

May 2026

Dear incoming 8th Grade Accelerated Student,

I am looking forward to working with you next year! In order to retain the skills you have learned this year, I am sending you a summer math packet to complete.

Attached is the packet to be completed by the first day of school. This will be your first grade of the year. Make sure to **show all work neatly** when appropriate. Please complete only the **ODD NUMBERED PROBLEMS** on each page.

If you are having trouble with a concept in the packet, you may use your current math notebook or access any of the websites below for review.

Khan Academy

IXL

Math Antics

Have a great summer and I will see you next year!

Blessings,
Mrs. Schicitano

7-1 Ratios, Rates, and Unit Rates

Name _____

Date _____

A *ratio* is a way of comparing two numbers by division.

Word Form 6 to 8 Ratio Form 6 : 8

Fraction Form $\frac{6}{8}$

- To write a ratio in simplest form, divide the numerator and denominator by the GCF of the terms.

$$\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

Think

The GCF of 6 and 8 is 2.

The ratio $\frac{3}{4}$ is in simplest form.

A *rate* is a ratio that compares two quantities.

- To find a *unit rate*, divide each term by the value in the denominator.

$$\frac{240 \text{ miles} \div 6}{6 \text{ hours} \div 6} = \frac{40 \text{ miles}}{1 \text{ hour}} \rightarrow 40 \text{ miles per hour}$$

- To find *equal rates*, multiply or divide both terms by the same nonzero number.

$$\frac{240 \text{ miles}}{6 \text{ hours}} = \frac{240 \text{ miles} \cdot 2}{6 \text{ hours} \cdot 2} = \frac{480 \text{ miles}}{12 \text{ hours}}$$

$$\frac{240 \text{ miles}}{6 \text{ hours}} = \frac{240 \text{ miles} \div 3}{6 \text{ hours} \div 3} = \frac{80 \text{ miles}}{2 \text{ hours}}$$

Write a ratio in three different forms for each situation. Express in simplest form.

1. 9 out of 10 people use Sure Glue

9 to 10; 9 : 10; $\frac{9}{10}$

2. the number of consonants to the number of vowels in your first name

3. The number of even digits to the number of odd digits in 9,241,657

4. 6 workers in $1\frac{2}{3}$ days

Write a ratio as a fraction in simplest form for each situation.

Change to like units when necessary.

5. 25¢ out of every dollar goes to entertainment

$$\frac{25¢}{\$1} = \frac{0.25 \div 0.25}{1.00 \div 0.25} = \frac{1}{4}$$

6. 8 apples in a basket of 2 dozen apples

7. 6 rainy days out of 15 days

8. 12 years to 36 years

9. one day to one week

10. days in March to days in June

11. 12 out of 16 correct

12. 18 girls to 12 boys

13. 1 quarter to 2 nickels

14. 6 inches out of 1 yard



Find the unit rate.

15. 12 pages in 3 hours

$$\frac{12 \text{ pages}}{3 \text{ hours}} = \frac{4 \text{ pages}}{1 \text{ hour}}; 4 \text{ pages per hour}$$

17. 500 yards in 40 seconds

19. 180 kilometers traveled in 2 hours

21. \$4.80 per dozen flowers

16. 105 wheel revolutions in 3 minutes

18. 100 meters in 10 seconds

20. 510 words read in 3 minutes

22. \$1.92 for 6 cans

Find two rates equal to each given rate.

23. $\frac{9 \text{ in. of snow}}{1 \text{ day}}$

24. $\frac{3 \text{ miles}}{1 \text{ hour}}$

25. $\frac{1.5 \text{ laps}}{1 \text{ minute}}$

26. $\frac{6.25 \text{ points}}{1 \text{ day}}$

18 in. of snow, 27 in. of snow
2 days, 3 days

27. $\frac{16 \text{ boxes}}{40 \text{ people}}$

28. $\frac{\$14}{42 \text{ tickets}}$

29. $\frac{20 \text{ adults}}{50 \text{ children}}$

30. $\frac{6 \text{ movies}}{24 \text{ hours}}$

31. $\frac{6.4 \text{ degrees}}{1.4 \text{ hours}}$

32. $\frac{5 \text{ packages}}{2.5 \text{ pounds}}$

33. $\frac{3\frac{1}{3} \text{ cups}}{2 \text{ pies}}$

34. $\frac{4\frac{1}{2} \text{ quarts}}{27 \text{ servings}}$

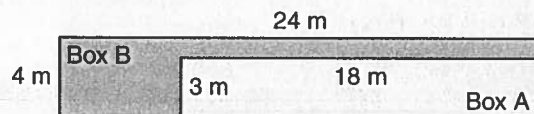
Solve. Show your work.

35. Justin is 7 years old and his grandfather is 77 years old. What is the ratio of Justin's age to his grandfather's age? Express the answer as a fraction in simplest form.

36. There are 13 stripes and 50 stars on the American flag. What is the ratio of the number of stripes on the American flag to the sum of the number of stars and the number of stripes?

CHALLENGE

37. What is the ratio of the perimeter of Box A to the perimeter of Box B? What is the ratio of their areas? Express the answers as fractions in simplest form.



7-2 Proportions

Name _____

Date _____

A *proportion* is an equation that shows two ratios or rates are equal.

