

• Tables and Schedules

Power Up

facts

Power Up J

mental math

Thinking of quarters can make mentally adding and subtracting numbers ending in 25, 50, and 75 easier.

- a. **Number Sense:** $350 + 175$
- b. **Number Sense:** $325 - 150$
- c. **Number Sense:** $175 + 125$
- d. **Money:** Each ticket costs \$10.00 if purchased at the concert hall. A ticket costs \$1.95 less if it is purchased in advance. What is the advance price for a ticket?
- e. **Time:** The year 2011 begins on a Saturday. On what day of the week will the year 2012 begin?
- f. **Estimation:** Estimate 24×21 . Round 24 to 25, round 21 to 20, and then multiply.
- g. **Calculation:** 10% of 70, -5 , $\times 50$, $\sqrt{\quad}$
- h. **Roman Numerals:** Compare: 29 ○ XXXI

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Congress meets in Washington, D.C., to make laws for the United States. The 535 members of the U.S. Congress are divided into two groups—representatives and senators. There are 2 senators from each of the 50 states. The rest of the people in the U.S. Congress are representatives. How many senators are there? How many representatives are there?

New Concept

We have studied graphs that present number information in picture form. Another way of presenting number information is in a **table**.

Example 1



Visit www.SaxonMath.com/Int4Activities for an online activity.

Use the information in this table to answer the questions that follow:

Heights of Major Mountains

Mountain	Feet	Meters
Everest	29,035	8850
McKinley	20,320	6194
Kilimanjaro	19,340	5895
Matterhorn	14,691	4478
Pikes Peak	14,110	4301
Fuji	12,388	3776

a. The Matterhorn is how many meters taller than Pikes Peak?

b. McKinley is how many feet taller than Kilimanjaro?

We compare the heights by subtracting.

a. We use the numbers from the meters column.

$$\begin{array}{r} \text{Matterhorn} \quad 4478 \text{ m} \\ \text{Pikes Peak} \quad - 4301 \text{ m} \\ \hline \quad \quad \quad \mathbf{177 \text{ m}} \end{array}$$

b. We use the numbers from the feet column.

$$\begin{array}{r} \text{McKinley} \quad 20,320 \text{ ft} \\ \text{Kilimanjaro} \quad - 19,340 \text{ ft} \\ \hline \quad \quad \quad \mathbf{980 \text{ ft}} \end{array}$$

Estimate About how many miles high is Everest? (A mile is 5280 feet.)

A **schedule** is a list of events organized by the times at which they are planned to occur.

Example 2

Li Ming follows this schedule on school days:

School-Day Schedule	
6:30 a.m.	Wake up, dress, eat breakfast
7:30 a.m.	Leave for school
8:00 a.m.	School starts
12:00 p.m.	Eat lunch
2:45 p.m.	School ends, walk home
3:15 p.m.	Eat snack
3:30 p.m.	Start homework
5:00 p.m.	Play
6:00 p.m.	Eat dinner
7:00 p.m.	Watch TV
8:00 p.m.	Read
8:30 p.m.	Shower
9:00 p.m.	Go to bed

Thinking Skill

Analyze

If Li Ming watched television from 7:00 p.m. to 8:30 p.m., how many half-hour shows could she watch?

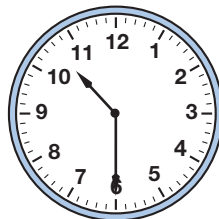
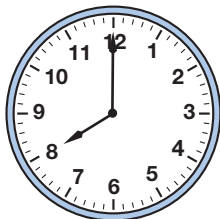
If lunch and recess together last 45 minutes, then how many hours does Li Ming spend in class?

School starts at 8:00 a.m. and ends at 2:45 p.m., which is a span of 6 hours 45 minutes. Since 45 minutes of school time is spent on lunch and recess, the time spent in class is **6 hours**.

Example 3

On Saturday morning, Cameron wakes up at 8:00 a.m. His softball game starts at 10:30 a.m. How long after he wakes up does his softball game start?

One clock below shows when Cameron wakes up, and the other shows when his game begins. Starting from when he wakes up, we count forward one hour to 9:00 a.m., two hours to 10:00 a.m., and 30 minutes to 10:30 a.m. We find that Cameron's game starts **2 hours 30 minutes (or $2\frac{1}{2}$ hrs)** after he wakes up.



Analyze If it takes Cameron 25 minutes to drive to the game, what time should he leave his house in order to arrive at the game 15 minutes early? Explain your reasoning.

Activity

Make a Table

Material needed:

- thermometer

- a. Use a thermometer to measure the temperature outside your classroom for five days. Measure the temperature at the same time each day. Make a table like the one below and record the temperatures in both Celsius and Fahrenheit degrees.

Daily Temperature at _____ o'clock for Week of _____

	Mon	Tue	Wed	Thu	Fri
Celsius					
Fahrenheit					

- b. Make a second table like the one below to record the change in temperature from one day to the next. For example, if the temperature Monday was 75°F and Tuesday was 72°F , then the temperature was three degrees lower, which we record as -3° .

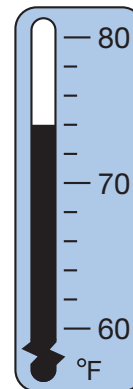
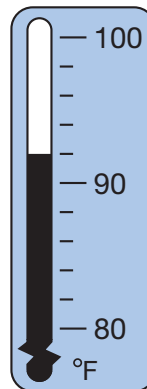
	Mon \rightarrow Tue	Tue \rightarrow Wed	Wed \rightarrow Thu	Thu \rightarrow Fri
Celsius				
Fahrenheit				

Lesson Practice

Refer to the table and the schedule in Examples 1 and 2 to answer problems a–c.

- Kilimanjaro is how many meters taller than Fuji?
- Everest is how many feet taller than the Matterhorn?
- How much sleep does Li Ming get on a school night if she follows her schedule?

- d. Using the thermometers shown, how much did the temperature change between 4 p.m. and 12 a.m.?



Written Practice

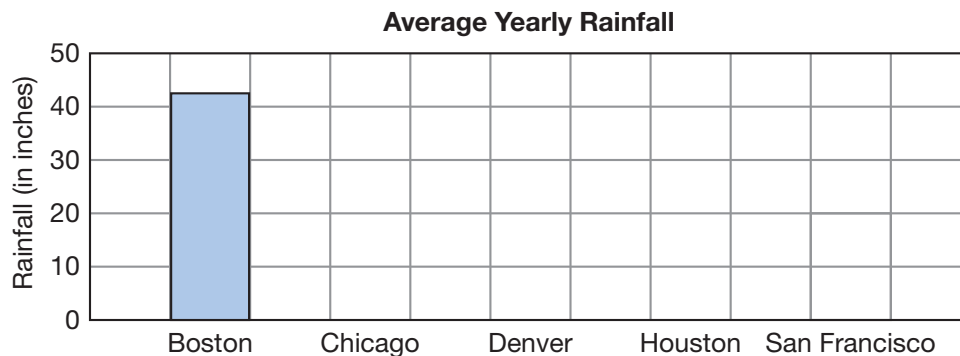
Distributed and Integrated

- * 1.** **Interpret** Use the information in the table below to answer parts **a–c**.
(Inv. 6, 101)

Average Yearly Rainfall

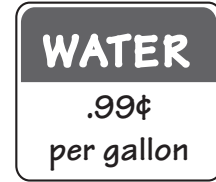
City	Rainfall (in inches)
Boston	43
Chicago	36
Denver	16
Houston	48
San Francisco	20

- Which cities listed in the table average less than 2 feet of rain per year?
- In one year Houston received 62 inches of rain. This was how much more than its yearly average?
- Copy and complete the bar graph below to show the information in the rainfall table.

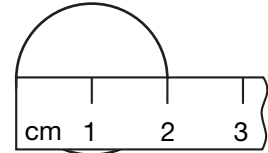


*2. **Represent** Five sixths of the 288 marchers were out of step. How many marchers were out of step? Draw a picture to illustrate the problem.

*3. **Represent** Something is wrong with this sign. Draw two different signs that show how to correct the error.



4. What is the radius of this circle in millimeters?



*5. **Conclude** The chance of rain is 60%. Is it more likely that it will rain or that it will not rain? Explain your answer.

*6. Estimate the product of 88 and 22. Then find the actual product.

7. Apples were priced at 53¢ per pound. What was the cost of 5 pounds of apples?

*8. **Represent** Write the number 3708 in expanded form. Then use words to write the number.

9. The top of a doorway is about two meters from the floor. Two meters is how many centimeters?

*10. Four pounds of pears cost \$1.20. What did 1 pound of pears cost? What did 6 pounds of pears cost?

11. Mike drove his car 150 miles in 3 hours. What was his average speed in miles per hour?

$$\begin{array}{r} 12. \quad \$46.00 \\ (52) \quad - \$45.56 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 10,165 \\ (52) \quad - \quad 856 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad \$ 0.63 \\ (43, 51) \quad \$ 1.49 \\ \$12.24 \\ \$ 0.38 \\ \$ 0.06 \\ \$ 5.00 \\ + \$ 1.20 \\ \hline \end{array}$$

$$* 15. \quad 70^2$$

(62, 86)

$$16. \quad 71 \times 69$$

(90)

$$17. \quad 4 \overline{) \$30.00}$$

(76, 80)

$$18. \quad 3 \overline{) 263}$$

(68)

$$19. \quad 5x = 4080$$

(76)

$$20. \quad \frac{344}{8}$$

(65)

$$21. \quad \begin{array}{r} 37 \\ (67) \quad \times 60 \\ \hline \end{array}$$

$$22. \quad \begin{array}{r} 56 \\ (90) \quad \times 42 \\ \hline \end{array}$$

$$23. \quad \begin{array}{r} \$5.97 \\ (58) \quad \times \quad 8 \\ \hline \end{array}$$

$$24. \quad 10.000 - (4.468 - 2.3)$$

(45, 50)

*25. Find the mean, median, mode, and range of this set of numbers:

(97)

3, 1, 4, 1, 6

*26. **Represent** Draw and shade circles to show that 2 equals $\frac{4}{2}$.

(89)

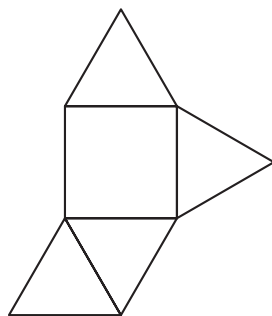
*27. a. **Represent** Draw a square with sides 4 cm long.

(21, Inv. 3)

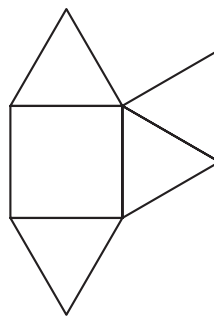
b. Find the perimeter and the area of the square you drew.

*28. **Conclude** Which of these nets can be folded to form a pyramid?

(100)



Net 1



Net 2

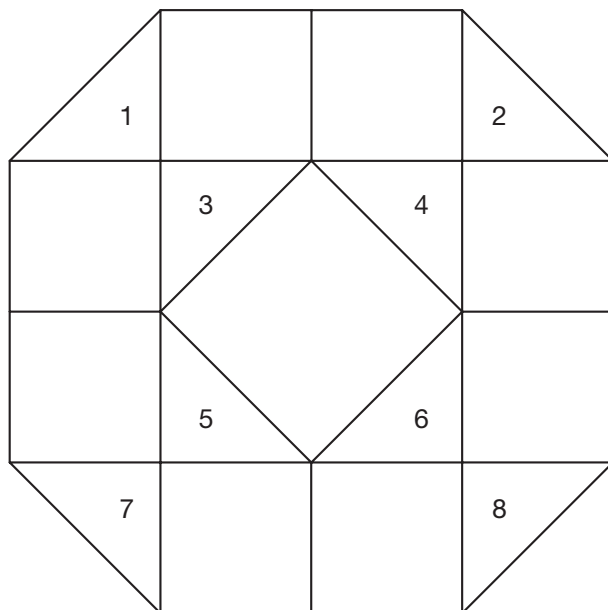
*29. If $y = 6x - 4$, what is y when

(94)

a. x is 5?

b. x is 8?

- *30.** In this pattern of loose tiles, there are triangles and squares:
(66, 78)



- What transformation could be performed on triangle 7 to see if it is congruent to triangle 4?
- What transformation could be performed on triangle 1 to see if it is congruent to triangle 3?



Use the table below to answer parts **a–c**.

Airline	Flight Time
Airline A	2 hours 45 minutes
Airline B	3 hours 15 minutes
Airline C	6 hours 35 minutes

- Maria is taking Airline A, and her flight leaves at 9:00 a.m. What time will she arrive at her destination?
- How much longer is the flight time for Airline B than Airline A?
- If Carol took Airline C and arrived at her destination at 10:00 p.m., what time did her flight leave?

