



# Chapter Review



## Interactive Study Guide

See pages 119–122 for:

- Vocabulary Check
- Key Concept Check
- Problem Solving
- Reflect

## Lesson-by-Lesson Review

### Lesson 5-1 Ratios (pp. 184–188)

Express each ratio as a fraction in simplest form.

- 10 girls out of 24 students  $\frac{5}{12}$
- 6 red cars to 4 blue cars  $\frac{3}{2}$
- 10 yards to 8 inches  $\frac{45}{1}$
- 18 ounces to 3 cups  $\frac{3}{4}$
- Jean got 12 hits out of 16 times at bat. Express this rate as a fraction in simplest form. Explain its meaning.

#### Example 1

Express the ratio 2 feet to 18 inches as a fraction in simplest form.

First, convert feet to inches.

$$\frac{2 \text{ ft}}{18 \text{ in.}} = \frac{24 \text{ in.}}{18 \text{ in.}}$$

Next, divide the numerator and denominator by the GCF, 6.

$$\frac{24 \text{ in.} \div 6}{18 \text{ in.} \div 6} = \frac{4 \text{ in.}}{3 \text{ in.}} \text{ or } \frac{4}{3}$$

5.  $\frac{3}{4}$ ; For every 4 times at bat, Jean got 3 hits or in  $\frac{3}{4}$  of his at-bats, he got a hit.

### Lesson 5-2 Unit Rates (pp. 189–193)

Express each rate as a unit rate. Round to the nearest tenth or to the nearest cent, if necessary.

- \$25.97 for 8 boxes **\$3.25 per box**
- 400 meters in 5 minutes **80 meters per minute**
- \$175 for 4 concert tickets **\$43.75 per ticket**
- 125 miles in 200 minutes **0.6 mile per minute**
- Financial Literacy** An eight pack of juice boxes costs \$4.79, and a twelve pack of juice boxes costs \$6.59. Which is a better buy? Explain. **See margin.**

#### Example 2

Express 274 miles in 14 gallons of gasoline as a unit rate. Round to the nearest tenth of a mile if necessary.

Write the rate that compares the miles to the number of gallons. Then divide to find the unit rate.

$$\frac{274 \text{ miles}}{14 \text{ gallons}} = \frac{19.6 \text{ miles}}{1 \text{ gallon}}$$

So, the car traveled 19.6 miles on 1 gallon of gasoline.

$$\text{SPEED} = \frac{\text{DISTANCE}}{\text{TIME}}$$

### Lesson 5-3 Complex Fractions and Unit Rates (pp. 194–199)

Simplify.

11.  $\frac{6}{\frac{2}{5}}$  **15**

12.  $\frac{\frac{5}{3}}{\frac{1}{6}}$

13. Noreen can walk  $1\frac{1}{10}$  miles in  $\frac{1}{3}$  hour. Find her average speed in miles per hour.  **$3\frac{3}{10}$  mph**

14. Write  $66\frac{2}{3}\%$  as a fraction in simplest form.  **$\frac{2}{3}$**

15. Write  $6\frac{1}{2}\%$  as a fraction in simplest form.  **$\frac{13}{200}$**

16. Write  $11\frac{1}{3}\%$  as a fraction in simplest form.  **$\frac{17}{150}$**

#### Example 3

Simplify  $\frac{5}{\frac{3}{4}}$ .

$$\frac{5}{\frac{3}{4}} = 5 \div \frac{3}{4}$$

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

$$= \frac{20}{3} \text{ or } 6\frac{2}{3}$$

(13)  $\frac{1\frac{1}{10} \text{ mi}}{\frac{1}{3} \text{ hr}} = \frac{\frac{11}{10} \text{ mi}}{\frac{1}{3} \text{ hr}} = \frac{11}{10} \cdot \frac{3}{1} = \frac{33}{10} = 3\frac{3}{10}$

Write the complex fraction as a division problem.

Multiply by the reciprocal of  $\frac{3}{4}$ , which is  $\frac{4}{3}$ .