Cross-Products Rule: Two ratios form a proportion if their cross products are equal.

$$\begin{array}{r} 0.3 \\ 0.4 \end{array} \begin{array}{l} \nearrow 0.6 \\ \searrow 0.8 \end{array}$$

$$0.3 \cdot 0.8 \stackrel{?}{=} 0.4 \cdot 0.6 \quad \leftarrow \text{Multiply the extremes and the means.}$$

$$0.24 = 0.24$$

So $\frac{0.3}{0.4} = \frac{0.6}{0.8}$ is a proportion.

Use the *Cross-Products Rule* to find the missing term in a proportion.

$$\frac{\frac{1}{2}}{a} = \frac{\frac{1}{3}}{12} \quad \begin{array}{l} \nearrow \frac{1}{3} \\ \searrow \frac{1}{2} \end{array}$$

$$\frac{1}{2} \cdot 12 = \frac{1}{3} \cdot a \quad \leftarrow \text{Multiply the extremes and the means.}$$

$$\frac{6}{\frac{1}{3}} = \frac{\frac{1}{3}a}{\frac{1}{3}} \quad \leftarrow \text{Divide each side by one third.}$$

$$18 = a$$

So $\frac{\frac{1}{2}}{18} = \frac{\frac{1}{3}}{12}$.

Determine if each set of ratios forms a proportion. Write = or $\neq$. Justify your answer.

1. $\frac{7}{9} \quad \underline{\quad} \quad \frac{21}{27}$

$$7 \cdot 27 \stackrel{?}{=} 9 \cdot 21$$

$$189 = 189$$

2. $\frac{28}{35} \quad \underline{\quad} \quad \frac{4}{5}$

3. $\frac{8}{7} \quad \underline{\quad} \quad \frac{96}{49}$

4. $6 : 138 \quad \underline{\quad} \quad 4 : 92$

5. $12 : 60 \quad \underline{\quad} \quad 4 : 24$

6. $\frac{23}{29} \quad \underline{\quad} \quad \frac{46}{58}$

7. $10 : 90 \quad \underline{\quad} \quad 45 : 5$

8. $9 : 27 \quad \underline{\quad} \quad 3 : 9$

9. $\frac{4.2}{5.6} \quad \underline{\quad} \quad \frac{0.6}{0.8}$

10. $\frac{1.44}{1.32} \quad \underline{\quad} \quad \frac{1.2}{1.1}$

11. $\frac{8\frac{1}{2}}{5} \quad \underline{\quad} \quad \frac{25\frac{1}{2}}{7\frac{1}{2}}$

12. $\frac{2\frac{1}{3}}{1\frac{2}{5}} \quad \underline{\quad} \quad \frac{11\frac{2}{3}}{7}$

Solve each proportion. Check your work to justify your solutions.

13. $\frac{27}{63} = \frac{n}{7}$

$$27 \cdot 7 = 63n$$

$$189 = 63n$$

$$\frac{189}{63} = \frac{63n}{63}$$

$$n = 3$$

Check: $\frac{27}{63} \stackrel{?}{=} \frac{3}{7}$

$$27 \cdot 7 \stackrel{?}{=} 63 \cdot 3$$

$$189 = 189 \text{ True}$$

14. $\frac{48}{x} = \frac{6}{12}$

15. $\frac{a}{15} = \frac{18}{45}$

16. $\frac{21}{b} = \frac{147}{105}$

17. $\frac{42}{24} = \frac{a}{4}$

18. $\frac{72}{64} = \frac{18}{r}$

19. $\frac{4.8}{1.32} = \frac{c}{1.1}$

20. $\frac{b}{\frac{1}{3}} = \frac{4}{2}$



Solve each proportion. Check your work to justify your solutions.

$$21. \frac{n}{0.24} = \frac{0.05}{0.03}$$

$$n \cdot 0.03 = 0.24 \cdot 0.05$$

$$\frac{0.03n}{0.03} = \frac{0.012}{0.03}$$

$$n = 0.4$$

$$\text{Check: } \frac{0.4}{0.24} = \frac{?}{0.03}$$

$$0.4 \cdot 0.03 = 0.24 \cdot 0.05$$

$$0.012 = 0.012 \text{ True}$$

$$22. \frac{2.4}{3.7} = \frac{1.2}{t}$$

$$23. \frac{r}{2\frac{1}{2}} = \frac{1}{2}$$

$$24. \frac{2}{b} = \frac{\frac{5}{6}}{\frac{1}{3}}$$

$$25. \frac{\frac{3}{7}}{\frac{2}{3}} = \frac{\frac{1}{4}}{c}$$

$$26. \frac{a}{0.25} = \frac{0.8}{0.5}$$

$$27. \frac{3.6}{c} = \frac{1.2}{2.1}$$

$$28. \frac{x}{36} = \frac{24}{50}$$

$$29. \frac{6}{r} = \frac{4}{25}$$

$$30. \frac{n+3}{4} = \frac{9}{2}$$

$$31. \frac{t+6}{5} = \frac{t-2}{10}$$

$$32. \frac{6r-3}{7} = \frac{3}{4}$$

Solve. Check to justify your work.