• **Tenths and Hundredths
on a Number Line**

Power Up

facts

Power Up A

**mental
math**

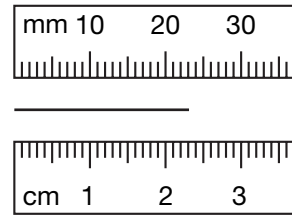
- a. **Number Sense:** $425 - 175$
- b. **Number Sense:** 4×18
- c. **Money:** Gabriella purchased a sandwich for \$3.65 and a beverage for \$0.98. What was the total price?
- d. **Geometry:** How many vertices do 4 hexagons have?
- e. **Time:** The year 2012 begins on a Sunday. On what day of the week will the year 2013 begin? (Remember that 2012 is a leap year.)
- f. **Estimation:** Estimate the product of 19×31 by rounding one number up and the other number down.
- g. **Calculation:** $4 \times 5, -5, + 6, \div 7$
- h. **Roman Numerals:** Write 24 in Roman numerals.

**problem
solving**

Choose an appropriate problem-solving strategy to solve this problem. Nalo said, "An inch is less than 10% of a foot." Write a short paragraph explaining why you agree or disagree with Nalo's statement.

New Concept

We have used decimal numbers to name lengths that include a fraction of a centimeter. For instance, the length of this segment can be written as 23 millimeters or 2.3 centimeters:

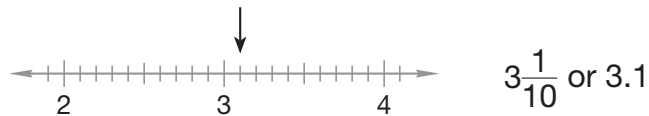


Thinking Skill

Generalize

How are rulers and number lines the same? How are they different?

Likewise, on the following number line, the distance between every two whole numbers is divided into ten equal parts. The arrow is pointing to the number three and one tenth, which we can write as a mixed number or as a decimal.



If the distance between whole numbers on a number line is divided into 100 parts, then points between whole numbers may need to be written with two decimal places. The arrow below is pointing to three and twenty-five hundredths, which can be written as 3.25 or as $3\frac{25}{100}$.



If you inspect a meterstick, you will see that it is divided into 100 centimeters. Each centimeter is $\frac{1}{100}$ of a meter, so a pencil that is 18 cm long is 0.18 m (eighteen hundredths of a meter) long.

Example 1

Santiago is 162 cm tall. What is Santiago's height in meters?

One hundred centimeters equals a meter, so Santiago's height is one meter plus 62 centimeters. Since 62 centimeters is 62 hundredths of a meter, Santiago is **1.62 meters** tall.

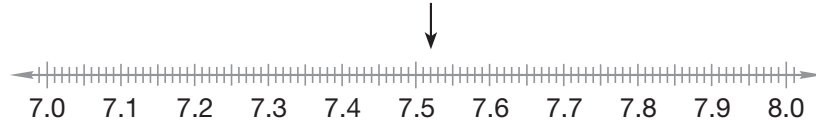
Example 2

Write the decimal number to which each arrow points:

a.



b.



a. 9.6

b. 7.52

Example 3

a. Round 9.6 to the nearest whole number.

b. Round 7.52 to the nearest tenth.

a. The decimal number 9.6 is between the whole numbers 9 and 10. Halfway from 9 to 10 is 9.5, and 9.6 is greater than 9.5. So 9.6 rounds to **10**.

b. Rounding 7.52 to the nearest tenth is like rounding \$7.52 to the nearest ten cents. Just as \$7.52 is between \$7.50 and \$7.60, 7.52 is between 7.5 and 7.6. It is closer to **7.5**, as we can see on the number line in Example 2.

Example 4

Estimate the sum of 4.87 and 3.11 to the nearest whole number.

First we round 4.87 to 5. We round 3.11 to 3. Then we add 5 and 3. The sum is **8**.

Activity

Measuring Objects with a Meterstick

Material needed:

- meterstick

a. Using a meterstick, measure the heights and widths of various rectangular objects in the classroom, such as doors, tabletops, desktops, or books. Measure to the nearest centimeter and record each measurement twice: once in centimeters and once in meters.

Here is an example:

height and width of door 203 cm (2.03 m) high,
90 cm (0.90 m) wide

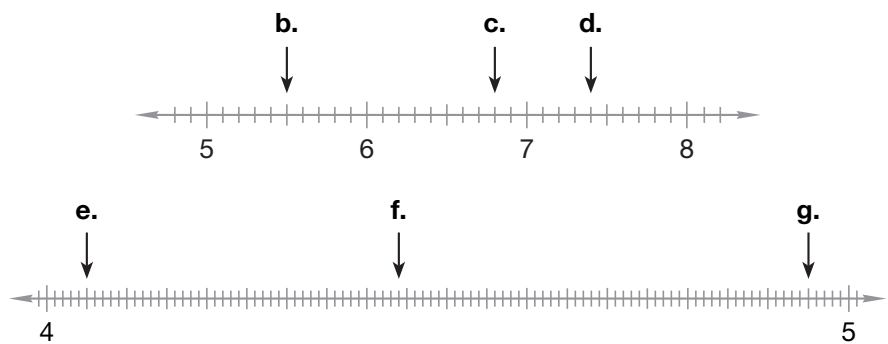
- b.** Estimate the area of each rectangular object you measured in part **a**. Here is an example:

area of door
 $200 \text{ cm} \times 90 \text{ cm} = 18,000 \text{ sq. cm}$

Lesson Practice

- a.** Mackenzie jumped over a bar that was 167 cm high. How many meters high was the bar?

Write the decimal number and mixed number to which each arrow is pointing:



- h.** Locate 6.8 on the number line and round to the nearest whole number.



- i.** Round 4.44 to the nearest whole number.
j. Locate 4.4 on the number line and round to the nearest whole number.



- k.** Estimate the sum of 6.8 and 5.9.

Written Practice

Distributed and Integrated

- * 1.** **Analyze** ⁽⁸⁸⁾ All 110 books must be packed in boxes. Each box will hold 8 books.

- a.** How many boxes can be filled?
b. How many boxes are needed to hold all the books?

*2. **Formulate** What number is five more than the product of six and seven? Write an expression.
(94)

*3. **Explain** Trevor paid \$7 for the tape. He received a quarter and two dimes as change. Tax was 42¢. What was the price of the tape? Explain how you found your answer.
(83)

*4. a. **Represent** Four fifths of the 600 gymnasts did back handsprings. How many gymnasts did back handsprings? Draw a picture to illustrate the problem.
(70, 95)

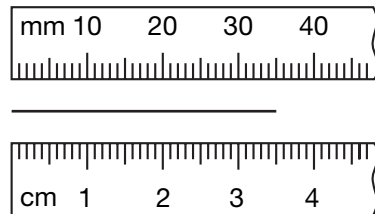
b. What percent of the gymnasts did not do back handsprings?

5. **Explain** Mrs. Tyrone is arranging 29 desks into rows. If she starts by putting 8 desks in each row, how many desks will be in the last row? Explain how you know.
(88)

6. **Analyze** What is the value of two \$100 bills, five \$10 bills, four \$1 bills, 3 dimes, and 1 penny?
(35)

7. a. Find the length of this line segment in millimeters.
(69)

b. Find the length of the segment in centimeters. Write the answer as a decimal number.



8. **Represent** Use words to write 12.67.
(Inv. 4)

*9. a. Round 3834 to the nearest thousand.
(54, 102)

b. Round 38.34 to the nearest whole number.

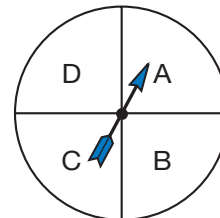
10. The diameter of a circle is 1 meter. What is the radius of the circle in centimeters?
(Inv. 2, 21)

*11. Find the sum of two hundred eighty-six thousand, five hundred fourteen and one hundred thirty-seven thousand, two.
(34, 51)

12. Seven pairs of beach sandals cost \$56. What is the cost of one pair?
(94) What is the cost of ten pairs?

***13.** There were 36 children in one line and 24 children in the other line.
(96) What is the average number of children per line?

***14.** If the arrow is spun once, what is the probability that it will stop in sector C?
(Inv. 10)



15. $7.486 - (6.47 + 0.5)$
(45, 50)

16. 40×50
(86)

17. 41×49
(90)

18. $2^3 \times 5 \times \sqrt{49}$
(Inv. 3, 62)

***19.** $\begin{array}{r} 32 \\ \times 17 \\ \hline \end{array}$
(90)

***20.** $\begin{array}{r} 38 \\ \times 40 \\ \hline \end{array}$
(67)

21. $7 + 4 + 6 + 8 + 5 + 2 + 7 + 3 + k = 47$
(2)

***22.** $8 \overline{)360}$
(65)

***23.** $4 \overline{)810}$
(80)

***24.** $7 \overline{)356}$
(65)

***25.** $6n = \$4.38$
(76)

26. $7162 \div 9$
(76)

27. $\frac{1414}{2}$
(80)

***28.** Draw and shade circles to show that 2 equals $\frac{8}{4}$.
(89)

***29.** The basketball player was 211 centimeters tall. Write the height of the basketball player in meters.
(Inv. 2)

30. How many square yards of carpeting are needed to cover the floor of a classroom that is 15 yards long and 10 yards wide?
(Inv. 3, 85)

• **Fractions Equal to 1 and Fractions Equal to $\frac{1}{2}$**

Power Up

facts

Power Up A

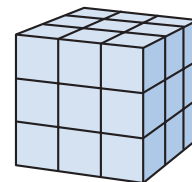
mental math

- a. **Number Sense:** $450 - 175$
- b. **Number Sense:** 50×42
- c. **Money:** Casius gave the clerk \$2.00 for lemons that cost \$1.62. How much change should he receive?
- d. **Time:** Which date occurs only once every four years?
- e. **Powers/Roots:** $2^3 \div 2$
- f. **Estimation:** Micalynn purchased 4 toothbrushes for \$11.56. Round this amount to the nearest dollar and then divide by 4 to estimate the cost per toothbrush.
- g. **Calculation:** $\sqrt{36}, \times 3, + 2, \div 10, - 1$
- h. **Roman Numerals:** Compare: 19 ○ XVIII

problem solving

Choose an appropriate problem-solving strategy to solve this problem.

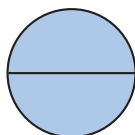
At the mall, Dirk saw a display of basketballs that were packaged individually in boxes and stacked. The stack of boxes is shown at right. Dirk was quickly able to figure how many basketballs were in the stack. How many basketballs were in the stack? How might Dirk have figured the number of basketballs without counting each box?



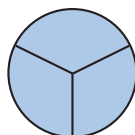
New Concept

Each of the following circles is divided into parts. Together, the parts of each circle make up a whole.

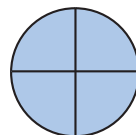
We see that 2 halves is the same as 1 whole. We also see that 3 thirds, 4 fourths, and 5 fifths are ways to say 1 whole. If the numerator (top number) and the denominator (bottom number) of a fraction are the same, the fraction equals 1.



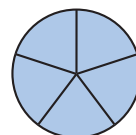
$$1 = \frac{2}{2}$$



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



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



$$1 = \frac{5}{5}$$

Example 1

Which of these fractions equals 1?

$$\frac{1}{6} \quad \frac{5}{6} \quad \frac{6}{6} \quad \frac{7}{6}$$

A fraction equals 1 if its numerator and denominator are equal. The fraction equal to 1 is $\frac{6}{6}$.

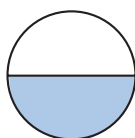
Model Use fraction manipulatives to verify that $\frac{6}{6} = 1$.

Example 2

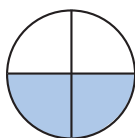
Write a fraction equal to 1 that has a denominator of 7.

A fraction equals 1 if its numerator and denominator are the same. If the denominator is 7, the numerator must also be 7. We write $\frac{7}{7}$.

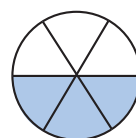
If the numerator of a fraction is half the denominator, then the fraction equals $\frac{1}{2}$. Notice below that the top number of each fraction illustrated is half of the bottom number of the fraction.



$$\frac{1}{2}$$



$$\frac{2}{4}$$



$$\frac{3}{6}$$



$$\frac{4}{8}$$

If the numerator is less than half the denominator, the fraction is less than $\frac{1}{2}$. If the numerator is greater than half the denominator, the fraction is greater than $\frac{1}{2}$.

Model Use fraction manipulatives to verify that $\frac{5}{10} = \frac{1}{2}$.

Example 3

- a. Which fraction below equals $\frac{1}{2}$?
- b. Which is less than $\frac{1}{2}$?
- c. Which is greater than $\frac{1}{2}$?

$$\frac{3}{7} \quad \frac{6}{12} \quad \frac{5}{9}$$

- a. Since 6 is half of 12, the fraction equal to $\frac{1}{2}$ is $\frac{6}{12}$.
- b. Since 3 is less than half of 7, the fraction less than $\frac{1}{2}$ is $\frac{3}{7}$.
- c. Since 5 is greater than half of 9, the fraction greater than $\frac{1}{2}$ is $\frac{5}{9}$.

Example 4

Compare: $\frac{3}{8} \bigcirc \frac{1}{2}$

Since 3 is less than half of 8, we know that $\frac{3}{8}$ is less than $\frac{1}{2}$.