Simplify. (15) SEE NEXT PAGE

$$\textcircled{15} \quad 100 \left( \frac{6\frac{1}{2}}{100} \right) = x(100)$$

$$6\frac{1}{2} = 100x$$

$$2 \left( \frac{13}{2} \right) = (100x)^2$$

$$\frac{13}{200} = \frac{200x}{200}$$

$$\frac{13}{200} = x$$

$$6\frac{1}{2}\%$$

$$15\% \rightarrow 15 \text{ out of } 100$$

$$\frac{15}{100} \div \frac{5}{5} = \frac{3}{20}$$

$$6\frac{1}{2}\% = \frac{6\frac{1}{2}}{100} = \frac{13}{200}$$

$$6\frac{1}{2}\% = \frac{6.5}{100} \cdot \frac{10}{10} = \frac{65}{1000} \div \frac{5}{5} = \frac{13}{200}$$



## Lesson 5-4 Converting Rates (pp. 200–205)

Complete each conversion. Round to the nearest hundredth, if necessary.

17. 7 in.  $\approx$   $\blacksquare$  cm **17.78**    18. 20 m  $\approx$   $\blacksquare$  yd **21.88**

19. 25 fl oz  $\approx$   $\blacksquare$  mL **739.35**    20. 4 L  $\approx$   $\blacksquare$  gal **1.06**

21. 18 pt  $\approx$   $\blacksquare$  L **8.51**    22. 12 oz  $\approx$   $\blacksquare$  g **340.2**

23. 26 cm  $\approx$   $\blacksquare$  in. **10.24**    24. 3 qt  $\approx$   $\blacksquare$  L **2.84**

25. 4 m  $\approx$   $\blacksquare$  ft **13.12**    26. 68 g  $\approx$   $\blacksquare$  oz **2.38**

27. **STEM** A plane is flying at a speed of 425 miles per hour. How far will the plane travel in 0.75 hour? **318.75 mi**

28. A swimming pool is being drained at a rate of 50 gallons per hour. How many milliliters per second is this? Round to the nearest tenth. **52.6 mL/s**

29. A runner runs 2 miles in 9.56 minutes. How many meters per second is this? **5.61 m/s**

30. A family drives their car 135 miles in 3 hours. How many kilometers per hour is this? **72.41 km/h**

29  $\frac{2 \text{ mi}}{9.56 \text{ min}}$

### Example 4

Complete the conversion. Round to the nearest hundredth.

18 centimeters to inches

Use 1 inch  $\approx$  2.54 centimeters.

$$\begin{aligned} 18 \text{ cm} &\approx 18 \text{ cm} \cdot \frac{1 \text{ in.}}{2.54 \text{ cm}} \\ &\approx 18 \cancel{\text{ cm}} \cdot \frac{1 \text{ in.}}{2.54 \cancel{\text{ cm}}} \\ &\approx \frac{18 \text{ in.}}{2.54} \text{ or } 7.09 \text{ in.} \end{aligned}$$

Multiply by  $\frac{1 \text{ in.}}{2.54 \text{ cm}}$ .

Divide out common units.

Simplify.

$\frac{425}{1} = \frac{x}{0.75}$

### Example 5

A peregrine falcon can fly at a top speed of 200 miles per hour. How many feet per second is this?

First, convert miles to feet and hours to seconds.

$$\frac{200 \text{ mi}}{1 \text{ h}} = \frac{200 \text{ mi}}{1 \text{ h}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ h}}{3600 \text{ s}}$$

Next, divide out the common factors.

$$\begin{aligned} &= \frac{200 \cancel{\text{ mi}}}{1 \text{ h}} \cdot \frac{5280 \cancel{\text{ ft}}}{1 \cancel{\text{ mi}}} \cdot \frac{1 \cancel{\text{ h}}}{3600 \cancel{\text{ s}}} \\ &= \frac{293.3 \text{ ft}}{1 \text{ s}} \end{aligned}$$

The falcon can fly about 293 feet per second.

## Lesson 5-5 Proportional and Nonproportional Relationships (pp. 206–210)

Determine whether the cost is proportional to the number of books purchased. If the relationship is proportional, find the constant of proportionality. Explain your reasoning.

31. 

Books	1	2	3	4
Cost (\$)	8	16	24	32

**Yes; 8; each rate is equal to 8.**

32. 

