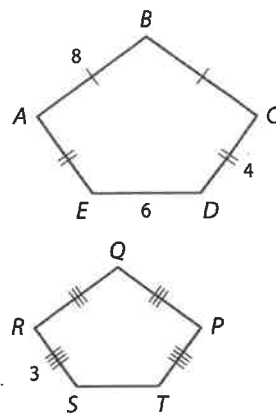




**Example 4 Use a Scale Factor to Find Perimeter**

If  $ABCDE \sim PQRST$ , find the scale factor of  $ABCDE$  to  $PQRST$  and the perimeter of each polygon.



The scale factor of  $ABCDE$  to  $PQRST$  is  $\frac{CD}{RS}$  or  $\frac{4}{3}$ .

Since  $\overline{BC} \cong \overline{AB}$  and  $\overline{AE} \cong \overline{CD}$ , the perimeter of  $ABCDE$  is  $8 + 8 + 4 + 6 + 4$  or  $30$ .

Use the perimeter of  $ABCDE$  and the scale factor to write a proportion. Let  $x$  represent the perimeter of  $PQRST$ .

$$\frac{4}{3} = \frac{\text{perimeter of } ABCDE}{\text{perimeter of } PQRST}$$

Theorem 7.1

$$\frac{4}{3} = \frac{30}{x}$$

Substitution

$$(3)(30) = 4x$$

Cross Products Property

$$22.5 = x$$

Solve.

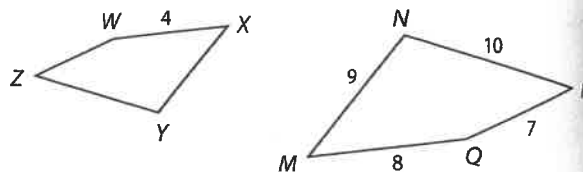
So, the perimeter of  $PQRST$  is  $22.5$ .

**WatchOut!**

**Perimeter** Remember that perimeter is the distance around a figure. Be sure to find the sum of all side lengths when finding the perimeter of a polygon. You may need to use other markings or geometric principles to find the length of unmarked sides.

**Guided Practice**

4. If  $MNPQ \sim XYZW$ , find the scale factor of  $MNPQ$  to  $XYZW$  and the perimeter of each polygon.

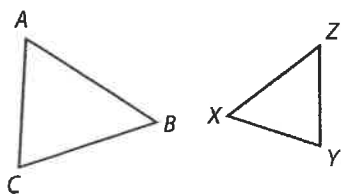


**Check Your Understanding**

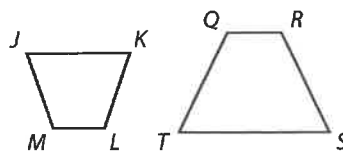
Step-by-Step Solutions begin on page R14.

**Example 1** List all pairs of congruent angles, and write a proportion that relates the corresponding sides for each pair of similar polygons.

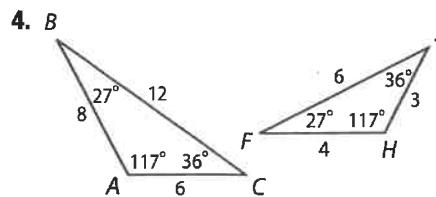
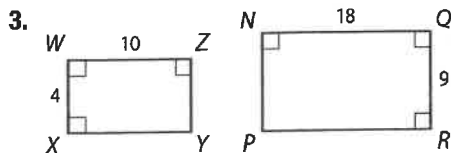
1.  $\triangle ABC \sim \triangle ZYX$



2.  $JKLM \sim TSRQ$



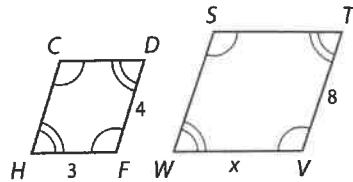
**Example 2** Determine whether each pair of figures is similar. If so, write the similarity statement and scale factor. If not, explain your reasoning.



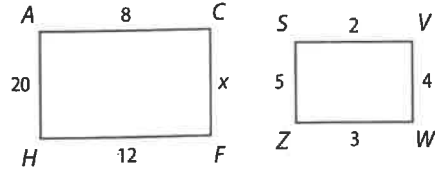
**Example 3**

Each pair of polygons is similar. Find the value of  $x$ .