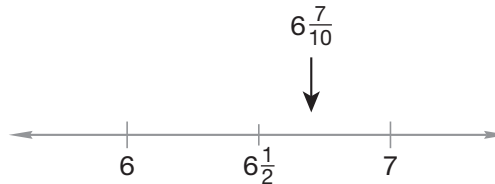
$$\frac{3}{8} < \frac{1}{2}$$

Represent Make a sketch that proves the answer is correct.

Example 5

Round $6\frac{7}{10}$ to the nearest whole number.

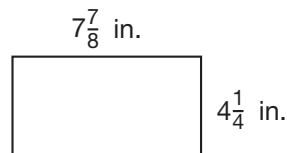
Halfway between 6 and 7 is $6\frac{1}{2}$. We know that $6\frac{7}{10}$ is greater than $6\frac{1}{2}$ because $\frac{7}{10}$ is greater than $\frac{5}{10}$, which equals $\frac{1}{2}$.



This means $6\frac{7}{10}$ rounds to 7.

Example 6

Estimate the perimeter and area of this rectangle.



First we round each dimension to the nearest whole number of inches. Since $\frac{7}{8}$ is greater than $\frac{1}{2}$, we round $7\frac{7}{8}$ in. up to 8 in. Since $\frac{1}{4}$ is less than $\frac{1}{2}$, we round $4\frac{1}{4}$ in. down to 4 in. Then we use 8 in. and 4 in. to estimate the perimeter and area.

$$\text{Perimeter: } 8 \text{ in.} + 4 \text{ in.} + 8 \text{ in.} + 4 \text{ in.} = \mathbf{24 \text{ in.}}$$

$$\text{Area: } 8 \text{ in.} \times 4 \text{ in.} = \mathbf{32 \text{ sq. in.}}$$

Lesson Practice

a. Write a fraction equal to 1 that has a denominator of 6.

b. **Multiple Choice** Which of these fractions equals 1?

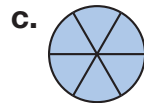
A $\frac{1}{10}$

B $\frac{9}{10}$

C $\frac{10}{10}$

D $\frac{11}{10}$

What fraction name for 1 is shown by each picture?



e. Write a fraction equal to $\frac{1}{2}$ with a denominator of 12.

f. Compare: $\frac{9}{20} \bigcirc \frac{1}{2}$

g. **Estimate** Round $5\frac{3}{8}$ to the nearest whole number.

h. Estimate the perimeter and area of a rectangle that is $6\frac{3}{4}$ in. long and $4\frac{3}{8}$ in. wide.

Written Practice

Distributed and Integrated

1. **Analyze** Find an even number between 79 and 89 that can be divided by 6 without a remainder.

2. How many minutes is 3 hours?

*3. Victor has \$8. Dana has \$2 less than Victor. How much money do they have altogether?

*4. **Represent** Write each fraction or mixed number as a decimal number:

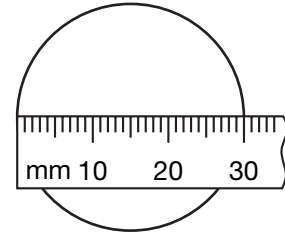
a. $\frac{3}{10}$


b. $4\frac{99}{100}$

c. $12\frac{1}{1000}$

*5. **Represent** Five eighths of the 40 students wore school colors. How many students wore school colors? Draw a picture to illustrate the problem.

6. a. What is the diameter of this circle in centimeters?
 (21, 69)
- b. What is the radius of this circle in centimeters?



7. The radius of a circle is what percent of the diameter?
 (21, Inv. 5)
8. Estimate the product of 49 and 68. Then find the actual product.
 (93)
- * 9.  **Explain** Pavan has filled a pitcher with iced tea for two guests and himself. The capacity of the pitcher is two quarts. How many 10-ounce glasses of iced tea can be poured from the pitcher? Explain your answer.
 (88)
- * 10. In row 1 there were 6 students, in row 2 there were 4 students, in row 3 there were 6 students, and in row 4 there were 4 students. What was the average number of students per row?
 (96)
- * 11. Gretchen paid \$20 for five identical bottles of fruit juice. She received \$6 in change. What was the price of one bottle of juice?
 (94)
- * 12. **Analyze** Find the median, mode, and range of Vonda's game scores. (Since there is an even number of scores, the median is the average of the two middle scores.)
 (97)

100, 80, 90, 85, 100, 90, 100, 100

13.
$$\begin{array}{r} \$3.85 \\ \times \quad 7 \\ \hline \end{array}$$

 (58)

14.
$$\begin{array}{r} 48 \\ \times 29 \\ \hline \end{array}$$

 (90)

15.
$$\begin{array}{r} 16 \\ 15 \\ 23 \\ 8 \\ \hline \end{array}$$

 (17)

16.
$$\begin{array}{r} 5 \\ 4 \\ 3 \\ 7 \\ 2 \\ 5 \\ 8 \\ 1 \\ 4 \\ \hline \end{array}$$

 (2)

17. 60^2
 (62, 86)

18. 59×61
 (90)

217
 20

19. $\frac{400}{5}$
 (71)

20. $6 \overline{)582}$
 (65)

6
 + 317

21. $9 \overline{)\$37.53}$
 (76)

22. $7 \overline{)420}$
 (65)

$\frac{+ n}{45}$


23. $7.500 - (3.250 - 0.125)$
 (43, 45)

- * 24. **Represent** Draw and shade circles to show that $3\frac{3}{4}$ equals $\frac{15}{4}$.
 (89)

- 25.** The perimeter of this square is 20 inches. What is the length of each side of the square? What is the area of the square?



- *26.** Write a fraction equal to 1 with a denominator of 8.
(103)

- *27.**  **Explain** If two dot cubes are rolled together, which outcome is more likely: dots totaling 12 or dots totaling 7? Explain your answer.
(Inv. 10)

- *28.** Songhi measured the paper in her notebook and found that it was 28 cm long. Write the length of her paper in meters.
(Inv. 2, 102)

- *29.** **Estimate** Round $12\frac{5}{12}$ to the nearest whole number.
(103)

- *30.** **a. Classify** What is the geometric name for the shape of a cereal box?
(23, 98)
- b.** How many edges does this box have?
- c.** Describe the angles.



Early Finishers

Real-World Connection

Eight students have decided to paint a rectangular mural in the school cafeteria. Five of Mrs. Lowery's students and three of Mr. Rushing's students will be painting equal sections for the mural.

- a.** Draw a diagram representing how much of the mural each class will paint.
- b.** Are Mrs. Lowery's or Mr. Rushing's students painting more than half of the mural?
- c.** Explain your answer for part **b.**

• **Changing Improper Fractions to Whole or Mixed Numbers**

Power Up

facts

Power Up A

mental math

Think of one cent more or less than quarters in **a–c**.

- a. **Number Sense:** $425 + 374$
- b. **Number Sense:** $550 - 324$
- c. **Number Sense:** $\$4.49 + \2.26
- d. **Number Sense:** 15×40
- e. **Time:** Each section of the test takes 25 minutes. There is a 5-minute break between sections. If the class starts the test at 9:00 a.m., how many sections can the class finish by 10:30 a.m.?
- f. **Estimation:** Estimate 35×25 . Round 35 to 40, round 25 down to 20, and then multiply.
- g. **Calculation:** 2×2 , square the number, $+ 4$, $\div 5$, $- 4$
- h. **Roman Numerals:** Write 34 in Roman numerals.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Todd rode his bicycle down his 50-foot driveway and counted eight full turns of the front wheel. How many times will the front wheel turn if he rides 100 yards?

New Concept

If the numerator of a fraction is equal to or greater than the denominator, the fraction is an *improper fraction*. All of these fractions are improper fractions:

$$\frac{3}{2} \quad \frac{5}{4} \quad \frac{10}{3} \quad \frac{9}{4} \quad \frac{5}{5}$$

Model Use fraction manipulatives to show $\frac{3}{2}$ and $\frac{5}{4}$ as mixed numbers.

To write an improper fraction as a whole or mixed number, we divide to find out how many wholes the improper fraction contains. If there is no remainder, we write the improper fraction as a whole number. If there is a remainder, the remainder becomes the numerator in a mixed number.

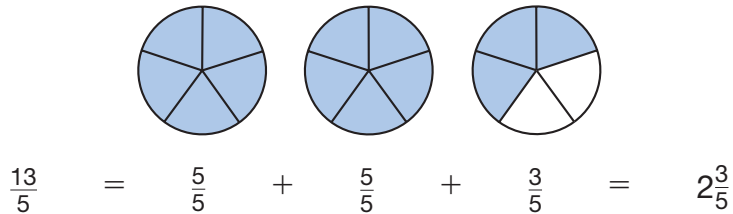
Example 1

Write $\frac{13}{5}$ as a mixed number. Draw a picture to show that the improper fraction and mixed number are equal.

To find the number of wholes, we divide.

$$\begin{array}{r} 2 \leftarrow \text{wholes} \\ 5 \overline{)13} \\ \underline{10} \\ 3 \leftarrow \text{remainder of 3} \end{array}$$

This division tells us that $\frac{13}{5}$ equals two wholes with three fifths left over. We write this as $2\frac{3}{5}$. We can see that $\frac{13}{5}$ equals $2\frac{3}{5}$ if we draw a picture.



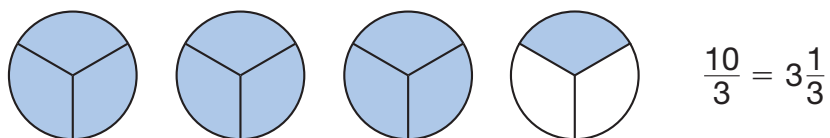
Example 2

Write $\frac{10}{3}$ as a mixed number. Then draw a picture to show that the improper fraction and mixed number are equal.

First we divide.

$$\begin{array}{r} 3 \\ 3 \overline{)10} \\ \underline{9} \\ 1 \end{array}$$

From the division we see that there are three wholes. One third is left over. We write $3\frac{1}{3}$. Then we draw a picture to show that $\frac{10}{3}$ equals $3\frac{1}{3}$.



Formulate Give a real-world example for dividing items into groups of $3\frac{1}{3}$.

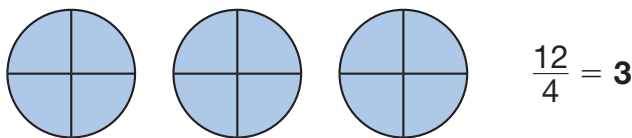
Example 3

Write $\frac{12}{4}$ as a whole number. Then draw a picture to show that the improper fraction and whole number are equal.

First we divide.

$$\begin{array}{r} 3 \\ 4 \overline{)12} \\ \underline{12} \\ 0 \end{array}$$

We have three wholes and no remainder. Our picture looks like this:



Discuss Explain how $\frac{4}{4}$ is related to $\frac{12}{4}$.

Lesson Practice

Represent Change each improper fraction to a whole number or to a mixed number. Then draw a picture to show that the improper fraction is equal to the number you wrote.

a. $\frac{7}{2}$

b. $\frac{12}{3}$

c. $\frac{8}{3}$

d. $\frac{15}{5}$

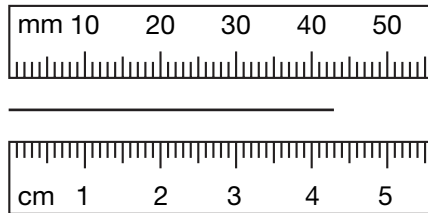
Written Practice

Distributed and Integrated

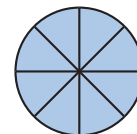
- *1. a. If the perimeter of a square is 280 feet, how long is each side of the square?
(Inv. 2)
- b. What is the area?
- *2. There are 365 days in a common year. How many full weeks are there in 365 days?
(54, 88)
- *3. Nia passed out crayons to 6 of her friends. Each friend received 3 crayons. There were 2 crayons left for Nia. How many crayons did Nia have when she began?
(88, 94)

- *4. **Represent** (95) Three fifths of the 60 trees in the orchard were more than 10 feet tall. How many trees were more than 10 feet tall? Draw a picture to illustrate the problem.

5. a. Find the length of this line segment in millimeters.
 b. Find the length of the line segment in centimeters. Write the answer as a decimal number.



- *6. (103) What fraction name for 1 is shown by this circle?




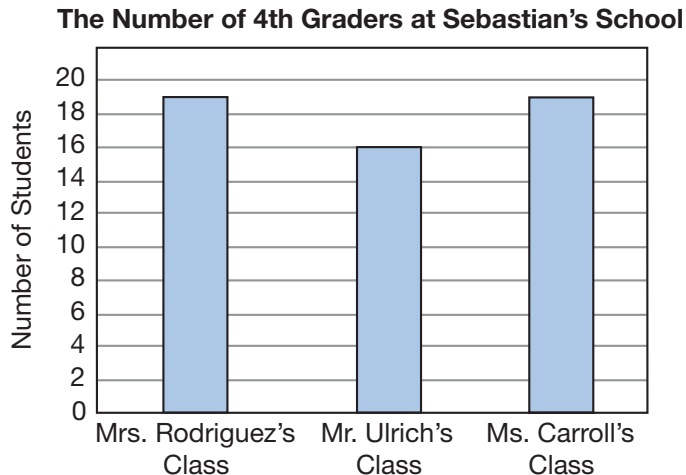
- *7. (20, 54) Round \$350,454 to the nearest thousand, to the nearest hundred, and to the nearest ten.

