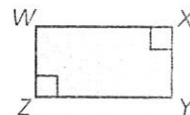
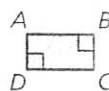


Vocabulary and Concept Check

- WRITING** How are the perimeters of two similar figures related?
- WRITING** How are the areas of two similar figures related?
- NUMBER SENSE** Rectangle $ABCD$ is similar to Rectangle $WXYZ$. The area of $ABCD$ is 30 square inches. Explain how to find the area of $WXYZ$.



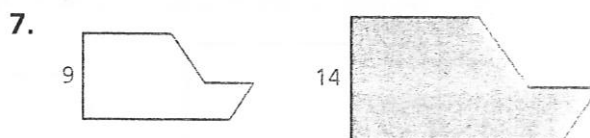
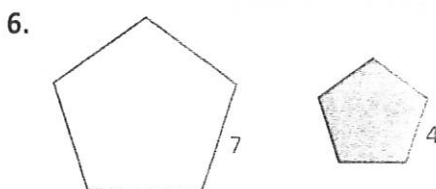
$$\frac{AD}{WZ} = \frac{1}{2}$$

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

Practice and Problem Solving

The two figures are similar. Find the ratios (red to blue) of the perimeters and of the areas.

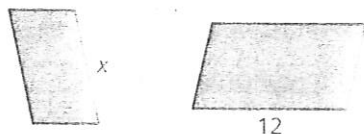
1 2



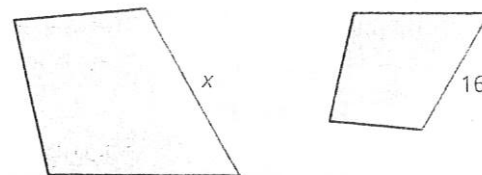
- PERIMETER** How does doubling the side lengths of a right triangle affect its perimeter?
- AREA** How does tripling the side lengths of a right triangle affect its area?

The figures are similar. Find x .

10. The ratio of the perimeters is 7 : 10.



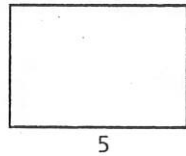
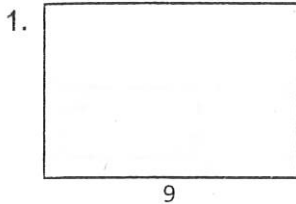
11. The ratio of the perimeters is 8 : 5.



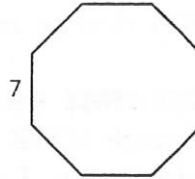
- FOOSBALL** The playing surfaces of two foosball tables are similar. The ratio of the corresponding side lengths is 10 : 7. What is the ratio of the areas?
- CHEERLEADING** A rectangular school banner has a length of 44 inches, a perimeter of 156 inches, and an area of 1496 square inches. The cheerleaders make signs similar to the banner. The length of a sign is 11 inches. What is its perimeter and its area?

2.6 Practice A

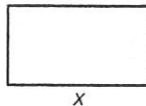
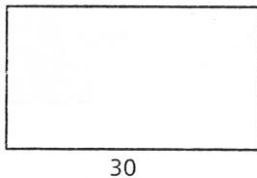
The two figures are similar. Find the ratio (small to large) of the perimeters and of the areas.



2.



3. How does doubling the side lengths of a triangle affect its area?
4. The ratio of the corresponding side lengths of two similar rectangular tables is 4 : 5.
 - a. What is the ratio of the perimeters?
 - b. What is the ratio of the areas?
 - c. The perimeter of the larger table is 44 feet. What is the perimeter of the smaller table?
5. The figures are similar. The ratio of the perimeters is 5 : 9. Find x .

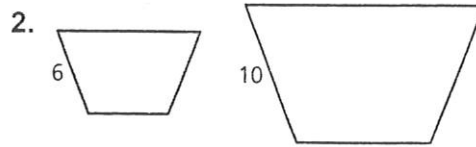
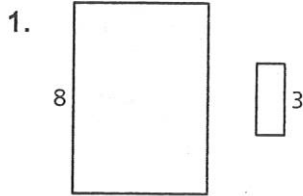


6. The ratio of the area of Triangle A to Triangle B is 16 : 49. Triangle A is similar to Triangle B .
 - a. Which triangle is larger, A or B ?
 - b. A side length of Triangle B is 3.5 inches. What is the corresponding side length of Triangle A ?
 - c. What is the ratio of the perimeter of Triangle A to the perimeter of Triangle B ?
 - d. The side lengths of Triangle A are increased by 40%. The side lengths of Triangle B do not change. What is the new ratio of the area of Triangle A to Triangle B ?