33. If 3 cans of orange juice cost \$2.15, what will 9 cans cost?

34. If $6\frac{1}{4}$ yards of fabric costs \$25.50, what will $2\frac{1}{2}$ yards cost?

35. If 4 boxes of stationery cost \$24.40, what will 6 boxes cost?

36. If 2.5 meters of fabric cost \$15.60, what will 2.25 meters cost?

CRITICAL THINKING

Using each set of numbers, write a proportion. Check to justify your answer.

37. 35, 70, 50, 25

38. 2.7, 10, 0.3, 90

39. 96, 17, 3, 544

7-3 Conversion Factors and Measurement Systems

Name _____

Date _____

A *conversion factor* is a rate of equal quantities that is used to convert from one unit of measure to another.

- You can represent measurement rates with a proportion.

Light travels at 186,282 miles per second. How far will light travel in 24 seconds?

To find the distance, write and solve a proportion.

$$\frac{186,282 \text{ mi}}{1 \text{ s}} = \frac{m}{24 \text{ s}}$$

$$186,282 \cdot 24 = 1 \cdot m \leftarrow \text{Cross multiply.}$$

$$4,470,768 = m$$

Light travels 4,470,768 miles in 24 seconds.

- You can use a conversion factor to rename metric and customary units of measure.

How many ounces are in 500 pounds?

Think

Use a *conversion factor*.

$$16 \text{ oz} = 1 \text{ lb}$$

$$\frac{16 \text{ oz}}{1 \text{ lb}} = \frac{x}{500 \text{ lb}} \leftarrow \text{Set up a proportion.}$$

$$16 \cdot 500 = x \cdot 1 \leftarrow \text{Cross multiply.}$$

$$8000 = x \leftarrow \text{Simplify.}$$

There are 8000 ounces in 500 pounds.

Write a proportion to represent the situation. Then solve.

1. A cubit equals 21 inches. How many inches are in 300 cubits?

$$\frac{21 \text{ in.}}{1 \text{ cubit}} = \frac{x}{300 \text{ cubits}}; 21(300) = x$$

There are 6300 inches in 300 cubits.

2. A kilowatt-hour is 3,600,000 joules. How many joules are in 7 kilowatt hours?

3. One horsepower is equal to about 746 watts of power. How many watts of power does a 400 horsepower engine generate?

4. There are 640 acres in one square mile. How many square miles are in 1000 acres?

5. There are 5280 ft in one mile. How many feet are in 6 miles?

6. How many square yards are in 43,560 square feet?

Solve. Check to justify your work.

7. There are 4 cups in a quart. How many cups are in 14 quarts?

8. There are 4 quarts in a gallon. How many quarts are in 21 gallons?



Solve. Check to justify your work.

9. There are 2 cups in a pint. How many cups are in a half pint?

11. There are 16.5 feet in a rod. How many rods are there if you have 148.5 feet?

10. One gallon of water weighs 8.3 pounds. How many pounds do 3 gallons of water weigh?

12. How many miles have you traveled if you have gone 1320 ft?

Problem Solving

13. A gallon of water weighs 8.3 pounds. To the nearest tenth, about how many gallons of water weigh 62 pounds?

15. Density is the amount of mass of an object per unit volume. A piece of iron weighs 45 ounces and has a volume of 10 cubic inches. Given that each ounce has a mass of 28.35 grams, determine the density of iron in grams per cubic inch.

14. Within 1 inch there are 2.54 centimeters. How many centimeters are in 1 foot?

16. A chunk of oak firewood has a mass of about 2.85 kilograms and a volume of 4100 cubic centimeters. Determine the density of oak in grams per cubic centimeter. Round the density to the nearest thousandth.

WRITE ABOUT IT

17. Monique says that because there are 3 feet in 1 yard, there must be 3 square feet in 1 square yard. Do you agree? Explain.

7-4 Dimensional Analysis

Name _____

Date _____

Dimensional analysis is the process of analyzing units to decide which conversion factor(s) to use.

A football field is 100 yards long. How many centimeters is this?

Method 1 Multiply by each conversion factor separately, and divide like units. Start with yards. End with centimeters.

$$100 \text{ yd} = \underline{\hspace{1cm}} \text{ cm}$$

$$100 \text{ yd} = \frac{100 \cancel{\text{yd}}}{1} \cdot \frac{36 \cancel{\text{in.}}}{1 \cancel{\text{yd}}} = 3600 \text{ in.}$$

$$3600 \text{ in.} = \frac{3600 \cancel{\text{in.}}}{1} \cdot \frac{2.54 \text{ cm}}{1 \cancel{\text{in.}}} = 9144 \text{ cm}$$

Method 2 Multiply by several conversion factors. Set up the conversion factors in sequence, so that those with like units cancel. Start with yards. End with centimeters.

$$100 \text{ yd} = \underline{\hspace{1cm}} \text{ cm}$$

$$100 \text{ yd} = \frac{100 \cancel{\text{yd}}}{1} \cdot \frac{36 \cancel{\text{in.}}}{1 \cancel{\text{yd}}} \cdot \frac{2.54 \text{ cm}}{1 \cancel{\text{in.}}} \\ = \frac{100 \cdot 36 \cdot 2.54 \text{ cm}}{1 \cdot 1 \cdot 1} = 9144 \text{ cm}$$

So a football field is 9144 cm long.

You can also use dimensional analysis to estimate conversions in measurement and find equal rates.

Use dimensional analysis to rename each unit of measure.