Books	2	4	6	8
Cost (\$)	2	5	7	10

**No; the rates are not equal.**

33. A customer at the ring toss booth gets 8 rings for \$2. Find the constant of proportionality. Write an equation relating the cost to the number of rings. At this same rate, how much would a customer pay for 11 rings? for 20 rings?

**0.25;  $c = 0.25r$ , 11 rings cost \$2.75; 20 rings cost \$5**

34. Mrs. Tebon buys 25 party favors for \$5. At this same rate, how much would she pay for 40 party favors? for 60 party favors? **\$8.00; \$12.00**

### Example 6

Determine whether the distance is proportional to the time. If the relationship is proportional, find the constant of proportionality. Explain your reasoning.

Distance (meters)	30	56	69	80
Time (minutes)	1	2	3	4

Write the rate of distance to time for each minute in simplest form.

$$\frac{30}{1} \quad \frac{56}{2} = \frac{28}{1} \quad \frac{69}{3} = \frac{23}{1} \quad \frac{80}{4} = \frac{20}{1}$$

Since the rates are not equal, the distance is not proportional to the time, and there is no constant of proportionality.

$$\textcircled{29} \quad \frac{2 \text{ mi}}{9.56 \text{ min}} \cdot \frac{9.56 \text{ min}}{573.6 \text{ sec}} = \frac{2 \text{ mi}}{573.6 \text{ sec}} \cdot \frac{3520 \text{ yds}}{2 \text{ mi}} = \frac{3203.2 \text{ m}}{573.6 \text{ sec}} = \frac{5.58 \text{ m}}{1 \text{ sec}}$$

$$5280 \text{ ft} = 1 \text{ mi}$$

$$1760 \text{ yds} = 1 \text{ mi}$$

$$3520 \text{ yds} = 2 \text{ mi}$$

$$3520(0.91) = 3203.2 \text{ m}$$

$$\text{YARDS}(0.91) = \text{m}$$

$$\text{MILES}(1.61) = \text{Km}$$

$$60(0.56 \text{ min}) = 33.6 \text{ sec}$$

$$9.56 \text{ min} \rightarrow \text{sec}$$

$$\begin{array}{r} 9 \text{ min} = 540 \text{ sec} \\ \underline{33.6} \\ 573.6 \text{ sec} \end{array}$$

$$\textcircled{21} \quad 18 \text{ pt} \approx x \text{ L}$$

$$0.95 \text{ qt} = 1 \text{ L}$$

$$2(0.95) \text{ pt} = 1 \text{ L}$$

$$1.90 \text{ pt} = 1 \text{ L}$$

$$\frac{1.90 \text{ pt}}{1 \text{ L}} = \frac{18 \text{ pt}}{x}$$

$$\frac{1.90x}{1.90} = \frac{18}{1.9}$$

$$x = 9.47$$



## Lesson 5-6 Graphing Proportional Relationships (pp. 212–217)

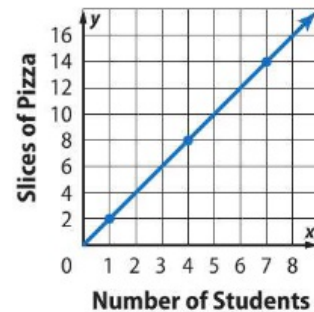
35. Determine whether the relationship is proportional by graphing on the coordinate plane. Explain your reasoning. **See margin.**

Time (min)	4	7	8	10
Distance (ft)	8	14	16	20

36. The cost of dance lessons is \$12 for 1 lesson, \$22 for 2 lessons, and \$32 for 3 lessons. Determine whether the cost is proportional to the number of lessons by graphing the ordered pairs on the coordinate plane. Explain your reasoning. **See margin.**
37. The number of squirrels is proportional to the number of trees. A graph of the relationship includes the points (0, 0), (3, 9), and (5, 15).
- Find and interpret the constant of proportionality. **3; there are 3 squirrels for every tree.**
  - Explain what the points (0, 0), (3, 9), and (5, 15) represent. **See margin.**

### Example 7

The number of slices of pizza purchased is proportional to the number of students eating. The graph below shows the relationship (students, slices). Determine the constant of proportionality. Explain what it means.