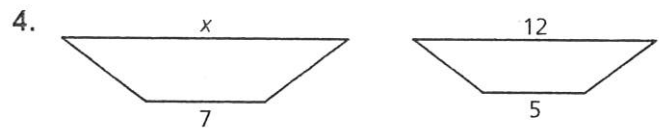
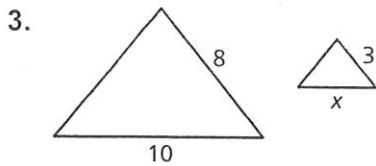
2.6

Practice
For use after Lesson 2.6

The two figures are similar. Find the ratios (shaded to nonshaded) of the perimeters and of the areas.



The polygons are similar. Find x .



5. You buy two picture frames that are similar. The ratio of the corresponding side lengths is 4 : 5. What is the ratio of the areas?

Dilation - transformation that produces an image that is the _____ as the original but _____.

- A dilation is _____ to the original figure.
- Dilations are centered around the origin $(0, 0)$, unless otherwise stated.

Scale factor - is $\frac{\text{image length}}{\text{pre-image length}}$, which is a _____.

- If the scale factor is greater than 1, the figure becomes _____.
- If the scale factor is between 0 and 1, the figure becomes _____.

Example 1:

Triangle ABC has vertices $A(0, 2)$, $B(4, 4)$, and $C(-1, 4)$.

What are the vertices of its *image* with a scale factor of 4?

Example 2:

Quadrilateral $PQRS$ has vertices $P(-2, 4)$, $Q(4, 4)$, $R(4, -2)$, and $S(-4, -4)$. It is dilated by a scale factor of $\frac{1}{2}$.

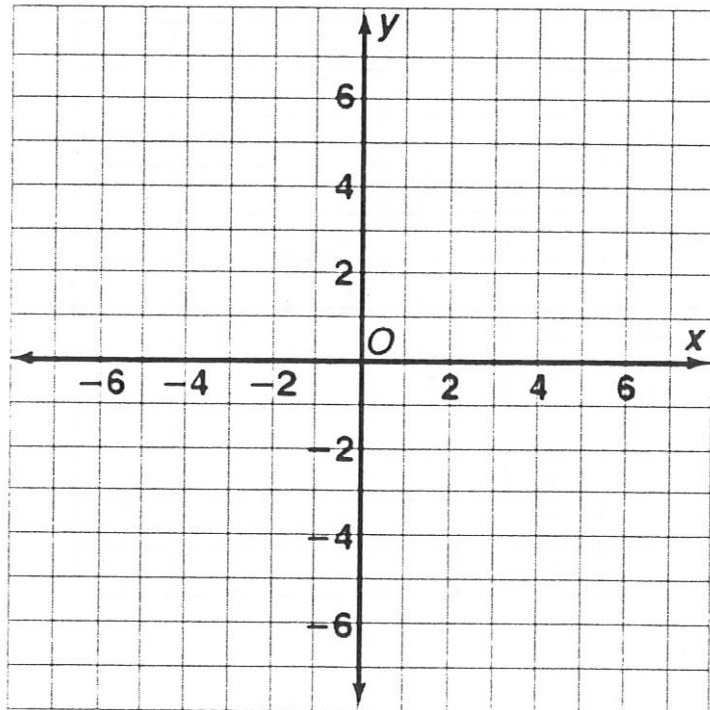
a) What are the coordinates of the image? Graph them.

