LESSON 6-1

Ratios

Practice and Problem Solving: A/B

The number of animals at the zoo is shown in the table. Write each ratio in three different ways.

1. lions to elephants

   _____

2. giraffes to otters

   _____

3. lions to seals

   _____

4. seals to elephants

   _____

5. elephants to lions

   _____

Animals in the Zoo	
Elephants	12
Giraffes	8
Lions	9
Seals	10
Otters	16

Write three equivalent ratios for the given ratio.

6. $\frac{4}{3}$ _____

7. $\frac{12}{14}$ _____

8. $\frac{6}{9}$ _____

Find three ratios equivalent to the ratio described in each situation.

9. The ratio of cats to dogs in a park is 3 to 4. _____

10. The ratio of rainy days to sunny days is $\frac{5}{7}$. _____

11. The ratio of protein to fiber in a granola bar is $\frac{9}{2}$. _____

12. The ratio of clown fish to angelfish at a pet store is 5:4. The ratio of angelfish to goldfish is 4:3. There are 60 clown fish at the pet store.
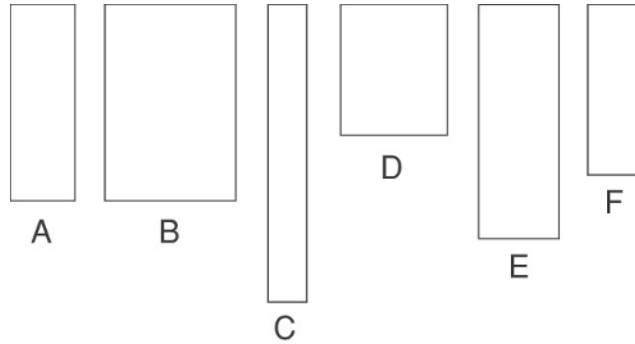
    a. How many angelfish are there? _____

    b. How many goldfish are there? _____

LESSON 6-1

Ratios

Practice and Problem Solving: C

For centuries, people all over the world have considered a certain rectangle to be one of the most beautiful shapes. Which of these rectangles do you find the most attractive?


If you are like most people, you chose rectangle B. Why? It's a golden rectangle, of course! In a golden rectangle, the ratio of the length to the width is called the **golden ratio**—about 1.6 to 1.

The golden ratio pops up all over the place—in music, sculptures, the Egyptian pyramids, seashells, paintings, pinecones, and of course in rectangles.

To create your own golden rectangle, just write a ratio equivalent to the golden ratio. This will give you the length and width of another golden rectangle.

Golden Ratio

$$\frac{\ell}{w} = \frac{1.6}{1}$$

$w = 1$ in.

$\ell = 1.6$ in.

Use a ruler to draw a new golden rectangle in the space below. Then draw several non-golden rectangles around it. Now conduct a survey of your family and friends to see if they choose the golden rectangle as their favorite.
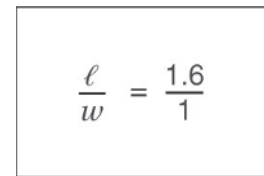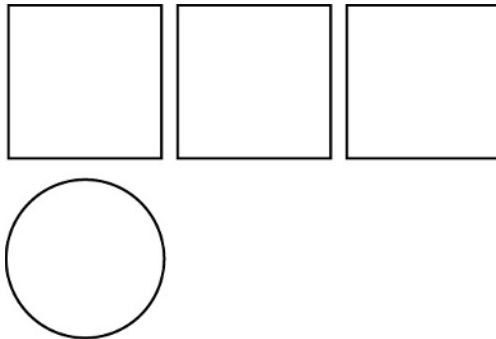
LESSON
6-1

Ratios

Practice and Problem Solving: D

The number of square patches compared to circle patches on a quilt is represented by the model below.

Complete. The first one is done for you.

1. Write a ratio that compares the number of circle patches to the number of square patches.

   __**1 circle patch to 3 square patches; 1 to 3**__

2. If there are 9 square patches on the quilt, how many circle patches are there?

   9 ÷ _____ = _____ circle patches

3. How many square patches are there if there are 4 circle patches on a quilt?

   4 × _____ = _____ square patches

The number of Caroline's pet fish is shown in the table. Write each ratio in three different ways. The first one is done for you.

4. tiger barbs to catfish

   __**5 to 1, 5:1,** $\frac{5}{1}$__

5. catfish to angelfish

   _____

6. angelfish to tiger barbs

   _____

Caroline's Pet Fish	
Tiger Barbs	5
Catfish	1
Angelfish	4

Write three equivalent ratios for the given ratio. The first one is done for you.

7. $\frac{2}{3}$ __$\frac{4}{6}, \frac{6}{9}, \frac{8}{12}$__

8. $\frac{3}{4}$ _____

9. $\frac{1}{6}$ _____

LESSON
6-1

Ratios
Reteach

A ratio is a comparison of two quantities by division.

To compare the number of times vowels are used to the number
of time consonants are used in the word "mathematics," first find each
quantity.

Number of times vowels are used: 4

Number of times consonants are used: 7

Then write the comparison as a ratio, using the quantities in the
same order as they appear in the word expression. There are three
ways to write a ratio.

$\frac{4}{7}$ 4 to 7   4:7

Write each ratio.

1. days in May to days in a year

2. sides of a triangle to sides of a square

   _____   _____

Equivalent ratios are ratios that name the same comparison.

The ratio of inches in a foot to inches in a yard is $\frac{12}{36}$. To find

equivalent ratios, divide or multiply the numerator and denominator
by the same number.

$$\frac{12}{36} = \frac{12 \div 3}{36 \div 3} = \frac{4}{12} \qquad \frac{12}{36} = \frac{12 \cdot 2}{36 \cdot 2} = \frac{24}{72}$$

So, $\frac{12}{36}$, $\frac{4}{12}$, and $\frac{24}{72}$ are equivalent ratios.

Write three equivalent ratios to compare each of the following.

3. 8 triangles to 12 circles

4. 20 pencils to 25 erasers

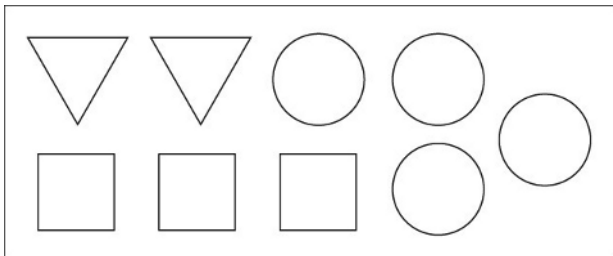   _____   _____

5. 5 girls to 6 boys

6. 10 pants to 14 shirts

   _____   _____

LESSON 6-1	**Ratios**

Reading Strategies: Use the Context

A **ratio** is a comparison between two similar quantities. The picture below shows geometric figures. You can write ratios to compare the figures.

Compare the number of triangles to the total number of figures. This comparison can be written as a ratio in three different ways.

$\dfrac{\text{number of triangles}}{\text{total figures}} \longrightarrow \dfrac{2}{9}$ Read: "two to nine."

2 to 9

2:9   Read: "two to nine."

Compare.

1. Write the ratio that compares the number of squares to the number of circles in three different ways.

   _____

2. Write the ratio that compares the number of circles to the total number of figures in three different ways.

   _____

3. Bernie wrote the ratio 2 to 3. What comparison of figures did he make?

   _____

4. Write a ratio that represents the number of polygons to the number of circles.

   _____

LESSON 6-1	**Ratios**

Success for English Learners

Ways to write ratios

Word form: 3 to 2

Fraction form: $\dfrac{3}{2}$

Ratio form: 3 : 2
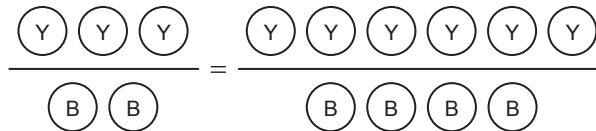
To read all forms, say "3 to 2."

Ways to find equivalent ratios

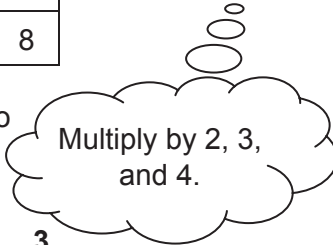**Multiply** the numerator and the denominator by the same number.

OR

Divide the numerator and the denominator by common factors.

Problem 1

Y	3	6	9	12
B	2	4	6	8

What is happening to the numerator and denominator?

Multiply by 2, 3, and 4.

Equivalent ratios for $\dfrac{3}{2}$:

Multiply by 2 $= \dfrac{3 \bullet 2 = 6}{2 \bullet 2 = 4} = \dfrac{6}{4}$

Multiply by 3 $= \dfrac{3 \bullet 3 = 9}{2 \bullet 3 = 6} = \dfrac{9}{6}$

Multiply by 4 $= \dfrac{3 \bullet 4 = 12}{2 \bullet 4 = 8} = \dfrac{12}{8}$

Equivalent ratios for $\dfrac{3}{2}$ are $\dfrac{6}{4}$, $\dfrac{9}{6}$, and $\dfrac{12}{8}$.

Problem 2

40	20	10	5
16	8	4	2

40 : 16 $= \dfrac{40}{16}$

Divide by 2 $= \dfrac{40 \div 2 = 20}{16 \div 2 = 8}$

Divide by 2 $= \dfrac{20 \div 2 = 10}{8 \div 2 = 4}$

Divide by 2 $= \dfrac{10 \div 2 = 5}{4 \div 2 = 2}$

So, **equivalent ratios** for $\dfrac{40}{16}$ are $\dfrac{20}{8}$, $\dfrac{10}{4}$, and $\dfrac{5}{2}$.

1. Complete the ratio in the table. Did you multiply or divide to find the equivalent ratio?

Y	3	6	9	12	☐
B	2	4	6	8	10

_____

2. Write a sentence explaining how to find an equivalent ratio for $\dfrac{5}{2}$.

_____

| LESSON 6-2 | **Rates** |

Practice and Problem Solving: A/B

Find the unit rate.

1. David drove 135 miles in 3 hours. _____

2. Three medium apples have about 285 calories. _____

3. A 13-ounce package of pistachios costs $5.99. _____

Use the information in the table to solve Exercises 4–6.

Morgan's favorite spaghetti sauce is available in two sizes: pint and quart. Each size and its price are shown in the table.

Size	Quantity (oz)	Price ($)
pint	16	3.98
quart	32	5.98

4. What is the unit rate to the nearest cent per ounce for each size?

   a. pint: _____   b. quart: _____

5. Which size is the better buy? _____

6. A coupon offers $1.00 off the 16-ounce size. Which size is the better buy then?

   _____

Find the unit rate to the nearest cent per ounce. Compare.

7. a. A 24-ounce box of cornflakes costs $4.59. _____

    b. A 36-ounce box of cornflakes costs $5.79. _____

    c. Which is the better buy? _____

Solve.

8. Karyn proofreads 15 pages in 2 hours for $40.

   a. What is her proofreading rate in pages per hour?

   _____

   b. How much does she receive on average for a page?

   _____

LESSON
6-2

Rates

Practice and Problem Solving: C

Find the unit rate. Compare.

1. Jason drives 180 miles in 4 hours and Ali drives 90 miles in 1.7 hours.

   Jason: _____   Ali: _____

   _____ is the faster driver.

2. Five medium apples have about 475 calories. Three medium oranges have about 186 calories.

   apple: _____   orange: _____

   _____ have fewer calories.

Use the information in the table to solve Exercises 3–5.

Paint is available in 3 sizes. Each size and its price are shown in the table.

Size	Quantity (oz)	Price ($)
pint	16	$12.29
quart	32	$19.98
gallon	128	$34.99

3. What is the unit rate to the nearest cent for each size?

   a. pint: _____   b. quart: _____   c. gallon: _____

4. Per ounce, which size paint container costs about twice as much as another size paint container?

   _____

   _____

5. How much larger is a gallon than a quart? _____

Find the unit costs. Solve.

6. a. A 15-inch link of silver chain costs $82.99. _____

   b. A 15-inch link of gold chain costs $112.59. _____

<table>
<tr><td>LESSON
6-2</td><td></td></tr>
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Rates

Practice and Problem Solving: D

Find the unit rate. The first one is done for you.

1. Carrie biked 75 miles in 3 days. _____**25 mi per day**_____

2. Twenty emails in 5 minutes. _____

3. A quart (32-ounce) bottle of milk costs $1.19. _____

Use the information in the table to solve the problems. The first one is done for you.

Rob's favorite shampoo is available in two sizes: regular and economy. Each size and its price are shown in the table.

Size	Quantity (oz)	Price ($)
regular	20	$8.00
economy	40	$10.00

4. What is the unit rate to the nearest cent per ounce for each size?

   a. regular: _____**$0.40**_____   b. economy: _____**$0.25**_____

5. Which size is the better buy? _____

6. A coupon offers $1.00 off the regular size. Which size is the better buy then?

   _____

Find the unit rate. The first one is done for you

7. a. A pound (16 ounces) of cheddar cheese costs $8.00 __**$0.50 per oz**__

   b. A half-pound of Swiss cheese costs $8.00 _____

Solve. The first one is done for you.

8. Eric paints 8 rooms in 3 days for $600.

   a. What is his painting rate in dollars per day? __**$200 per day**__

   b. How much does he receive on average for a room? _____

   c. About how many rooms could Eric paint in 6 days? _____
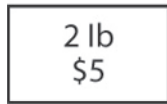
LESSON 6-2

Rates

Reteach

You can divide to find a unit rate or to determine a best buy.
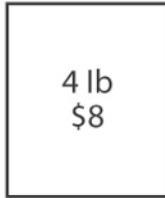
A. Find the unit rate.
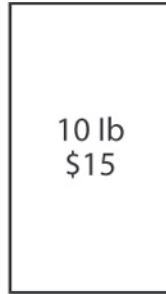Karin bikes 35 miles in 7 hours.
$35 \div 7 = 5$ mph

B. Find the best buy.

2 lb
$5

4 lb
$8

10 lb
$15

BEST BUY!

$5 \div 2 = \$2.50$ $8 \div 4 = \$2.00$ $15 \div 10 = \$1.50$
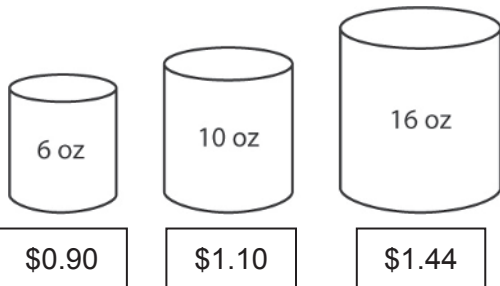per lb   per lb   per lb

Divide to find each unit rate. Show your work.

1. Jack shells 315 peanuts in 15 minutes. _____

2. Sharmila received 81 texts in 9 minutes. _____

3. Karim read 56 pages in 2 hours. _____

Find the best buy. Show your work.

4.

6 oz

10 oz

16 oz

$0.90 $1.10 $1.44

_____

_____

5.

