NAME _____ DATE _____ PERIOD _____

6-1 Practice

Ratios

Express each ratio as a fraction in simplest form.

1. 56 pencils to 64 erasers

2. 25 calculators to 20 students

3. 36 cassettes to 60 CDs

4. 18 minnows to 27 fish

5. 26 tents to 65 campers

6. 49 apples out of 63 fruit

7. 45 out of 75 days

8. 60 forks to 144 spoons

9. 112 out of 200 pages

10. 36 balls to 81 players

11. 6 pounds to 256 ounces

12. 5 hours to 720 minutes

13. 9 gallons to 48 quarts

14. 24 feet to 30 yards

15. 420 seconds to 10 minutes

16. 96 inches to 9 feet

17. 64 cups to 50 pints

18. 35 pints to 7 gallons

19. 4 inches to 3 yards

20. 780 seconds to 1 hour

21. HOMECOMING At a homecoming game, there are 630 students and 1,080 alumni in attendance. Express the ratio of students to alumni as a fraction in simplest form. Explain its meaning.

NAME _____ DATE _____ PERIOD _____

6-1 Word Problem Practice

Ratios

1. **ACADEMICS** There are 15 girls and 12 boys in Mrs. Johnson's math class. Express the ratio of boys to girls in simplest form.

2. **SPORTS** The table lists the medal count for the five countries with the most medals in the 2004 Summer Olympics. Write a ratio of the number of gold medals won for the USA to the total number of medals won for the USA.

Country	Gold	Silver	Bronze	Total
USA	35	39	29	103
Russia	27	27	38	92
China	32	17	14	63
Australia	17	16	16	49
Germany	14	16	18	48

3. **CAMP** At Windy Pines Summer Camp, there are 255 campers and 30 counselors. Express the ratio of counselors to campers as a fraction in simplest form. Explain its meaning.

4. **SCHOOL** Students at Parkville Elementary go to school 6 hours a day. The sixth graders have 55 minutes for lunch and recess each day. Express the ratio of the time spent at lunch and recess to the total time spent at school in simplest form.

5. **ZOOS** The table below shows the number of each type of animal found at a small zoo.

Animal	Number
Large mammal	75
Small mammal	159
Reptiles	88
Amphibian	92
Birds	107
Fish	73

a. Express the ratio of large mammals to small mammals as a fraction in simplest form.

b. Express the ratio of reptiles to amphibians as a fraction in simplest form.

c. Express the ratio of mammals to non-mammals as a fraction in simplest form.

d. Express the ratio of reptiles and amphibians to the total number of animals as a fraction in simplest form.

Lesson 6-1

NAME _____ DATE _____ PERIOD _____

6-2 Practice

Unit Rates

Express each rate as a unit rate.

1. $4.60 for 5 cans of soup

2. $51 for a box of 75 tiles

3. 657 miles in 9 days

4. 108 meters in 12 seconds

5. 176 new employees in 22 years

6. 39 yards for 6 costumes

7. 55 pages in 25 minutes

8. $3015 from 36 people

9. **CAMP** Happy Times Summer Camp has 351 campers and 39 counselors. PlayDay Summer Camp has 224 campers and 28 counselors. Which camp has the lower rate of campers to counselors?

10. **ROLLER COASTER** A roller coaster can accommodate 346 riders in 20 minutes. How many riders could ride in 90 minutes?

11. **BAGELS** The bakers at Joey's Bagels can make 340 bagels in 4 hours. How many bagels could the bakers make in 10 hours?

12. **CEREAL** The prices for various sizes of Health Crunch cereal are given in the table at the right. Which size has the best cost per ounce?

Size (oz)	Price
11	$4.73
15	$4.80
19.1	$5.73

Round to nearest tenth

13. **MUSIC** The Music Factory offers 50-minute music lessons for $40. The Music Makers offers 60-minute lessons for $55. Which is the better deal?

14. **RUNNING** Leslie ran a 5-kilometer race in 22 minutes. Jorge ran a 2-kilometer race in 8.5 minutes. Which runner ran at the faster rate?

15. **SEWING** It took Michala 4 hours to sew 9 scarves. How many scarves could she make in 24 hours?

NAME _____ DATE _____ PERIOD _____

6-4 Study Guide and Intervention

Proportional and Nonproportional Relationships

Identify Proportions Two quantities are **proportional** if they have a constant ratio or rate. If they do not have the same ratio or rate, they are said to be **nonproportional**.