1. $144 \text{ in.} = \underline{\hspace{1cm}} \text{ yd}$

2. $300 \text{ yd} = \underline{\hspace{1cm}} \text{ in.}$

3. $4 \text{ gal} = \underline{\hspace{1cm}} \text{ pt}$

$$144 \text{ in.} = \frac{144 \cancel{\text{in.}}}{1} \cdot \frac{1 \cancel{\text{ft}}}{12 \cancel{\text{in.}}} \cdot \frac{1 \text{ yd}}{3 \cancel{\text{ft}}} \\ \frac{144 \text{ yd}}{36} = 4 \text{ yards}$$

4. $3.25 \text{ mi} = \underline{\hspace{1cm}} \text{ in.}$

5. $1 \text{ mi} \approx \underline{\hspace{1cm}} \text{ m}$

6. $35,000 \text{ oz} \approx \underline{\hspace{1cm}} \text{ T}$

7. $4.75 \text{ qt} = \underline{\hspace{1cm}} \text{ fl oz}$

8. $64 \text{ c} \approx \underline{\hspace{1cm}} \text{ L}$

9. $440 \text{ yd} = \underline{\hspace{1cm}} \text{ m}$

Use dimensional analysis to find a reasonable estimate.

10. $570 \text{ min} \approx \underline{\hspace{1cm}} \text{ h}$

11. $323 \text{ fl oz} \approx \underline{\hspace{1cm}} \text{ c}$

12. $3,569,000 \text{ mm} \approx \underline{\hspace{1cm}} \text{ km}$

$$570 \approx 600 \rightarrow \frac{600 \cancel{\text{min}}}{1} \cdot \frac{1 \text{ h}}{60 \cancel{\text{min}}} \\ \frac{600 \text{ h}}{60} = 10 \text{ h}$$



Use dimensional analysis to find the value of x that makes an equal rate.

$$13. \frac{55 \text{ mi}}{1 \text{ h}} = \frac{x \text{ ft}}{1 \text{ min}}$$

$$\frac{55 \cancel{\text{mi}}}{1 \cancel{\text{h}}} \cdot \frac{5280 \text{ ft}}{1 \cancel{\text{mi}}} \cdot \frac{1 \cancel{\text{h}}}{60 \text{ min}} \\ \frac{290,400 \text{ ft}}{60 \text{ min}} = \frac{4840 \text{ ft}}{1 \text{ min}} \\ x = 4840$$

$$14. \frac{\$575}{1 \text{ day}} = \frac{x \text{ dollars}}{1 \text{ min}}$$

$$15. \frac{40 \text{ kg}}{1 \text{ m}} = \frac{x \text{ g}}{1 \text{ cm}}$$

$$16. \frac{x \text{ mi}}{1 \text{ h}} = \frac{144 \text{ ft}}{1 \text{ s}}$$

$$17. \frac{72 \text{ lb}}{1 \text{ ft}^3} = \frac{x \text{ T}}{1 \text{ yd}^3}$$

$$18. \frac{65 \text{ kg}}{1 \text{ L}} = \frac{x \text{ g}}{1 \text{ cm}^3}$$

Problem Solving

19. A gallon of water weighs 8.3 pounds. A cubic foot of water weighs about 62 pounds. To the nearest tenth, about how many gallons of water would fill a cubic foot?

20. The density of copper is 8.94 g per cubic centimeter. Express the density of copper in kilograms per cubic centimeter. What is the density in kilograms per liter? (*Hint: 1 cubic centimeter has a volume of 1 millimeter.*)

21. The average respiratory rate for an adult is 16 breaths per minute. About how many times does an adult breathe in one week? A year? (*Hint: 1 week = 7 days; 1 year = 365 days*)

22. Light travels at 186,282 miles per second. Based on a 365-day year, how many miles will light travel in one year? Express your answer in scientific notation to the nearest thousandth.

CRITICAL THINKING

The United Kingdom once used the following money system.

1 pound = 20 shillings

1 shilling = 12 pence

1 penny = 2 halfpence (*pence* is the plural of *penny*)

1 pence = 4 farthings

Use dimensional analysis to rename each unit of measure.

23. 1 pound = _____ farthings

24. 12 pounds = _____ pence

7-5 Direct Proportions

Name _____

Date _____

If it takes 6 hours to travel 360 miles, how many miles can you travel in 2 hours?

Method 1 Write and solve a proportion using ratios of unlike units.

$$\begin{aligned} \frac{\text{miles}}{\text{hours}} &= \frac{\text{miles}}{\text{hours}} \\ \frac{360}{6} &= \frac{m}{2} \\ 360 \cdot 2 &= 6 \cdot m && \leftarrow \text{Find cross products.} \\ 720 &= 6m && \leftarrow \text{Simplify.} \\ \frac{720}{6} &= \frac{6m}{6} && \leftarrow \text{Divide by 6.} \\ 120 &= m && \leftarrow \text{solution} \end{aligned}$$

Method 2 Write and solve a proportion using ratios of like units.

$$\begin{aligned} \frac{\text{miles}}{\text{miles}} &= \frac{\text{hours}}{\text{hours}} \\ \frac{360}{m} &= \frac{6}{2} \\ 360 \cdot 2 &= 6m && \leftarrow \text{Find cross products.} \\ 720 &= 6m && \leftarrow \text{Simplify cross products.} \\ \frac{720}{6} &= \frac{6m}{6} && \leftarrow \text{Divide by 6.} \\ 120 &= m && \leftarrow \text{solution} \end{aligned}$$

Method 3 Write a proportional relationship as an equation.

$$\begin{aligned} m &= 2 \cdot \frac{d \text{ (distance in miles)}}{t \text{ (time in hours)}} \\ m &= 2 \cdot \frac{360}{6} && \leftarrow \text{Rate is } d \div t. \\ m &= 2 \cdot 60 && \leftarrow \text{Simplify.} \\ m &= 120 && \leftarrow \text{solution} \end{aligned}$$

You can travel 120 miles in 2 hours.