Bread	Weight (oz)	Cost ($)
Whole wheat	16	2.24
Pita	20	3.60
7-grain	16	2.56

_____

_____

_____

_____

**LESSON
6-2**

Rates

Reading Strategies: Read a Table

A table organizes data in rows and columns.

Column headings tell you what data is below.

The title tells you what the whole table is about.

Columns are read up and down.

Rice Prices at Grandee Supermarket

Bag Size	Quantity (lb)	Bag Price ($)	Unit Price ($)
mini	1	1.50	1.50 per lb
small	2	3.40	1.70 per lb
medium	5	7.00	1.40 per lb
large	10	12.50	
extra large	25	26.25	

Rows are read back and forth.

Find the unit price to the nearest cent per pound. Answer the questions.

1. What is the unit price of the large bag? _____

2. What is the unit price of the extra large bag? _____

3. Which size bag has the highest unit price? _____

4. Which size bag is the best buy? _____

5. How do you know? _____

This table shows the hours three carpenters worked, the number of chairs each made, and how much money each made.

Carpenter	Time worked (h)	Chairs made	Money earned ($)
Dan	38	7	459.80
Flora	35	6	903.00
Chandra	32	5	680.00

6. Which carpenter makes the most money per hour? _____

7. Which makes the least money per hour? _____

8. Based on labor costs alone, which carpenter makes the most

    expensive chairs? _____

LESSON 6-2

Rates

Success for English Learners

Problem 1

Mr. Jackson corrects 56 tests in 3 hours. About how many tests does he correct per hour?

Find the unit rate. Divide 56 by 3.

$56 \div 3 = 18.7$

Mr. Jackson corrects about 19 tests per hour.

Problem 2

Find the best buy for different size boxes of breakfast bars.

Size	Weight (oz)	Cost ($)
small	8	5.99
medium	16	8.99
large	32	18.99

Divide the cost by the number of ounces.

Small $\$5.99 \div 8 \approx \$0.75$ per oz

Medium $\$8.99 \div 16 \approx \$0.56$ per oz

Large $\$18.99 \div 32 \approx \$0.59$ per oz

To the nearest cent per ounce

Compare. $0.56 < 0.59 < 0.75$.

The unit cost of the medium box of breakfast bars is lowest, so the medium size is the best buy.

1. How would you find the number of miles per hour Mrs. Rodriguez drives if you know she drives 300 miles in 5.2 hours?

   _____

2. Is the best buy always the largest size? Explain.

   _____

3. Should you always buy the largest size? Explain.

   _____

   _____

4. Write your own "best buy" problem.

   _____

   _____

LESSON 6-3	# Using Ratios and Rates to Solve Problems

Practice and Problem Solving: A/B

Solve using ratios.

1. Mark is using the ratio of 3 tablespoons of sugar to 2 tablespoons of milk in a recipe. Complete the table to show equivalent ratios if Mark decides to increase the recipe.

sugar	3	6		18	
milk	2		8		20

2. Mark's ratio is 3 tablespoons sugar to 2 tablespoons milk. Sharri is using 4 tablespoons of sugar to 3 tablespoons of milk. Eve is using 9 tablespoons of sugar to 6 tablespoons of milk. Which girl's ratio is

   equivalent to Mark's? _____

3. A school cafeteria makes cheese sauce for macaroni using 15 cups of Swiss cheese and 17 cups of cheddar cheese. Perry tries to make the sauce for a family party using 5 cups of Swiss and 7 cups of cheddar.

   Is Perry using the correct ratio? Explain. _____

   _____

4. The chess club members bought 6 tickets to a tournament for $15. How much would they have paid if all 9 members wanted to go?

   _____

5. The Khan's car averages 22 miles per gallon of gas. Predict how far

   they can travel on 5 gallons of gas. _____

6. Cafe A offers 2 free bottled waters or juices for every 20 purchased. Cafe B offers 3 free bottled waters or juices for every 25 purchased.

   a. What is Cafe A's ratio of free drinks to purchased drinks?

      _____

   b. What is Cafe B's ratio of free drinks to purchased drinks?

      _____

   c. If you purchased 50 drinks at each café, how many free drinks would you get?

      _____

LESSON
6-3

Using Ratios and Rates to Solve Problems

Practice and Problem Solving: C

Solve using ratios.

1. A water molecule is formed from two hydrogen atoms and one oxygen atom. Fill in the table for 2, 5, 10 and 20 water molecules.

water molecule				
hydrogen atoms				
oxygen atoms				

2. Hydrogen peroxide molecules have two hydrogen atoms and two oxygen atoms.

   How would a table for this compound differ? _____

3. Ammonia molecules have three hydrogen (H) atoms and one nitrogen (N) atom. How many of each atom are in five molecules of ammonia?

   _____

4. The ratio of the number of senior tickets sold to the number of adult tickets is 2:3. The ratio of the number of adult tickets to the number of student tickets is 6:15. If 24 seniors tickets were sold, how many adult and student tickets were sold altogether ? _____

5. The bus to the exposition averaged 18 miles to a gallon of gas. How far away was the exposition if they used 8 gallons of gas for the round trip?

   _____

6. Flyaway airline program offers 5 points for every mile flown, plus a bonus of 20 points for every trip over 500 miles. My Sky airline program offers 7 points for every mile flown plus a bonus of 30 points for each trip. Which program gives more points for this itinerary?

   Trip A 600 mi   Trip D 825 mi   Trip G 1,000 mi

   Trip B 450 mi   Trip E 300 mi   Trip H 545 mi

   Trip C 710 mi   Trip F 300 mi

   _____

7. An appliance store sells lamps at $95.00 for two. A department store sells similar lamps at five for $250.00. Which store sells at a better

   rate? How much better? _____

LESSON 6-3

Using Ratios and Rates to Solve Problems

Practice and Problem Solving: D

Solve using ratios. The first one is done for you.

1. Pam is making fruit punch for a party using the ratio of 2 cups of club soda to 5 cups of juice. Complete the table to show equivalent ratios for increasing numbers of guests.

club soda	2	4	8	10	
juice	5	10			50

2. Pam's ratio is 2 cups club soda to 5 cups juice. Barry is making punch with 3 cups club soda to 8 cups juice. Erin is also making punch with 4 cups of club soda to 10 cups of juice. Whose ratio is the same as Pam's?

   _____

3. A restaurant makes vegetable soup using 22 cups of mixed vegetables and 15 cups of stock. Henri tries to make this at home with 5 cups of mixed vegetables and 10 cups of stock. Is Henri using the correct ratio? Explain.

   _____

4. Barbara bought 5 amusement park tickets at a cost of $30. If she bought 7 tickets, how much would it cost?

   _____

5. Tony bikes 7 miles in one hour. Predict how far he would bike in 4 hours.

   _____

6. A sports store sells bicycle baskets at $40.00 for two. Another sports store sells bicycle baskets at $110 for five. Which store sells the baskets at the better rate?

   _____

7. Gobbler Stuffing mix has 3 cups of cubed bread and 1 cup of dried vegetables. Perfect Poultry mix has 5 cups of cubed bread to 2 cups of dried vegetables. Which mix has the greater vegetable to bread ratio?

   _____

LESSON 6-3 — Using Ratios and Rates to Solve Problems
Reteach

You can write a ratio and make a list of equivalent ratios to compare ratios.

Find out who uses more detergent.

Terri's recipe for soap bubble liquid uses 1 cup of dishwashing detergent to 4 cups of water.

Torri's recipe for soap bubble liquid uses 1 cup of dishwashing detergent to 12 cups of water (plus some glycerin drops).

Terri's ratio of detergent to water: 1 to 4 or $\frac{1}{4}$

Torri's ratio of detergent to water: 1 to 12 or $\frac{1}{12}$

List of fractions equivalent to $\frac{1}{4}$: $\frac{1}{4}$, $\frac{2}{8}$, $\boxed{\frac{3}{12}}$, $\frac{4}{16}$, $\frac{5}{20}$ . . .

List of fractions equivalent to $\frac{1}{12}$: $\boxed{\frac{1}{12}}$, $\frac{2}{24}$, $\frac{3}{36}$, $\frac{4}{48}$, $\frac{5}{60}$ . . .

You can compare $\frac{3}{12}$ to $\frac{1}{12}$, $\frac{3}{12} > \frac{1}{12}$.

Terri uses much more detergent.

Use the list to compare the ratios. Circle ratios with the same denominator and compare.

1. $\frac{2}{3}$ and $\frac{3}{4}$

_____

_____

2. $\frac{4}{5}$ and $\frac{3}{7}$

_____

_____

3. Jack's recipe for oatmeal uses 3 cups of oats to 5 cups of water. Evan's recipe uses 4 cups of oats to 6 cups of water. Thicker oatmeal has a greater ratio of oats to water. Compare the ratios of oats to water to see who makes the thicker oatmeal. Show your work.

_____

_____

LESSON 6-3

Using Ratios and Rates to Solve Problems

Reading Strategies: Identify Relationships

To identify a relationship between different units, you can use a table to find a rate. You know that a salad has 6 cups of mixed vegetables.

The Greens Salad Bar provides 3 cups of greens to 2 cups of mixed fresh vegetables.

The Veggie Salad Bar provides 3 cups of mixed fresh vegetables to 2 cups of greens.

The tables below show rates for each salad bar.

Greens (cups)	3	6	9	12	15
Veggies (cups)	2	4	6	8	10

Greens Salad Bar

Greens (cups)	2	4	6	8	10
Veggies (cups)	3	6	9	12	15

Veggie Salad Bar

1. At which salad bar would you get more vegetables in your salad?

   _____

2. Marge really likes lettuce and spinach. To which salad bar should she go?

   _____

3. Rich bought salad for a tailgate party. He had 18 cups of greens and 12 cups of veggies. At which salad bar did he buy the salad?

   _____

4. You know that a salad has 10 cups of mixed vegetables. Can you tell which salad bar it came from? Explain.

   _____

   _____

5. You have 20 cups of veggies in a salad for a large picnic.

   a. How many cups of greens do you have if you bought it at Greens

      Salad Bar? _____

   b. How many cups of greens do you have if you bought it at Veggie

      Salad Bar? _____

LESSON 6-3

Using Ratios and Rates to Solve Problems

Success for English Learners

Problem 1

Mrs. O'Hara frames 5 pictures in 3 hours. Use a table to predict how many pictures she will frame in her workweek of 30 hours.

pictures framed	5	10	15	20	25	. . .	50
hours	3	6	9	12	15	. . .	30

Mrs. O'Hara probably frames about 50 pictures in her workweek.

Problem 2

Mr. Suarez plants 6 large trees in 8 hours. Use a double number line to predict how many large trees he will plant in his workweek of 40 hours.

hours

8   16   24   32   40

trees

6   12   18   24   30
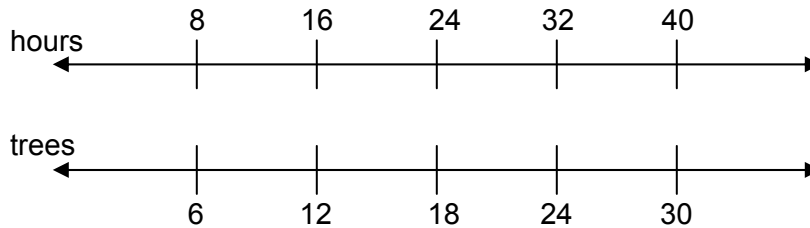
Mr. Suarez will plant 30 large trees in 40 hours.

You can use a table or a double number line. Predict how many sit ups each person can do in 12 seconds.

1. Janet does 3 sit ups in 2 seconds. _____

2. Paulo does 5 sit ups in 6 seconds. _____

3. Shah does 3 sit ups in 4 seconds. _____

4. Which method do you prefer to predict: table or a number line? Explain.

_____

_____

MODULE 6
Representing Ratios and Rates
Challenge

Arabella, Bettina, Chandra, and Divya are runners on the track team.
The distance and time for each runner are shown in the table below.

Runner	Distance	Time
Arabella	7,229 feet	561 seconds
Bettina	3,425 yards	13 minutes, 12 seconds
Chandra	8,214 feet	0.195 hours
Divya	1.62 miles	732 seconds

1. Find the rate for each runner in miles per hour.

   _____

   _____

2. Which runner ran the fastest? Which runner ran the slowest?

   _____

   _____

3. Why is it helpful to convert the rates above, as in Exercise 1, when comparing the runners?

   _____

   _____

4. Suppose each runner ran at the rate given in the table above for 3.1 miles. How much time will elapse between the first place finisher and the last place finisher? Show your work.

   _____

   _____

LESSON
7-1

Ratios, Rates, Tables, and Graphs

Practice and Problem Solving: A/B

Use the table to complete Exercises 1–7.

The table shows information about the packets of flavoring added to an amount of water to make soup.

Packets of Flavoring	2	5		10	
Ounces of Water	24		84		144

1. Find the rate of ounces of water needed for each packet of flavoring. Show your work.

    $\dfrac{\text{ounces of water}}{\text{packets of flavoring}} =$ _____

2. Use the unit rate to help you complete the table.

3. Graph the information in the table.

4. How much water should be added to 23 packets of flavoring?

    _____

5. Does the point (9.5, 114) make sense in this context? Explain.

    _____

    _____

    _____
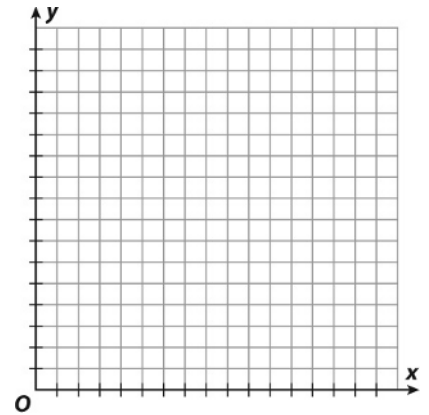
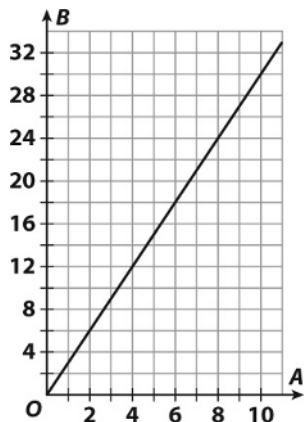6. What are the equivalent ratios shown in the table? Complete the statement.

    $\dfrac{24}{2} = \dfrac{}{3} = \dfrac{}{5.5} = \dfrac{108}{} = \dfrac{}{15}$

7. Does the relationship shown use addition or multiplication? Explain.

    _____

    _____

LESSON
7-1

Ratios, Rates, Tables, and Graphs
Practice and Problem Solving: C

1. Choose several points from the graph and make a table of the ordered pairs.

A					
B					

2. Find the unit rate from the information in the table.

   _____

3. Write a problem whose solution could be described by the table, rate, ratios, and graph above.

   _____

   _____

   _____

4. Does the relationship in your problem use addition or multiplication?

   _____

5. Does the point (6.5, 19.5) make sense in the context of your problem? Why or why not?

   _____

LESSON 7-1

Ratios, Rates, Tables, and Graphs

Practice and Problem Solving: D

Use the table to complete Exercises 1–6.