Example 1 **Determine whether the distance traveled is proportional to the time. Explain your reasoning.**

Time (minutes)	1	2	3	4
Distance (yards)	300	600	900	1200

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

$\frac{1}{300} = \frac{1}{300}$ $\frac{2}{600} = \frac{1}{300}$ $\frac{3}{900} = \frac{1}{300}$ $\frac{4}{1200} = \frac{1}{300}$

Since all rates are equal, the time is proportional to the distance.

Example 2 **Determine whether the number of jumping jacks completed is proportional to the time. Explain your reasoning.**

Jumping Jacks Completed	15	30	40	55	65
Time (seconds)	10	20	30	40	50

Write the ratio of jumping jacks completed to time in simplest form.

$\frac{15}{10} = \frac{3}{2}$ $\frac{30}{20} = \frac{3}{2}$ $\frac{40}{30} = \frac{4}{3}$ $\frac{55}{40} = \frac{11}{8}$ $\frac{65}{50} = \frac{13}{12}$

The rates are not equal. So, the number of jumping jacks is *not* proportional to the time.

Exercises

Determine whether the set of numbers in each table is proportional. Explain.

1.

Cookies	6	9	12	15
Cupcakes	4	6	8	10

2.

Population (100,000)	1.3	2.1	3.3	5.2
Years	1	2	3	4

3.

Miles	43	88	129	145
Hours	1	2	3	4

4.

Trading Cards	16	32	48	64
Packs	2	4	6	8

5.

Questions Answered	8	16	30	42
Minutes	2	8	15	20

6.

Cups of Juice	5	15	25	45
Gallons of Punch	2	6	10	18

7.

Money	180	225	270	360
Hours	20	25	30	40

8.

Pounds	10	25	40	100
Cost	40	95	150	365

9.

Months	1	2	3	4
Days	31	59	90	120

10.

Songs	3	5	7	10
Minutes	9	15	21	30

NAME _____ DATE _____ PERIOD _____

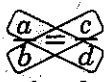
6-5 Study Guide and Intervention

Solving Proportions

Proportions A proportion is an equation stating that two ratios or rates are equal.

$$\frac{a}{b} = \frac{c}{d}$$

An important property of proportions is that their cross products are equal. You can use this property to solve problems involving proportions.



$$ad = bc$$

Example **Solve the proportion $\frac{14.1}{c} = \frac{3}{4}$.**

$\frac{14.1}{c} = \frac{3}{4}$

$14.1 \cdot 4 = c \cdot 3$ Cross products.

$56.4 = 3c$ Multiply.

$\frac{56.4}{3} = \frac{3c}{3}$ Divide.

$18.8 = c$ Simplify.

The solution is 18.8.

Exercises

ALGEBRA Solve each proportion. Show all steps.

1. $\frac{x}{9} = \frac{16}{12}$
2. $\frac{32}{28} = \frac{w}{7}$
3. $\frac{5}{u} = \frac{60}{132}$
4. $\frac{36}{21} = \frac{24}{s}$
5. $\frac{a}{64} = \frac{225}{480}$
6. $\frac{42}{w} = \frac{56}{8}$
7. $\frac{1}{10} = \frac{m}{12}$
8. $\frac{5}{3} = \frac{85}{h}$
9. $\frac{24}{g} = \frac{2}{30}$
10. $\frac{f}{21} = \frac{57}{63}$
11. $\frac{22}{z} = \frac{121}{16.5}$
12. $\frac{2}{3} = \frac{k}{12.6}$
13. $\frac{r}{9} = \frac{5}{20}$
14. $\frac{d}{21} = \frac{1.5}{3.5}$
15. $\frac{46}{57.5} = \frac{360}{q}$
16. $\frac{4.2}{4.8} = \frac{d}{80}$
17. $\frac{1}{c} = \frac{4.5}{11.7}$
18. $\frac{0.3}{n} = \frac{4.75}{14.25}$
19. $\frac{9.1}{14.7} = \frac{1.3}{p}$
20. $\frac{0.4}{3} = \frac{y}{98.25}$
21. $\frac{v}{33.44} = \frac{1}{3.2}$

NAME _____ DATE _____ PERIOD _____

6-5 Study Guide and Intervention *(continued)*

Solving Proportions

Use Proportions to Solve Problems You can use proportions to solve problems involving two quantities. Just be sure to compare the quantities in the same order.