$P' =$

$Q' =$

$R' =$

$S' =$



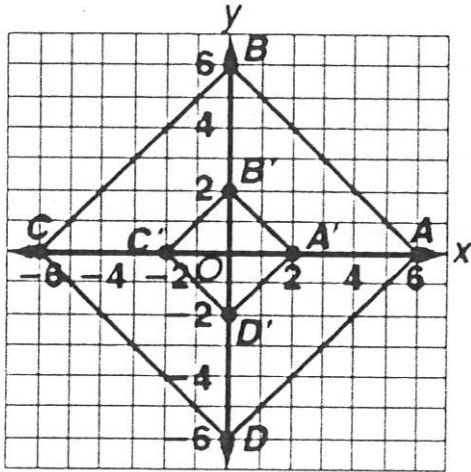
b) What do you notice about the angle measurements of the two figures?

Example 3:

If the scale factor is $\frac{5}{2}$, is the new figure going to be larger or smaller?

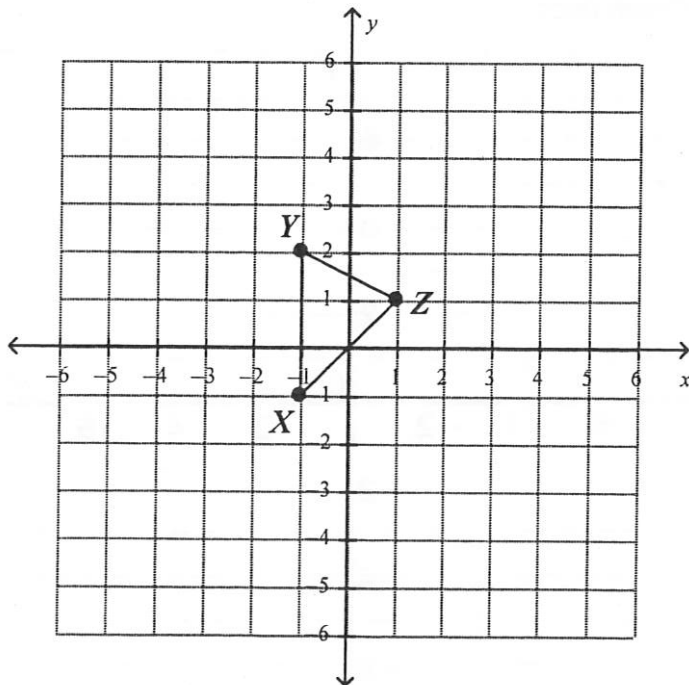
Example 4:

Quadrilateral $A'B'C'D'$ is a dilation of quadrilateral $ABCD$. Find the scale factor. Classify the dilation as an enlargement or a reduction.



Example 5:

Triangle XYZ is graphed below. Draw and label Triangle $X'Y'Z'$ after a dilation using a scale factor of two.

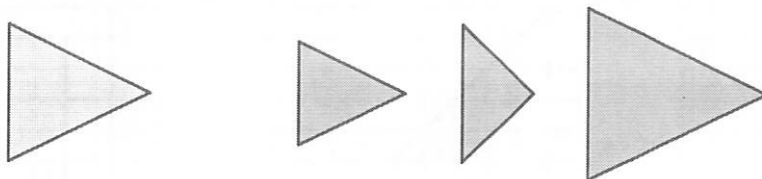


X'
 $Y' =$
 $Z' =$

2.7 Exercises

Vocabulary and Concept Check

- VOCABULARY** How is a dilation different from other transformations?
- VOCABULARY** For what values of scale factor k is a dilation called an *enlargement*? a *reduction*?
- REASONING** Which figure is *not* a dilation of the blue figure? Explain.



Practice and Problem Solving

Draw the triangle with the given vertices. Multiply each coordinate of the vertices by 3, and then draw the new triangle. How are the two triangles related?

4. $(0, 2), (3, 2), (3, 0)$ 5. $(-1, 1), (-1, -2), (2, -2)$ 6. $(-3, 2), (1, 2), (1, -4)$

Tell whether the blue figure is a dilation of the red figure.

- 1 7. 8. 9. 10. 11. 12.