Use a proportion or equation to solve each problem. Round to the nearest cent where necessary.

1. 9 gallons of ice cream cost \$50.40 to make. How much will it cost to make 15 gallons?

$$\frac{9}{50.40} = \frac{15}{c}; 9c = 756$$

$$\frac{9c}{9} = \frac{756}{9}; c = 84$$

It will cost \$84.

2. If 15 tickets for a baseball game cost \$97.50, how many tickets can be bought for \$71.50?

3. The Grant family's $2\frac{1}{2}$ -week vacation cost \$1540.15. How much would a $5\frac{1}{2}$ -week vacation cost at the same rate?

4. A plane can travel 5000 kilometers in 6 hours. How far can it travel in 1.5 hours?

5. A plane traveled 1800 kilometers in 2.5 hours. At this rate, how long will it take to travel 2000 kilometers? Round to the nearest hour.

6. A car travels 85 kilometers in $1\frac{1}{6}$ hours. At this rate, how far will it travel in $4\frac{1}{5}$ hours?



Use a proportion or equation to solve each problem. Round to the nearest cent where necessary.

7. Four bars of soap cost \$1.12. What would you pay for 2 dozen bars? (1 dozen = 12)
8. An ad says that 6 lemons cost \$1.86. What will 8 lemons cost?
9. Kevin rides his bicycle 3 miles in a half hour. How long will it take him to ride 5.5 miles?
10. A track star runs 100 yards in 12.5 seconds. At this rate, how far can the star run in one and one half minutes?

Problem Solving

11. A room is 14 feet long and 8 feet wide. A scale drawing of the room is 12 centimeters long. How wide is the scale drawing?
12. One pound of a snack food mixes 3 peanuts for every 8 pieces of popcorn. If a crate of snack food has 30 pounds of popcorn, how many pounds of snack food are in the crate?
13. The ratio of advertising time to total air time of a weekly TV show is 3 : 16. If a weekly TV show is 60 minutes long, how much time is devoted to advertising?
14. A large group and a smaller group of campers go on a trip and agree to pay the expenses using the ratio 9 to 7, where the first term represents the larger group, and the second term represents the smaller group. If the smaller group pays \$107.45, what will the larger group pay?

WRITE ABOUT IT

15. Bob painted 15.08 meters of fence in 5.2 hours and Jake painted 19.72 meters in 6.8 hours. Each feels that the other is not working fast enough. Explain why both are working at the same rate.

7-8 Scale Drawings and Scale Models

Name _____

Date _____

To find the scale of a *scale drawing*, write and solve a proportion.

What is the scale of a map if 12 centimeters in the map represents 3.6 kilometers?

Let n = the actual distance.

$$\frac{\text{scale distance}}{\text{actual distance}} \rightarrow \frac{1 \text{ cm}}{n \text{ km}} = \frac{12 \text{ cm}}{3.6 \text{ km}}$$

$$3.6 = 12n$$

$$\frac{3.6}{12} = \frac{12n}{12}$$

$$0.3 = n$$

The scale is 1 cm = 0.3 km.

To find the *scale factor* for a *scale model*, write the scale as a ratio of like units.

A model of a 42-foot long truck is 6-inches long. Find the scale factor from the truck to the model.

$$\frac{6 \text{ in.}}{42 \text{ ft}} = \frac{6 \text{ in.}}{(42 \cdot 12) \text{ in.}} = \frac{6 \text{ in.}}{504 \text{ in.}} = \frac{1}{84}$$

The scale factor for the model is $\frac{1}{84}$.

Solve for n . Check your work to justify your solutions.

1. scale: 3 cm : 4 km
scale measure: n cm
actual measure: 0.16 km

$$\frac{3 \text{ cm}}{4 \text{ km}} = \frac{n \text{ cm}}{0.16 \text{ km}}$$

$$0.48 = 4n$$

$$\frac{0.48}{4} = \frac{4n}{4}$$

$$0.12 = n$$

scale measure: 0.12 cm

2. scale: 1 cm : 4 km
scale measure: 27.5 cm
actual measure: n km

3. scale: 2 cm : 5 km
scale measure: n cm
actual measure: 12 km

4. scale: 2 in. : 3.5 mi
scale measure: 7.2 in.
actual measure: n mi

5. scale: 0.3 cm : 1.7 km
scale measure: n cm
actual measure: 11.9 km

6. scale: 0.5 in. : 1.75 km
scale measure: 2 in.
actual measure: n km

7. scale: n mm : 38 ft
scale measure: 24.5 mm
actual measure: 133 ft

8. scale: $1\frac{3}{4}$ cm : n mi
scale measure: 7 cm
actual measure: 250 mi

9. scale: n in. : 6.75 km
scale measure: 23 in.
actual measure: 62.1 km

**Find the scale factor.**

10. 4-in. model of a 24-ft tree

$$\frac{4 \text{ in.}}{24 \text{ ft}} = \frac{4 \text{ in.}}{(24 \cdot 12) \text{ in.}} = \frac{4 \text{ in.}}{288 \text{ in.}}$$