Example **DRIVING Lori drove 232 miles in 5 hours. At this rate, how long will it take her to drive 580 miles?**

Understand You know how long it took to drive 232 miles. You need to find out how long it will take to drive 580 miles.

Plan Write and solve a proportion using ratios that compare miles to hours. Let h represent the hours it will take to drive 580 miles.

Solve There are two ways to set up the proportion.

One Way		**Another Way**
$\frac{232}{5} = \frac{580}{h}$		$\frac{232}{580} = \frac{5}{h}$
$232 \cdot h = 5 \cdot 580$	Cross products.	$232 \cdot h = 580 \cdot 5$
$232h = 2900$	Multiply.	$232h = 2900$
$\frac{232h}{232} = \frac{2900}{232}$	Divide.	$\frac{232}{232} = \frac{2900}{232}$
$h = 12.5$	Simplify.	$h = 12.5$

Check Check the cross products. Because $232 \cdot 12.5 = 2900$ and $5 \cdot 580 = 2900$, the answer is correct.

So, it will take 12.5 hours to drive 580 miles at the current rate.

Exercises Write a proportion and solve. Show all steps.

1. **FUNDRAISING** A school is running a fundraiser. For every \$75 worth of wrapping paper sold, the school receives \$20. How much wrapping paper must be sold to reach the fund-raising goal of \$2500?

2. **PIZZA** At a pizzeria, a 10-pound bag of shredded cheese can be used to make 32 pizzas. How many pounds would be needed to make 100 pizzas?

3. **MONEY** In 4 weeks, Marlie earned \$500 at her job. At this rate, how many weeks would it take Marlie to earn \$5000?

4. **SCIENCE** Mike weighs 90 pounds. On a Web site, he calculated that he would weigh about 15 pounds on the Moon. About how many pounds would Mike's dog weigh on the Moon if he weighs 54 pounds on Earth?

NAME _____ DATE _____ PERIOD _____

6-5 Word Problem Practice

Solving Proportions

Show your work.

1. **RUNNING** Donna is planning to run a 13.1-mile half marathon. She tells of her plans to her European friend, who asks how many meters she will run. There are approximately 1609 meters in 1 mile. Write a proportion that could be used to find the distance of the marathon in meters.

2. **FLOWERS** The Tyler Municipal Rose Garden and Center in Tyler, Texas, is the nation's largest rose garden. It contains 38,000 rose bushes representing 500 varieties of roses set in a 14-acre park. Write a proportion that could be used to find the average number of rose bushes per acre.

3. **RECYCLING** Ohio is the home of two of the world's largest aluminum smelters, in which metal is separated for recycling. Together, these two facilities process an average of 15 million pounds of aluminum each month. How many pounds of aluminum do the Ohio smelting plants average per week?

4. **TECHNOLOGY** Elton just bought a new flash drive for his computer. He read in the literature that 7 flash drives can hold 1792 megabytes of data. Write and solve a proportion to find the number of megabytes of data that 5 flash drives can hold.

5. **COOKING** Ashley is planning breakfast for a family event. She wants to serve Deltan Waffles. She found this recipe, which serves 8 people.

Deltan Waffles	
$1\frac{3}{4}$ cups flour	$1\frac{1}{4}$ cups milk
$\frac{1}{2}$ teaspoon salt	$\frac{1}{2}$ cup shortening, melted
1 tablespoon baking powder	
2 egg yolks	2 egg whites

a. How much salt does she need if she uses 3 eggs?

b. How much baking powder does she need if she wants to serve 12 people?

NAME _____ DATE _____ PERIOD _____

6-5 Practice

Solving Proportions

Determine whether each pair of ratios forms a proportion.

1. $\frac{5}{8}, \frac{20}{32}$
2. $\frac{12}{28}, \frac{27}{63}$
3. $\frac{8}{50}, \frac{1}{43}$
4. $\frac{40}{48}, \frac{56}{42}$
5. $\frac{6.4}{16}, \frac{32}{80}$
6. $\frac{12}{18}, \frac{90}{135}$
7. $\frac{21}{24}, \frac{56}{64}$
8. $\frac{9}{16}, \frac{3}{4}$
9. $\frac{12}{32}, \frac{8}{3}$
10. $\frac{2.6}{4}, \frac{4.6}{8}$
11. $\frac{5.1}{1.7}, \frac{7.5}{2.5}$
12. $\frac{8.5}{25}, \frac{17}{50}$

ALGEBRA Solve each proportion. Show your work.