The table shows information about the number of tires needed for a number of cars.

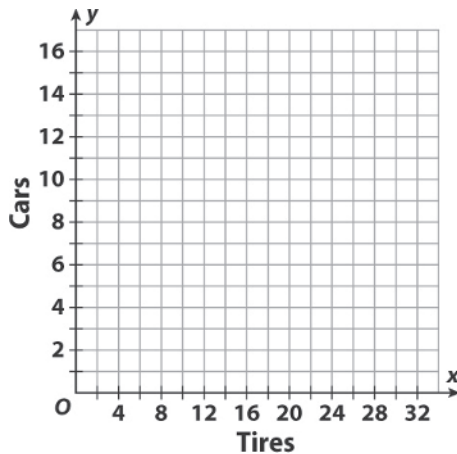| Number of Tires	8	12		20		
Number of Cars	2	3	4		6	7

1. Complete the table. The first one is done for you.

2. Write the rule for the table.

   _____

3. Find the rate of tires needed for one car. Start with a ratio from the table.

   $\dfrac{\text{tires}}{\text{cars}}$ = ——— = ——— = ____ tires for every ____ car

4. Write the information in the table as ordered pairs.

   _____

5. Plot the ordered pairs on the graph and draw the line.

6. Write some equivalent ratios shown by the line of the graph.

   $\dfrac{8}{2}$ = ——— = ——— = ——— = $\dfrac{40}{10}$

LESSON
7-1

Ratios, Rates, Tables, and Graphs
Reteach

A **ratio** shows a relationship between two quantities.

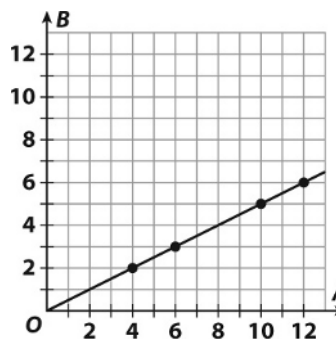Ratios are **equivalent** if they can be written as the same fraction in lowest terms.

A **rate** is a ratio that shows the relationship between two different units of measure in lowest terms.

You can make a table of equivalent ratios. You can graph the equivalent ratios.

A	4	6	10	12
B	2	3	5	6

$$\frac{4}{2} = \frac{2}{1} \qquad \frac{6}{3} = \frac{2}{1}$$

$$\frac{10}{5} = \frac{2}{1} \qquad \frac{12}{6} = \frac{2}{1}$$

1. Use equivalent ratios to complete the table.

A	6	9			18		
B	2		4	5		7	8

2. Show the ratios are equivalent by simplifying any 4 of them.

   _____

3. Find the rate of $\dfrac{A}{B}$ and complete the equivalent ratio: $\dfrac{69}{\rule{2em}{0.4pt}}$.

   _____

4. Use the rate to find how many As are needed for 63 Bs, then write the ratio.

   _____

LESSON 7-1 Ratios, Rates, Tables, and Graphs

Reading Strategy: Read a Table

Tables help us organize information.

Number of gallons of gas

Number of miles traveled

Gas (gallons)	3	4	7	10	16
Miles traveled	102	136	238	340	544

Traveled 238 miles on 7 gallons of gas

Use the columns to write ratios.

$$\frac{\text{gas}}{\text{miles}} = \frac{7}{238} \qquad\qquad \frac{\text{miles}}{\text{gas}} = \frac{238}{7}$$

Use the ratios to write ordered pairs.

$$\frac{7}{238} \longrightarrow (7, 238) \qquad\qquad \frac{238}{7} \longrightarrow (238, 7)$$

1. Read the table. Write all the ordered pairs of cost to pounds. Then write the ordered pairs of pounds to cost.

Cost	$4.50	$7.50	$10.50	$13.50	$16.50
Pounds of Oranges	3	5	7	9	11

_____

_____

2. Find the unit rate. What is the cost of 1 pound of oranges?

_____

3. Read the table. Write all of the ordered pairs in the order you choose.

Cups of Flour	6	8	10	12	18	24
Teaspoons of Baking Soda	3	4	5	6	9	12

_____

_____

4. Write the unit rate of baking soda to flour.

_____

LESSON 7-1	# Ratios, Rates, Tables, and Graphs

Success for English Learners

Problem 1

The table shows the cost of cereal and the amount of cereal for each amount of money. Write the ratios of ounces to cost.
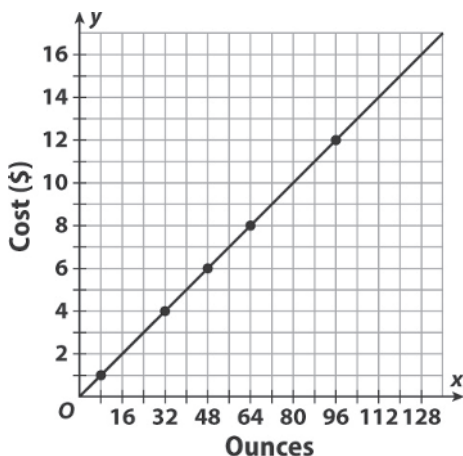
Cereal (oz)	8	32	48	64	96
Cost	$1	$4	$6	$8	$12

$$\frac{\text{ounces}}{\text{cost}} = \frac{8}{\$1} = \frac{32}{\$4} = \frac{48}{\$6} = \frac{64}{\$8} = \frac{96}{\$12}$$

Problem 2

Write the ratios as ordered pairs. Graph the ordered pairs and draw the line.

(8, 1), (32, 4), (48, 6), (64, 8), (96, 12)

1. How would the ratios change if the problem asked for the ratios of cost to ounces?

   _____

2. How would the graph change?

   _____

3. Make your own table of ratios of gallons of gas used to the miles traveled. Write the ratios as ordered pairs.

Gas (gal)					
Miles					

LESSON
7-2

Solving Problems with Proportions

Practice and Problem Solving: A/B

Find the unknown value in each proportion. Round to the nearest tenth if needed.

1. $\dfrac{4}{5} = \dfrac{}{20}$

2. $\dfrac{3}{7} = \dfrac{}{35}$

3. $\dfrac{4}{3} = \dfrac{12}{}$

4. $\dfrac{13}{15} = \dfrac{52}{}$

Solve using equivalent ratios.

5. Wayne has a recipe on a 3-inch-by-5-inch index card that he wants to enlarge to 15 inches long. How wide will the enlargement be?

   _____

6. Sharon is decreasing the size of a diagram of a leaf that is 30 centimeters long by 10 centimeters wide. If the reduced diagram is 4 centimeters wide, how long will it be?

   _____

Solve using unit rates. Round to the nearest hundredth if needed.

7. A wood stove burns 4 same-sized logs in 2 hours. How many logs

   does the stove burn in 8 hours? _____

8. In 2012, five U.S. postal stamps cost $2.20. How much did seven

   stamps cost? _____

9. a. What is the actual distance between Saugerties and

   Kingston? _____

   b. Catskill is 15 miles from Saugerties. What would the

   distance on the map be? _____

   c. On another map, the distance between Saugerties and Kingston is 2 inches. What would the distance from

   Saugerties to Catskill be on this map? _____
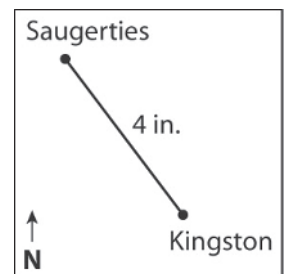
Scale: 1 in. = 2.5 mi.

10. The scale of a map is 1 in. : 250 miles. City A is 378 miles from City B. To the nearest tenth, how far is its distance on the map?

    _____

<table>
<tr><td>LESSON
7-2</td><td></td></tr>
</table>

Solving Problems with Proportions

Practice and Problem Solving: C

Find the unknown value in each proportion. Round to the nearest tenth if needed.

1. $\dfrac{2}{3} = \dfrac{}{7.5}$

2. $\dfrac{7}{100} = \dfrac{3.5}{}$

3. $\dfrac{9}{5} = \dfrac{}{16}$

4. $\dfrac{2}{7} = \dfrac{}{20}$

Solve using equivalent ratios.

5. Suki has a 9 foot by 12 foot oriental rug. She is making a scale drawing of the rug that is 1 foot long. How many inches wide should

the diagram be? _____

6. Another rug is 6 feet by 8 feet. For this one, Suki makes a diagram that

is $1\dfrac{1}{3}$ feet long. How many inches should its width be? _____

Solve using unit rates. Round to the nearest hundredth if needed.

7. You can buy 4 pounds of peaches for $5.96. What do $4\dfrac{1}{2}$ pounds of

peaches cost? _____

8. The table shows the number of miles that Dave, Raul, and Sinead drove on their last trips, as well as the time it took for each drive.

Driver	Distance (mi)	Time (min)
Dave	15	20 min
Raul	15	15 min
Sinead	20	30 min

a. What is Sinead's unit rate in miles per minutes? _____

b. Whose speed was the slowest? _____

c. If all three drivers drove for 2.5 hours at the same speed as their last drive, how many total miles will all three drivers have driven?

_____

9. The scale of a scientific drawing is 1 cm = 2 in. If the actual length of an object in the drawing was 4.5 inches, how long would it be in the

drawing? _____

LESSON 7-2 Solving Problems with Proportions
Practice and Problem Solving: D

Find the unknown value in each proportion. The first one has been done for you.

1. $\dfrac{2}{5} = \dfrac{8}{20}$

2. $\dfrac{2}{7} = \dfrac{}{28}$

3. $\dfrac{5}{4} = \dfrac{}{16}$

4. $\dfrac{11}{15} = \dfrac{}{45}$

Solve using equivalent ratios. The first one has been done for you.

5. Jackie has a poster that is 8 inches by 11 inches. She wants to enlarge it so that its length is 33 inches. What should the width be?

    $\dfrac{8}{11} = \dfrac{x}{33}$, **x = 24; The width should be 24 in.**

6. Tom has a large photo he wants to shrink to wallet-sized. Its width is 20 centimeters and its length is 30 centimeters. If he wants the width to

   be 5 centimeters what should the length be? _____

Solve using equivalent ratios. The first one has been done for you.

7. Mr. Sanchez drives 120 miles in 3 hours. At the same rate, how far will

    he drive in 5 hours? _____ **200 mi** _____

8. Six pounds of apples cost $12.00. How much do 8 pounds cost?

    _____

9. a. What is the actual distance between River City and Pine Bluff?

    _____

    b. White Oak is 15 miles from River City. What would its distance

    be on the map? _____

    c. On another map, the distance between River City and Pine Bluff is 6 inches. What is the scale of the map?

    _____
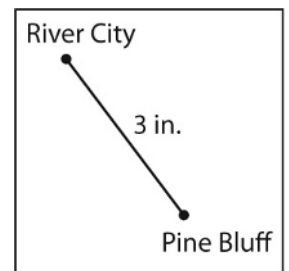
    River City
    3 in.
    Pine Bluff
    Scale: 1 in. = 3 mi.

10. The scale of a map is 1 in. : 500 miles. City A is 650 miles from City C.

    How far is its distance on the map? _____

LESSON 7-2

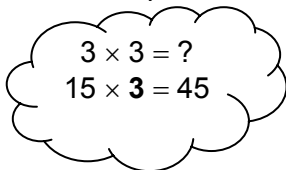# Solving Problems with Proportions
Reteach

You can solve problems with proportions in two ways.

A. Use equivalent ratios.

Hanna can wrap 3 boxes in 15 minutes.
How many boxes can she wrap in 45 minutes?

$$\frac{3}{15} = \frac{}{45}$$

$$\frac{3 \bullet 3}{15 \bullet 3} = \frac{9}{45}$$

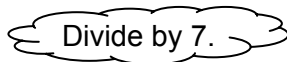$3 \times 3 = ?$
$15 \times \mathbf{3} = 45$

Hanna can wrap 9 boxes in 45 minutes.

B. Use unit rates.

Dan can cycle 7 miles in 28 minutes.
How long will it take him to cycle 9 miles?

$$\frac{28 \text{ min}}{7 \text{ mi}} = \frac{}{1 \text{ mi}}$$

Divide by 7.

$$\frac{28}{7} = \frac{28 \div 7}{1} = \frac{4}{1} \text{, or 4 minutes per mile}$$

To cycle 9 miles, it will take Dan 9×4, or 36 minutes.

Solve each proportion. Use equivalent ratios or unit rates. Round to the nearest hundredth if needed.

1. Twelve eggs cost $2.04. How much would 18 eggs cost?

   _____

2. Seven pounds of grapes cost $10.43. How much would 3 pounds

   cost? _____

3. Roberto wants to reduce a drawing that is 12 inches long by 9 inches
   wide. If his new drawing is 8 inches long, how wide will it be?

   _____

LESSON
7-2

Solving Problems with Proportions

Reading Strategies: Read a Table

This table shows the prices for different-sized bottles of fruit juices.

Column headings tell you what data is below.

Size	Capacity (oz.)	Cost ($)
Small	8	2.80
Medium	12	3.96
Large	16	4.80

Rows are read left to right.

Columns are read up and down.

1. What is the unit cost for each bottle?

   a. Small (8 oz): _____

   b. Medium (12 oz): _____

   c. Large (16 oz): _____

2. Cara drank a 6-ounce glass from the 12-ounce bottle. How much did her drink cost?

   _____

3. Sean drank an 8-ounce glass from the 16-ounce bottle. How much did his drink cost?

   _____

4. Luca had a 4-ounce glass from the 16-ounce bottle. How much did his drink cost?

   _____

This table shows the time three delivery people worked, the miles they drove, and the amount each earned.

Driver	Miles Driven	Hours Driven	Earnings ($)
Jeff	65	7	158.75
Alicia	82	8	180.80
LeShawn	56	6	118.50

5. a. How much did Alicia earn per hour? _____

   b. How much would she earn for 5 hours of work? _____

6. a. On average, how far did LeShawn drive in an hour? _____

   b. On average, how far would she drive in 2 hours? _____

7. Who had the highest earnings per hour? _____

Solving Problems with Proportions

Success for English Learners

Problem 1

Mrs. O'Neill tiles 24 square feet in 3 hours. How many square feet can she tile in 9 hours?

Use a proportion.

$$\frac{24}{3} = \frac{}{9}$$ $3 \times 3 = 9$

$$\frac{24}{3} = \frac{72}{9}$$ $24 \times 3 =$

She can tile 72 square feet in 9 hours.

Problem 2

Which is the better buy: an 18-ounce box of cereal for $4.50 or a 30-ounce box of cereal for $9.00?

Use a unit rate. $0.25 < 0.30$

$$\frac{4.50}{18} = 0.25$$

$$\frac{9.00}{30} = 0.30$$

The 18-ounce box has a lower unit rate, so it is the better buy.

