. **Time:** How many years is 5 centuries?

g. **Estimation:** Choose the more reasonable estimate for the height of a telephone pole: 30 feet or 30 inches.

h. **Calculation:** 50 × 2 + 26 + 49

problem solving

Choose an appropriate problem-solving strategy to solve this problem. The question below is written in a code where 1 is A, 2 is B, 3 is C, and so on. After you decode the question, write the answer using the same code.

23-8-1-20   4-1-25   9-19   20-8-9-19?

New Concept

Rate problems involving time consist of three quantities: a rate, an amount of time, and a total. If we know two of the quantities in a rate problem, we can find the third. We have practiced problems in which we were given the rate and the amount of time. We multiplied to find the total. In this lesson we will practice problems in which we are given the total. We will divide to find either the rate or the amount of time.

Example 1

Zariali can read 2 pages in 1 minute. How long will it take him to read 18 pages?

This is a rate problem. A rate problem is an "equal groups" problem.

We are told that Zariali can read 2 pages in 1 minute. This means the rate is 2 pages each minute. The total number of pages is 18. We are asked for the amount of time.

Formula	Problem
Number **in each** time group	2 pages each minute
$\times$ Number **of** time groups	$\times$ n minutes
Total	18 pages

> **Reading Math**
>
> We translate a rate problem using a multiplication formula:
>
> Pages **in each** minute: 2
> Number **of** minutes: 9
> Total: 18 pages

Now we find the missing number. **To find the first or second number in an "equal groups" pattern, we divide.**

$$2\overline{)18}^{\,9}$$

It will take Zariali **9 minutes** to read 18 pages.

Example 2

Yolanda rode her bike 24 miles in 3 hours. Yolanda's average riding rate was how many miles per hour?

We are given the total distance Yolanda rode (24 miles) and the amount of time it took her (3 hours). We are asked for the average number of miles Yolanda rode in each hour.

Formula	Problem
Number **in each** time group	m miles each hour
$\times$ Number **of** time groups	$\times$ 3 hours
Total	24 miles

To find the missing factor, we divide.

$$24 \div 3 = 8$$

Rebecca's average riding rate was **8 miles per hour.** Rebecca actually may have ridden more than 8 miles during one hour and less than 8 miles during another hour, but her *average* rate was 8 miles per hour.

Connect Explain how to solve the equation $3m = 24$.

Lesson Practice **Formulate** Write and solve an equation for each problem.

a. Javier can sharpen 5 pencils in a minute. How long will it take Javier to sharpen 40 pencils?

b. The troop hiked 12 miles in 4 hours. The troop's average rate was how many miles per hour?

c. Alexis was paid $48 for 6 hours of work. How much money was Alexis paid for each hour of work?

Written Practice *Distributed and Integrated*

Formulate Write and solve equations for problems **1** and **2**.

* 1. There were two hundred fourteen parrots, seven hundred fifty-two
(1, 33, 51) crows, and two thousand, forty-two blue jays. How many birds were there in all?

* 2. K'Shella used one bag of soil to pot 8 plants. How many bags of soil
(52) would she need to pot 2 dozen plants?

* 3. Yachi could paint 12 signs in 1 hour. At that rate, how many signs could
(57) he paint in 3 hours? Make a table to solve this problem.

4. Fifty percent of an hour is how many minutes?
(Inv. 5)

* 5. **Estimate** Mount St. Helens is a volcano in Washington State. After
(51) erupting in May 1980, the peak of the volcano was 8363 feet above sea level. During the eruption, the volcano lost 1314 feet of its height. What is a reasonable estimate of the height of the volcano before its eruption? Explain your thinking.

*6. **Multiple Choice** Which of these numbers is *not* a multiple of 2?
(55)
    A 23   **B** 24   **C** 32   **D** 46

7. Write the time "a quarter to seven in the morning" in digital form.
(19)

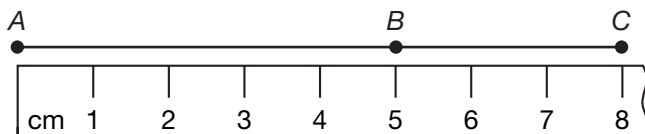**8.** Solve for *n*: $3n = 3 \times 5$
(41)

*9. The product of 6 and 7 is how much greater than the sum of 6
(31) and 7?