- *8. (37, 102) Copy this number line. Then make a dot at $\frac{1}{2}$ and label the dot point A. Make a dot at 1.3 and label the dot point B. Make a dot at $1\frac{7}{10}$ and label the dot point C.



- *9. (104) **Represent** Change the improper fraction $\frac{5}{4}$ to a mixed number. Draw a picture to show that the improper fraction and the mixed number are equal.

- * 10.**  **Interpret** The bar graph shows the number of students in fourth grade at Sebastian's school. Use the graph to answer the questions that follow.



- a. How many fewer students are in Mr. Ulrich's class than in Ms. Carroll's class or in Mrs. Rodriguez's class?
 - b. Altogether, how many fourth grade students does the bar graph represent?
 - c. Which measure of the data is greater: the range or the median? Explain your answer.
- 11.** (49, 67) The baker used 30 pounds of flour each day to make bread. How many pounds of flour did the baker use in 73 days?
- 12.** (96) The chef used 132 pounds of potatoes every 6 days. On average, how many pounds of potatoes were used each day?
- 13.** (43) $\$6.52 + \$12 + \$1.74 + 26\text{¢}$
- 14.** (50) $3.65 + 2.7 + 0.454 + 2.0$
- 15.** (43, 45) $\$80 - (\$63.72 + \$2)$
- 16.** (52) $37,614 - 29,148$
- 17.** (61) $9w = 9 \cdot 26$
- * 18.** (62) 3^4
- 19.** (85) 24×1000
- 20.** (48) $79\text{¢} \times 6$

$$\begin{array}{r} 21. \quad 50 \\ (86) \quad \times 50 \\ \hline \end{array}$$

$$\begin{array}{r} 22. \quad 51 \\ (90) \quad \times 49 \\ \hline \end{array}$$

$$\begin{array}{r} 23. \quad 47 \\ (90) \quad \times 63 \\ \hline \end{array}$$

$$\begin{array}{r} 24. \quad 4 \overline{)810} \\ (76) \end{array}$$

$$\begin{array}{r} 25. \quad 5 \overline{)490} \\ (65) \end{array}$$

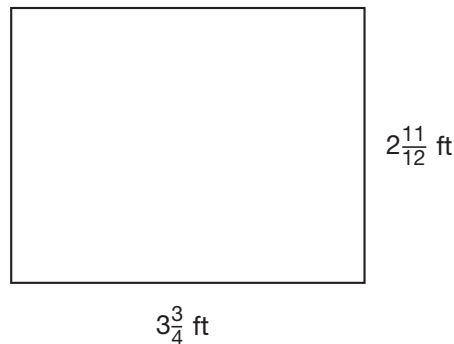
$$\begin{array}{r} 26 \quad 6 \overline{)362} \\ (65, 68) \end{array}$$

$$\begin{array}{r} 27. \quad 1435 \div \sqrt{49} \\ (Inv. 3, 80) \end{array}$$

*28. How many 8-ounce glasses of milk can be poured from one gallon of milk?
(40)

*29. Round $16\frac{5}{8}$ to the nearest whole number.
(103)

*30. Estimate the area of a window with the dimensions shown.
(Inv. 3)



Early Finishers
Real-World Connection

Joyce went fishing for crustaceans with her brothers and caught $2\frac{1}{4}$ pounds of crab, $1\frac{1}{4}$ pounds of lobster, and $2\frac{3}{4}$ pounds of shrimp.

- Write each mixed number as an improper fraction.
- Use fraction manipulatives or diagrams to show and find the total number of pounds of crustaceans that Joyce caught.
- Which crustacean did Joyce catch the most pounds of?

• **Dividing by 10**

Power Up

facts

Power Up A

mental math

Think of one cent more or less than quarters in **a–c**.

- a. **Number Sense:** $126 + 375$
- b. **Number Sense:** $651 - 225$
- c. **Number Sense:** $\$6.51 + \2.75
- d. **Money:** The atlas cost $\$16.25$. Amol paid for it with a $\$20$ bill. How much change should he receive?
- e. **Measurement:** Fran drank $1\frac{1}{2}$ quarts of water. How many pints did she drink?
- f. **Estimation:** Estimate 32×28 .
- g. **Calculation:** $40 \div 4, \times 6, + 4, \sqrt{\quad}, - 8$
- h. **Roman Numerals:** Compare: XIX ○ 20

problem solving

Choose an appropriate problem-solving strategy to solve this problem. This sequence has an alternating pattern. Copy this sequence on your paper, and continue the sequence to 18. Then describe the pattern in words.

0, 5, 3, 8, 6, 11, 9, 14, ...

New Concept

Thinking Skill

Verify

What are the 4 steps in division?

We have used a four-step procedure to divide by one-digit numbers. We will use the same four-step procedure to divide by two-digit numbers. In this lesson we will learn how to divide by 10.

Example

Divide: $10\overline{)432}$

Ten will not divide into 4 but will divide into 43 four times. In Step 1 we are careful to write the 4 above the 3 in 432.

Step 1: We find $10\overline{)43}$ and write “4.”

Step 2: We multiply 4 by 10 and write “40.”

Step 3: We subtract 40 from 43 and write “3.”

Step 4: We bring down the 2, making 32.

Repeat:

Step 1: We divide 32 by 10 and write “3.”

Step 2: We multiply 3 by 10 and write “30.”

Step 3: We subtract 30 from 32 and write “2.”

Step 4: There is no number to bring down.

The answer is 43 with a remainder of 2.

$$\begin{array}{r} 4 \\ 10\overline{)432} \\ \underline{40} \\ 32 \end{array}$$

$$\begin{array}{r} 43 \text{ R } 2 \\ 10\overline{)432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Thinking Skill

Discuss

Why do we place the digit 4 in the tens place of the quotient?

Notice that the remainder is the last digit of the dividend. When dividing by 10, there will be no remainder if the last digit of the whole-number dividend is zero. Otherwise, the remainder will be the last digit of the dividend.

Justify How can we check the answer?

Lesson Practice

Divide:

a. $10\overline{)73}$

b. $10\overline{)342}$

c. $10\overline{)243}$

d. $10\overline{)720}$

e. $10\overline{)561}$

f. $10\overline{)380}$

g. **Multiple Choice** Which of these numbers can be divided by 10 without a remainder?

A 365

B 472

C 560

D 307

Written Practice


Distributed and Integrated

1. How many 6¢ erasers can be bought with 2 quarters?
(88)

2. Two quarters are what percent of a dollar?
(Inv. 5)


3. D’Jmon has \$8. Parisa has \$2 more than D’Jmon. How much money do they have altogether?
(94)

*4. **Represent** Three fourths of the 20 students in a class participate in an after-school activity. What number of students participate? Draw a picture to illustrate and solve the problem.
(95)

*5.  **Justify** If one card is drawn from a standard deck of playing cards, is it more likely that the card will be a “number card” or a “face card”? Explain your answer.
(Inv. 10)

*6. Write a fraction equal to one that has a denominator of 10.
(103)

7. **Represent** Write 86.743 with words.
(84)

*8.  **Estimate** There are many ways to make an estimate. Describe two different ways to estimate the difference of 496 subtracted from 605.
(59)

*9. Change each improper fraction to a whole number or a mixed number:
(104)

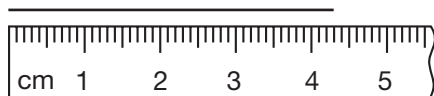
a. $\frac{9}{5}$

b. $\frac{9}{3}$

c. $\frac{9}{2}$

*10. **Estimate** Soon after James Marshall discovered gold at John Sutter’s mill in California on January 24, 1848, the “gold rush” began. If 2400 people came in 10 days, about how many came each day? About how many people came in 1 week?
(94, 105)

11. Find the length of this segment to the nearest tenth of a centimeter. Write the length as a decimal number.
(69)



*12. A miner bought 6 bags of flour for \$4.20 per bag and 8 pounds of salt for 12¢ per pound. How much money did the miner spend?
(94)

*13. a. Which digit in 86.743 is in the tenths place?
(91, 102)

b. Is 86.74 closer to 86.7 or 86.8?

*14. Draw a trapezoid.
(92)

15. $4.867 - (2.8 + 0.56)$
(45, 50)

16. 30^2
(62, 86)

17. 54×29
(90)

*18. $10 \overline{)230}$
(105)

19. $7 \overline{)2383}$
(80)

*20. $372 \div 10$
(105)

21. $8c = \$5.76$
(41)

22. 12
(17)

23. $\begin{array}{r} 351,426 \\ + 449,576 \\ \hline \end{array}$
(51)


24. $\begin{array}{r} \$50.00 \\ - \$49.49 \\ \hline \end{array}$
(52)

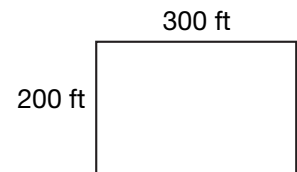
26
26
13
35
110
8
+ 15

25. $\begin{array}{r} \$12.49 \\ \times \quad 8 \\ \hline \end{array}$
(48)

26. $\begin{array}{r} 73 \\ \times 62 \\ \hline \end{array}$
(90)

*27. a. A field is 300 feet long and 200 feet wide. How many feet of fencing would be needed to go around the field?
(Inv. 2)

b.  **Explain** Is this problem about perimeter or area? How do you know?



*28. Which letters in **MATH** have one line of symmetry? Which have two lines of symmetry? Which have rotational symmetry?
(79)

*29. Which transformation can make the digit 6 look like the digit 9?
(73)

- * 30.** **Interpret** Use this chart to answer parts **a–c**.
(101)

Mileage Chart

	Atlanta	Boston	Chicago	Kansas City	Los Angeles	New York City	Wash., D.C.
Chicago	674	963		499	2054	802	671
Dallas	795	1748	917	489	1387	1552	1319
Denver	1398	1949	996	600	1059	1771	1616
Los Angeles	2182	2979	2054	1589		2786	2631
New York City	841	206	802	1198	2786		233
St. Louis	541	1141	289	257	1845	948	793

- The distance from Los Angeles to Boston is how much greater than the distance from Los Angeles to New York City?
- Heather is planning a trip from Chicago to Dallas to Los Angeles to Chicago. How many miles will her trip be?
- There are three empty boxes in the chart. What number would go in these boxes?

Early Finishers

Real-World Connection

There are 728 students in the auditorium. Ten students can fit in each row. The students are to fill as many rows as possible.

- Divide 722 by 10.
- How many rows are filled?
- How many rows are only partly filled? Why?

• Evaluating Expressions

Power Up

facts

Power Up A

mental math

Find each fraction of 24.

- Fractional Parts:** $\frac{1}{2}$ of 24
- Fractional Parts:** $\frac{1}{3}$ of 24
- Fractional Parts:** $\frac{1}{4}$ of 24
- Number Sense:** 4×18
- Money:** Stefano has \$3.75 in his pocket and \$4.51 in his piggy bank. Altogether, how much money does Stefano have?
- Estimation:** Estimate 62×19 .
- Calculation:** 5^2 , $+ 10$, $- 3$, $\div 4$, $\times 2$
- Roman Numerals:**¹ Write CX in our number system.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Two cups make a pint. Two pints make a quart. Two quarts make a half gallon, and two half gallons make a gallon. A pint of water weighs about one pound. Find the approximate weight of a cup, a quart, a half gallon, and a gallon of water.

New Concept

Math Language

We can *evaluate* an expression by replacing a letter with a number. Then we perform the operations to simplify the expression.

What is the value of the following expression?

$$n + 7$$

The value of the expression depends on the value of n . If we know a value for n , then we can **evaluate** the expression by adding 7 to the value of n .

¹ In Lessons 106–120, the Mental Math section “Roman Numerals” reviews concepts from Appendix Topic B. You may skip these Mental Math problems if you have not covered Appendix Topic B.

Example

If r is 5, then what is the value of each of these expressions?

a. $r + 3$

b. $r - 3$

c. $3r$

We are told that the value of r is 5. To find the value of each expression, we substitute 5 in place of r and perform the calculation.

a. $r + 3$

$$5 + 3 = 8$$

b. $r - 3$

$$5 - 3 = 2$$

c. $3r$

$$3 \times 5 = 15$$

Lesson Practice

- If m equals 12, then what is the value of $m - 10$?
- Evaluate $a + b$ when $a = 9$ and $b = 15$.
- What is the value of xy when x is 6 and y is 7?
- What is the value of w^2 when w is 5?
- If $A = lw$, then what is A when l is 8 and w is 4?
- Evaluate $\frac{m}{n}$, using $m = 12$ and $n = 3$.
- Find the value of \sqrt{t} when t is 16.

Written Practice

Distributed and Integrated

- *1. Use this information to answer parts **a–c**.

(94)

Nara has 6 cats. Each cat eats half of a can of food each day. Cat food costs 47¢ per can.

- How many cans of cat food are eaten each day?
- How much does Nara spend on cat food per day?
- How much does Nara spend on cat food in a week?