1. Can you use a unit rate to solve Problem 1? Explain. _____

_____

_____

2. Can you use a proportion to solve Problem 2? Explain. _____

_____

_____

LESSON
7-3

Converting within Measurement Systems

Practice and Problem Solving: A/B

Use proportions to convert.

1. 4 feet to inches

2. 6 quarts to gallons

_____

3. 5 kilometers to meters

4. 2,000 grams to kilograms

_____

Use conversion factors to convert. Write the factor you used.

5. 5 quarts to cups

6. 600 centimeters to meters

_____

Solve.

7. Denver is called the Mile-High City because it is at an altitude of 1 mile.

   How many feet is this? _____

8. The distance from the library to the park is 0.7 kilometers.

   How many meters is this? _____

9. Marcus has three dowels with the lengths shown in the table.
   Complete the table to give each length in inches, feet, and yards.

Dowel	in.	ft	yd
A	36		
B		$5\frac{1}{2}$	
C			$2\frac{1}{2}$

10. Cameron wants to measure a poster frame, but he only has a sheet of

    paper that is $8\frac{1}{2}$ by 11 inches.

    a. He lays the long edge of the paper along the long edge of the frame several times
       and finds the frame is 4 papers long. How long is this in inches?

       _____ In feet? _____

    b. He lays the short edge of the paper along the short edge of the frame several times
       and finds the frame is 3 papers wide. How long is this in inches?

       _____ In feet? _____

11. How would you convert 3 yards 2 feet to inches?

    _____

LESSON 7-3

Converting within Measurement Systems

Practice and Problem Solving: C

Use proportions to convert.

1. 4.5 feet to inches

2. 4.5 inches to feet

_____

_____

3. 543 centimeters to meters

4. 5.1 kilometers to meters and centimeters

_____

_____

Use conversion factors to convert.

5. 6.5 quarts to cups

6. 3.9 meters to centimeters

_____

_____

Solve.

7. Denver is the Mile-High City. How high is this in feet? _____

   In yards?_____

8. The distance from the porch to the flagpole is 736 centimeters. How far is this in meters?

   _____

9. Tammy has 3 chains of different lengths as shown in the table. Complete the table. Find the length of the longest and shortest chains and the difference between them. Show the difference in inches, feet, and yards.

Chain	yd	ft	in.
gold	$3\frac{1}{2}$		
silver		12.5	
bronze			148

10. a. Pat has a 10-centimeter length of string she is going to use to measure a small square table. The side length she measures is 5 strings. What are the dimensions of the table?

    _____

    b. What is the area of the table? _____

    c. Is that as large as a square meter? Explain.

    _____

LESSON
7-3
Converting within Measurement Systems
Practice and Problem Solving: D

Use proportions to convert. The first one is done for you.

1. 48 inches to feet

   $\dfrac{12\ in}{1\ ft} = \dfrac{48}{x}; 4\ ft$

2. 2 gallons to quarts

   _____

3. 3,000 meters to kilometers

   _____

4. 1,500 grams to kilograms

   _____

Use conversion factors to convert. Write the factor you used. The first one is done for you.

5. 7 quarts to cups

   4c = 1 qt; 28 c

6. 500 centimeters to meters

   _____

Solve.

7. A bike race takes place over a 3 mile course. How many feet is it?

   _____

8. The distance from the school to the corner is 0.9 kilometers. How many meters is this?

   _____

9. Christina has two pieces of lace trim with lengths as shown in the table. Complete the table to give each length in inches, feet, and yards.

Trim	in.	ft.	yd.
A	24		
B			6

10. a. Lyza has a 9-inch board. She wants to measure the length of a small rug in feet. How can she do this?

    _____

   b. She finds that the 9-inch board fits 4 times along the rug length.

      How many inches is this? _____

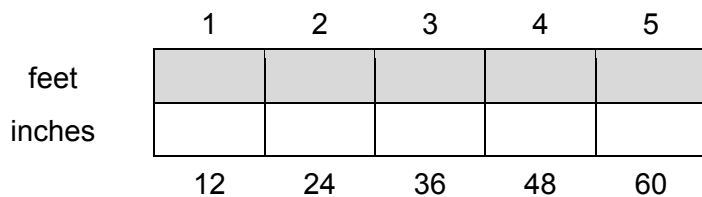   How many feet? _____

11. How would you convert 4 meters 20 centimeters to
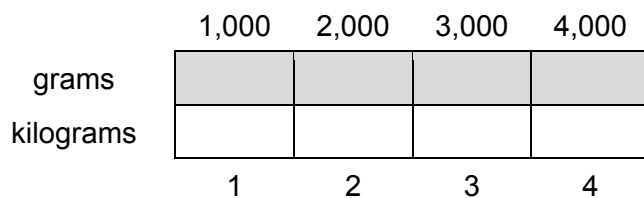
    centimeters?_____

LESSON 7-3

Converting within Measurement Systems
Reteach

You can use a bar model to convert measurements.

	1	2	3	4	5
feet					
inches					
	12	24	36	48	60

$\dfrac{1}{12} = \dfrac{3}{36}$ so 3 feet = 36 inches

	1,000	2,000	3,000	4,000
grams				
kilograms				
	1	2	3	4

$\dfrac{1,000}{1} = \dfrac{4,000}{4}$ so 4,000 g = 4 kg

1. Draw a bar model for converting feet to yards.

2. Draw a bar model for converting cups to fluid ounces.

3. Do you think a bar model would be a good model for converting miles to feet? Explain.

_____

_____

_____

LESSON
7-3

Converting within Measurement Systems

Reading Strategies: Identify Relationships

You can use relationships between customary and metric units to convert within the same measurement system. You can use a table to identify a relationship.

in.	12	24	36
ft	1	2	3

or

in.	18	27	45
ft	1.5	2.25	3.75

1. a. A foot is _____ inches.

   b. An inch is _____ foot.

2. a. To convert feet to inches, _____.

   b. To convert inches to feet, _____.

3. If you wanted to show the relationship between meters and centimeters, what would differ in your table?

   _____

   _____

4. Choose a customary and a metric relationship and make a table to show the relationship for each.
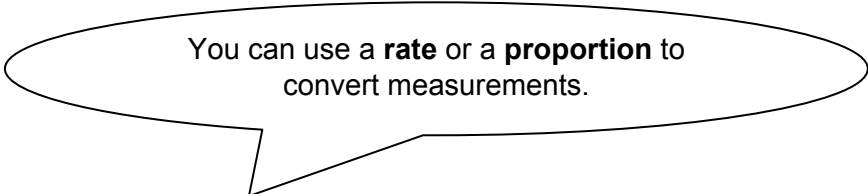
LESSON 7-3

Converting within Measurement Systems
Success for English Learners

The two most common systems of measurement used around the world are the **metric system** and the **customary system.** The United States uses the customary system of measurements. Some examples of **customary measurements** are yards (yd), feet (ft), ounces (oz), and pounds (lb).

Problem 1

Nicole bought <u>2 pounds</u> of grapes. <u>How many ounces</u> is this?

How do you **convert,** or change, pounds to ounces?

You can use a **rate** or a **proportion** to convert measurements.

1 pound (lb) = 16 ounces (oz)

$$\frac{1 \text{ lb}}{16 \text{ oz}} = \frac{1 \text{ lb} \times 2}{16 \text{ oz} \times 2} = \frac{2 \text{ lb}}{32 \text{ oz}}$$

Two pounds is equal to 32 ounces. So, Nicole bought 32 ounces of grapes.

Problem 2

Joel bought 42 inches of wire. How many yards is that?

Conversion factor: $\dfrac{1 \text{ yd}}{36 \text{ in.}}$

$$\frac{1 \text{ yd}}{36 \text{ in.}} = \frac{\frac{7}{6} \text{ yd}}{42 \text{ in.}}, \ 42 \text{ in.} = \frac{7}{6} \text{ or } 1\frac{1}{6} \text{ yd}$$

42 inches is $1\frac{1}{6}$ yards. Joel bought $1\frac{1}{6}$ yards of wire.

1. Convert 5.5 yards to inches. _____

2. Convert 450 inches to yards. _____

Name _____ Date _____ Class _____

Converting between Measurement Systems

Practice and Problem Solving: A/B

Length	Mass	Capacity
1 inch = 2.54 centimeters 1 foot ≈ 0.305 meter 1 yard ≈ 0.914 meter 1 mile ≈ 1.61 kilometers	1 ounce ≈ 28.4 grams 1 pound ≈ 0.454 kilogram	1 fluid ounce ≈ 29.6 milliliters 1 quart ≈ 0.946 liter 1 gallon ≈ 3.79 liters

Use a conversion factor to convert each measurement. Round your answer to the nearest hundredth.

1. A driveway is 40 yards long. About how many meters long is it?

   _____

2. An ice cube is made of 5 fluid ounces of water. About how many

   milliliters of water does it take to make the ice cube? _____

3. Steven bagged 52 pounds of potatoes. About what is that measure in

   kilograms? _____

4. It is 7 kilometers from Kerry's house to the mall. About what is that

   distance in miles? _____

5. A cooler holds 15 liters of water. About how many gallons does it hold?

   _____

6. Mia's cat weighs 13 pounds, 7 ounces. About what is that weight in

   kilograms? (Hint: 1 kilogram = 1,000 grams) _____

7. D'Quan's grandmother made a quilt for his bed. The quilt is
   2.44 meters long and 1.83 meters wide. What is the area of the quilt in

   square feet? _____

8. It is recommended that an adult drink 64 fluid ounces of water every
   day. Josey has already consumed 700 milliliters of water. How many

   more liters should he drink today? _____

LESSON
7-4

Converting between Measurement Systems

Practice and Problem Solving: C

Some units of measurement are very old and outdated, or used only under certain circumstances.

1 pes ≈ 0.973 foot	1 cubit = 1.5 feet
1 perch = 16.5 feet	1 span = 0.75 foot
1 furlong = 660 feet	1 bamboo ≈ 10.499 feet
1 kick ≈ 3,280.84 feet	1 cabel = 720 feet

1. You have a measure in the units indicated. To which of the measures in the chart would you most likely convert? Why?

   mile _____

   yard _____

   foot _____

   inch _____

   _____

2. How would you convert each unit to feet? How would you convert feet to each unit? Complete the tables below.

Convert to Feet	
Unit	**Factor**
a. cubit	
b. perch	
c. kick	
d. cabel	

Convert from Feet	
Unit	**Factor**
e. bamboo	
f. furlong	
g. pes	
h. span	

3. As part of a land grant from General George Washington, a soldier received a parcel of land that measured 108 yards on one side. What is that measure in perches?

   _____

4. In 2004, Xie Qiuping of China held the world's record for the longest hair (female). Her hair measured 5.627 meters. What is that measure in bamboos? (Hint: 1 foot ≈ 0.305 meter)

   _____

LESSON 7-4

Converting between Measurement Systems

Practice and Problem Solving: D

Length	Mass	Capacity
1 inch = 2.54 centimeters 1 foot ≈ 0.305 meter 1 yard ≈ 0.914 meter 1 mile ≈ 1.61 kilometers	1 ounce ≈ 28.4 grams 1 pound ≈ 0.454 kilogram	1 fluid ounce ≈ 29.6 milliliters 1 quart ≈ 0.946 liter 1 gallon ≈ 3.79 liters

To convert customary measurements to metric measurements, multiply by the conversion factor in the table. Round to the nearest hundredth. The first one is done for you.

1. 7 inches × ____**2.54**____ ≈ ____**17.78**____ centimeters

2. 2 pounds × _____ ≈ _____ kilograms

3. 6 fluid ounces × _____ ≈ _____ milliliter

4. 5 gallons × _____ ≈ _____ liters

5. 20 yards × _____ ≈ _____ meters

6. 15 ounces × _____ ≈ _____ grams

To convert metric measurements to customary measurements, write a ratio and multiply. Round to the nearest hundredth. The first one is done for you.

7. 100 grams × $\frac{1}{28.4}$ ≈ __**3.52**__ ounces

8. 20 liters × _____ ≈ _____ quarts

9. 4 kilometers × _____ ≈ _____ miles

10. 6 kilograms × _____ ≈ _____ pounds

11. 50 centimeters × _____ ≈ _____ inches

12. 81 milliliters × _____ ≈ _____ fluid ounces

Solve.

13. Ashley needs 4.6 yards of chain to hang some flower baskets. The chain is sold by the meter. How many meters does Ashley need?

_____

LESSON 7-4	**Converting between Measurement Systems**

Reteach

Sometimes you have to convert measurements from one system of measurement to another. You can use this conversion chart to help you change from customary units to metric units.

Length	Mass	Capacity
1 inch = 2.54 centimeters 1 foot ≈ 0.305 meter 1 yard ≈ 0.914 meter 1 mile ≈ 1.61 kilometers	1 ounce ≈ 28.4 grams 1 pound ≈ 0.454 kilogram	1 fluid ounce ≈ 29.6 milliliters 1 quart ≈ 0.946 liter 1 gallon ≈ 3.79 liters

To change from inches to centimeters, multiply the number of inches by the factor in the chart: 1 inch = 2.54 centimeters.

8 inches × 2.54 = 20.32 centimeters

Most conversions are approximate. This is shown by the symbol ≈.

Find each conversion factor in the chart.

1. To convert from feet to meters, multiply by _____

2. To convert from quarts to liters, multiply by _____

3. To convert from pounds to kilograms, multiply by _____

4. To convert from gallons to liters, multiply by _____

Use a conversion factor from the chart to change each measurement.

5. 9 yards ≈ _____ meters

6. 4 ounces ≈ _____ grams

7. 12 fluid ounces ≈ _____ milliliters

8. 3 miles ≈ _____ kilometers

9. 24 pounds ≈ _____ kilograms

10. 7 gallons ≈ _____ liters

LESSON 7-4

Converting between Measurement Systems

Reading Strategies: Read a Table

The table below helps you change units of measurement from one system of measurement to another.

Length	Mass	Capacity
1 inch = 2.54 centimeters 1 foot ≈ 0.305 meter 1 yard ≈ 0.914 meter 1 mile ≈ 1.61 kilometers	1 ounce ≈ 28.4 grams 1 pound ≈ 0.454 kilogram	1 fluid ounce ≈ 29.6 milliliters 1 quart ≈ 0.946 liter 1 gallon ≈ 3.79 liters

Use the table. Find each factor.

1. What is the factor to change pounds to kilograms? _____

2. What is the factor to change quarts to liters? _____

Use the table. Find each measure.

3. 8 yards ≈ _____ meters

4. 2 gallons ≈ _____ liters

5. 6 pounds ≈ _____ kilograms

6. 13 feet ≈ _____ meters

7. 36 fluid ounces ≈ _____ liters

8. 3 miles ≈ _____ kilometers

LESSON 7-4

Converting between Measurement Systems
Success for English Learners

Length	Mass	Capacity
1 inch = 2.54 centimeters 1 foot ≈ 0.305 meter 1 yard ≈ 0.914 meter 1 mile ≈ 1.61 kilometers	1 ounce ≈ 28.4 grams 1 pound ≈ 0.454 kilogram	1 fluid ounce ≈ 29.6 milliliters 1 quart ≈ 0.946 liter 1 gallon ≈ 3.79 liters

To **convert** a measure means to change the units.