10. What is the length of segment *BC?*
(Inv. 2)

11. Compare: $(32 \div 8) \div 2 \bigcirc 32 \div (8 \div 2)$
(45)

12. $6.49 + $12 + $7.59 + 8¢
(43)

13. $6.5 + 4.75 + 11.3$ **14.** $12.56 - 4.3$
(50)   (50)

*15.   350   ***16.**   204   ***17.**   463
(58) $\times$ 5   (58) $\times$ 7   (58) $\times$ 6

18. 4)‾37‾   **19.** 6)‾39‾   **20.** 3)‾28‾
(53)   (53)   (53)

21. **a.** A nickel is what fraction of a dollar?
(36,
Inv. 5)   **b.** A nickel is what percent of a dollar?

*22. Perfect squares have an odd number of factors. The numbers 9 and 25
(Inv. 3,
55) are perfect squares. The three factors of 9 are 1, 3, and 9. What are the
three factors of 25?

23. Compare: 5% $\bigcirc \dfrac{1}{2}$
(Inv. 5)

*24. (**Classify**) Refer to figure ABCD to answer parts **a** and **b**.
(23)
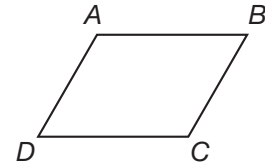
    a. What type of angle are angles *A* and *C?*

    b. What type of angle are angles *B* and *D?*

*25. (**Analyze**) The rectangular room is 5 yards long and 4 yards wide.
(Inv. 2, Inv. 3)

5 yd

4 yd
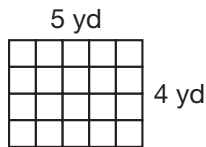
    a. How many yards of molding are needed to go around the room?

    b. How many square yards of carpet are needed to cover the floor?

*26. Multiple Choice If $n + 10 = 25$, then which of these equations is *not*
(24) true?

    A $n + 11 = 26$ **B** $n + 12 = 27$

    C $n - 5 = 20$ **D** $n + 9 = 24$

27. a. Compare: $8 \div (4 \div 2) \bigcirc (8 \div 4) \div 2$
(45, 47)

    b. Look at your answer to part **a.** Does the Associative Property apply to division?

28. a. Nineteen pennies are what fraction of a dollar?
(36, Inv. 5)

    b. Nineteen pennies are what percent of a dollar?

    c. Write the value of nineteen pennies as a decimal part of a dollar.

*29. (**Estimate**) At the restaurant Jackson ordered a meal for $7.95, a
(59) glass of milk for $1.75, and a dessert for $3.95. Estimate Jackson's restaurant bill.

*30. a. (**Conclude**) Name a segment that is parallel to $\overline{EF}$.
(23)

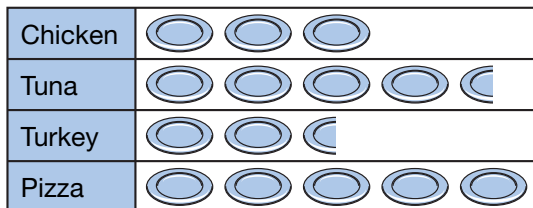   **b.** Name a segment that is perpendicular to $\overline{BF}$.
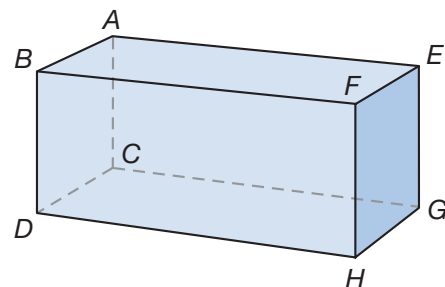
Focus on

• Displaying Data Using Graphs

In this investigation we will practice finding information in different types of **graphs.** Then we will practice making graphs. The four types of graphs we will study are **pictographs, bar graphs, line graphs,** and **circle graphs.** The first three types usually have a rectangular shape. On these graphs look for titles, labels, scales, and units. You might also find a **legend,** or **key,** that tells what the symbols on the graph stand for.

Pictographs

We begin with a pictograph, which uses pictures to display information. The following pictograph shows the results of a survey of some students at Thompson School. The cafeteria manager wanted to know the favorite lunches of Thompson School students, so each student in Room 12 was asked to name his or her favorite lunch from the school menu. Each student could name one lunch. The pictograph shows how students in the class answered the question.