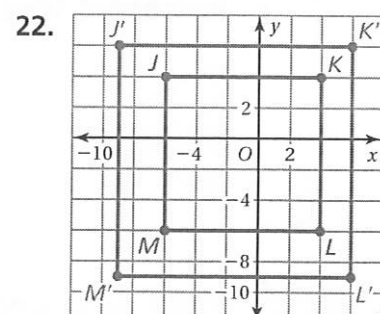
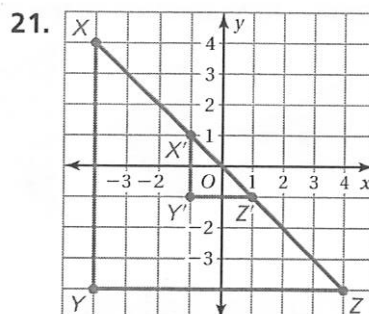
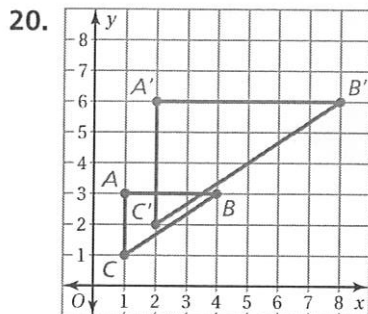
The vertices of a figure are given. Draw the figure and its image after a dilation with the given scale factor. Identify the type of dilation.

- 2 3 13. $A(1, 1), B(1, 4), C(3, 1); k = 4$ 14. $D(0, 2), E(6, 2), F(6, 4); k = 0.5$
 15. $G(-2, -2), H(-2, 6), J(2, 6); k = 0.25$ 16. $M(2, 3), N(5, 3), P(5, 1); k = 3$
 17. $Q(-3, 0), R(-3, 6), T(4, 6), U(4, 0); k = \frac{1}{3}$ 18. $V(-2, -2), W(-2, 3), X(5, 3), Y(5, -2); k = 5$

19. **ERROR ANALYSIS** Describe and correct the error in listing the coordinates of the image after a dilation with a scale factor of $\frac{1}{2}$.

X	Vertices of ABC	$(2x, 2y)$	Vertices of $A'B'C'$
	$A(2, 5)$	$(2 \cdot 2, 2 \cdot 5)$	$A'(4, 10)$
	$B(2, 0)$	$(2 \cdot 2, 2 \cdot 0)$	$B'(4, 0)$
	$C(4, 0)$	$(2 \cdot 4, 2 \cdot 0)$	$C'(8, 0)$

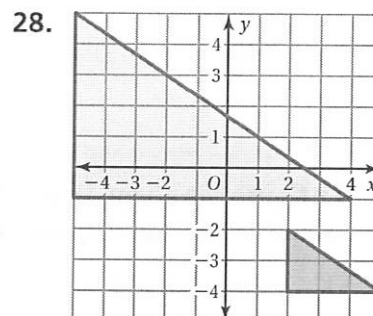
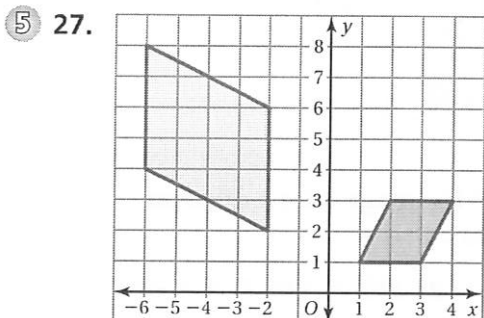
The blue figure is a dilation of the red figure. Identify the type of dilation and find the scale factor.



The vertices of a figure are given. Find the coordinates of the figure after the transformations given.

23. $A(-5, 3), B(-2, 3), C(-2, 1), D(-5, 1)$
 Reflect in the y -axis. Then dilate with respect to the origin using a scale factor of 2.
24. $F(-9, -9), G(-3, -6), H(-3, -9)$
 Dilate with respect to the origin using a scale factor of $\frac{2}{3}$. Then translate 6 units up.
25. $J(1, 1), K(3, 4), L(5, 1)$
 Rotate 90° clockwise about the origin. Then dilate with respect to the origin using a scale factor of 3.
26. $P(-2, 2), Q(4, 2), R(2, -6), S(-4, -6)$
 Dilate with respect to the origin using a scale factor of 5. Then dilate with respect to the origin using a scale factor of 0.5.

The red figure is similar to the blue figure. Describe a sequence of transformations in which the blue figure is the image of the red figure.