Problem 1

Convert 6 inches to centimeters. Find the factor in the table.

6 inches × 2.54 = 15.24 centimeters

6 inches = 15.24 centimeters

Problem 2

Convert 6 centimeters to inches. Find the factor in the table and work backwards.

$$6 \text{ centimeters} \times \frac{1}{2.54} = \frac{6}{2.54} \approx 2.362 \text{ inches}$$

6 centimeters ≈ 2.362 inches

Find each measurement. Use the factors in the table.

1. 5 miles × _____ ≈ _____ kilometers

2. 4 gallons × _____ ≈ _____ liters.

3. 32 ounces × _____ ≈ _____ grams

4. 15 meters × _____ ≈ _____ yards

5. 9 kilograms × _____ ≈ _____ pounds

6. 8 liters × _____ ≈ _____ quarts

MODULE 7

Applying Ratios and Rates
Challenge

A parking lot has three sections. The ratio of the number of cars in the first section to the number of cars in the second section to the number of cars in the third section is 1 : 2 : 3. There are 36 cars in all three sections of the parking lot.

1. How many cars are in each section of the parking lot?

   _____

2. What is one way in which you can move some of the cars between sections so the ratio of cars between sections of the parking lot is 1 : 1 : 1?

   _____

3. Another parking lot with three sections has 80 cars in it. Is it possible for ratio of the number of cars in the first section to the number of cars in the second section to the number of cars in the third section to be 1 : 2 : 3? Explain why or why not.

   _____

   _____

4. Suppose 18 cars are added to the original parking lot of 36 cars in which the ratio of the number cars in the first section to the number of cars in the second section to the number of cars in the third section is 1 : 2 : 3. If all 18 cars are placed in the third section, what will be the new ratio of the number of cars in each section?

   _____

   _____

LESSON 8-1	**Understanding Percent**

Practice and Problem Solving: A/B

Write each percent as a fraction in simplest form and as a decimal to the nearest hundredth.

1. 30% _____

   _____

2. 42% _____

   _____

3. 18% _____

   _____

4. 35% _____

   _____

5. 100% _____

   _____

6. 29% _____

   _____

7. 56% _____

   _____

8. $66\frac{2}{3}$ % _____

   _____

9. 25% _____

   _____

Write each decimal or fraction as a percent.

10. 0.03 _____

11. 0.92 _____

12. 0.18 _____

13. $\frac{2}{5}$ _____

14. $\frac{23}{25}$ _____

15. $\frac{7}{10}$ _____

Solve.

16. Bradley completed $\frac{3}{5}$ of his homework. What percent of his homework

    does he still need to complete? _____

17. After reading a book for English class, 100 students were asked whether or not they enjoyed it. Nine twenty-fifths of the class did not like the book. How many students liked the book?

    _____

18. At a concert, 20% of the people are wearing black dresses or suits, $\frac{1}{4}$ are wearing navy, 0.35 are wearing brown, and the rest are wearing a variety of colors (other). Write the percent, fraction, and decimal for each color clothing.

    black _____

    navy _____

    brown _____

    other _____

LESSON
8-1

Understanding Percent
Practice and Problem Solving: C

Write each percent as a fraction in simplest form and as a decimal to the nearest thousandth.

1. 4.5% _____

2. 119% _____

3. 200% _____

_____

_____

_____

4. 0.7% _____

5. 307% _____

6. $5\frac{1}{2}$% _____

_____

_____

_____

Write each decimal or fraction as a percent.

7. $7\frac{1}{7}$ _____

8. $\frac{3}{400}$ _____

9. 0.0054 _____

10. How could you use grids to model percents greater than 100%, such as 217%?

_____

_____

11. How could you use grids to model percents less than 1%, such as 0.7%?

_____

_____

12. In Jeffrey's class, 30% of the students are wearing blue shirts, $\frac{1}{4}$ of the students are wearing green shirts, 0.15 of the students are wearing red shirts and the rest are wearing white shirts. Write the percent, fraction, and decimal for each color shirt.

blue: _____

green: _____

red: _____

white: _____

13. Annabelle's homework is 75% complete. It took her 3 hours. How long should she estimate it will take her to complete her homework?

_____

14. Explain what percent of a dollar a quarter, 2 nickels, a dime and 3 pennies are.
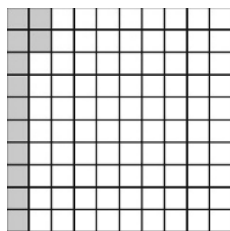
_____

LESSON 8-1

Understanding Percent
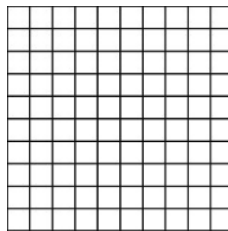
Practice and Problem Solving: D

Use the 10-by-10 square grids to model each percent. The first one is done for you.

67% means 67 out of 100.

1. 12%

2. 67%

Write each percent as a fraction in simplest form and as a decimal. The first is done for you.

3. 50% $\dfrac{50}{100} = \dfrac{1}{2}$

   50 hundredths = 0.50

4. 1% _____

   _____

5. 11% _____

   _____

6. 10% _____

   _____

7. 99% _____

   _____

8. 17% _____

   _____

9. 73% _____

   _____

10. 47% _____

    _____

11. 11.5% _____

    _____

Write each decimal or fraction as a percent. The first one is done for you.

12. 0.1 $\dfrac{1}{10} = \dfrac{10}{100} = 10\%$

13. 0.6 _____

14. 0.02 _____

15. $\dfrac{1}{2}$ _____

16. $\dfrac{7}{10}$ _____

17. $\dfrac{97}{100}$ _____

Solve.

18. A math workbook has 100 pages. Each chapter of the book is 10 pages long. What percent of the book does each chapter make up?

_____

LESSON 8-1	**Understanding Percent**

Reteach

A. A percent is a ratio of a number to 100. Percent means "per hundred."
To write 38% as a fraction, write a fraction with a denominator of 100.

$$\frac{38}{100}$$

Then write the fraction in simplest form.

$$\frac{38}{100} = \frac{38 \div 2}{100 \div 2} = \frac{19}{50}$$

So, 38% = $\frac{19}{50}$.

B. To write 38% as a decimal, first write it as fraction.

$$38\% = \frac{38}{100}$$

$\frac{38}{100}$ means "38 divided by 100."

$$
\begin{array}{r}
0.38 \\
100\overline{)38.00} \\
-\underline{300} \\
800 \\
-\underline{800} \\
0
\end{array}
$$

So, 38% = 0.38.

Write each percent as a fraction in simplest form.

1. 43%   2. 72%   3. 88%   4. 35%

_____   _____   _____   _____

Write each percent as a decimal.

5. 64%   6. 92%   7. 73%   8. 33%
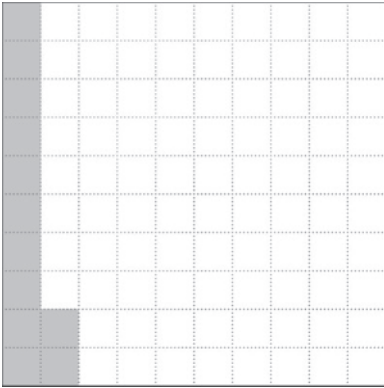
_____   _____   _____   _____

LESSON
8-1

Understanding Percent

Reading Strategies: Use Graphic Aids

The word **percent** means "per hundred." It is a ratio that compares a number to 100. A grid with 100 squares is used to picture percents.

Twelve percent is pictured on the grid below.

12 percent is a ratio, and means per hundred. $\rightarrow \dfrac{12}{100}$

12 percent can be written with symbols. $\rightarrow$ 12%

Use this figure to complete Exercises 1–4.

1. What is the ratio of shaded squares to total

   squares? _____

2. Write the shaded amount using the %

   symbol._____

3. What is the ratio of unshaded squares to

   total squares? _____

4. Use the % symbol to write the unshaded

   amount. _____
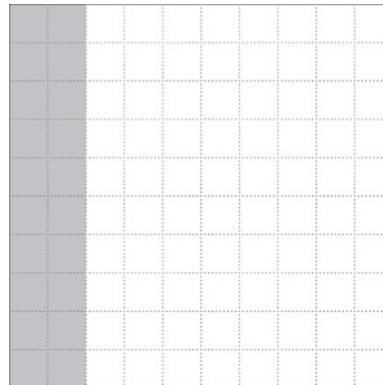
LESSON 8-1	**Understanding Percent**

Success for English Learners

Problem 1

A percent compares numbers to 100 with the symbol %.

You can rewrite a percent as a decimal or fraction.

$$27\% = \frac{27}{100} = 0.27$$

Problem 2

You can also rewrite a fraction or a decimal as a percent.

For a fraction, first rewrite it as a fraction with a denominator of 100.

$$\frac{3}{4} \quad \times 25 \quad \frac{75}{100}$$
$$\times 25$$

Then write it as a percent.

$$\frac{75}{100} = 75\%$$

For a decimal, first rewrite if necessary as a decimal in hundredths.

$$0.3 = 0.30$$

Then remove the decimal point and write the number as a percent.

$$0.30 = 30\%$$

1. Write each percent as a decimal and as a fraction.

   37% _____   6% _____

2. Which way of writing a percent (as a decimal or as a fraction) do you prefer?

   _____

   _____

LESSON 8-2	**Percents, Fractions, and Decimals**

Practice and Problem Solving: A/B

Find the percent of each number.

1. 25% of 56

2. 10% of 110

3. 5% of 150

4. 90% of 180

_____ _____ _____ _____

5. 125% of 48

6. 225% of 88

7. 2% of 350

8. 285% of 200

_____ _____ _____ _____

Find the percent of each number. Check whether your answer is reasonable.

9. 55% of 900

10. 140% of 50

11. 75% of 128

12. 3% of 600

_____ _____ _____ _____

13. 16% of 85

14. 22% of 105

15. 0.7% of 110

16. 95% of 500

_____ _____ _____ _____

Solve.

The world population is estimated to be nearly 9 billion by the year 2050. Use the circle graph to solve Exercises 17–19.

17. What is the estimated population of Africa in

the year 2050? _____

18. Which continent is estimated to have more than 5.31 billion people by the year 2050?

_____

19. What is the combined estimated population for North and South America in the year 2050?

_____

Estimated 2050 World Population

South America 5.3%
North America 7.9%
Other 0.7%
Europe 7.1%
Africa 20%
Asia 59%

20. In the year 2002, the world population was estimated at 6 billion people. Based on research from the World Bank, about 20% lived on less than $1 per day. How many people lived on less than $1 per day?

_____

21. The largest frog in the world is the goliath, found in West Africa. It can grow to be 12 inches long. The smallest frog in the world is about 2.5% as long as the goliath. About how long is the smallest frog in the

world?_____
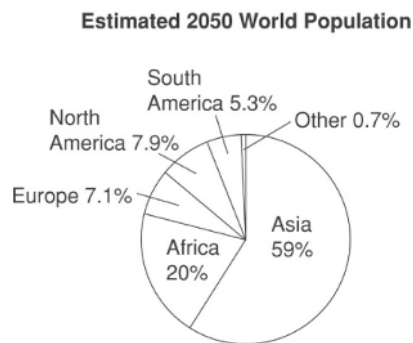
LESSON 8-2

Percents, Fractions, and Decimals

Practice and Problem Solving: C

Tell whether the percent of the number will be greater than, less than, or equal to the number. Explain your reasoning.

1. 25% of 56

   _____

   _____

2. 220% of 35

   _____

   _____

Solve.

3. The price of a shirt was $38. It was reduced by 20% and then again by 10%.

   a. What is the final price of the shirt? _____

   b. What would the price of the shirt be if it were reduced by 30% from

   the original? _____

   c. Explain why the two prices in a. and b. differ.

   _____

   _____

4. In July 2011, about 27% of the population of Texas was under 18 years old. Using the 2011 population figure of 25,674,681, about how many people who lived in

   Texas were under 18? _____
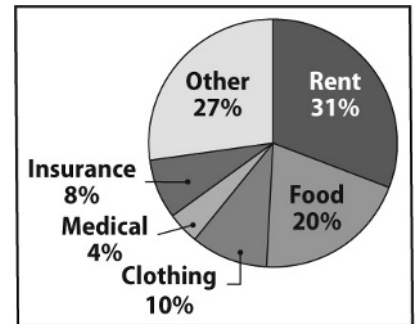
5. The circle graph shows how the Chinn family spends its monthly budget of $5,000.

   a. How much greater is the family's spending on rent than it is on food? Give your answer as a percent and in dollars.

   _____

   b. How much does the family spend on insurance and medical?

   _____

Circle graph: Rent 31%, Food 20%, Clothing 10%, Medical 4%, Insurance 8%, Other 27%

LESSON 8-2	**Percents, Fractions, and Decimals**

Practice and Problem Solving: D

Find the percent of each number. Check whether your answer is reasonable. The first one is done for you.

1. 20% of 75

$$\frac{20}{100} = \frac{x}{75}$$

$$\frac{1}{5} = \frac{x}{75}$$

$$x = 15$$

2. 25% of 64

$$\frac{25}{100} = \frac{x}{64}$$

$$\frac{\quad}{\quad} = \frac{x}{64}$$

$$x = \underline{\quad}$$

3. 4% of 75

_____

4. 2% of 400

_____

5. 160% of 80

_____

6. 12% of 50

_____

7. 87% of 500

_____

8. 28% of 250

_____

9. 500% of 25

_____

Solve.

10. Frank's Sports Store discounts all sports equipment by 20%. What is the cost of a baseball mitt that originally cost $45?

_____

11. In a science experiment, two tomato seeds were planted and watered. After six weeks, the plant that was fertilized was 26 centimeters tall. The plant that was not fertilized was only 74% as tall. What was the

height of the shorter plant?_____

12. Jackie made $28 babysitting last week. Her brother Joe made only 86% as much as she did. How much did Joe make?

_____

13. Meredith bought a book that cost $18 at a discount of 16%. What did

she pay for the book?_____

14. Tomás bought a book that cost $18. It was on sale for 84% of its original price. How much did Tomás pay?

_____

15. Explain why the prices were the same in 13 and 14.

_____

_____

LESSON 8-2	**Percents, Fractions, and Decimals**

Reteach

Percent is a ratio whose second term is 100. The ratio of 27 to 100 is 27%.

To write a fraction as a percent, convert the fraction to an equivalent fraction with a denominator of 100. Then, write it as a percent.

$$\frac{3}{4} \overset{\times 25}{\underset{\times 25}{=}} \frac{75}{100} = 75\%$$

To write a decimal as a percent, move the decimal point two places to the right and write a percent sign.

$$0.89 = 89\%$$

Use the methods above to find the percents.