$$\frac{1}{72}$$

11. 15-in. model of a 100-ft plane

12. 14-cm model of a 2-m bike

13. 6-ft model of a 24-yd statue

14. 4.5-ft model of a 40-yard field

15. 1-yd model of a 33-ft sailboat

16. 6-ft model of a 246-in. lighthouse

17. 1-m model of a 3-cm beetle

18. 6-in. model of a 1-yd statuette

Problem Solving

19. On a map, 1.5 centimeters represents a distance of 45 kilometers. If two points on the map are 0.8 centimeters apart, what is the actual distance between the two points?

20. On a map, a line segment $\frac{1}{2}$ -inch long represents an actual distance of 250 miles. What is the actual length of a road that has a length of $5\frac{1}{4}$ inches on the map?

21. The scale of a map is $\frac{3}{4}$ in. = 12 mi. What is the actual area, in square miles, of a park represented on this map by a square whose side is 1 inch?

22. A model of an old oak tree was built using the scale 2 in. : 20 ft. If the tree's actual height is 82 feet, what is the height of the model?

SPIRAL REVIEW**Write in scientific notation.**

23. 63,700

24. 0.003

25. 92,900,000

26. 0.0000072

27. 34,000,000

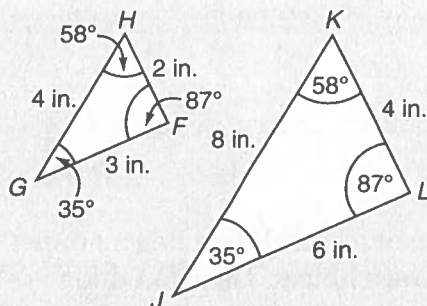
28. 0.00043

7-9 Similarity

Name _____

Date _____

Determine whether the two triangles are *similar*.



- Compare corresponding angles:

$$\angle G \cong \angle J, \angle H \cong \angle K, \angle F \cong \angle L$$

- Compare the ratios of the lengths of the corresponding sides:

$$\frac{GH}{JK} = \frac{4 \text{ in.}}{8 \text{ in.}} = \frac{1}{2}, \frac{HF}{KL} = \frac{2 \text{ in.}}{4 \text{ in.}} = \frac{1}{2}, \frac{FG}{LJ} = \frac{3 \text{ in.}}{6 \text{ in.}} = \frac{1}{2}$$

$$\text{So } \frac{GH}{JK} = \frac{HF}{KL} = \frac{FG}{LJ} = \frac{1}{2}$$

$\triangle GHF$ is similar to $\triangle JKL$. $\triangle GHF \sim \triangle JKL$.

The *scale factor* of two similar figures is the ratio formed by the lengths of their corresponding sides.

Original photo : 10 cm long and 6 cm wide

Enlarged photo: x cm long and 15 cm wide

How long will the enlarged photo be?

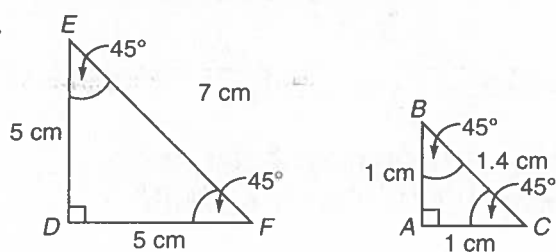
$$\frac{\text{enlarged width}}{\text{actual width}} = \frac{15}{6} = \frac{5}{2} \quad \leftarrow \text{scale factor}$$

$$\begin{array}{l} \text{enlarged photo} \\ \text{length} \end{array} = \frac{5}{2} \cdot 10 \text{ cm} = 25 \text{ cm}$$

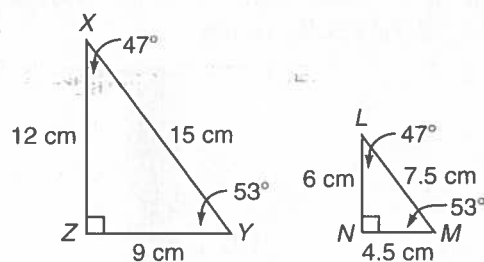
So the length of the enlarged photo is 25 cm.

Show that the triangles are similar. Name the corresponding parts.

1.

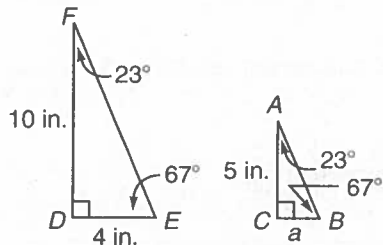


2.

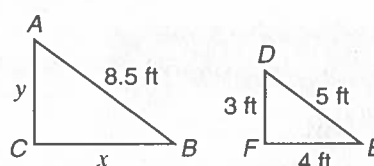


Use proportions to find the missing dimensions of these similar figures.

3.



4.





Use the scale factor to find the missing dimension.