13. $\frac{n}{12} = \frac{6}{18}$
14. $\frac{8}{v} = \frac{56}{105}$
15. $\frac{15}{35} = \frac{s}{7}$
16. $\frac{24}{30} = \frac{8}{w}$
17. $\frac{c}{28} = \frac{5}{7}$
18. $\frac{3}{r} = \frac{39}{65}$
19. $\frac{9}{15} = \frac{m}{25}$
20. $\frac{7.5}{6.0} = \frac{3.6}{x}$
21. $\frac{12}{25} = \frac{u}{40}$
22. $\frac{1}{a} = \frac{33}{132}$
23. $\frac{f}{5} = \frac{16}{40}$
24. $\frac{r}{6.5} = \frac{0.2}{1.3}$
25. $\frac{30}{14} = \frac{k}{1.54}$
26. $\frac{3.5}{7.2} = \frac{k}{57.6}$
27. $\frac{2.1}{42} = \frac{7}{t}$

28. **FOOD** Gayle is making fruit punch that consists of 2 quarts of juice and 1 quart of soda water. How much soda water does she need if she has 5 quarts of juice?

NAME _____ DATE _____ PERIOD _____

6-6 Practice

Scale Drawings and Models

On a map, the scale is 5 centimeters = 2 kilometers. Find the missing distances.

	Location	Map Distance	Actual Distance
1.	Town A to Town B	10 cm	
2.	Town A to Town C		10 km
3.	Town A to Town D		5.6 km
4.	Town A to Town E	2 cm	
5.	Town A to Town F	0.5 cm	
6.	Town A to Town G		3.2 km
7.	Town A to Town H	0.25 cm	
8.	Town A to Town I		2.4 km
9.	Town A to Town J		0.04 km
10.	Town A to Town K	1 cm	
11.	Town A to Town L	2.5 cm	
12.	Town A to Town M		0.48 km

13. Refer to Exercises 1–12. What is the scale factor?

14. What is the scale factor if the scale is 15 inches = 1 yard?

15. STRUCTURES A barn is 50 feet wide by 80 feet long. Make a scale drawing of the barn that has a scale of $\frac{1}{2}$ inch = 10 feet.

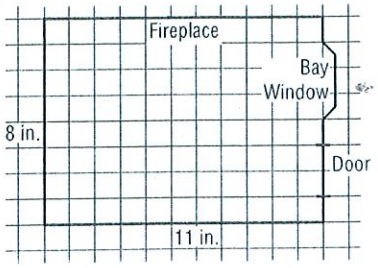
16. PHOTOGRAPHY A man in a photograph is 1.5 inches in height. If the man is 6 feet tall, what is the scale?

NAME _____ DATE _____ PERIOD _____

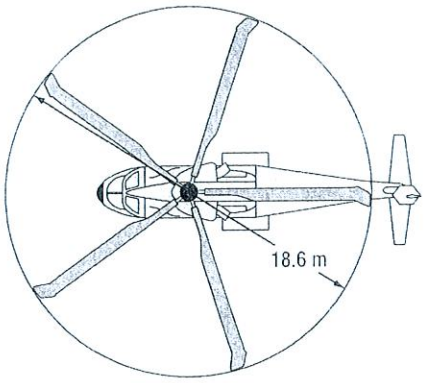
6-6 Word Problem Practice

Scale Drawings and Models

1. **INTERIOR DESIGN** Jane is planning the furniture layout of her living room. On the scale drawing of the living room below, 1 inch represents 2 feet. What measurement does 8 inches represent?



2. **TOYS** The diameter of the sweep of the main rotor of the EH101 helicopter is 18.6 meters. A toy model of it has a sweep of 31 centimeters. What is the scale of the model?



3. **ARCHITECTURE** The Freedom Tower will sit at the northwest corner of the 16-acre World Trade Center site in New York City. The height of the tower is set to be 1776 feet. Suppose that 1 inch represents 74 feet on a scale model of the tower. What is the height of the model?

4. **MODEL RAILROADING** Mr. Miller's model railroad layout is in HO scale. The scale factor of HO is 1:87. How high is the smokestack of the actual engine if the model is 2 inches high? Express your answer in feet.

5. **BLUEPRINTS** John and Julie are planning to have a new house built. The architect designed a house and sent them the blueprints. The scale that the architect used on the blueprints is $2\frac{1}{2}$ inches equals 10 feet.

   a. The living room will have the actual dimensions of 12 feet by 16 feet. What are its dimensions on the blueprints?

   b. Julie notices that the bedroom closet on the blueprint is 0.25 inch by 1 inch. She told the architect that she wanted a walk-in closet that is 6 feet long. Did the architect follow her instruction?

   c. What is the scale factor?