Use the point (4, 8).

$$\frac{\text{slices of pizza}}{\text{number of students}} = \frac{8}{4} = \frac{2}{1} \text{ or } 2$$

The constant of proportionality is the unit rate, 2 slices per student. It describes the number of slices of pizza purchased for every 1 student eating.

## Lesson 5-7 Solving Proportions (pp. 218–223)

Solve each proportion.

38.  $\frac{15}{a} = \frac{5}{4}$  **12**

39.  $\frac{m}{6} = \frac{18}{15}$  **7.2**

40.  $\frac{28}{24} = \frac{d}{12}$  **14**

41.  $\frac{16.5}{21} = \frac{5.5}{t}$  **7**

42. **Financial Literacy** A homeowner whose house is assessed for \$120,000 pays \$1800 in taxes. At the same rate, what is the tax on a house assessed at \$135,000? **\$2025**

### Example 8

Solve  $\frac{4}{9} = \frac{9}{x}$ .

$$\frac{4}{9} = \frac{9}{x}$$

Write the proportion.

$$4 \cdot x = 9 \cdot 9$$

Cross products

$$4x = 81$$

Multiply.

$$\frac{4x}{4} = \frac{81}{4}$$

Divide each side by 4.

$$x = 20.25$$

Simplify.

## Lesson 5-8 Scale Drawing and Models (pp. 224–229)

On the scale drawing of a museum, the scale is 0.5 inch = 10 feet. Find the actual length of each gallery.

	Gallery	Drawing Length	
43.	Modern Art	6 in.	<b>120 ft</b>
44.	Renaissance	4.25 in.	<b>85 ft</b>
45.	Egypt	7.5 in.	<b>150 ft</b>

46. The length of a highway is 900 miles. If 0.5 inch on a map represents 50 miles, what is the length of the highway on the map? **9 in.**

### Example 9

A scale model of a car has a bumper that is 3.5 inches long. The scale on the model is 1 inch = 2 feet. What is the length of the actual car bumper?

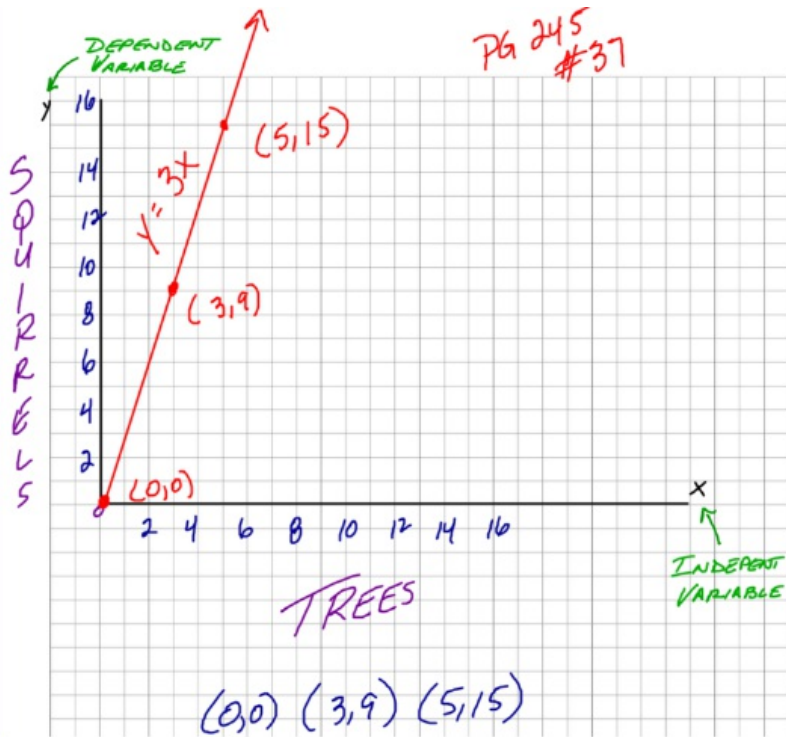
$$\begin{array}{l} \text{model length} \cdots \rightarrow \frac{1 \text{ in.}}{2 \text{ ft}} = \frac{3.5 \text{ in.}}{x \text{ ft}} \leftarrow \cdots \text{model length} \\ \text{actual length} \cdots \rightarrow \quad \leftarrow \cdots \text{actual length} \end{array}$$

$$1 \cdot x = 2 \cdot 3.5$$

$$x = 7$$

The actual length of the car bumper is 7 feet.