29. **STRUCTURE** In Exercises 27 and 28, is the blue figure still the image of the red figure when you perform the sequence in the opposite order? Explain.

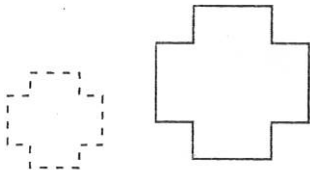
2.7 Practice A

Draw the triangle with the given vertices. Multiply each coordinate of the vertices by 3 and then draw the new triangle. How are the two triangles related?

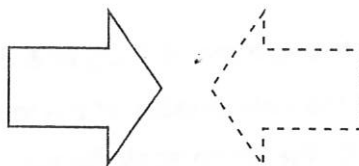
1. $(0, 0), (1, 3), (2, 1)$
2. $(-3, -2), (-1, 4), (2, -2)$

Tell whether the dashed figure is a dilation of the solid figure.

3.



4.

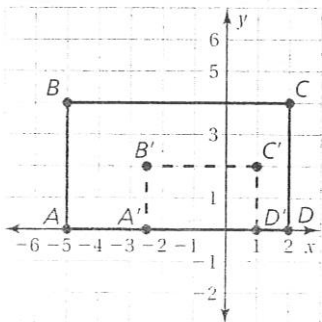


The vertices of a figure are given. Draw the figure and its image after a dilation with the given scale factor. Identify the type of dilation.

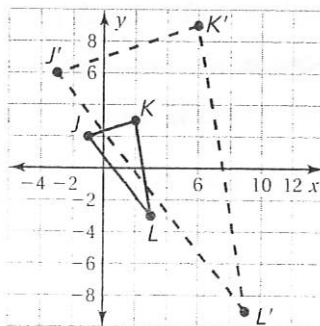
5. $A(-3, -2), B(2, 4), C(8, 1); k = \frac{1}{4}$
6. $D(1, 2), E(4, 1), F(1, -3), G(-3, -2); k = 5$

The dashed figure is a dilation of the solid figure. Identify the type of dilation and find the scale factor.

7.



8.



9. A triangle is dilated using a scale factor of 4. The image is then dilated using a scale factor of 3. What scale factor could you use to dilate the original triangle to get the final image?
10. The vertices of a figure are $P(1, 2), Q(3, 4),$ and $R(-1, 6)$. Dilate with respect to the origin using a scale factor of 2 and then translate 4 units right and 3 units down. Find the coordinates of the figure after the transformations given.

2.7 Puzzle Time

What Do You Call A Surgeon With Eight Arms?

Write the letter of each answer in the box containing the exercise number.

The vertices of a triangle are $A(2, 2)$, $B(2, 5)$, and $C(4, 2)$. Find the coordinates of the image after a dilation with the given scale factor.

1. $k = 2$ 2. $k = 5$ 3. $k = 1\frac{1}{2}$

The vertices of a triangle are $A(-5, 5)$, $B(-2, -5)$, and $C(-2, 0)$. Find the coordinates of the image after a dilation with the given scale factor.

4. $k = \frac{1}{2}$ 5. $k = 0.75$ 6. $k = \frac{1}{5}$

The vertices of a triangle are $A(1, 3)$, $B(7, 3)$, and $C(7, 5)$. The vertices of its image after a dilation are given. Find the scale factor.

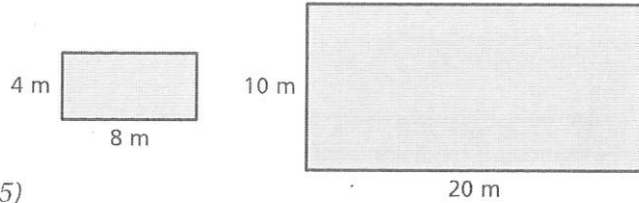
7. $A'(4, 12)$, $B'(28, 12)$, $C'(28, 20)$
 8. $A'\left(\frac{1}{6}, \frac{1}{2}\right)$, $B'\left(1\frac{1}{6}, \frac{1}{2}\right)$, $C'\left(1\frac{1}{6}, \frac{5}{6}\right)$
 9. $A'(0.5, 1.5)$, $B'(3.5, 1.5)$, $C'(3.5, 2.5)$