Visit www. SaxonMath.com/ Int4Activities for a calculator activity.

Favorite School Lunches of Students in Room 12

Chicken	⬭ ⬭ ⬭
Tuna	⬭ ⬭ ⬭ ⬭ ⬭
Turkey	⬭ ⬭ ⬭
Pizza	⬭ ⬭ ⬭ ⬭ ⬭

⬭ represents the choice of 2 students

1. What is the title of the pictograph?

2. How many different types of lunches are shown in the graph?

3. **Explain** How can you tell how many students chose a particular lunch as their favorite lunch?

4. How many students named chicken as their favorite lunch? How did you find your answer?

5. [Explain] How many students named tuna as their favorite lunch? How did you find your answer?

6. [Represent] The pictograph shows the favorite lunches of how many students? How did you find your answer?

Bar Graphs

The information in the pictograph can also be shown in a bar graph like the one below. In this graph the bars are vertical (they go up and down). In some bar graphs, the bars are horizontal (they go sideways). The words along the sides of the graph are labels. The labels tell what other words or numbers along the sides mean.

Favorite School Lunches of Students in Room 12
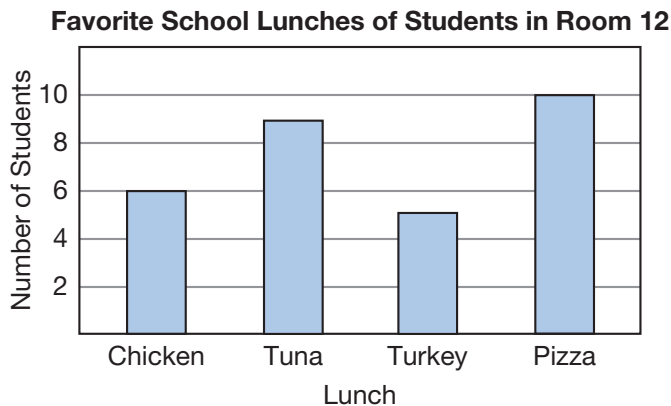
7. What is the label along the vertical left side of the graph?

8. Along the vertical left side of the graph are marks and numbers. What does the number 8 stand for?

9. [Explain] Which bar is the tallest, and what does that mean?

10. [Explain] The bar for tuna is taller than the bar for turkey, so more students named tuna as their favorite lunch than turkey. How many more students named tuna than named turkey? How did you find the answer?

Line Graphs

The following graph is a line graph. Line graphs are often used to show information or data that change over time. The data are **continuous,** which means that the data are assembled between the points on the graph. This graph shows Jamil's height from his birth until he was 10 years old. Notice that there is a vertical scale and a horizontal scale. The labels along these scales show the units (in parentheses) for the numbers along the scales. The change in Jamil's height is shown by the segments connecting the dots. The background grid makes the chart easier to read.

Jamil's Height from Birth to Age Ten
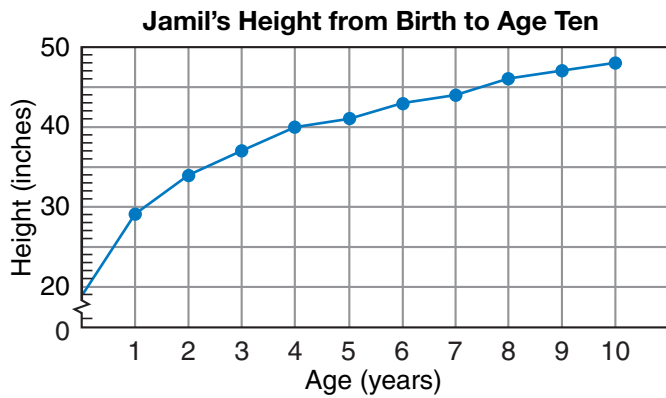
11. What does the 8 on the horizontal scale mean?

12. **Explain** How tall was Jamil on his fourth birthday? How did you find your answer?

13. **Analyze** During which year did Jamil become 45 inches tall? How did you find the answer?

14. **Interpret** The graph of Jamil's height is steep during the first few years and then becomes less steep. What does the change in steepness mean about Jamil's growth?

Analyze What data are accumulating between the points on the graph?