Pg 245  
#37

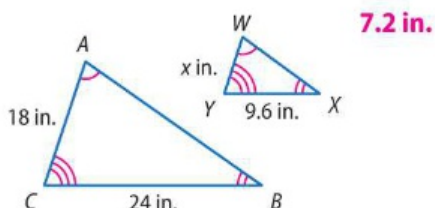




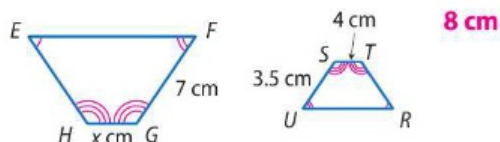
## Lesson 5-9 Similar Figures (pp. 232–237)

The figures are similar. Determine each missing measure.

47.



48.

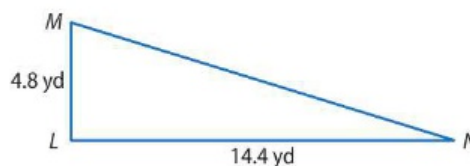
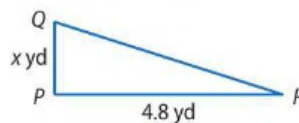


49. A mosaic is created using rectangular blocks. Block A has a length of 5 centimeters and a width of 2.5 centimeters. Block B is similar to block A and has a length of 7 centimeters. What is the width of block B? **3.5 cm**

50. Keshawn enlarges a rectangular photograph to make a poster that is similar to the photograph. The photograph is 4 inches wide and 6 inches long. The poster is 51 inches long. What is the width of the poster? **34 in.**

### Example 10

If  $\triangle LMN \sim \triangle PQR$ , what is the value of  $x$ ?



$$\frac{LM}{PQ} = \frac{LN}{PR}$$

$$\frac{4.8}{x} = \frac{14.4}{4.8}$$

$$x = 1.6$$

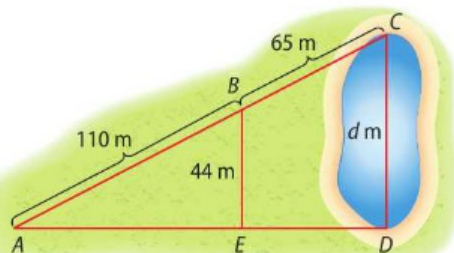
Write a proportion.

Replace  $\overline{LM}$  with 4.8,  $\overline{PQ}$  with  $x$ ,  $\overline{LN}$  with 14.4, and  $\overline{PR}$  with 4.8.

Find cross products and simplify.

## Lesson 5-10 Indirect Measurement (pp. 238–242)

51. At 7 feet 8 inches, the world's tallest woman casts a 46-inch shadow. At the same time, the world's shortest woman casts a 15.5-inch shadow. How tall is the world's shortest woman? **31 in.**
52. The largest known pyramid is the Pyramid of Khufu. At a certain time of day, a vertical yard stick casts a shadow 1.5 feet long, and the pyramid casts a shadow 241 feet long. How tall is the pyramid? **482 ft**
53. Mylie's house is 9 meters tall and casts a shadow 1.5 meters long. At the same time of day, a nearby doghouse casts a shadow that is 0.2 meter long. How tall is the dog house? **1.2 m**
54. In the figure below,  $\triangle ABE \approx \triangle ACD$ . What is the distance across the pond? **70 m**



### Example 11

The Washington Monument casts a 185-foot shadow at the same time as a nearby flagpole casts a 3-foot shadow. If the flagpole is 9 feet tall, how tall is the Washington Monument?