- *2. a. Sketch a right triangle. Label the vertices A , B , and C , so that C is at the right angle.

(63)

- Name two segments that are perpendicular.
- Name two segments that intersect but are not perpendicular.
- Can a triangle have two parallel sides?

- *3. **Represent** (39) Four students are planning a race. Draw a tree diagram to show all of the different ways that Quinton, Katelyn, and Nafuna can finish the race if Rita wins the race. Then list all the possible combinations.



4. (Inv. 3, 86) If the perimeter of a square classroom is 120 feet, then how long is each side of the classroom? What is the area of the classroom?

- *5. **Represent** (95) Math was the favorite class of five sevenths of the 28 students. Math was the favorite class of how many students? Draw a picture to illustrate the problem.

- *6. **Analyze** (99) Something is wrong with this sign. Draw two different signs to show how to correct the error.



7. (21, 39) If the radius of a circle is $1\frac{1}{2}$ inches, then what is the diameter of the circle?

8. **Represent** (Inv. 4) Use words to write 523.43.

9. **Estimate** (93) Colin used rounding to estimate the product of 61 and 397. What estimate did Colin make? Explain your answer.

- *10. (104) Change each improper fraction to a whole number or a mixed number:

a. $\frac{10}{10}$

b. $\frac{10}{5}$

c. $\frac{10}{3}$

- *11. (94) LaTonya went to the fair with \$20. She paid \$6.85 for a necklace and \$4.50 for lunch. Then she bought bottled water for 75¢. How much money did she have left?

- *12. **Explain** (83) Clara bought two dolls priced at \$7.40 each. The tax was 98¢. She paid the clerk with a \$20 bill. How much change did she get back? Explain why your answer is reasonable.

13. The big truck that transported the Ferris wheel could go only 140 miles in 5 hours. What was the truck's average speed in miles per hour?

***14.** Compare: $\frac{49}{100} \bigcirc \frac{1}{2}$

***15. a.** **Estimate** Round \$12.25 to the nearest dollar.

b. Round 12.25 to the nearest whole number.

***16. a.** Which digit in 36.47 is in the tenths place?

(91, 102)

b. **Estimate** Is 36.47 closer to 36.4 or to 36.5?

$$\begin{array}{r} 17. \quad 73.48 \\ (50) \quad 5.63 \\ + 17.9 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad \$65.00 \\ (52) \quad - \$29.87 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \quad 24,375 \\ (52) \quad - 8,416 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \quad \$3.68 \\ (58) \quad \times \quad 9 \\ \hline \end{array}$$

$$21. \quad 89 \times 91$$

(90)

$$22. \quad 3 \overline{)3210}$$

(76)

$$*23. \quad 10 \overline{)4300}$$

(105)

$$24. \quad 6 \overline{)\$57.24}$$

(76)

$$25. \quad 765 \div 9$$

(65)

$$*26. \quad 563 \div 10$$

(105)

***27.** Find the value of n^2 when n is 90.

(106)

***28.** Find the value of $\frac{m}{\sqrt{m}}$ when m is 36.

(106)

***29. a.** **Multiple Choice** The sum of $6\frac{3}{4}$ and $5\frac{3}{5}$ is between which two numbers?

(59)

A 5 and 7

B 30 and 40

C 0 and 2

D 11 and 13

b. Explain your answer for part **a**.

***30.** The African bush elephant is the heaviest land mammal on Earth. Even though it eats only twigs, leaves, fruit, and grass, an African bush elephant can weigh 7 tons. Seven tons is how many pounds?

(77)

• Adding and Subtracting Fractions with Common Denominators

Power Up

facts

Power Up B

mental math

Find each fraction of 30 in **a–c**.

- a. **Fractional Parts:** $\frac{1}{2}$ of 30
- b. **Fractional Parts:** $\frac{1}{3}$ of 30
- c. **Fractional Parts:** $\frac{1}{5}$ of 30
- d. **Number Sense:** 50×28

e. **Time:** The soccer match ended at 1:15 p.m. The match had started $1\frac{1}{2}$ hours earlier. When did the match begin?

f. **Estimation:** To estimate 26×19 , round 26 down to 25, round 19 up to 20, and then multiply.

g. **Calculation:** $5 \times 2, \times 10, \div 2, - 1, \sqrt{\quad}$

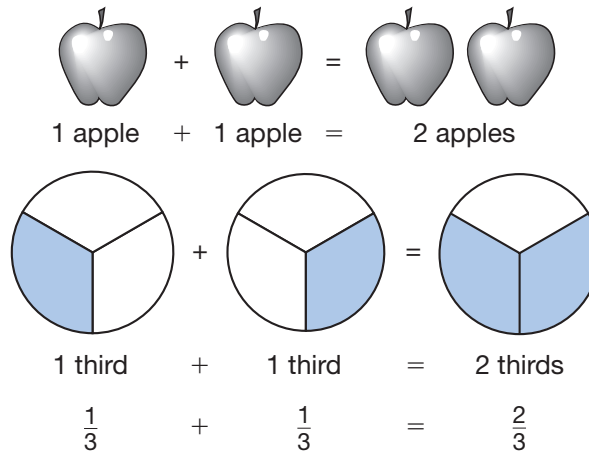
h. **Roman Numerals:** Write LXV in our number system.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. In parts of the country where “daylight saving time” is observed, we follow the rule “spring forward, fall back.” This rule means we turn the clock forward one hour in the spring and back one hour in the fall. Officially, clocks are reset at 2 a.m. on a Sunday. How many hours long are each of those Sundays when the clocks are reset?

New Concept

When adding fractions, it helps to think of the denominators as objects such as apples. Just as 1 apple plus 1 apple equals 2 apples, 1 third plus 1 third equals 2 thirds.



When we add fractions, we add the numerators (top numbers). We do not add the denominators (bottom numbers).

Example 1

Blake mixed $\frac{3}{5}$ of a pound of cashews with $\frac{1}{5}$ of a pound of pecans. What is the weight in pounds of the cashew and pecan mixture?

We add only the top numbers. Three fifths plus one fifth is four fifths. The weight of the cashew and pecan mixture is $\frac{4}{5}$ of a pound.

$$\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$$

Likewise, when we subtract fractions, we subtract only the numerators. The denominator does not change. For example, five sevenths minus two sevenths is three sevenths.

$$\frac{5}{7} - \frac{2}{7} = \frac{3}{7}$$

Example 2

To make a small bow for a present, D’Nietra cut $\frac{1}{5}$ of a yard of ribbon from a length of ribbon that was $\frac{3}{5}$ of a yard long. What is the length of the ribbon that was not used for the bow?

We subtract only the numerators. Three fifths minus one fifth is two fifths. The length of the ribbon not used for the bow is $\frac{2}{5}$ of a yard.

$$\frac{3}{5} - \frac{1}{5} = \frac{2}{5}$$

Discuss How can we check the answer?

Recall that a mixed number is a whole number plus a fraction, such as $2\frac{3}{5}$. To add mixed numbers, we add the fraction parts and then the whole-number parts.

Example 3

Add: $2\frac{3}{5} + 3\frac{1}{5}$

It is helpful to write the numbers one above the other. First we add the fractions and get $\frac{4}{5}$. Then we add the whole numbers and get 5. The sum of the mixed numbers is $5\frac{4}{5}$.

$$\begin{array}{r} 2\frac{3}{5} \\ + 3\frac{1}{5} \\ \hline 5\frac{4}{5} \end{array}$$

Example 4

Subtract: $5\frac{2}{3} - 1\frac{1}{3}$

We subtract the second number from the first number. To do this, we write the first number above the second number. We subtract the fractions and get $\frac{1}{3}$. Then we subtract the whole numbers and get 4. The difference is $4\frac{1}{3}$.

$$\begin{array}{r} 5\frac{2}{3} \\ - 1\frac{1}{3} \\ \hline 4\frac{1}{3} \end{array}$$

Example 5

In the race Martin rode his bike $7\frac{1}{2}$ miles and ran $2\frac{1}{2}$ miles. Altogether, how far did Martin ride his bike and run?

This is a story about combining. We add $7\frac{1}{2}$ miles and $2\frac{1}{2}$ miles. The two half miles combine to make a whole mile. The total distance is **10 miles**.

$$\begin{array}{r} 7\frac{1}{2} \\ + 2\frac{1}{2} \\ \hline 9\frac{2}{2} = 10 \end{array}$$

Lesson Practice

Find each sum or difference:

a. $\frac{1}{3} + \frac{1}{3}$

b. $\frac{1}{4} + \frac{2}{4}$

c. $\frac{3}{10} + \frac{4}{10}$

d. $\frac{2}{3} - \frac{1}{3}$

e. $\frac{3}{4} - \frac{2}{4}$

f. $\frac{9}{10} - \frac{6}{10}$

g. $2\frac{1}{4} + 4\frac{2}{4}$

h. $5\frac{3}{8} + 1\frac{2}{8}$

i. $8 + 1\frac{2}{5}$


j. $4\frac{3}{5} - 1\frac{1}{5}$

k. $9\frac{3}{4} - 4\frac{2}{4}$

l. $12\frac{8}{9} - 3\frac{3}{9}$

m. How much is three eighths plus four eighths?

n. The troop hiked to the end of the trail and back. If the trail was $3\frac{1}{2}$ miles long, how far did the troop hike?

*** 1.**  **Justify** Hayley bought 5 tickets for \$2.75 each. She paid for them with a \$20 bill. How much change should she receive? Explain why your answer is reasonable.

(83)

2. If fifty cents is divided equally among 3 friends, there will be some cents left. How many cents will be left?

(88)

3. What is the difference when four hundred nine is subtracted from nine hundred four?

(30)

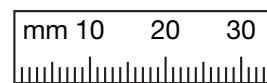
*** 4.** **Represent** Two fifths of the 45 stamps were from Brazil. How many stamps were from Brazil? Draw a picture to illustrate the problem.

(95)

*** 5. a.** Find the length of this line segment in millimeters.

(69)

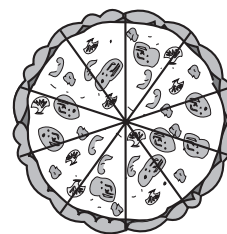
b. Find the length of the segment in centimeters.



*** 6. a.** The pizza was cut into 10 equal slices. The entire sliced pizza shows what fraction name for 1?

(Inv. 5, 103)

b. One slice of the pizza is what percent of the whole pizza?



*** 7. Multiple Choice** If a number cube is tossed once, which of these is the most likely outcome?

(Inv. 10)

A 1

B 3

C a number greater than 1

D a number less than 3

8. Estimate Round 5167 to the nearest thousand.

(54)

*** 9.** Change the improper fraction $\frac{9}{4}$ to a mixed number.

(104)

*** 10. Multiple Choice** Which of these fractions is *not* equal to 1?

(103)

A $\frac{12}{12}$

B $\frac{11}{11}$

C $\frac{11}{10}$


D $\frac{10}{10}$

11. In the summer of 1926, there were only 17 stores in the town. Today there are 8 times as many stores in the town. How many stores are in the town today?

(48, 72)

12. The wagon train took 9 days to make the 243-mile journey. What was the average number of miles traveled per day?

(96)

*** 13.**  **Explain** On Saturday Jacinda played outside for $1\frac{1}{2}$ hours and played board games for $2\frac{1}{2}$ hours. Altogether, how much time did Jacinda spend playing outside and playing board games? Explain how you found your answer.

(107)

*** 14.** **Estimate** Round $8\frac{21}{100}$ to the nearest whole number.

(37, 59)

15.
$$\begin{array}{r} 36.31 \\ - 7.4 \\ \hline \end{array}$$

(50)

*** 16.** $\frac{5}{8} + \frac{2}{8}$

(107)

17.
$$\begin{array}{r} 6 \\ 5 \\ 4 \\ 3 \\ + n \\ \hline 25 \end{array}$$

(2)

*** 18.** $\frac{9}{10} - \frac{2}{10}$

(107)

*** 19.** $3\frac{2}{5} + 1\frac{1}{5}$

(107)

20. 27×32

(90)

21. 62×15

(90)

22. $7^2 + \sqrt{49}$

(Inv. 3,
62)

*** 23.** $10 \overline{)460}$

(105)

24. $9 \overline{) \$27.36}$

(76, 80)

25. $6w = 2316$

(41, 76)

26. $1543 \div 7$

(80)

*** 27.** $532 \div 10$

(105)

28. $\frac{256}{8}$

(65)

*** 29. a.** How many square feet of shingles are needed to cover a rectangular roof that is 40 feet wide and 60 feet long?

(Inv. 3,
86)

b. Is this problem about area or perimeter? How do you know?

30. Shaun walked $2\frac{1}{5}$ miles on Monday. He walked $3\frac{4}{5}$ miles on Wednesday. How many more miles did Shaun walk on Wednesday than on Monday?

(107)

- Formulas
- Distributive Property

Power Up

facts

Power Up B

mental math

Find each fraction of 36 in **a–c**.