5. original width = 11 in.; original length = 5.5 in.
enlarged width = 27.5 in.; enlarged length = ?

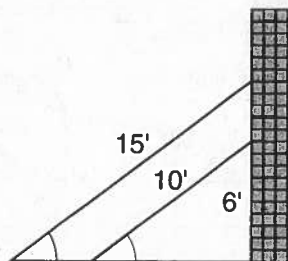
6. original depth = 1.5 ft; original width = ?
enlarged depth = 6 ft; enlarged width = 13 ft

Problem Solving

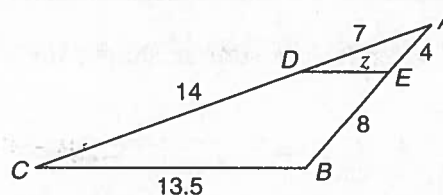
7. A pizzeria makes rectangular pizzas. The small and large pizzas are similar. The width of a small pizza is 10 inches and the length is 14 inches. The width of a large pizza is 15 inches. What is its length?

8. The Olabisi's want to build their dog house similar to their own house. The front door of their house measures $3\frac{1}{2}$ feet by 8 feet. If the scale factor from the actual house to the dog house is to be $\frac{1}{6}$, what should the dimensions of the dog's front door be?

9. A 10-foot ladder and a 15-foot ladder are placed against the same wall and make congruent angles with the ground. If the 10-foot ladder reaches a height of 6 feet against the wall, how far up the wall does the 15-foot ladder reach?



10. Ben was shown the following figure during a state mathematics test.



How can he find the missing length of segment ED ? What is its length?

CRITICAL THINKING

True or false? Explain.

11. All squares are similar.

12. All rectangles are similar.

Practice Chapter 7 Test

Name _____ Date _____

Find the unit rate. Round to the nearest cent.

1. \$15 for 48 stickers

2. 5 ounces for 2.5 servings

3. 50 ride tickets for \$10

Find two ratios equal to the given ratio.

4. $8 : 32$

5. $14 : 63$

6. $2.5 : 7.5$

7. $\frac{1}{5} : 1\frac{3}{5}$

Compare. Write = or $\neq$.

8. $\frac{6}{12}$ _____ $\frac{10}{18}$

9. $\frac{18}{27}$ _____ $\frac{14}{21}$

10. $\frac{20}{25}$ _____ $\frac{5}{7}$

Solve.

11. $\frac{5}{6} = \frac{30}{y}$

12. $\frac{1}{8} = \frac{b}{40}$

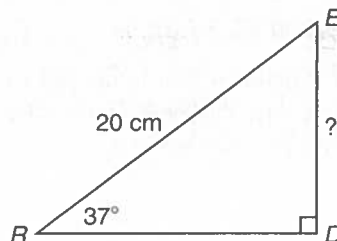
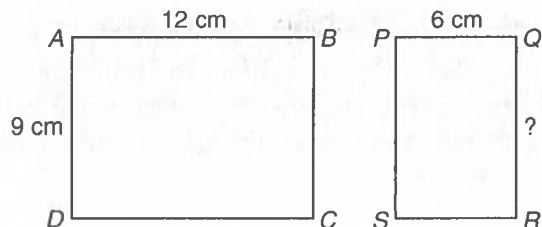
13. $\frac{c}{0.4} = \frac{1.2}{1.6}$

14. $\frac{\frac{1}{4}}{x} = \frac{1\frac{1}{2}}{3}$

Find the unknown measure.

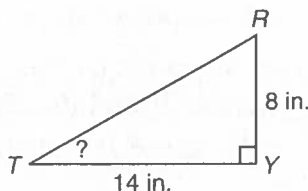
15. rectangle $ABCD \sim$ rectangle $SPQR$. Find QR .

16. Find ED to the nearest tenth.



17. In $\triangle ABC$, $m\angle C = 90^\circ$, $m\angle A = 25^\circ$, $AC = 11$ in. Find AB to the nearest tenth. Draw a picture.

18. Find the measure of $\angle T$ to the nearest tenth.





Solve. Show your work.

19. Three members of the Green Lawn Corporation can mow a lawn in 45 minutes. How long will it take 9 members working at the same rate?
- _____

21. What is the scale factor of a photograph in which a 6-foot tall man is 1.5 inches high?
- _____

23. Stan drove 90 miles in 1.5 hours. How long will it take him to drive 300 miles?
- _____

25. From the top of a 120-foot lighthouse, the angle of sight of a boat at sea is 26° . Find, to the nearest foot, the distance from the boat to the foot of the lighthouse.
- _____

20. On a map, 1 centimeter represents 80 kilometers. If two cities are 260 kilometers apart, how many centimeters apart are they on the map?
- _____

22. Stephen wants to make a scale model of a triangular traffic sign to use with his train set. The actual sign measures 3 feet by 3 feet by 5 feet. The largest side of his model sign will be 2.5 inches. What is the length of the other sides?
- _____

24. Divide 540 into three parts having a ratio of 5 : 6 : 7.
- _____

26. A 20-foot ladder leans against a building. If the ladder is 8 feet from the building, find, to the nearest degree, the measure of the angle that the foot of the ladder makes with the ground.
- _____

Tell About It

Explain how you solve each problem. Show all your work.