1. Write the ratio of 41 to 100 as a percent. _____

2. Write 0.23 as a percent. _____

3. Write $\frac{3}{8}$ as a percent. _____

4. How did you change $\frac{3}{8}$ to an equivalent fraction with a denominator of 100?

   _____

   _____

5. Which do you find easier to work with: percents, fractions, or decimals?

   _____

   _____

LESSON 8-2

Percents, Fractions, and Decimals

Reading Strategies: Find a Pattern

You can use decimals to find the percent of a number.

Find 35% of 80.

35% of 80 means 35% times 80.

Step 1: Change the percent to a decimal by using place values.

$$35\% = \frac{35}{100}$$

$$= 0.35$$

Step 2: Multiply the decimal times the number. $\rightarrow 0.35 \times 80$

The answer is 28, so 35% of 80 is 28.

Answer each question.

1. What decimal is equal to 35%? _____

2. How do you change a percent to a decimal?

   _____

3. After the percent is changed to a decimal, what is the next step in

   finding the percent of a number? _____

4. Write 10% as a decimal. _____

5. What is 10% of 60? _____

6. What is 20% of 60? _____

7. What is 30% of 60? _____

8. What is 40% of 60? _____

9. What pattern did you notice in the answers to 10%, 20%, 30%,
   and 40% of 60?

   _____

10. Suppose you know that 10% of 250 is 25. How could you use
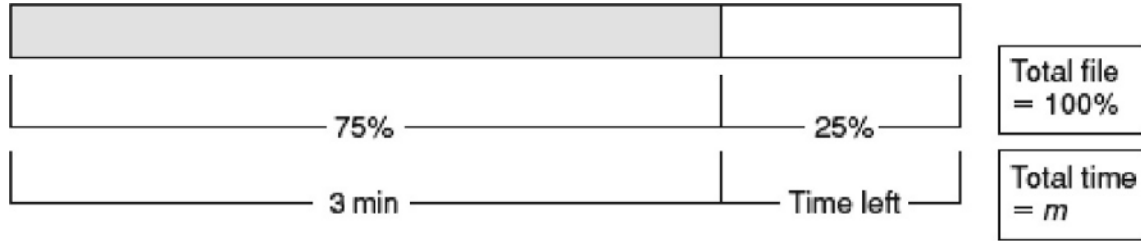   that information to find 30% of 250?

    _____

    _____

Percents, Fractions, and Decimals
Success for English Learners

Problem 1

How much more time will the download take?

75% — 25% — Total file = 100%

3 min — Time left — Total time = m

$$\frac{75}{100} = \frac{3}{m}$$
$$m = 4$$

It will take 4 minutes for the entire file.

It will take 1 more minute to download the file.

Total time − time passed = time left.
4 min − 3 min = 1 min

Problem 2

What is 20% of 150?

First, write the percent as a decimal.
20% = 20 hundredths
     = 0.20

2.0

0.20 • 150 = 30

Then multiply the decimal by the number given, 150.

20% of 150 is 30.

1. What is 15% of 84? _____

2. Explain why you represent 75% as $\frac{75}{100}$ in Problem 1.

   _____

3. What are two methods of finding the percent of a number?

   _____

   _____

LESSON 8-3

Solving Percent Problems

Practice and Problem Solving: A/B

Solve.

1. 22 students is ____% of 55.

2. 24 red marbles is 40% of ____ marbles.

3. 15% of $9 is $_____.

4. 12 is ____ % of 200.

5. Yesterday, Bethany sent 60 text messages. She said that 15% of those messages were to her best friend. How many text messages did Bethany send to her friend yesterday?

   _____

6. In a survey, 27% of the people chose salads over a meat dish. In all, 81 people chose salads. How many people were in the survey?

   _____

7. The sales tax on a $350 computer is $22.75. Find the sales tax rate.

   _____

Use the circle graph to complete Exercises 8–12.

8. If 6,000 people voted in the election, how many were from 18 to 29 years old?

   _____

9. If 12,000 people voted in the election, how many were from 50 to 64 years old?

   _____

10. If 596 people voted in the election, how many were over 65 years old?

   _____

11. Suppose that Sahil knows that 45 people with ages of 18 to 29 voted. Without using a calculator, he quickly says then 135 people with ages of 30 to 49 voted. Is he correct? How might Sahil have come up with his answer so quickly?
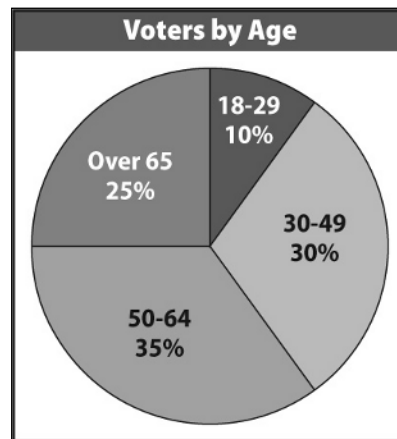
   _____

   _____

   _____

Voters by Age

18-29 10%
Over 65 25%
30-49 30%
50-64 35%

**LESSON
8-3**

Solving Percent Problems
Practice and Problem Solving: C

Solve.

1. Selina earns 8% commission on sales. On one sale, her commission was $20.40. What was the amount of that sale?

   _____

2. Bryan bought two shirts for $14.50 each and a pair of shoes for $29.99. The sales tax was 6%. How much did Bryan spend?

   _____

3. Josh created a pattern by using tiles. Twenty tiles were blue. For the rest of the pattern he used equal numbers of red and white tiles. Forty percent of the pattern was made with blue tiles. How many red tiles were used to make the pattern?

   _____

4. Suppose you have a coupon for a 20% discount. You buy a game that costs $38. The sales tax rate is 5.5%. Sales tax applies to the cost after the discount. What is the total cost of the game?

   _____

Use the circle graph to complete Exercises 5–8.

5. Maria spent 40 minutes chatting online. How many minutes did she spend playing games?

   _____
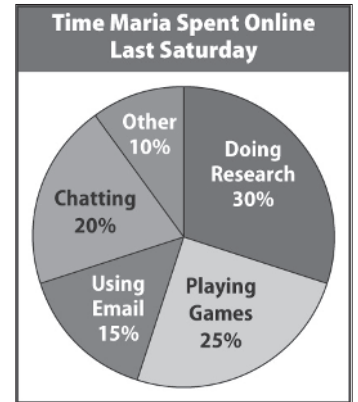
6. How much more time did Maria spend doing research than checking email?

   _____

7. How much time did Maria spend online on Saturday?

   _____

8. Write your own problem using the data from the graph. Your problem should need more than one-step in the solution. Then show how to solve your problem and give the answer.

   Problem: _____

   _____

   Solution: _____

   _____

LESSON
8-3

Solving Percent Problems

Practice and Problem Solving: D

Solve each problem. The first one is done for you.

The world population is estimated to exceed 9 billion by the year 2050. Use the circle graph to solve Exercises 1–2.

1. What is the estimated population of Africa in 2050?
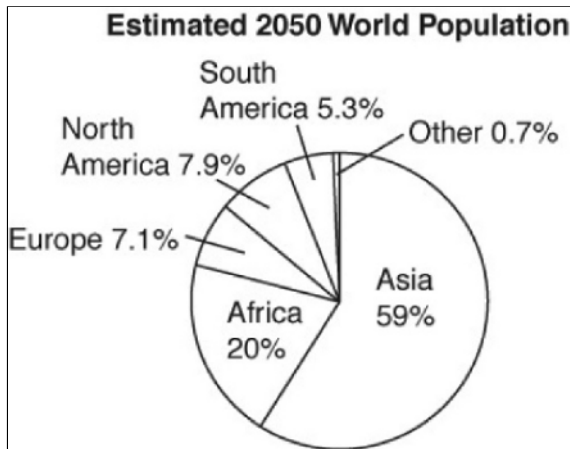
   Solution:

   The graph shows in 2050, Africa will have 20% of the world population. Find 20% of 9 billion.

   Write 20% as a decimal. $20\% = 0.2$

   Multiply 9 by 0.2. $9 \bullet 0.2 = 1.8$

   The estimated population of Africa in 2050

   is about _____**1.8 billion**_____

Estimated 2050 World Population

South America 5.3%
North America 7.9%
Other 0.7%
Europe 7.1%
Asia 59%
Africa 20%

2. Which continent is estimated to have more than 5.31 billion people by 2050?

   To solve, find what percent 5.31 billion is of 9 billion.

   Write a ratio of part to whole. $\dfrac{?}{100} = \dfrac{5.31}{9}$

   Solve for ?. Change $\dfrac{\text{your answer for ?}}{100}$ to a decimal and then to a percent._____ %

   Use the graph to complete: In 2050, _____ will have _____ % of the population on the graph.

3. A half-cup of pancake mix has 5% of the total daily allowance of cholesterol. The total daily allowance of cholesterol is 300 mg. How much cholesterol does a half-cup of pancake mix have?

   _____

4. The student population at King Middle School is 52% female. There are 637 girls at King Middle School. What is the total student population King Middle School? How many boys go to King Middle School?

   _____

5. Carey needs $45 to buy her mother a gift. She has saved 22% of that amount so far. How much more money does she need?
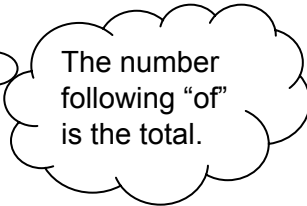
   _____

CAUTION: Read the question carefully.
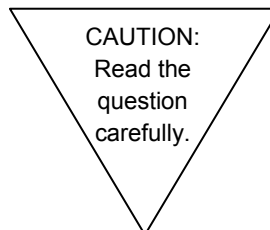
LESSON 8-3	**Solving Percent Problems**

Reteach

You can use this proportion to solve percent problems.

$$\frac{\text{part}}{\text{total}} = \frac{\text{percent}}{100}$$

9 is what percent of 12?

Think: part   unknown   total

The number following "of" is the total.

30% of what number is 24?

Think: percent unknown part

$$\frac{9}{12} = \frac{x}{100}$$

$12 \cdot x = 9 \cdot 100$

$12x = 900$

$$\frac{12x}{12} = \frac{900}{12}$$

$x = 75$

So, 9 is 75% of 12.

$$\frac{24}{x} = \frac{30}{100}$$

$30 \cdot x = 24 \cdot 100$

$30x = 2{,}400$

$$\frac{30x}{30} = \frac{2{,}400}{30}$$

$x = 80$

So, 30% of 80 is 24.

Solve.

1. What percent of 25 is 14?

   a. part = _____

   b. total = _____

   c. percent = _____

   d. Write and solve the proportion.

   Answer: _____ % of 25 is 14.

2. 80% of what number is 16?

   a. part = _____

   b. total = _____

   c. percent = _____

   d. Write and solve the proportion.

   Answer: 80% of _____ is 16.

3. What percent of 20 is 11? _____

4. 18 is 45% of what number? _____

5. 15 is what percent of 5? _____

6. 75% of what number is 105? _____

LESSON 8-3

Solving Percent Problems

Reading Strategies: Connecting Words and Symbols

You can connect words and symbols to write equations for percent problems.

Ten percent of 190 students are in the band. How many students are in the band?

Use what you know: n is 10% of 190

Use symbols: $n = 10\% \bullet 190$

Jessica has saved $38. That is 20% of what she wants to save this year. How much does she want to save this year?

Use what you know: $38 is 20% of what number

Use symbols: $38 = 20\% \bullet n$

Bart answered 18 questions correctly. What percent of the 20 questions on the test did he get correct?

Use what you know: 18 is what percent of 20

Use symbols: $18 = n \bullet 20$

> *Remember:* When finding a percent, your answer will be a decimal that needs to be rewritten as a percent.

Answer each question.

1. What is the symbol for the word "of"? _____

2. What symbol means "is"? _____

3. What symbol in the above examples stands for the unknown

   number? _____

Write an equation for each problem.

4. Mika has completed 5 birdhouses. That is 25% of the number of birdhouses she wants to build. How many birdhouses does she want to build?

   _____

5. A baker made 40 loaves of wheat bread. In all, 160 loaves of bread were made. What percent of the loaves of bread made was wheat bread?

   _____

LESSON 8-3

Solving Percent Problems
Success for English Learners

Problem 1

For Sale $39,500

Just to inform you, I get a 4% commission if I sell a car.

Commission	is	Commission Rate	of	Total Sales
⇩	⇩	⇩	⇩	⇩
c	=	4%	•	$39,500

$c = 4\% \bullet \$39,500$ Write the equation.

$c = 0.04 \bullet \$39,500$ Change the percent to a decimal.

$c = \$1,580$ Multiply.

The salesperson will be paid $1,580 for selling the car.

Problem 2

HH Mart
Welcome to our store

1@ 145.80	$145.80
2@ 15.99	$31.98
Subtotal	$177.78
Tax (7.75%)	$13.78

Add the cost of total purchases to get a subtotal.

Multiply the subtotal by the tax rate.

Find the tax on the sale.

$t = 7.75\% \bullet \$177.78$

$t = 0.0775 \bullet \$177.78$

$t \approx \$13.78$

So, Meka would pay $13.78 in tax for her purchases.

Complete.

1. In Problem 2, what is the total cost, including tax? _____

2. How much is a 6% commission on a sale of $24,000? _____

3. What is the total cost, including tax, of a $48 coat

   with 8% sales tax? _____

Percents

Challenge

1. Anthony found a number that is 20% of 30% of 400. What percent of 45 is the number that Anthony found?

_____

2.   Book A: 120 pages

                Book B: 170 pages

                Book C: 90 pages

Kevin and Dashawn were both assigned reading from books A, B and C above. Kevin completed 40% of Book A, 30% of Book B, and 10% of Book C. Dashawn completed 50% of Book A, 20% of Book B, and 30% of Book C. How many pages did each student read?

_____

Food	Calories	Fat (grams)
Whole Milk	150	8
Egg	80	6
Hamburger	220	15
Pizza	160	3

3. The table above shows calories and fat grams for different foods. Fat grams contain 9 calories each. Find the percent of calories from fat for each of the foods above.

_____

_____

_____

_____

4. Suppose a food has 300 calories per serving. What is the maximum number of grams of fat that the food can contain in order for the percent of calories from fat to be 40% or less?

_____

UNIT 3: Proportionality: Ratios and Rates

MODULE 6 Representing Ratios and Rates

LESSON 6-1

Practice and Problem Solving: A/B

1. 9 to 12; 9:12; $\dfrac{9}{12}$

2. 8 to 16; 8:16; $\dfrac{8}{16}$

3. 9 to 10; 9:10; $\dfrac{9}{10}$

4. 10 to 12; 10:12; $\dfrac{10}{12}$

5. 12 to 9; 12:9; $\dfrac{12}{9}$

6. Answers may vary. Sample answers:
   $\dfrac{8}{6}, \dfrac{16}{12}, \dfrac{32}{24}$

7. Answers may vary. Sample answers: $\dfrac{6}{7}$,
   $\dfrac{18}{21}, \dfrac{24}{28}$

8. Answers may vary. Sample answers: $\dfrac{2}{3}$,
   $\dfrac{8}{12}, \dfrac{12}{18}$

9. Answers may vary. Sample answers:
   6 to 8, 9 to 12, 12 to 16

10. Answers may vary. Sample answers: $\dfrac{10}{14}$,
    $\dfrac{15}{21}, \dfrac{20}{28}$

11. Answers may vary. Sample answers: $\dfrac{18}{4}$,
    $\dfrac{27}{6}, \dfrac{36}{8}$

12. a. 48
    b. 36

Practice and Problem Solving: C
Answers will vary. Check students' work.