- Fractional Parts:** $\frac{1}{2}$ of 36
- Fractional Parts:** $\frac{1}{3}$ of 36
- Fractional Parts:** $\frac{1}{4}$ of 36
- Number Sense:** $83 - 68$
- Geometry:** What is the perimeter of a hexagon with sides that are each 5 cm long?
- Estimation:** Camille is cutting lengths of yarn that are each $7\frac{3}{4}$ inches long. If she must cut 6 pieces of yarn, about how many inches of yarn will she need?
- Calculation:** $10 \div 2, \times 8, - 4, \div 6$
- Roman Numerals:** Write CL in our number system.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. In this sequence, each term is the sum of the two preceding terms. Copy this sequence and find the next four terms.

1, 1, 2, 3, 5, 8, _____, _____, _____, _____, ...

New Concepts

Formulas

Recall that we find the area of a rectangle by multiplying its length by its width.

$$\text{Area} = \text{length} \times \text{width}$$

This expression is a *formula* for finding the area of any rectangle. Usually formulas are written so that a letter represents each measure.

Below we list several common formulas. In these formulas, P stands for perimeter, and s represents the side length of a square.

Some Common Formulas

Area of a rectangle	$A = lw$
Perimeter of a rectangle	$P = 2(l + w)$ $P = 2l + 2w$
Area of a square	$A = s^2$
Perimeter of a square	$P = 4s$

Some figures are combinations of rectangles. In Example 1, we see that the floor area of the house can be found by dividing the figure into rectangles and then adding the areas of the rectangles.

Example 1

The diagram shows the blueprint of a one-story house.

a. What is the perimeter of the house?

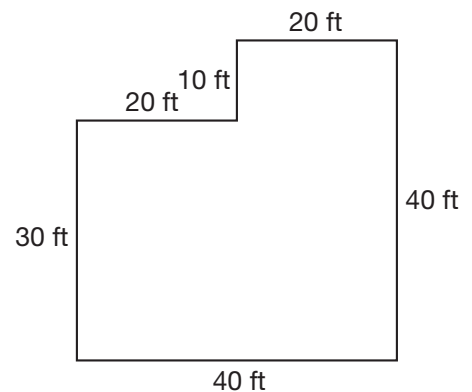
b. What is the floor area of the house?

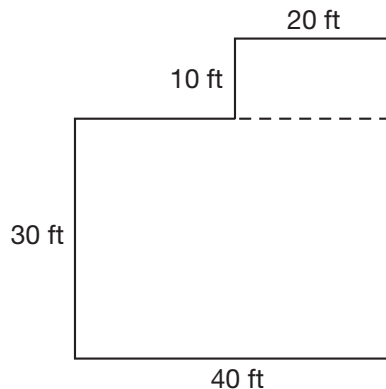
a. The perimeter of the house is the distance around the house. We add the lengths of the six sides.

$$30 + 40 + 40 + 20 + 10 + 20 = 160$$

Adding the lengths of the sides, we find that the perimeter of the house is **160 ft**.

b. To find the floor area, we first divide the figure into two rectangles. We show one way to do this on the next page.





We have divided the figure with dashes, and we have labeled the length and width of both rectangles. Now we find the area of each rectangle.

$$\begin{array}{r}
 \text{Small rectangle} = 200 \text{ sq. ft} \\
 + \text{Large rectangle} = 1200 \text{ sq. ft} \\
 \hline
 \text{Total Area of Figure} = 1400 \text{ sq. ft}
 \end{array}$$

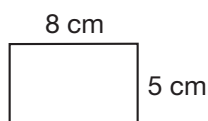
Adding the areas of the two rectangles, we find that the total floor area is **1400 sq. ft.**

Distributive Property

There are two formulas for the perimeter of a rectangle. One of the formulas is

$$P = 2(l + w)$$

This formula tells us to add the length and width of a rectangle and then multiply by 2. Applying this formula to the rectangle below, we add 8 cm to 5 cm and get 13 cm. Then we double 13 cm and get 26 cm.



The other formula for the perimeter of a rectangle is

$$P = 2l + 2w$$

This formula tells us to double the length, double the width, and then add the results. Applying this formula to the same rectangle, we double 8 cm and get 16 cm. Then we double 5 cm and get 10 cm. Then we add 16 cm to 10 cm and get 26 cm.

We see that the result of our calculations is the same using either formula for the perimeter of a rectangle. The equality of these two formulas illustrates an important property of mathematics called the **Distributive Property**.

$$2(l + w) = 2l + 2w$$

In the expression $2(l + w)$, both l and w are multiplied by 2. In other words, the multiplication by 2 is distributed over both l and w .

$$2(l + w)$$

When we multiply 2 by l , the product is $2l$.

When we multiply 2 by w , the product is $2w$.

Example 2

Use the Distributive Property to multiply:

$$4(20 + 3)$$

This problem is the same as 4×23 , except that 23 is written as $20 + 3$. We are used to adding 20 and 3 before multiplying, but the Distributive Property allows us to multiply first and then add the products.

$$4(20 + 3) = 80 + 12 = 92$$

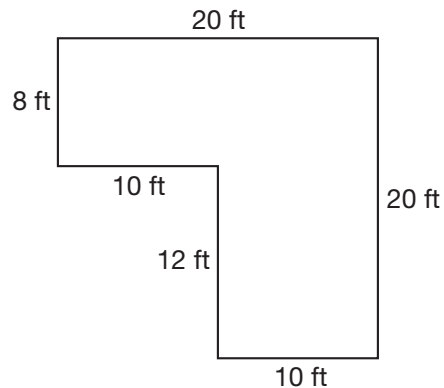
Thinking Skill

Evaluate

Why is 4×23 the same as $4(20 + 3)$?

Lesson Practice

The figure below shows the boundary of a garden. Refer to the figure to solve problems **a** and **b**.



- How many feet of wire fence are needed to enclose the garden along its boundary?
- What is the area of the garden?
- Use the Distributive Property to multiply:

$$6(10 + 6)$$

- d. Use the formula $P = 2(l + w)$ to find the perimeter of a rectangle that is 15 cm long and 10 cm wide.
- e. Use the formula $A = s^2$ to find the area of a square with sides 20 feet long.

Written Practice

Distributed and Integrated

- * 1. **Analyze** ⁽⁹⁴⁾ Cody bought 8 pounds of oranges. He gave the storekeeper a \$5 bill and received \$1.96 in change. What did 1 pound of oranges cost? What is the first step in solving this problem?
2. ⁽⁹⁴⁾ After baking a dozen raisin muffins, Ethan ate two muffins for a snack. Then he placed half of the remaining muffins in the freezer. How many muffins did Ethan place in the freezer?
3. ⁽⁹⁴⁾ What number is six less than the product of five and four?
4. ⁽⁹⁵⁾ Two thirds of the 12 guitar strings were out of tune. How many guitar strings were out of tune? Draw a picture to illustrate the problem.
- * 5. ^(Inv. 10) What is the probability that a rolled number cube will stop with exactly two dots on top?
- * 6. ⁽¹⁰³⁾ Write a fraction equal to 1 and that has a denominator of 5.
7. **Represent** ⁽³⁵⁾ Use words to write $397\frac{3}{4}$.
8. ⁽⁵⁹⁾ Estimate the sum of 4178 and 6899 by rounding both numbers to the nearest thousand before adding.
- * 9. ⁽¹⁰⁴⁾ Change each improper fraction to a whole number or a mixed number:
a. $\frac{7}{3}$ b. $\frac{8}{4}$ c. $\frac{9}{5}$
- * 10. ⁽⁹⁶⁾ The hiking club went on hikes of 8 miles, 15 miles, 11 miles, and 18 miles. What was the average length of the club's hikes?

- * **11.** For the first 3 hours, the hikers hiked at 3 miles per hour. For the next 2 hours, they hiked at 4 miles per hour. If the total trip was 25 miles, how far did they still have to go?
(57, 94)

12. What percent of a quart is a pint?
(40, Inv. 5)

13. $41.6 + 13.17 + 9.2$
(50)

14. $h + 8.7 = 26.47$
(50)

* **15.** $6\frac{3}{8} + 4\frac{2}{8}$
(107)

* **16.** $4\frac{7}{10} - 1\frac{6}{10}$
(107)

- * **17.** We may write 48 as $40 + 8$. Use the Distributive Property to find $5(40 + 8)$.
(108)

- * **18.** **Analyze** Two fifths of the students rode the bus, and one fifth traveled by car. What fraction of the students either rode the bus or traveled by car?
(107)

19. $\$0.48 \times 5$
(48)

20. 80^2
(62, 86)

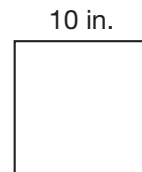
21. $\sqrt{25} \times \sqrt{25}$
(Inv. 3)

22. $4d = \$6.36$
(41, 76)

* **23.** $10 \overline{)520}$
(105)

24. $\frac{175}{5}$
(65)

- * **25.** What is the perimeter and area of this square?
(Inv. 2, Inv. 3)



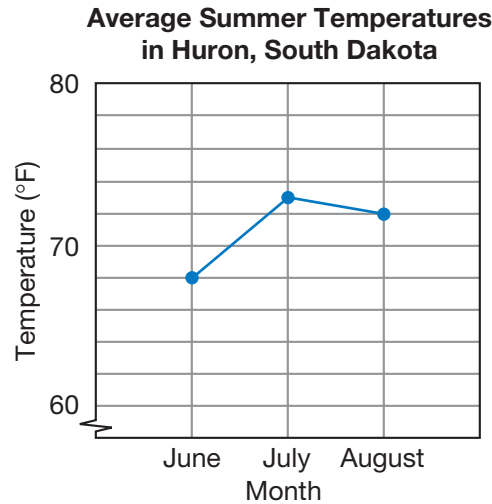
- * **26.** If a 3 in. by 4 in. rectangle is cut from the square in problem **25**, then what is the perimeter and area of the remaining figure?
(Inv. 3, 108)
- * **27.** The tabletop was 76 cm above the floor. The tabletop was how many meters above the floor?
(69, 102)

***28.**
(Inv. 6,
97)



Interpret

Use the line graph to answer parts **a–c**.



- a. Write the names of the months in order from warmest to coolest.
 - b. How many degrees warmer is the average temperature during July than the average temperature during June?
 - c. Write a sentence that explains how the mean temperature compares to the median temperature.
- *29.** (107) There were $3\frac{4}{5}$ potpies in the chef's kitchen. Then the chef removed $1\frac{3}{5}$ of the potpies. How many potpies remained in the chef's kitchen?
- *30.** (103) **Multiple Choice** The mixed numbers $5\frac{3}{8}$ and $7\frac{4}{5}$ do not have common denominators, but we know their sum is between which two numbers?
- | | |
|--------------------|--------------------|
| A 14 and 16 | B 12 and 14 |
| C 10 and 12 | D 5 and 8 |

Early Finishers

Real-World
Connection

Cardinal Elementary is preparing the stage for a school play. The stage will be covered with hay. The rectangular stage has a length of 12 feet and a width of 14 feet.

- a. How much area must be covered with hay?
- b. The perimeter of the stage will be outlined with grass. Use the formula $2(l + w)$ to find the number of feet the grass will cover.

• Equivalent Fractions

Power Up

facts

Power Up B

mental math

Find each fraction of 40 in **a–c**.

a. **Fractional Parts:** $\frac{1}{2}$ of 40

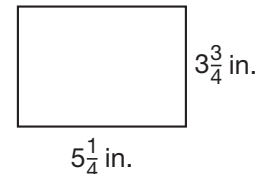
b. **Fractional Parts:** $\frac{1}{4}$ of 40

c. **Fractional Parts:** $\frac{1}{10}$ of 40

d. **Money:** S’Vanna gave the clerk a \$10 bill for a half gallon of milk that cost \$1.95. How much change should she receive?

e. **Time:** Nia was born on a Monday in April 2000. On what day of the week was her first birthday?

f. **Estimation:** Estimate the area of the rectangle shown at right.



g. **Calculation:** $\sqrt{64}$, -3 , $\times 7$, -3 , $\div 8$

h. **Roman Numerals:** Write XL in our number system.

problem solving

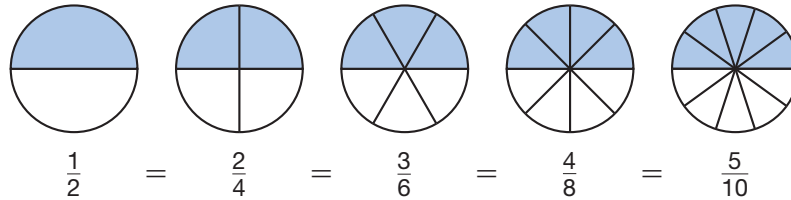
Choose an appropriate problem-solving strategy to solve this problem. There are four parking spaces (1, 2, 3, and 4) in the row nearest to the entrance of the building. Suppose only two of the four parking spaces are filled. What are the combinations of two parking spaces that could have cars in them?

New Concept

Math Language

Equivalent is another word for equal. For example, $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions, as well as equal fractions.

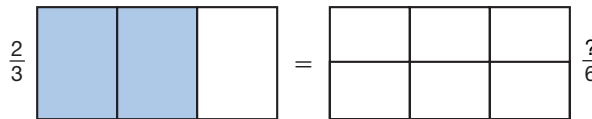
Equal portions of each circle below have been shaded. We see that different fractions are used to name the shaded portions.