27. Jordan mixes 2 parts pineapple juice with 3 parts orange juice to make Island Punch. How many liters of each are needed to make 15 liters of punch?
- _____

28. The perimeter of a triangle is 91 centimeters. If the sides are in the ratio 2 : 4 : 7, find the length of each side of the triangle.
- _____

Cumulative Review: Chapters 1–7

Name _____

Date _____

Choose the correct answer.

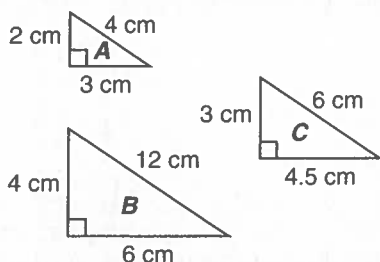
1. The sum of 2.5×10^3 and 2.05×10^4 is:

- A. 2.25×10^3
- B. 2.3×10^4
- C. 2.255×10^3
- D. 2.3×10^3

7. The product of 0.000000000000089 and 234,050,000,000 is

- A. 20.83045×10^2
- B. 2.083045×10^{-12}
- C. 2.083045×10^{-2}
- D. 2.083045×10^{12}

2. Which triangles are similar?



- F. A and B
- G. B and C
- H. A and C
- J. None

8. Two numbers are in the ratio of 3 : 4. If 9 is subtracted from their sum, the result is 40. What is the greater number?

- F. 35
- G. 21
- H. 28
- J. 49

3. Solve for n : $n - \frac{2}{3} = \frac{6}{4}$

- A. $1\frac{5}{12}$
- B. $7\frac{5}{12}$
- C. $8\frac{5}{7}$
- D. not given

9. On a scale drawing, 48 feet is represented by 12 inches. How many feet are represented by $\frac{1}{4}$ inch?

- A. 8 ft
- B. 4 ft
- C. 2 ft
- D. 1 ft

4. What is the square root of 25?

- F. 5
- G. 50
- H. 625
- J. not given

10. A baseball team played x games, losing 4 of them and winning the rest. What is the ratio of games won to games lost?

- F. $\frac{x}{4}$
- G. $\frac{4}{x}$
- H. $\frac{4}{x-4}$
- J. $\frac{x-4}{4}$

5. If \$165.00 is divided among 3 school clubs in the ratio of 2 : 3 : 6, what is the difference between the least and the greatest amounts received?

- A. \$30.00
- B. \$60.00
- C. \$45.00
- D. \$90.00

11. Find the slope of the line that passes through points (4, 5) and (-1, 3).

- A. $\frac{5}{2}$
- B. $\frac{1}{6}$
- C. $\frac{2}{5}$
- D. $-\frac{5}{2}$

6. What number when doubled and added to 25 yields 65?

- F. 20
- G. 22.5
- H. 40
- J. 45

12. After reading a low of -16°F at 10 P.M., the temperature began rising an average of 3 degrees an hour. What was the thermometer reading at 1 A.M.?

- F. -25°F
- G. -7°F
- H. 7°F
- J. 9°F



13. Find the value of the expression $\frac{4(a-b)}{3c}$ when $a = 6.5$, $b = 3$, and $c = 2\frac{1}{3}$.

A. 6 B. 12
C. 2 D. 3

18. Find the length of the hypotenuse of a right triangle with legs measuring 9 centimeters and 12 centimeters.

F. 11.25 cm G. 15 cm
H. 22.5 cm J. not given

14. Solve for n : $\frac{n}{6} = \frac{3}{4}$

F. 4.5 G. 4.8
H. 18 J. 20

19. The decimal equivalent of $\frac{7}{8}$ is

A. 0.78 B. 0.785
C. 0.875 D. 0.87

15. The sum of two integers is 3. When the lesser integer is subtracted from the greater integer, the difference is 9. What are the integers?

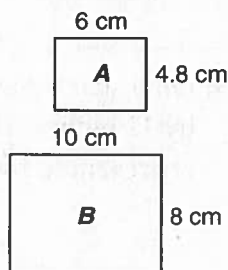
A. 9 and -6 B. -6 and 3
C. -6 and -3 D. 6 and -3

20. The reciprocal of $-2\frac{2}{3}$ is

F. $-\frac{8}{3}$ G. $2\frac{1}{2}$
H. $-\frac{3}{8}$ J. $\frac{3}{22}$

16. What is the scale factor from figure B to figure A?

F. $1\frac{1}{3}$ G. $2\frac{1}{12}$
H. 0.6 J. $1\frac{2}{3}$



21. Choose the number equal to $2^3 \cdot 5 \cdot 7$.

A. 125
B. 96
C. 280
D. 210

17. Which is a rational number between -12 and -11.25?

A. -12.45 B. -11.45
C. 11.45 D. not given

22. Find the unit price of 32 pens for \$1.28.

F. \$0.03 G. \$0.04
H. \$0.32 J. \$0.42

Tell About It

Explain how you solve each problem. Show all your work.

23. If a winning candidate received 8 votes for every 3 received by the loser, how many votes did each receive if the total number of votes was 5390?

24. Two planes take off at a New York airport. The first plane climbs at an angle of 45° with respect to the ground and reaches an altitude of 5600 feet. The second plane climbs at an angle of 60° with respect to the ground and reaches an altitude of 8200 feet. To the nearest foot, which plane covers a longer ground distance?