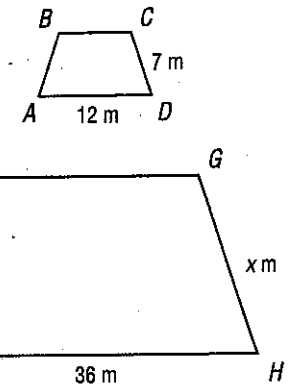
NAME _____ DATE _____ PERIOD _____

6-7 Study Guide and Intervention

Similar Figures

Corresponding Parts of Similar Figures **Similar figures** are figures that have the same shape but not necessarily the same size. If two figures are similar, then the corresponding angles have the same measure, and the corresponding sides are proportional. Because corresponding sides are proportional, you can use proportions or the scale factor to find the measures of the sides of similar figures when some measures are known.

Example **If the polygons *ABCD* and *EFGH* are similar, what is the value of *x*?**



$\frac{AD}{EH} = \frac{CD}{GH}$ The corresponding sides are proportional. Write a proportion.

$\frac{12}{36} = \frac{7}{x}$ Replace *AD* with 12, *EH* with 36, *CD* with 7, and *GH* with *x*.

$12 \cdot x = 36 \cdot 7$ Find the cross products.

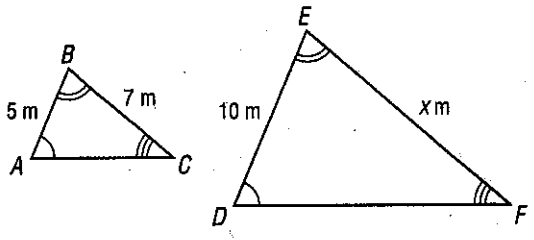
$12x = 252$ Simplify.

$x = 21$ Mentally divide each side by 12.

Exercises

The figures are similar. Find each missing measure. Show your proportion and work!

1.



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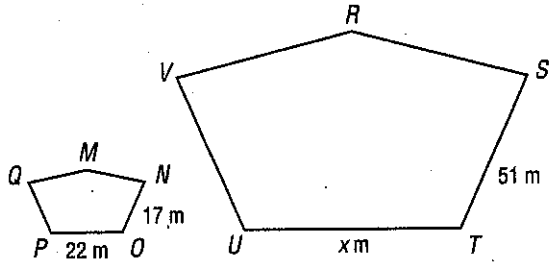

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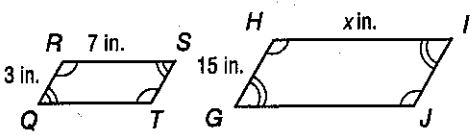

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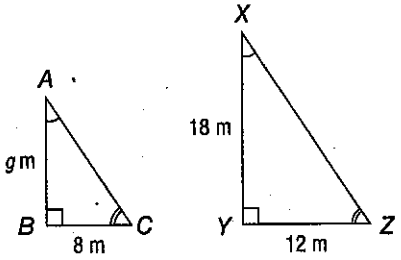

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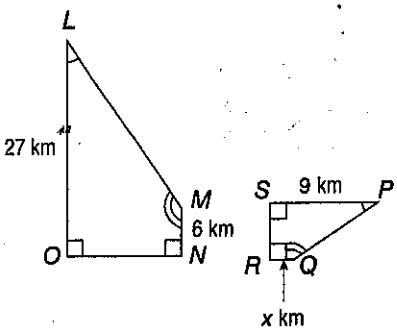

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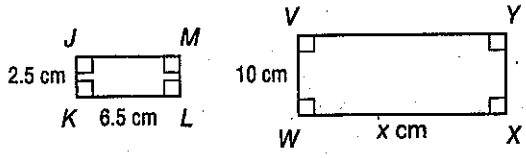


NAME _____ DATE _____ PERIOD _____

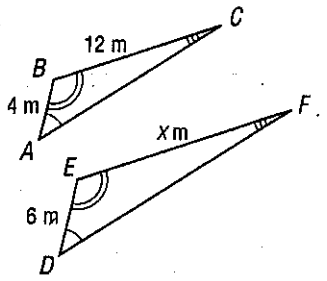
6-7 Practice

Similar Figures

Show your proportion & work

In Exercises 1–8, the figures are similar. Find each missing measure.