These fractions all name the same amount. Different fractions that name the same amount are called **equivalent fractions**.

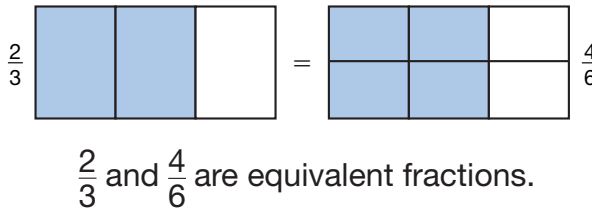
Example 1

The rectangle on the left has three equal parts. We see that two parts are shaded, so two thirds of the figure is shaded.



The rectangle on the right has six equal parts. How many parts must be shaded so that the same fraction of this rectangle is shaded?

We see that **four parts** out of six must be shaded. This means two thirds is the same as four sixths.



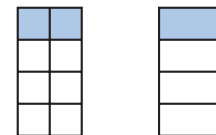
Thinking Skill

Conclude

Would we use a translation, a reflection, or a rotation to decide if the shaded areas of the rectangles are congruent?

Example 2

What equivalent fractions are shown at right?



An equal portion of each rectangle is shaded. The rectangles shown are equal.

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

Thinking Skill**Verify**

What property states that we can multiply any number by 1 and the answer is that number?

We remember that when we multiply a number by 1, the answer equals the number we multiplied.

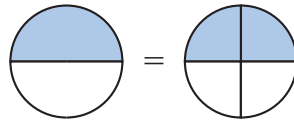
$$2 \times 1 = 2 \quad 2000 \times 1 = 2000 \quad \frac{1}{2} \times 1 = \frac{1}{2}$$

We also remember that there are many ways to write “1.”

$$1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6} = \dots$$

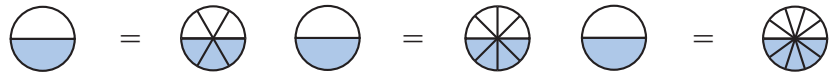
We can use these two facts to find equivalent fractions. If we multiply a fraction by a fraction name for 1, the product is an equivalent fraction.

$$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4} \quad \begin{matrix} (1 \times 2 = 2) \\ (2 \times 2 = 4) \end{matrix}$$



By multiplying $\frac{1}{2}$ by $\frac{2}{2}$, which is a fraction name for 1, we find that $\frac{1}{2}$ equals $\frac{2}{4}$. Notice that we multiply numerator by numerator and denominator by denominator. We can find other fractions equal to $\frac{1}{2}$ by multiplying by other fraction names for 1:

$$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6} \quad \frac{1}{2} \times \frac{4}{4} = \frac{4}{8} \quad \frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$$

**Example 3**

Find four fractions equal to $\frac{1}{3}$ by multiplying $\frac{1}{3}$ by $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, and $\frac{5}{5}$.

$$\frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$$

$$\frac{1}{3} \times \frac{3}{3} = \frac{3}{9}$$

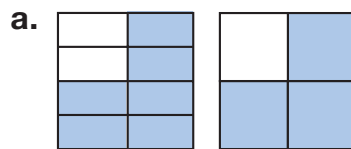
$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$$

$$\frac{1}{3} \times \frac{5}{5} = \frac{5}{15}$$

Each of our answers is a fraction equal to $\frac{1}{3}$.

Lesson Practice

Name the equivalent fractions shown:



Draw pictures to show that the following pairs of fractions are equivalent:

c. $\frac{2}{4} = \frac{1}{2}$

d. $\frac{4}{6} = \frac{2}{3}$

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

Find four equivalent fractions for each fraction below. To do this, multiply each fraction by $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, and $\frac{5}{5}$.

f. $\frac{1}{4}$


g. $\frac{5}{6}$





h. $\frac{2}{5}$

i. $\frac{1}{10}$

Written Practice

Distributed and Integrated

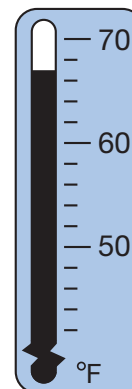
1.  **Interpret** The pictograph shows the number of motor vehicles that were driven past Sylvia's home during 1 hour. Use the pictograph to answer the questions that follow.

Type of Vehicle	Number of Vehicles
Cars	
Trucks	
Mopeds	
Motorcycles	

Key:  = 4 vehicles

- What kind of vehicle was driven past Sylvia's home two times?
 - Write a word sentence that compares the number of trucks to the number of cars.
 - Suppose ten bicyclists rode past Sylvia's house. In the pictograph, how many symbols would be needed to show the number of bicycles? Explain your answer.
- What number is six less than the sum of seven and eight? Write an expression. (94)
 - Nell read three tenths of 180 pages in one day. How many pages did she read in one day? (95)

4. ⁽¹⁸⁾ The thermometer shows the temperature of a warm October day in Buffalo, New York. What temperature does the thermometer show?



5. ⁽¹⁰³⁾ A circular disc, divided into 8 equal pieces, represents what fraction name for 1?

6. ^(21, 69) a. What is the diameter of this dime?

b. What is the radius of the dime?

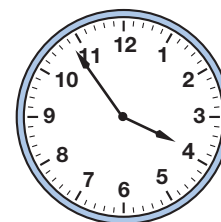
c. What is the diameter of the dime in centimeters?



7. ⁽³²⁾ There are 11 players on a football team, so when two teams play, there are 22 players on the field at one time. Across the county on a Friday night in October, many games are played. The table shows the number of players on the field for a given number of games. How many players are on the field in 5 games? 10 games?

Number of games	1	2	3	4	5
Number of players	22	44	66	88	?

8. ⁽¹⁹⁾ Rick left home in the afternoon at the time shown on the clock and arrived at a friend's house 15 minutes later. At what time did Rick arrive at his friend's house?



- *9. ⁽¹⁰⁴⁾ **Represent** Change the improper fraction $\frac{5}{2}$ to a mixed number. Draw a picture that shows that the improper fraction and the mixed number are equal.

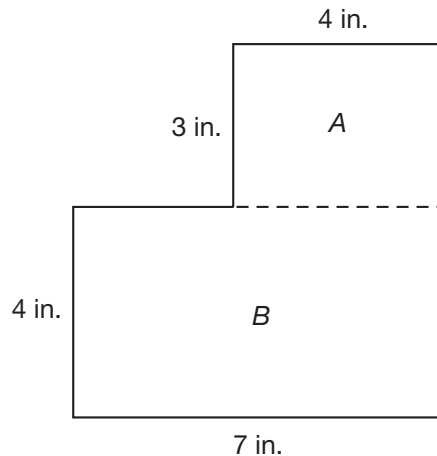
- * 10. Use the information below to answer parts **a** and **b**.
(94, 96)

Chico did 12 push-ups on the first day. On each of the next four days, he did two more push-ups than he did the day before.

- Altogether, Chico did how many push-ups in five days?
- What was the average number of push-ups Chico did per day?

- * 11. The dashes in this polygon divide the figure into two rectangles.
(Inv. 3, 79)

- What is the area of rectangle *A*?
- What is the area of rectangle *B*?
- What is the area of the whole polygon?
- Do the dashes show a line of symmetry for the figure?



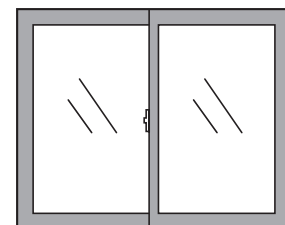
- * 12. **Analyze** There were red checkers and black checkers on the checkerboard. There were 8 more red checkers than black checkers. Altogether, there were 20 checkers. How many checkers were red, and how many were black? Guess and check to solve.
(94)

- * 13. Find three fractions equivalent to $\frac{2}{3}$ by multiplying $\frac{2}{3}$ by $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{10}{10}$.
(109)

- * 14. Since 63 equals $60 + 3$, we may find 5×63 by finding $5(60 + 3)$. Use the Distributive Property to find $5(60 + 3)$.
(108)

- * 15. Find ac when a is 18 and c is 22.
(106)

16. To open the window, Natalie slides the rectangular pane of glass on the right to the position of the pane on the left. Which transformation describes the movement of the pane of glass?
(73)



17. Find the median, mode, and range of this set of scores:
(97)

100, 100, 95, 90, 90, 80, 80, 80, 60

*** 18. Multiple Choice** If a quadrilateral has two pairs of parallel sides, then the quadrilateral is certain to be a _____.

- A rectangle
- C trapezoid

- B parallelogram
- D square

19. $v + 8.5 = 24.34$
(50)

20. $26.4 - 15.18$
(91)

21. $4 \times 3 \times 2 \times 1$
(62)

22. 26×30
(67)

23. $8 \overline{) \$16.48}$
(76, 80)

*** 24.** $10n = 250$
(41, 105)

*** 25.** $\frac{5}{12} + \frac{6}{12}$
(107)

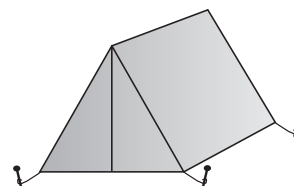
*** 26.** $\frac{8}{12} - \frac{3}{12}$
(107)

27. How many square feet of paper are needed to cover a bulletin board that is 3 feet tall and 6 feet wide?
(Inv. 3)

*** 28.** The bread recipe calls for $7\frac{1}{2}$ cups of flour to make 2 loaves of bread. The baker wants to make 4 loaves of bread. How many cups of flour does the baker need?
(107)

*** 29.** The backpackers camped in a tent. Refer to the figure at right to answer parts **a–c**.
(98)

- a. The tent has the shape of what geometric solid?
- b. Including the bottom, how many faces does it have?
- c. How many edges does it have?



*** 30.** The flag of the United States has thirteen stripes. Six of the stripes are white, and the rest of the stripes are red.
(11, 74)

- a. How many red stripes are on the flag?
- b. What fraction of the stripes on the flag are white?
- c. What fraction of the stripes on the flag are red?

• Dividing by Multiples of 10

Power Up

facts

Power Up B

mental math

Find each fraction of 100 in **a–c**.

a. Fractional Parts: $\frac{1}{2}$ of 100

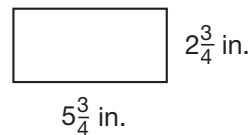
b. Fractional Parts: $\frac{1}{4}$ of 100

c. Fractional Parts: $\frac{1}{10}$ of 100

d. Number Sense: 5×46

e. Money: Doug purchased socks for \$4.37 and a hairbrush for \$2.98. How much did he spend?

f. Estimation: Estimate the area of the rectangle shown at right.



g. Calculation: 12×3 , $\sqrt{\quad}$, $\div 2$, $\div 3$

h. Roman Numerals: Write MCX in our number system.

problem solving

Choose an appropriate problem-solving strategy to solve this problem. Using at least one of each coin from a penny through a half-dollar, which nine coins would be needed to make exactly 99¢?

New Concept

In this lesson we will begin dividing by multiples of 10. Multiples of 10 are the numbers 10, 20, 30, 40, 50, 60, and so on. To help us divide by a two-digit number, we may think of dividing by the first digit only.

To help us divide this: $20 \overline{)72}$

we may think this: $2 \overline{)7}$

We use the easier division to estimate the answer to the more difficult division. Since there are three 2s in 7, we estimate that there are also three 20s in 72. Since we are dividing 72 by 20, we write the 3 above the 2 in 72.

$$\begin{array}{r} 3 \\ 20 \overline{)72} \end{array}$$

This is correct.
The 3 above the 2 means there are three 20s in 72.

$$\begin{array}{r} 3 \\ 20 \overline{)72} \end{array}$$

This is not correct!
Do not write the 3 above the 7. This would mean there are three 20s in 7, which is not true.

It is important to place the digits in the answer correctly.

Now we complete the multiplication and subtraction steps to find the remainder.

$$\begin{array}{r} 3 \text{ R } 12 \leftarrow \text{We write the answer this way.} \\ 20 \overline{)72} \\ \underline{60} \\ 12 \end{array}$$

Example

Thinking Skill

Discuss

Why do we write the digit 4 in the ones place of the quotient?

Divide: $30 \overline{)127}$

To help us divide, we mentally block out the last digit of each number. So we think “ $3 \overline{)12}$.” Since there are four 3s in 12, we estimate that there are also four 30s in 127.

We write “4” above the 7 of 127. Next we multiply 4 by 30 and write “120.” Then we subtract 120 from 127 and write “7” as the remainder.

$$\begin{array}{r} 4 \text{ R } 7 \\ 30 \overline{)127} \\ \underline{120} \\ 7 \end{array}$$

Justify Explain how you can check the answer using a calculator.

Lesson Practice

Divide:

a. $30 \overline{)72}$

b. $20 \overline{)87}$

c. $40 \overline{)95}$

d. $20 \overline{)127}$

e. $40 \overline{)127}$

f. $30 \overline{)217}$

Written Practice

Distributed and Integrated

- * 1. **Analyze** Eighty students were divided among three classrooms as equally as possible. Write three numbers to show how many students were in each of the three classrooms.