Practice and Problem Solving: D

1. 1 circle patch to 3 square patches; 1 to 3

2. 3; 3

3. 3; 12

4. 5 to 1; 5:1; $\dfrac{5}{1}$

5. 1 to 4; 1:4; $\dfrac{1}{4}$

6. 4 to 5; 4:5; $\dfrac{4}{5}$

7. Answers may vary. Sample answers: $\dfrac{4}{6}$,
   $\dfrac{6}{9}, \dfrac{8}{12}$

8. Answers may vary. Sample answers: $\dfrac{6}{8}$,
   $\dfrac{9}{12}, \dfrac{12}{16}$

9. Answers may vary. Sample answers: $\dfrac{2}{12}$,
   $\dfrac{3}{18}, \dfrac{4}{24}$

Reteach

1. 31 to 365

2. 3 to 4

3. Sample answer: 2:3, 4:6. 6:9

4. Sample answer: 4:5, 8:10, 12:15

5. Sample answer: 10:12, 15:18, 20:24

6. Sample answer: 5:7, 15:21, 20:28

Reading Strategies

1. $\dfrac{3}{4}$; 3 to 4; 3:4

2. 4:9; 4 to 9; $\dfrac{4}{9}$

3. triangles to squares

4. 5:4

Success for English Learners

1. 15; multiply

2. Sample answer: Multiply $\frac{5}{2}$ by $\frac{3}{3}$ or any representation of 1.

LESSON 6-2

Practice and Problem Solving: A/B

1. 45 mph
2. 95 calories per apple
3. $0.46 per oz
4. a. $0.25 per oz
   b. $0.19 per oz
5. quart
6. Both are the same unit rate.
7. a. $0.19 per oz
   b. $0.16 per oz
   c. the 36-oz box
8. a. 7.5 pages per h
   b. $2.67 per page

Practice and Problem Solving: C

1. 45 mph; 52.9 mph; Ali
2. 95 calories per apple; 62 calories per apple; Oranges
3. a. $0.77 per oz
   b. $0.62 per oz
   c. $0.27 per oz
4. An ounce of paint from a quart costs about twice as much as an ounce from a gallon.
5. 4 times larger
6. a. $5.53 per in.
   b. $7.51 per in.

Practice and Problem Solving: D

1. 25 mi per day
2. 4 emails per min
3. $0.04 per oz
4. a. $0.40
   b. $0.25
5. economy

6. economy
7. a. $0.50 per oz
   b. $1.00 per oz
8. a. $200 per day
   b. $75.00 per room
   c. 16 rooms

Reteach

1. 315 ÷ 15 = 21 peanuts a minute
2. 81 ÷ 9 = 9 texts per minute
3. 56 ÷ 2 = 28 pages per hour
4. 6 oz: $0.90 ÷ 6 = $0.15, 10 oz: $1.10 ÷ 10 = $0.11; 16 oz: $1.44 ÷ 16 = $0.09; The 16-oz can is the best buy.
5. $2.24 ÷ 16 = $0.14; $3.60 ÷ 20 = $0.18; $2.56 ÷ 16 = $0.16; whole wheat

Reading Strategies

1. $1.25 per lb
2. $1.05 per lb
3. small
4. extra large
5. It has the lowest unit price.
6. Flora
7. Dan
8. Flora

Success for English Learners

1. Divide 300 by 5.2 to find the unit rate.
2. No, sometimes the unit price of a smaller size is less.
3. No, sometimes you might not need that much or it might get stale before you can finish it.
4. Sample answer: Bags of apples in three different sizes are on sale at the store. The large 10-lb bag costs $15, the medium 5-lb bag costs $10, and the small 2-lb bag costs $4.50. Which is the best buy? (The large 10-lb bag has the lowest unit price at $1.50 per pound.)

LESSON 6-3

Practice and Problem Solving: A/B

1.
sugar	3	6	12	18	30
milk	2	4	8	12	20

2. Eve's

3. No, the ratios are not the same. 5 to 7 is not equivalent to 15 to 17.

4. $22.50

5. 110 mi

6. a. $\frac{2}{20}$ or $\frac{1}{10}$

   b. $\frac{3}{25}$

   c. Cafe A: 5; Cafe B: 6

Practice and Problem Solving: C

1.
water molecule	2	5	10	20
hydrogen atoms	4	10	20	40
oxygen atoms	2	5	10	20

2. The numbers of atoms of hydrogen and oxygen would be equal.

3. 15H, 5N

4. 36 adult tickets + 90 student tickets = 126 tickets altogether

5. 72 mi

6. My Sky

7. Appliance Store; $2.50 per lamp

Practice and Problem Solving: D

1.
club soda	2	4	8	10	20
juice	5	10	20	25	50

2. Erin

3. No, the rates are not the same. 22 to 15 is not equivalent to 5 to 10.

4. $42

5. 28 mi

6. The first sports store sells at the better bargain.

7. Perfect Poultry

Reteach

1. $\frac{2}{3}$, $\frac{4}{6}$, $\frac{6}{9}$ $\boxed{\frac{8}{12}}$ $\frac{10}{15}$ ...; $\frac{3}{4}$, $\frac{6}{8}$, $\boxed{\frac{9}{12}}$ ...; $\frac{8}{12}$, $< \frac{9}{12}$

2. $\frac{4}{5}$, $\frac{8}{10}$, $\frac{12}{15}$, $\frac{16}{20}$, $\frac{20}{25}$, $\boxed{\frac{28}{35}}$ ...; $\frac{3}{7}$, $\frac{6}{14}$, $\frac{9}{21}$, $\frac{12}{28}$, $\boxed{\frac{15}{35}}$ ...; $\frac{28}{35}$, $> \frac{15}{35}$

3. Jack: $\frac{3}{5}$, $\frac{6}{10}$, $\frac{9}{15}$, $\frac{12}{20}$, $\frac{15}{25}$, $\boxed{\frac{18}{30}}$ ...;

   Evan: $\frac{4}{6}$, $\frac{8}{12}$, $\frac{12}{18}$, $\frac{16}{24}$, $\boxed{\frac{20}{30}}$ ...; $\frac{20}{30}$ $> \frac{18}{30}$;
   Evan's oatmeal is thicker (has more oats).

Reading Strategies

1. Veggie

2. Greens

3. Greens

4. No, it could come from Greens Salad Bar and you have 15 cups of greens or from Veggie Salad Bar and you have only $6\frac{2}{3}$ cups of greens.

5. a. 30 cups

   b. $13\frac{1}{3}$ cups

Success for English Learners

1. 18 sit ups

2. 10 sit ups

3. 9 sit ups

4. Sample answer: table because it is easier to draw; number line because you can see the relationship better.

MODULE 6 Challenge

1. Arabella: $\dfrac{7{,}229 \text{ ft}}{561 \text{ s}} \cdot \dfrac{1 \text{ mi}}{5{,}280 \text{ ft}} \cdot \dfrac{3{,}600 \text{ s}}{1 \text{ h}}$
   $= 8.786$ mph

   Bettina: first convert 13 min, 12 s to
   $13 \times 60 + 12 = 792$ s
   $\dfrac{3{,}425 \text{ yd}}{792 \text{ s}} \cdot \dfrac{1 \text{ mi}}{1{,}760 \text{ yd}} \cdot \dfrac{3{,}600 \text{ s}}{1 \text{ h}} = 8.846$ mph

   Chandra: $\dfrac{8{,}214 \text{ ft}}{0.195 \text{ h}} \cdot \dfrac{1 \text{ mi}}{5{,}280 \text{ ft}} = 7.978$ mph

   Divya: $\dfrac{1.62 \text{ mi}}{732 \text{ s}} \cdot \dfrac{3{,}600 \text{ s}}{1 \text{ h}} = 7.967$ mph

2. Bettina ran the fastest. Divya ran the slowest.

3. Answers will vary. Sample answer: It is helpful to convert to the same units so that the rates can be compared easily.

4. The first place finisher Bettina would finish in $\dfrac{3.1}{8.846} = 0.3504$ h, or $0.3504 \times 60 = 21.026$ min.

   The last place finisher Divya would finish in $\dfrac{3.1}{7.967} = 0.3891$ h, or $0.3891 \times 60 = 23.346$ min.

   $23.346 - 21.026 = 2.32$ minutes will elapse.

MODULE 7 Applying Ratios and Rates
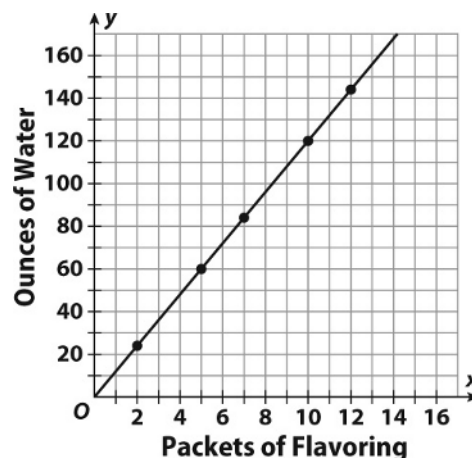
LESSON 7-1

Practice and Problem Solving: A/B

1. $\dfrac{\text{ounces of water}}{\text{packets of flavoring}} =$

   $\dfrac{24 \text{ oz}}{2 \text{ packets}} = \dfrac{12 \text{ oz}}{1 \text{ packet}} =$

   12 oz of water per packet

2.

Packets of Flavoring	2	5	7	10	12
Ounces of Water	24	60	84	120	144

3.

4. 276 oz

5. Yes. You can add nine and a half packets of flavoring to 114 oz of water.

6. $\dfrac{24}{2} = \dfrac{36}{3} = \dfrac{66}{5.5} = \dfrac{108}{9} = \dfrac{180}{15}$

7. It is a multiplicative relationship because the number of packets is multiplied by 12 oz. The line of the graph begins at the origin and is steep.

Practice and Problem Solving: C

1. Sample answer:

A	2	5	7	8	10
B	6	15	21	24	30

2. $\dfrac{A}{B} = \dfrac{2}{6} = \dfrac{1}{3}$. For each 1 A, there will be 3 Bs.

3. Sample answer: An amusement park provides seating on rides in the ratio of 6 children's seats for every 2 adult seats.

4. Sample answer: Multiplication; Each adult seat is multiplied by 3 to find the number of children's seats.

5. Sample answer: No, because it is unlikely an amusement park would have half a child's seat or half an adult seat.
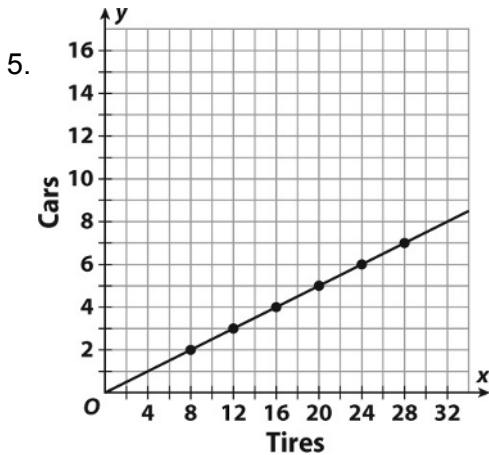
Practice and Problem Solving: D

1.

Number of Tires	8	12	16	20	24	28
Number of Cars	2	3	4	5	6	7

2. The number of tires is equal to the number of cars times 4.

3. $\dfrac{\text{tires}}{\text{cars}} = \dfrac{8}{2} = \dfrac{4}{1} = 4$ tires for every 1 car

4. (8, 2), (12, 3), (16, 4), (20, 5), (24, 6), (28, 7)

5.

6. $\dfrac{8}{2} = \dfrac{12}{3} = \dfrac{16}{4} = \dfrac{20}{5} = \dfrac{40}{10}$

Reteach

1.

A	6	9	12	15	18	21	24
B	2	3	4	5	6	7	8

2. Sample answer: $\dfrac{6}{2} = \dfrac{3}{1}, \ \dfrac{9}{3} = \dfrac{3}{1}, \ \dfrac{18}{6} = \dfrac{3}{1},$

$\dfrac{24}{8} = \dfrac{3}{1}$

3. $\dfrac{3}{1}; \dfrac{69}{23}$

4. 189; $\dfrac{189}{63}$

Reading Strategies

1. Cost to pounds: ($4.50, 3), ($7.50, 5), ($10.50, 7), ($13.50, 9), ($16.50, 11)

   Pounds to cost: (3, $4.50), (5, $7.50), (7, $10.50), (9, $13.50), (11, $16.50)

2. 1 to $1.50; $1.50

3. Flour to baking soda: (6, 3), (8, 4), (10, 5), (12, 6), (18, 9), (24, 12)

   Baking soda to flour: (3, 6), (4, 8), (5, 10), (6, 12), (9, 18), (12, 24)

4. 1 tsp of baking soda to 2 c of flour

Success for English Learners

1. The cost would be on the top of the ratio and the ounces would be on the bottom of the ratio.

2. The ounces would be on the *y*-axis and the cost would be on the *x*-axis. The line would be steeper.

3. Sample answer:

Gas (gal)	4	5	6	7	8
Miles	128	160	192	224	256

   Ordered pairs: (4, 128), (5, 160), (6, 192), (7, 224), (8, 256)

LESSON 7-2

Practice and Problem Solving: A/B

1. 16
2. 15
3. 9
4. 60
5. 9 in.
6. 12 cm
7. 16
8. $3.08
9. a. 10 mi
   b. 6 in.
   c. 3 in.
10. 1.5 in.

Practice and Problem Solving: C

1. 5
2. 50
3. 28.8
4. 5.7
5. 9 in.
6. 12 in.
7. $6.71

8 a. 0.67 mi/min

   b. Sinead

   c. 362.5 mi; 40 × 2.5 = 100.
      100 + 150 + 112.5 = 362.5

9. 2.25 cm

Practice and Problem Solving: D

1. 8

2. 8

3. 20

4. 33

5. $\dfrac{8}{11} = \dfrac{x}{33}$, $x = 24$; The width should be 24 in.

6. 7.5 cm

7. 200 mi

8. $16.00

9. a. 9 mi.

   b. 5 in.

   c. 1 in. = 1.5 mi

10. 1.3 in.

Reteach

1. $3.06

2. $4.47

3. 6 in.