Write and solve a proportion.

$$\begin{array}{l} \text{flagpole height} \cdot \rightarrow 9 \text{ ft} = \frac{3 \text{ ft}}{185 \text{ ft}} \leftarrow \text{flagpole's shadow} \\ \text{monument height} \cdot \rightarrow x \text{ ft} = \frac{185 \text{ ft}}{3 \text{ ft}} \leftarrow \text{monument's shadow} \end{array}$$

$$9 \cdot 185 = x \cdot 3$$

$$1665 = 3x$$

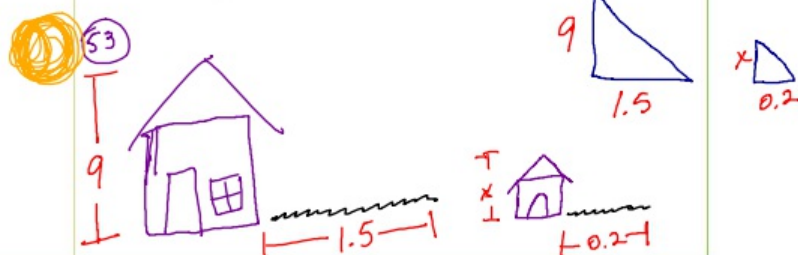
$$\frac{1665}{3} = \frac{3x}{3}$$

$$555 = x$$

Cross products  
Multiply.

Divide each side by 3.

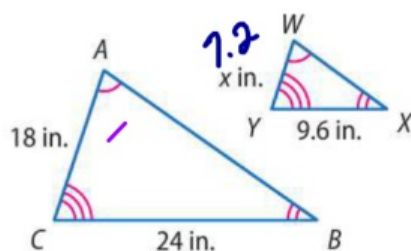
The Washington Monument is 555 feet tall.





The figures are similar. Determine each missing measure.

47.



7.2 in.

$$\frac{24}{18} = \frac{9.6}{x}$$

$$\frac{8}{6}$$

$$\frac{24}{18} = \frac{9.6}{x}$$

$$\frac{4}{3} = \frac{9.6}{x}$$

53. Mylie's house is 9 meters tall and casts a shadow 1.5 meters long. At the same time of day, a nearby doghouse casts a shadow that is 0.2 meter long. How tall is the dog house? **1.2 m**

$$\frac{\text{MYLIE HOUSE}}{\text{HOUSE}} = \frac{\text{DOG HOUSE}}{\text{DOG HOUSE SHADOW}}$$

$$\frac{9}{1.5} = \frac{x}{0.2}$$

$$\frac{\text{MYLIE'S HOUSE}}{\text{DOG HOUSE}} = \frac{\text{HOUSE SHADOW}}{\text{DOG HOUSE SHADOW}}$$

$$\frac{9}{x} = \frac{1.5}{0.2}$$

①⑥  $11\frac{1}{3}\%$  AS A FRACTION MULTIPLY BY  
RECIPROCAL

$$\frac{11\frac{1}{3}}{100} = 11\frac{1}{3} \div \underline{100} = 11\frac{1}{3} \cdot \frac{1}{100} = \frac{34}{3} \cdot \frac{1}{100} = \frac{34}{300} \div \frac{2}{2} = \frac{17}{150}$$

③③

$$\frac{8}{\$2}$$

$$\frac{Y}{X}$$

$$\frac{\$2}{8}$$

$$= \frac{0.25}{1}$$

← CONSTANT  
OF  
PROPORTIONALITY

RINGS X  
COST Y

$$\downarrow$$

$$\frac{X}{11}$$

$$\frac{X}{20}$$

$$\frac{2}{8} = \frac{X}{11}$$

$$8X = 2(11)$$

$$\frac{8X}{8} = \frac{22}{8}$$

$$X = 2.75$$

COST	\$2		
RINGS	8	11	20

52. The largest known pyramid is the Pyramid of Khufu. At a certain time of day, a vertical yard stick casts a shadow 1.5 feet long, and the pyramid casts a shadow 241 feet long. How tall is the pyramid? **482 ft**

STICK PYRAMID

SHADOW  
HEIGHT

$$\times 2 \quad \frac{1.5'}{3'} = \frac{241'}{x} \quad \times 2$$

$$\begin{aligned} 3(241) &= 1.5x \\ \frac{723}{1.5} &= \frac{1.5x}{1.5} \\ 482 &= x \end{aligned}$$

53. Mylie's house is 9 meters tall and casts a shadow 1.5 meters long. At the same time of day, a nearby doghouse casts a shadow that is 0.2 meter long. How tall is the dog house? **1.2 m**

MH DH

SHADOW  
HEIGHT

$$\times 6 \quad \frac{1.5}{9} = \frac{0.2}{x} \quad \times 6$$

1.2