9		3	6	1		5	7	8	2	4
---	--	---	---	---	--	---	---	---	---	---

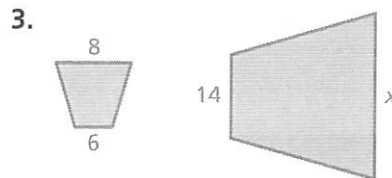
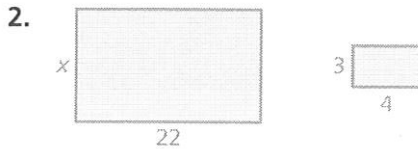
Answers

- B. $k = \frac{1}{4}$
 D. $A'(3, 3)$, $B'\left(3, 7\frac{1}{2}\right)$, $C'(6, 3)$
 T. $A'(-3.75, 3.75)$, $B'(-1.5, -3.75)$, $C'(-1.5, 0)$
 E. $k = 2$
 C. $A'(4, 4)$, $B'(4, 10)$, $C'(8, 4)$
 O. $k = 4$
 A. $k = 0.5$
 S. $A'\left(-2\frac{1}{2}, 2\frac{1}{2}\right)$, $B'(-1, -2\frac{1}{2})$, $C'(-1, 0)$
 F. $k = \frac{1}{7}$
 P. $k = \frac{1}{6}$
 U. $A'(10, 10)$, $B'(10, 25)$, $C'(20, 10)$
 J. $k = 6$
 O. $A'(-1, 1)$, $B'\left(-\frac{2}{5}, -1\right)$, $C'\left(-\frac{2}{5}, 0\right)$
 T. $k = 7$

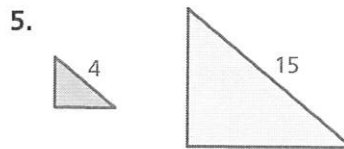
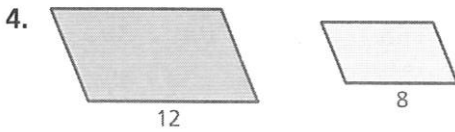
1. Tell whether the two rectangles are similar. Explain your reasoning. (Section 2.5)



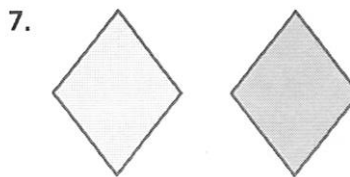
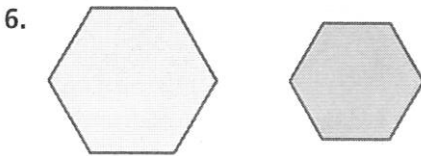
The figures are similar. Find x . (Section 2.5)



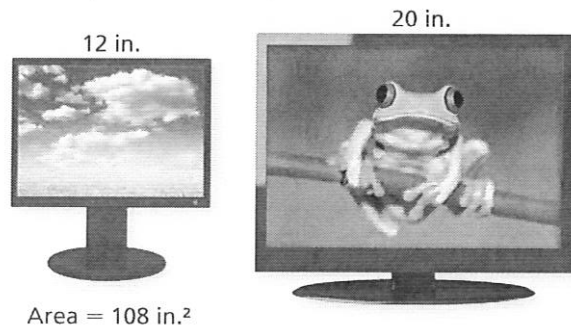
The two figures are similar. Find the ratios (red to blue) of the perimeters and of the areas. (Section 2.6)



Tell whether the blue figure is a dilation of the red figure. (Section 2.7)



8. **SCREENS** The TV screen is similar to the computer screen. What is the area of the TV screen? (Section 2.6)



9. **GEOMETRY** The vertices of a rectangle are $A(2, 4)$, $B(5, 4)$, $C(5, -1)$, and $D(2, -1)$. Dilate the rectangle with respect to the origin using a scale factor of $\frac{1}{2}$. Then translate it 4 units left and 3 units down. What are the coordinates of the image? (Section 2.7)

10. **TENNIS COURT** The tennis courts for singles and doubles matches are different sizes. Are the courts similar? Explain. (Section 2.5)