5.

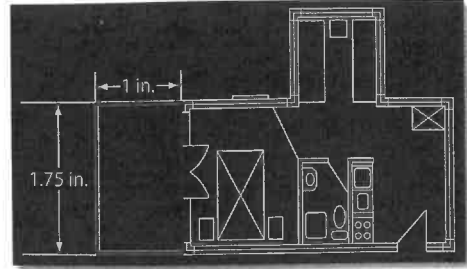


6.



**Example 4**

7. **DESIGN** On the blueprint of the apartment shown, the balcony measures 1 inch wide by 1.75 inches long. If the actual length of the balcony is 7 feet, what is the perimeter of the balcony?



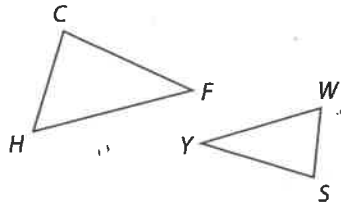
**Practice and Problem Solving**

Extra Practice is on page R7.

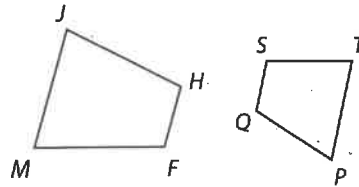
**Example 1**

List all pairs of congruent angles, and write a proportion that relates the corresponding sides for each pair of similar polygons.

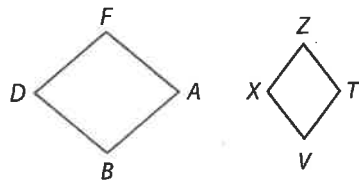
8.  $\triangle CHF \sim \triangle YWS$



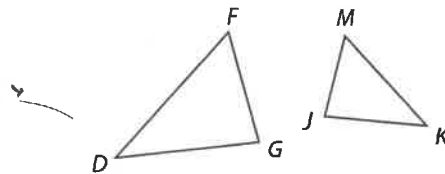
9.  $JHFM \sim PQST$



10.  $ABDF \sim VXZT$



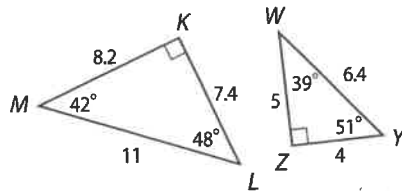
11.  $\triangle DFG \sim \triangle KMJ$



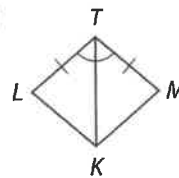
**Example 2**

**CCSS ARGUMENTS** Determine whether each pair of figures is similar. If so, write the similarity statement and scale factor. If not, explain your reasoning.

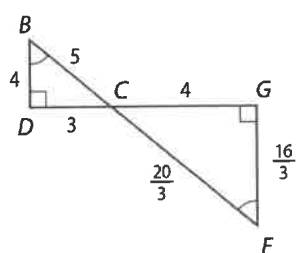
12.



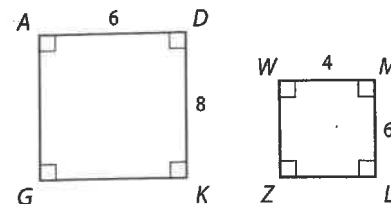
13.



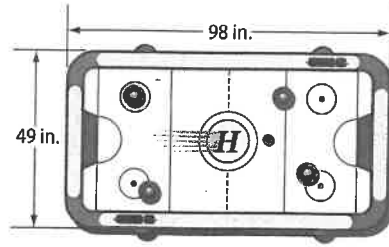
14.



15.



16. **GAMES** The dimensions of a hockey rink are 200 feet by 85 feet. Are the hockey rink and the air hockey table shown similar? Explain your reasoning.

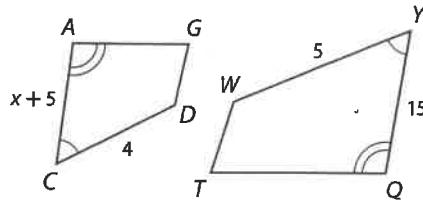


17. **COMPUTERS** The dimensions of a 17-inch flat panel computer screen are approximately  $13\frac{1}{4}$  by  $10\frac{3}{4}$  inches. The dimensions of a 19-inch flat panel computer screen are approximately  $14\frac{1}{2}$  by 12 inches. To the nearest tenth, are the computer screens similar? Explain your reasoning.