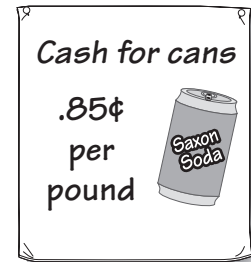
(88)

*2. **Formulate** When the sum of three and four is subtracted from the product of three and four, what is the difference? Write an equation.
(94)

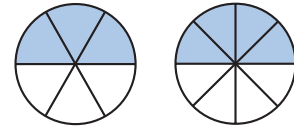
3. **Explain** Inma is twice as old as her sister and three years younger than her brother. Inma's sister is six years old. How old is Inma's brother? What is the first step?
(94)

*4. Four ninths of 513 fans cheered when the touchdown was scored. How many fans cheered?
(95)

5. This sign has an error. Draw two different signs that show how to correct the error.
(35)



*6. **Connect** These circles show fractions equivalent to $\frac{1}{2}$. Name the fractions shown.
(109)



*7. **Predict** The chance of winning the jackpot is 1%. Which is more likely, winning or not winning?
(Inv. 10)

*8. **Explain** In a sporting goods store, an aluminum baseball bat sells for \$38.49, a baseball sells for \$4.99, and a baseball glove sells for \$24.95. What is a reasonable estimate of the cost to purchase a bat, a glove, and two baseballs? Explain why your estimate is reasonable.
(20, 22)

*9. Change the improper fraction $\frac{5}{2}$ to a mixed number.
(104)

10. Paul ran 7 miles in 42 minutes. What was the average number of minutes it took Paul to run one mile?
(60, 96)

*11. Kia bought 3 scarves priced at \$2.75 each. Tax was 58¢. She paid with a \$10 bill. How much change should Kia receive?
(83)

12. **Analyze** Two tickets for the play cost \$26. At that rate, how much would twenty tickets cost?
(94)

* **13.** Hikaru is $49\frac{1}{2}$ inches tall. Dawn is $47\frac{1}{2}$ inches tall. Hikaru is how many inches taller than Dawn?
(107)

14. $7.43 + 6.25 + 12.7$
(50)

15. $q + 7.5 = 14.36$
(50)

16. 90×8000
(86)

17. $8 \times 73\text{¢}$
(48)

18. $7 \times 6 \times 5 \times 0$
(62)

19. 15^2
(Inv. 3, 62)

20. 60×5^2
(62, 67)

21. $\sqrt{49} \times \sqrt{49}$
(Inv. 3)

* **22.** $5\frac{1}{3} + 3\frac{1}{3}$
(107)

* **23.** $4\frac{4}{5} - 3\frac{3}{5}$
(107)

* **24.** $\frac{1240}{10}$
(105)

* **25.** $60 \overline{)240}$
(110)

26. This square has a perimeter of 8 cm. Find the length of each side. Then find the area of the square.
(Inv. 2, Inv. 3)



* **27.** Refer to the bus schedule below to answer parts **a–c**.
(27, 101)

Route 346

Terminal	6:43 a.m.	7:25 a.m.	3:45 p.m.
5th & Western	6:50 a.m.	7:32 a.m.	3:50 p.m.
5th & Cypress	6:54 a.m.	7:36 a.m.	3:55 p.m.
Cypress & Hill	7:01 a.m.	7:43 a.m.	4:03 p.m.
Hill & Lincoln	7:08 a.m.	7:50 a.m.	4:12 p.m.
Lincoln & 5th	7:16 a.m.	7:58 a.m.	4:20 p.m.

a. Ella catches the 6:50 a.m. bus at 5th and Western. When can she expect to arrive at Hill and Lincoln?

b. If the bus runs on schedule, how many minutes is her ride?

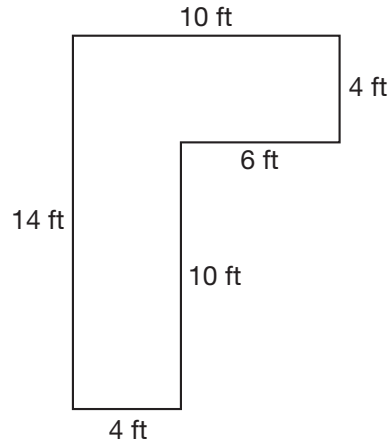
c. If Ella misses the 6:50 a.m. bus, then when can she catch the next Route 346 bus at that corner?

- 28. Predict** When Xena says a number, Yihana doubles the number and adds 3. Xena and Yihana record their numbers in a table.

X	1	2	5	7
Y	5	7	13	17

What number does Yihana record in the table if Xena says 11?

- *29.** Workers are replacing a section of broken sidewalk. Before pouring the concrete, the workers build a frame along the perimeter.



- What is the perimeter of the replaced sidewalk?
- What is the area of the replaced sidewalk?

- *30. Represent** A variety of morning times and temperatures are shown in the table below.

Morning Temperatures

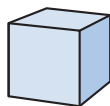
Time	Temperature (°F)
12:00 a.m.	51
2:00 a.m.	48
4:00 a.m.	49
6:00 a.m.	50
8:00 a.m.	56
10:00 a.m.	62

Display the data in a line graph. Then write one statement that describes the data.

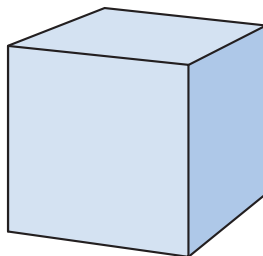
Focus on

• Volume

Shapes such as cubes, pyramids, and cones take up space. The amount of space a shape occupies is called its **volume**. We measure volume with **cubic units** like cubic centimeters, cubic inches, cubic feet, and cubic meters.



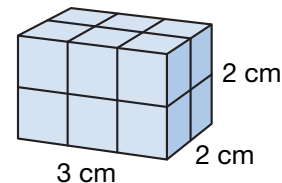
1 cubic centimeter



1 cubic inch

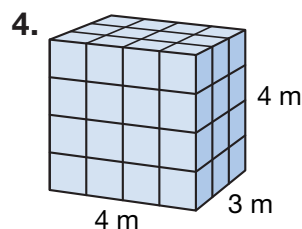
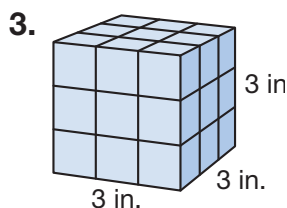
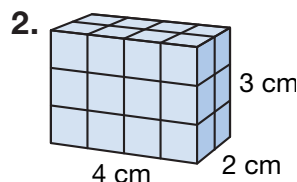
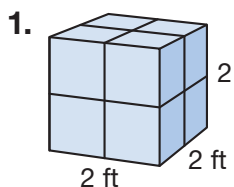
The model of the cube we constructed in Lesson 99 has a volume of one cubic inch.

Here is a model of a rectangular solid built with cubes that each have a volume of 1 cubic centimeter. To find the volume of the rectangular solid, we can count the number of cubic centimeters used to build it.



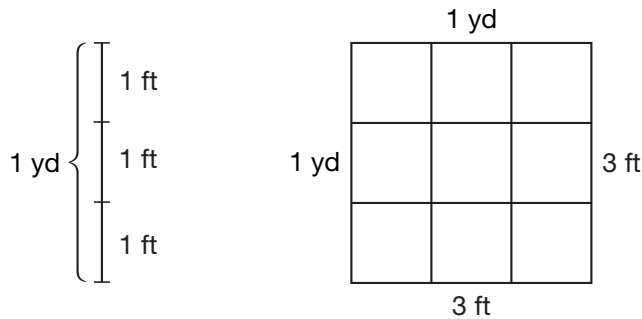
One way to count the small cubes is to count the cubes in one layer and then multiply that number by the number of layers. There are six cubes on the top layer, and there are two layers. The volume of the rectangular solid is 12 cubic centimeters.

Count cubes to find the volume of each rectangular solid below. Notice the units used in each figure.

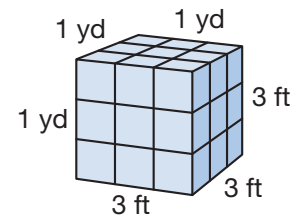


Another way to calculate the volume of a rectangular solid is to multiply the length, the width, and the height (depth) of the solid. The product of the three measures is the volume of the rectangular solid in cubic units. Use this multiplication method to find the volume of each rectangular solid in problems 1–4.

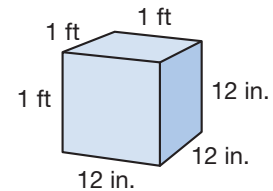
Recall that 3 feet equals 1 yard and that 9 square feet make up 1 square yard. Use this information to help you solve problem 5.



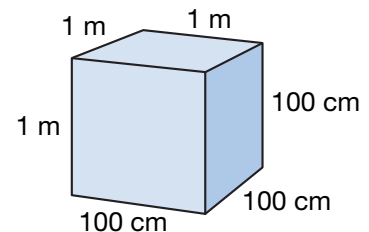
5. **Analyze** The length, width, and height of this cube are each 1 yard, so the volume of the cube is 1 cubic yard. What is the volume of the cube in cubic feet?



6. One foot equals 12 inches. One square foot equals 144 square inches. The volume of this figure is 1 cubic foot. What is its volume in cubic inches?

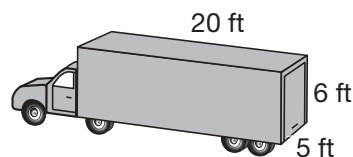


7. **Analyze** One meter equals 100 centimeters. One square meter equals 10,000 square centimeters. A shape with a volume of 1 cubic meter has a volume of how many cubic centimeters?



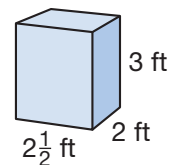
Items that we see on store shelves are usually shipped to stores in trucks. The amount of merchandise a truck can carry depends upon the capacity of the truck's trailer and the volume of the items being shipped.

Suppose the storage area of a delivery truck is shaped like a box that is 5 feet wide, 6 feet high, and 20 feet long on the inside.



8. What is the volume (capacity) of the storage area in cubic feet?

Now suppose the truck is to be loaded with boxes with the dimensions shown at right. The first boxes are stacked against the back wall (which is 5 feet wide and 6 feet high).



9. **Represent** How many of these boxes can be stacked against the back wall? Draw a diagram.
10. **Explain** If same-size boxes continue to be stacked in the truck in the same manner, then how many boxes will fit in the truck? Explain your answer.

Activity 1

Estimating Volume

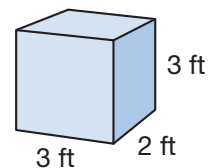
As a class, calculate the volume of your classroom twice, once in metric units and once in customary units. First estimate the volume in cubic meters by finding the number of boxes, one meter on each edge, that could be packed into the room. (Assume all cabinets and other furniture pieces are moved out of the room.)

11. **Estimate** What needs to be measured before the calculation can be performed? What units should be used? Record the room's dimensions to the nearest meter.
12. Use the dimensions of the room to estimate the volume of your classroom in cubic meters.

Perform a second calculation for the volume of the classroom, this time in cubic feet.

13. **Estimate** Record the length, width, and height of the room in feet. (Round to the nearest foot.)
14. Use the dimensions of the room to estimate the volume of your classroom in cubic feet.

A classroom with 30 desks may seem full. However, many more than 30 desks can fit into most classrooms. Suppose student desks were shipped in boxes 3 feet long, 2 feet wide, and 3 feet tall.



15. **Represent** How many boxes of this size could be stacked against one wall of your classroom? Draw a diagram.
16. **Estimate** How many such stacks could fit in the classroom?
17. **Estimate** Altogether, how many boxed desks could fit in your classroom?

Activity 2

Estimating Perimeter, Area, and Volume

Material needed:

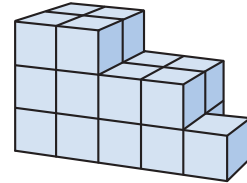
- Lesson Activity 48

Choose a rectangular room at school or at home and complete the tasks described on **Lesson Activity 48**.

Investigate Further



- a. In a group, use the 1-inch paper cube manipulatives from Lesson 99 and tape or glue to model unusual shapes. Write the volume in pencil on the bottom of your shape. Ask other students to estimate the volume of your three-dimensional shape and compare your estimates.

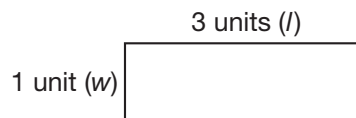


Option:

Work together as a class to tape the 1-inch paper cubes into one large structure. Display the figure and ask classroom guests to estimate the volume.

- b. The rectangle has a length of 3 units and a width of 1 unit.

This table shows the values for l when $w = 1, 2, 3,$ and 4 .



w	l
1	3
2	6
3	9
4	12

- Write an equation to show the relationship between the two sets of data.
- Use your equation to determine the length when the width is 8 units.

- c.** Get an empty container from your teacher. Estimate the number of cups of water your container holds. Using cups, determine exactly how many cups of water your container holds. How close was your estimate to the actual number of cups of water your container holds?

- d.** Get an empty container from your teacher. Estimate the number of milliliters your container holds. Using milliliters, determine exactly how many milliliters of water your container holds. How close was your estimate to the actual milliliters of water your container holds?