Reading Strategies

1. a. $0.35

   b. $0.33

   c. $0.30

2. $1.98

3. $2.40

4. $1.20

5. a. $22.60

   b. $113.00

6. a. 9.33 mph

   b. 18.67 mi

7. Jeff

Success for English Learners

1. Yes, $\dfrac{24}{3} = \dfrac{8}{1}$. 8 ft^2 per hour is the unit
   rate. 8 (unit rate) × 9 h = 72 ft^2 per 9 h.

2. No, not a proportion; $\dfrac{4.50}{18} \neq \dfrac{9.00}{30}$; 2 x
   4.50 = 9.00, but 2 × 18 ≠ 30

LESSON 7-3

Practice and Problem Solving: A/B

1. 48 in.

2. $1\dfrac{1}{2}$ gal

3. 5,000 m

4. 2 kg

5. 20 c; $\dfrac{4\ \text{cups}}{1\ \text{quart}}$

6. 6 m; $\dfrac{1\text{m}}{100\ \text{cm}}$

7. 5,280 ft

8. 700 m

9.

Dowel	in.	ft	yd
A	36	3	1
B	66	$5\dfrac{1}{2}$	$1\dfrac{5}{6}$
C	90	$7\dfrac{1}{2}$	$2\dfrac{1}{2}$

10. a. 44 in.; $3\dfrac{2}{3}$ ft

    b. $25\dfrac{1}{2}$ in.; $2\dfrac{1}{8}$ ft

11. Multiply 3 × 36 and 2 × 12 and add the
    products.

Practice and Problem Solving: C

1. 54 in.

2. 0.375 ft

3. 5.43 m

4. 5,100 m; 510,000 cm

5. 26 c

6. 390 cm

7. 5,280 ft; 1,760 yd

8. 7.36 m

9.

Chain	yd	ft	in.
gold	$3\frac{1}{2}$	$10\frac{1}{2}$	126
silver	$4\frac{1}{6}$	12.5	150
bronze	$4\frac{1}{9}$	$12\frac{1}{3}$	148

10. a. 50 cm by 50 cm

b. 2,500 cm²

c. No, a square meter is 100 cm × 100 cm = 10,000 cm².
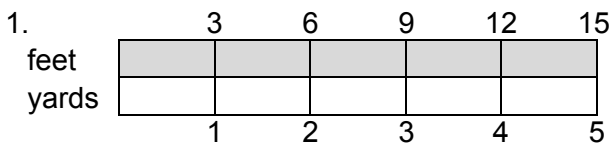
Practice and Problem Solving: D

1. 4 ft
2. 8 qt
3. 3 km
4. 1.5 kg
5. 28 c; 4 cups
6. 5 m; $\frac{1}{100}$ m
7. 15,840 ft
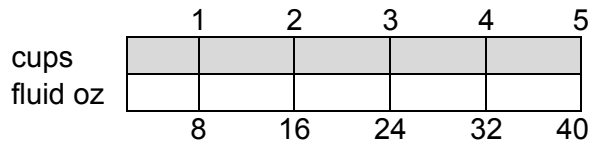8. 900 m

9.

Trim	in.	ft.	yd.
A	24	2	$\frac{2}{3}$
B	216	18	6

10. a. Use the board to see how many inches long the rug is. Divide the number of inches by 12 to find feet.

b. 36 in.; 3 ft

11. Multiply 4 × 100 and add 20.

Reteach

1.

feet	3	6	9	12	15
yards	1	2	3	4	5

2.

cups	1	2	3	4	5
fluid oz	8	16	24	32	40

3. Sample answers: No, doubling, tripling, quadrupling 5,280 is difficult. Yes, you would double, triple, quadruple 5,280.

Reading Strategies

1. a. 12

b. $\frac{1}{12}$

2. a. multiply by 12

b. divide by 12

3. You could show 1 meter and 100 centimeters, 2 meters and 200 centimeters, 3 meters and 300 centimeters and so on.

4. Sample answer:

customary

yd	1	2	3	4
ft	3	6	9	12

Relationship: 1 yd to 3 ft

metric

kg	1	2	3
g	1,000	2,000	3,000

Relationship: 1 kg to 1,000 g

Success for English Learners

1. 198 in.
2. 12.5 yd

LESSON 7-4

Practice and Problem Solving: A/B

1. 36.56 m
2. 148 mL
3. 23.608 kg
4. 4.348 mi
5. 3.958 gal
6. 6.1006 kg
7. 48 ft^2
8. 1.1944 L

Practice and Problem Solving: C

1. mile: kick, furlong, cabel

   yard: furlong, cabel, perch, bamboo, cubit

   foot: pes, cubit, span, bamboo

   inch: pes, span

   Sample answer: I chose the units that are close in size to the given unit.

2. a. 1.5

   b. 16.5

   c. 3,280.84

   d. 720

   e. $\dfrac{1}{10.499}$

   f. $\dfrac{1}{660}$

   g. $\dfrac{1}{0.973}$

   h. $\dfrac{1}{0.75}$

3. 19.636 perches

4. 1.757 bamboos

Practice and Problem Solving: D

1. 2.54; 17.78
2. 0.454; 0.908
3. 29.6; 177.6
4. 3.79; 18.95
5. 0.914; 18.28
6. 28.4; 426
7. $\dfrac{1}{28.4}$; 3.52
8. $\dfrac{1}{0.946}$; 21.14
9. $\dfrac{1}{1.61}$; 2.48
10. $\dfrac{1}{0.454}$; 13.22
11. $\dfrac{1}{2.54}$; 19.69
12. $\dfrac{1}{29.6}$; 2.74
13. 4.2044 m

Reteach

1. 0.305
2. 0.946
3. 0.454
4. 3.79
5. 8.226
6. 113.6
7. 355.2
8. 4.83
9. 10.896
10. 26.53

Reading Strategies

1. 0.454
2. 0.946
3. 7.312
4. 7.58
5. 2.724
6. 3.965
7. 1.0656
8. 4.83

Success for English Learners

1. 1.61; 8.05
2. 3.79; 15.16
3. 28.4; 908.8
4. $\dfrac{1}{0.914}$; 16.41
5. $\dfrac{1}{0.454}$; 19.82
6. $\dfrac{1}{0.946}$; 8.46

MODULE 7 Challenge

1. There are 6 cars in the first section, 12 cars in the second section and 18 cars in the third section.

2. Answers will vary. Sample answer: One way is to move 6 cars from the third section to the first section. Then there will be 12 cars in each section and the ratio will be 1 : 1 : 1.

3. No. To have the ratio of 1 : 2 : 3 the total number of cars must be a multiple of 6. 80 is not a multiple of 6.

4. If 18 cars are added to the third section there would be 6 cars in the first section, 12 cars in the second section and 36 cars in the third section. The new ratio would be 1 : 2 : 6.

MODULE 8 Percents

LESSON 8-1

Practice and Problem Solving: A/B

1. $\frac{3}{10}$; 0.3

2. $\frac{21}{50}$; 0.42

3. $\frac{9}{50}$; 0.18

4. $\frac{7}{20}$; 0.35

5. $\frac{1}{1}$ or 1

6. $\frac{29}{100}$; 0.29

7. $\frac{14}{25}$; 0.56

8. $\frac{2}{3}$; 0.67

9. $\frac{1}{4}$; 0.25

10. 3%

11. 92%

12. 18%

13. 40%

14. 92%

15. 70%

16. 40%

17. 64 students

18. black: 20%; $\frac{1}{5}$; 0.2

navy: 25%; $\frac{1}{4}$; 0.25

brown: 35%; $\frac{7}{20}$; 0.35

other: 20%; $\frac{1}{5}$; 0.2

Practice and Problem Solving: C

1. $\frac{9}{200}$; 0.045

2. $1\frac{19}{100}$; 1.19

3. $\frac{2}{1}$; 2

4. $\frac{7}{1,000}$, 0.007

5. $3\frac{7}{100}$; 3.07

6. $\frac{11}{200}$; 0.055

7. 7.143%

8. 0.75%

9. 0.54%

10. Use more than one grid. For 217% you would use 3 grids, shading in 2 completely and shading 17 squares on the third.

11. Divide a small square on the grid into tenths and shade 7 of them.

12. blue: 30%; $\frac{3}{10}$; 0.3

green: 25%; $\frac{1}{4}$; 0.25

red: 15%; $\frac{3}{20}$; 0.15

white: 30%; $\frac{3}{10}$; 0.3

13. 1 h

14. Add the values 25 + 10 + 10 + 3 = 48, 48% of a dollar.

Practice and Problem Solving: D

1.

2.
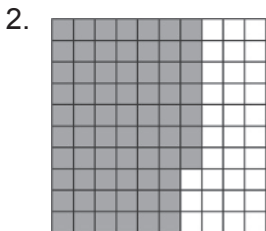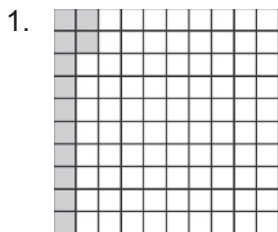
3. $50\% = \dfrac{50}{100} = \dfrac{1}{2}$; 50 hundredths = 0.50

4. $\dfrac{1}{100}$; 0.01

5. $\dfrac{11}{100}$; 0.11

6. $\dfrac{1}{10}$; 0.1

7. $\dfrac{99}{100}$; 0.99

8. $\dfrac{17}{100}$; 0.17

9. $\dfrac{73}{100}$; 0.73

10. $\dfrac{47}{100}$; 0.47

11. $\dfrac{23}{200}$; 0.115

12. $\dfrac{1}{10} = \dfrac{10}{100} = 10\%$

13. 60%

14. 2%

15. 50%

16. 70%

17. 97%

18. 10%

Reteach

1. $\dfrac{43}{100}$

2. $\dfrac{18}{25}$

3. $\dfrac{22}{25}$

4. $\dfrac{7}{20}$

5. 0.64

6. 0.92

7. 0.73

8. 0.33

Reading Strategies

1. 20 to 100

2. 20%

3. 80 to 100

4. 80%

Success for English Learners

1. 0.37; $\dfrac{37}{100}$

   0.06; $\dfrac{6}{100}$ or $\dfrac{3}{50}$

2. Answers will vary, but should reflect that it depends on the situation and numbers and operations involved.

LESSON 8-2

Practice and Problem Solving: A/B

1. 14

2. 11

3. 7.5

4. 162

5. 60

6. 198

7. 7

8. 570

9. 495

10. 70

11. 96

12. 18

13. 13.6

14. 23.1

15. 0.77

16. 475

17. more than 1.8 billion

18. Asia

19. about 1.2 billion

20. about 1.2 billion

21. about 0.3 in.

Practice and Problem Solving: C

1. less than; 25% is equivalent to $\frac{25}{100}$ or $\frac{1}{4}$, a fraction less than 1. A number multiplied by a fraction less than 1 gives a product less than the original number.

2. greater than; 220% is equivalent to $\frac{220}{100}$ or $2\frac{1}{5}$, a mixed number greater than 1. Multiplying a number by a mixed number gives a product greater than the original number.

3. a. $27.36; b. $26.60; c. In a., you find 80% of the original price and then find 90% of the new price so you are finding 72% of the original price. In b., you are finding 70% of the original price.

4. 6,932,164

5. a. 11%; $550

   b. $600

Practice and Problem Solving: D

1. 15

2. $\frac{1}{4}$; 16

3. 3

4. 8

5. 128

6. 6

7. 435

8. 70

9. 125

10. $36

11. 19.24 cm

12. $24.08

13. $15.12

14. $15.12

15. A discount of 16% is the same as 84% of the original price.

Reteach

1. 41%

2. 23%

3. 37.5%

4. First divided 100 by 8 to get 12.5. Then multiplied 3 and 8 by 12.5 to get
$$\frac{3 \times 12.5}{8 \times 12.5} = \frac{37.5}{100}$$

5. Accept all reasonable answers. A good answer might include looking at numbers involved and then choosing which to use.

Reading Strategies

1. 0.35

2. Remove the percent sign. Move the decimal point two places to the left.

3. Multiply the decimal times the number.

4. 0.10

5. 6

6. 12

7. 18

8. 24

9. The answers are multiples of 6.

10. Since 30% is three times as great as 10%, I could multiply 25 by 3 to get 75.

Success for English Learners

1. 12.6

2. 75% is 75 hundredths or $\frac{75}{100}$

3. You can find the percent of a number by using a proportion as in Problem 1 or by changing the percent to a decimal and multiplying as in Problem 2.

LESSON 8-3

Practice and Problem Solving: A/B

1. 40

2. 60

3. $1.35

4. 6

5. 9 text messages

6. 300 people

7. 6.5%

8. 600 people

9. 4,200 people

10. 149 people

11. Yes, Sahil is correct; Possible answer: He knew that 30% is 3 times 10%, so he just multiplied 45 by 3.

Practice and Problem Solving: C

1. $255

2. $62.53

3. 15 red tiles

4. $32.07

5. 50 min

6. 30 min

7. 200 min or 3 h 20 min

8. Check student's work.

Practice and Problem Solving: D

1. 1.8 billion

2. 59%; Asia, 59%

3. 15 mg

4. 1,225 students; 588 boys

5. $35.10

Reteach

1. a. 14

   b. 25

   c. x

   d. $\dfrac{x}{100} = \dfrac{14}{25}$; $25x = 1,400$; $x = 56$

   Answer: 56% of 25 is 14.

2. a. 16

   b. x

   c. 80

   d. $\dfrac{16}{x} = \dfrac{80}{100}$; $80x = 1,600$; $x = 20$;

   Answer: 80% of 20 is 16.

3. 55%

4. 40

5. 300%

6. 140

Reading Strategies

1. •

2. =

3. n

4. $5 = 25\% \bullet n$

5. $40 = n \bullet 160$

Success for English Learners

1. $191.56

2. $1,440

3. $51.84

MODULE 8 Challenge

1. 20% of 30% of 400 is $0.2 \times 0.3 \times 400 = 24$.

   24 is $\dfrac{24}{45} = 53\dfrac{1}{3}\%$ of 45.

2. Kevin completed $0.4(120) + 0.3(170) + 0.1(90) = 108$ pages

   Dashawn completed $0.5(120) + 0.2(170) + 0.3(90) = 121$ pages

3. Whole milk has $8 \times 9 = 72$ fat calories and 150 total calories. $\dfrac{72}{150} = 48\%$ of the calories are from fat.

   An egg has $6 \times 9 = 54$ fat calories and 80 total calories. $\dfrac{54}{80} = 67.5\%$ of the calories are from fat.

   A hamburger has $15 \times 9 = 135$ fat calories and 220 total calories. $\dfrac{135}{220} = 61.4\%$ of the calories are from fat.

   A slice of pizza has $3 \times 9 = 27$ fat calories and 160 total calories $\dfrac{27}{160} = 16.875\%$ of the calories are from fat.

4. 40% of 300 is $0.4(300) = 120$. The maximum number fat calories is 120. Since there are 9 calories per fat gram, the maximum grams of fat is $\dfrac{120}{9} = 13.3$ g.