1.



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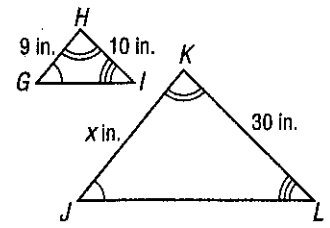

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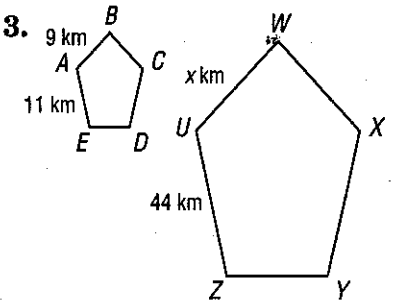

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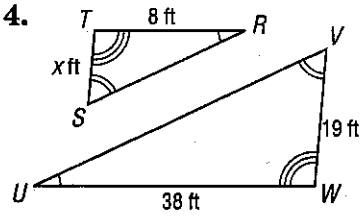

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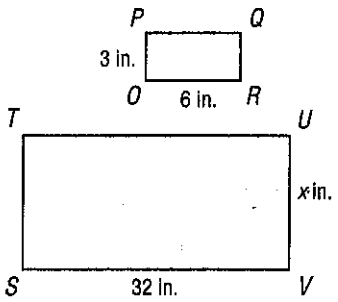

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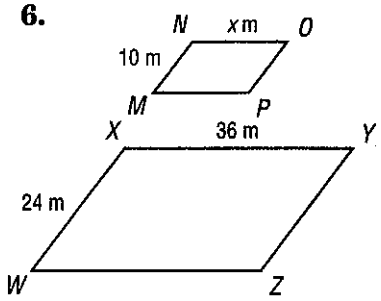

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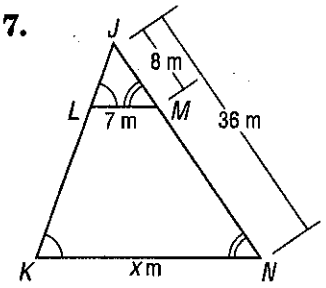

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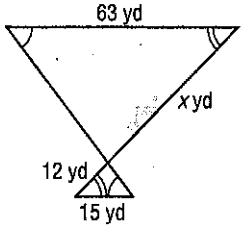


9. GEOMETRY Triangle ABC is similar to triangle DEF. What is the value of $\overline{BC}$ if $\overline{EF}$ is 36 feet, $\overline{AC}$ is 7 feet, and $\overline{DF}$ is 28 feet?

10. GEOMETRY Quadrilateral $RSTU$ is similar to quadrilateral $LMNO$. What is the value of $\overline{LO}$ if $\overline{RU}$ is 6 inches, $\overline{LM}$ is 45 inches, and $\overline{RS}$ is 9 inches?

11. QUILTS A woman sews similar quilts for her daughter and her daughter's doll. If the daughter's quilt has a length of 2 yards and a width of 1 yard, and the doll's quilt has a length of $\frac{1}{2}$ yard, what is the width of the doll's quilt?

Lesson 6-7

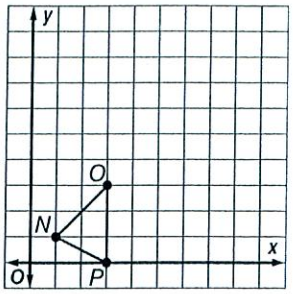
NAME _____ DATE _____ PERIOD _____

6-8 Practice

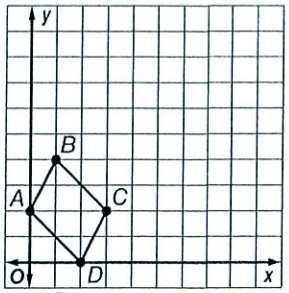
Dilations

Find the vertices of each figure after a dilation with the given scale factor k. Then graph the image.