Circle Graphs

We have looked at three rectangular graphs. Now we will look at a circle graph. A circle graph shows how a whole is divided into parts. A circle graph is sometimes called a *pie graph.* The "pie" is cut into "slices" that show the size of the parts. In this circle graph we see how Vanessa usually spends a whole school day.

How Vanessa Spends a School Day
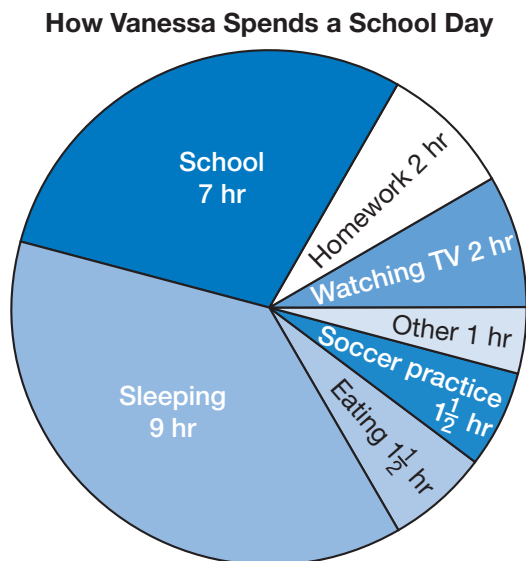
15. The "scale" on a circle graph is the size of the slices. Which slice of the circle graph on the previous page is the largest, and what does that mean?

16. Analyze Together, school and homework amount to how many hours of Vanessa's day?

17. Interpret What is the total number of hours represented by the entire circle graph?

18. Explain According to the graph, Vanessa is awake about how many hours each day? How did you find the answer?

Activity

Displaying Information on Graphs

Materials needed:
- **Lesson Activities 27** and **28**

Lesson Activities 27 and **28** are patterns for making the four kinds of graphs we have studied in this investigation. Use these patterns to make graphs for the following information.

Make a Pictograph:

Represent The students in Room 12 were asked to name the drink they most like to have with lunch. Eight students said "punch," six said "water," nine said "milk," and seven said "juice."

Display this information in a pictograph. Title the graph. List the drink choices along the vertical left side of the graph. Draw an object, like a cup, to represent the students' drink preferences. You may use the same object for each category. Decide whether the picture will represent the choice of one student or more than one student, and show that information in a legend. Here is an example:

= **choice of one student**

Make a Bar Graph:

Represent Carmen asked the students in Room 15 how they travel to school in the morning. She found that six students walk, seven ride bikes, three ride skateboards, six travel by car, and seven ride the bus.

Display this information in a bar graph. Title the graph. Label the vertical and horizontal sides of the graph. Mark a scale and draw the bars.

Make a Line Graph:

(Represent) Mr. Lopez ran a six-mile race. As he passed each mile mark of the race, he looked at his stopwatch to see how long he had been running. Here are the times Mr. Lopez read on his stopwatch at each mile mark:

1 mile	6 minutes
2 miles	13 minutes
3 miles	20 minutes
4 miles	28 minutes
5 miles	36 minutes
6 miles (finished race)	45 minutes