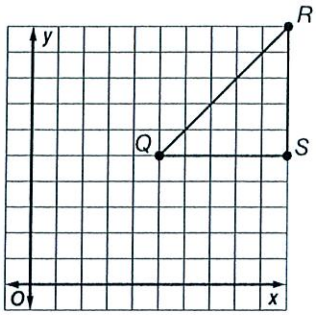
1. $k = 3$



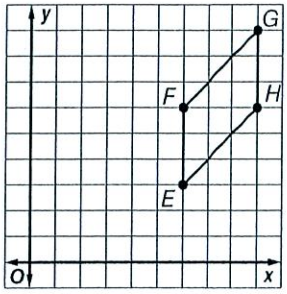
2. $k = 2.5$



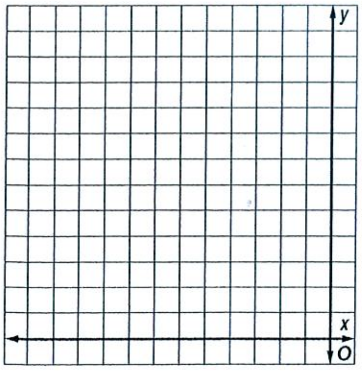
3. $k = \frac{1}{5}$



4. $k = \frac{2}{3}$



5. Find the vertices of figure $STUV$ after a dilation with a scale factor of 1.5 if it has vertices $S(-4, 1)$, $T(-4, 6)$, $U(-2, 8)$, and $V(-2, 3)$. Then graph the image.



6. PHOTOS Jordan has a photo of a lion that is 4 inches by 6 inches. He wants to sketch a larger version of the photo on paper that is 14 inches by 21 inches. What is the scale factor of the dilation?

7. IMAGES Mrs. Williamson is projecting a slide on the wall. The image on the slide is 1.25 inches by 1.5 inches. The image projected on the wall is 20 inches by 24 inches. What is the scale factor of the dilation?

NAME _____ DATE _____ PERIOD _____

6-8 Word Problem Practice

Dilations

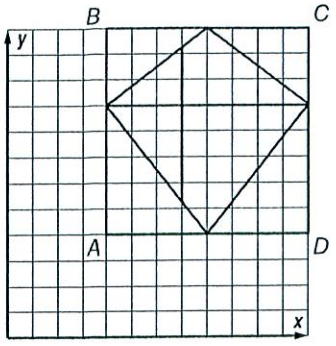
1. **GEOMETRY** A parallelogram has vertices at $A(-8, 5)$, $B(10, 3)$, $C(1, -5)$, and $D(-4, -3)$. Find the coordinates of the figure after a dilation with a scale factor of 0.5.

2. **PENNANTS** Linda is sketching a triangular pennant on a piece of grid paper. The triangle's vertices are located at (1, 3), (1, 15), and (16, 9). Once she got the sketch the way she wanted, she drew a larger copy. Find the coordinates of the triangle after a dilation with a scale factor of 3.

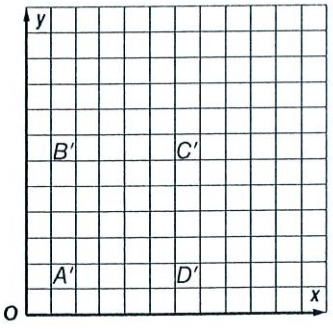
3. **PHOTOS** Rita enlarged a picture on a photocopier. The original photo was 3.5 by 5 inches. The copy was 8.75 by 12.5 inches. What is the scale factor of the dilation?

4. **STAMPS** Mike had a photo made into a postage stamp. The photo was 7 by 9.5 inches and the stamp was 1.4 by 1.9 inches. What is the scale factor of the dilation?

5. **ADVERTISING** An ad agency designed a logo for a company. The logo is shown below. Each square on the grid represents 1 square inch.



a. The company wants to create a smaller version of the logo to use on their letterhead. Graph the dilation of the logo with a scale factor of $\frac{1}{2}$.



b. The company wants to enlarge the logo for t-shirts. What would the coordinates of the vertices of the outer edge of the figure be after a dilation with a scale factor of 1.5?

c. The company wants to produce a large version of the logo to put over their company headquarters. The logo will be 6 feet wide. What is the scale factor of the dilation?

Name _____ Date _____ Pd_____

Chapter 6 Bringing It All Together #1

(Ratios, Proportions & Similar Figures)

I. Express each ratio as a fraction in simplest form:

_____ 1) 6 aces out of 24 serves

_____ 2) 8 pencils to 12 pens

_____ 3) 3 pounds to 15 ounces

_____ 4) 15 inches to 2 yards

_____ 5) 27 rooms to 48 windows

_____ 6) 1 yard to 1 foot

II. Express each rate as a unit rate:

_____ 7) $2,702 from 28 people

_____ 8) 51 meters in 8 seconds

_____ 9) $39 for a case of 75 bananas

_____ 10) There are 156 seventh graders and 7 seventh grade teachers. There are 120 eighth graders and 5 eighth grade teachers. Which grade has the lower student to teacher ratio?