On a line graph, make the vertical scale represent the distance run in miles. Make the horizontal scale represent the time run in minutes. Let the lower left corner of the scale be zero miles and zero minutes. Mark each scale with a sequence of numbers that allows the information to fit well on the graph. (For instance, let the distance between marks on the horizontal scale be 5 minutes.) Remember to title the graph.
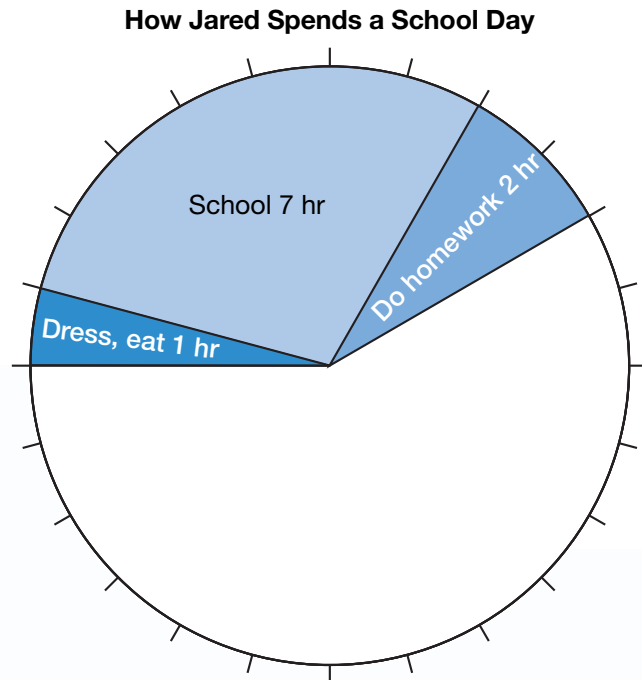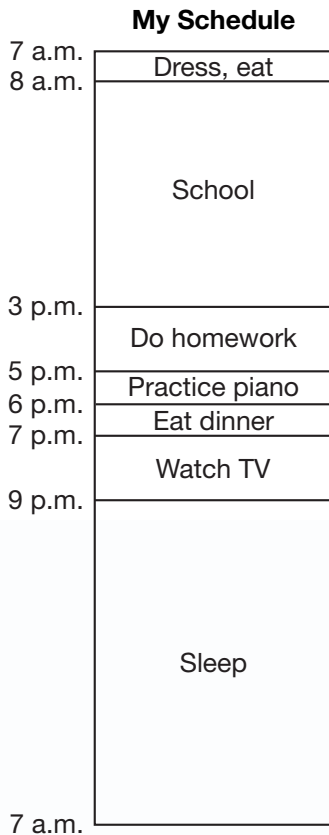
Now make seven dots on the graph. One dot will be at the lower left corner to show the start of the race. The other six dots will show the elapsed time at each mile mark. On the one-mile level of the graph, mark a dot at your best estimate for 6 minutes. On the two-mile level, mark a dot for 13 minutes. Continue marking dots to the end of the race. After marking the dots, draw line segments from dot to dot, beginning at the lower left corner and stopping at the dot for the end of the race. Every point along the line graph shows the approximate running time and distance run by Mr. Lopez at that point in the race.

(Analyze) What data are accumulating between the points on your graph?

Make a Circle Graph:

(Represent) Jared made a schedule for school days. His schedule is shown on the following page. Notice that the schedule has seven sections. Use the information in this schedule to make a circle graph of how Jared spends his day. Your circle graph should also have seven sections. The size of the sections should show the number of hours Jared spends on each activity. (The circle graph pattern on **Lesson Activity 28** has 24 marks to make it easier to divide the circle into sections. The distance from one mark to the next represents one hour.) Choose a title for the graph, and label each section with

Jared's activity and the amount of time spent on that activity. Below we show an example with three of the seven sections completed.

My Schedule

Time	Activity
7 a.m. 8 a.m.	Dress, eat
	School
3 p.m.	Do homework
5 p.m. 6 p.m. 7 p.m.	Practice piano
	Eat dinner
	Watch TV
9 p.m.	
	Sleep
7 a.m.	

How Jared Spends a School Day

Dress, eat 1 hr
School 7 hr
Do homework 2 hr

Investigate Further

a. **Represent** Look for examples of graphs in newspapers, magazines, or Web sites to show how different types of graphs are used to display information.

b. **Model** Generate or collect information (data) and make graphs to display the information.

c. **Represent** Round the population of each town to the nearest thousand.

Town	Population
Roosevelt, UT	4404
Lincoln, CA	1860
Washington, KS	1168
Adams, WI	1840

Town	Population
Johnson, TX	1274
Clinton, CT	3516
Monroe, OH	8821
Jefferson, IA	4440

d. Choose five towns from problem **c.** Then choose an appropriate graph for graphing the rounded populations of those towns. Decide whether to use a bar graph, a pictograph, or a line graph. Make the graph, and then write a statement that describes the data in your graph.

e. ✎ Analyze) The data in the table below show an estimated relationship between centimeters and inches. Describe the relationship. Then predict about how many centimeters are equal to a yard on a yardstick, and explain how you made your estimate.

Inches	1	2	3	4	5	6
Centimeters	2.5	5	7.5	10	12.5	15

f. Students at Parkcrest Middle School conducted a survey of 100 people. They asked the following question: What is your favorite subject: math, science, language arts, or social studies?

They found 27 people chose math, 26 people chose science, 21 people chose language arts, and 18 people chose social studies.

Their teacher explained that the results of their survey were not accurate and that they would need to do it again. Was their teacher right? Why or why not?