III. Determine whether the set of numbers in each table is proportional. Explain.

11) _____

Number of shirts	1	2	3	4
Cost	$11.50	$13.00	$14.50	$16.00

12) _____

Number of text messages	4	8	9	11
Cost	$0.40	$0.80	$0.90	$1.10

13) Sharif started a new job working 15 hours a week. Write an equation relating the hours to weeks. After how many weeks will he have worked a total of 75 hours?

OVER ⟶

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IV. Solve each proportion:

_____ 14) $\frac{9}{15} = \frac{m}{25}$ _____ 15) $\frac{12}{18} = \frac{h}{81}$ _____ 16) $\frac{25}{60} = \frac{s}{12}$

_____ 17) $\frac{e}{9.5} = \frac{6.4}{7.6}$ _____ 18) $\frac{2.7}{3.0} = \frac{3.6}{x}$ _____ 19) $\frac{1.68}{w} = \frac{7}{12}$

V. Set up and solve a proportion for each:

20) A scale drawing of a house that measures 24 meters tall is being drawn with a scale of 2 cm = 3 meters. How many cm tall is the scale drawing?

21) Mr. Miller is ordering cookies for the Pre-Algebra students of Stilwell. He knows that 8 cookies will feed 3 students. If there are 90 Pre-, how many cookies should Mr. Miller order?

22) Stilwell is having a fundraiser for the Music Department. For every $85 worth of wrapping paper sold, the school receives $30. How much wrapping paper must be sold to reach the fundraising goal of $3,600?

23) The walls at Stilwell are painted each summer. If 18 gallons of paint are needed to paint 5 classrooms, how many gallons of paint are needed to paint 32 classrooms?

OVER⟶

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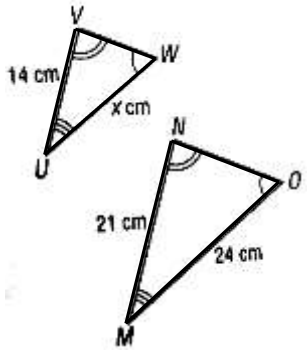
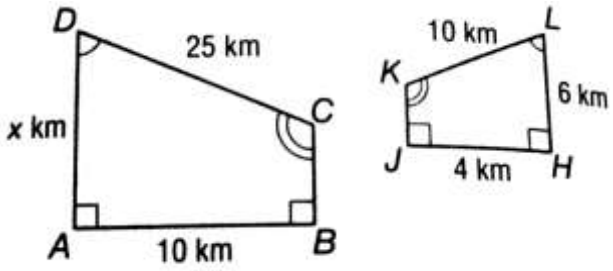
VI. The figures are similar. Find each missing measure:

24)

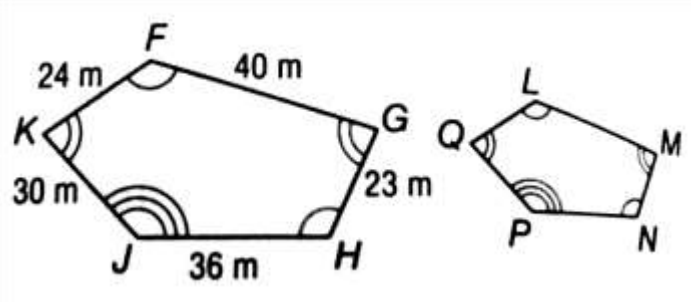


25)

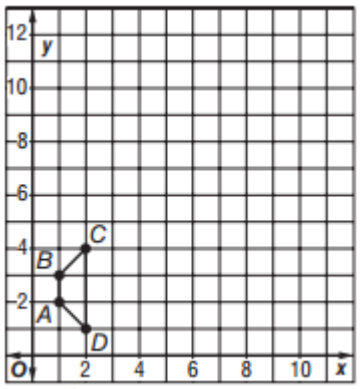


26) **MAPS** On a map, the key indicates that 1 cm equals 3.5 meters. A road is shown on this map that runs for 30 cm. How long is this road?

27) Figure FGHJK ~ Figure LMNPQ. The scale factor from Figure FGHJK to Figure LMNPQ is $\frac{3}{2}$. What is the perimeter of Figure LMNPQ?



28) Find the vertices of the following figure with the given scale factor *k*. Then graph the image. $k = 3$



FINALLY DONE