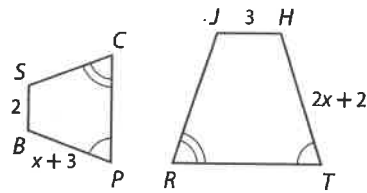
**Example 3**

**REGULARITY** Each pair of polygons is similar. Find the value of  $x$ .

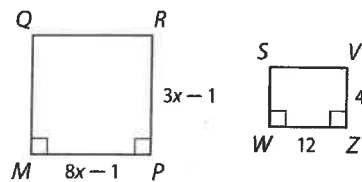
18.



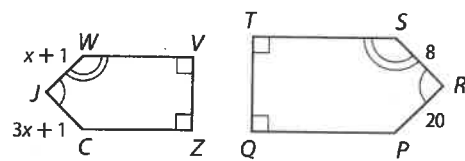
19.



20.



21.

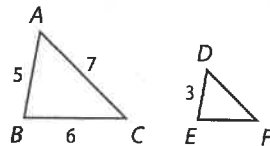


**Example 4**

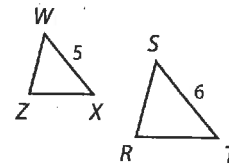
22. Rectangle  $ABCD$  has a width of 8 yards and a length of 20 yards. Rectangle  $QRST$ , which is similar to rectangle  $ABCD$ , has a length of 40 yards. Find the scale factor of rectangle  $ABCD$  to rectangle  $QRST$  and the perimeter of each rectangle.

Find the perimeter of the given triangle.

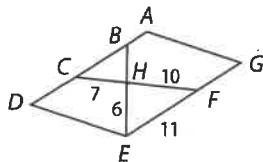
23.  $\triangle DEF$ , if  $\triangle ABC \sim \triangle DEF$ ,  $AB = 5$ ,  $BC = 6$ ,  $AC = 7$ , and  $DE = 3$



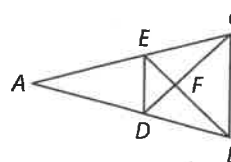
24.  $\triangle WZX$ , if  $\triangle WZX \sim \triangle SRT$ ,  $ST = 6$ ,  $WX = 5$ , and the perimeter of  $\triangle SRT = 15$



25.  $\triangle CBH$ , if  $\triangle CBH \sim \triangle FEH$ ,  $ADEG$  is a parallelogram,  $CH = 7$ ,  $FH = 10$ ,  $FE = 11$ , and  $EH = 6$



26.  $\triangle DEF$ , if  $\triangle DEF \sim \triangle CBF$ , perimeter of  $\triangle CBF = 27$ ,  $DF = 6$ ,  $FC = 8$



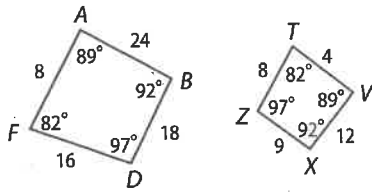
27. Two similar rectangles have a scale factor of 2:4. The perimeter of the large rectangle is 80 meters. Find the perimeter of the small rectangle.

28. Two similar rectangles have a scale factor of 3:2. The perimeter of the small rectangle is 50 feet. Find the perimeter of the large rectangle.

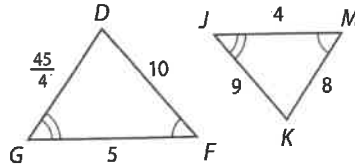


List all pairs of congruent angles, and write a proportion that relates the corresponding sides.

29.



30.



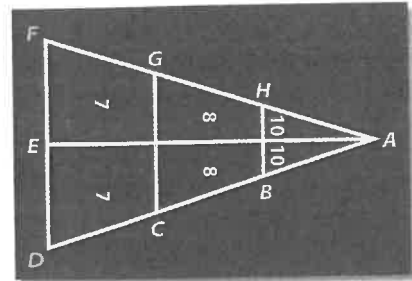
**SHUFFLEBOARD** A shuffleboard court forms three similar triangles in which  $\angle AHB \cong \angle AGC \cong \angle AFD$ . For the given sides or angles, find the corresponding side(s) or angle(s) that are congruent.

31.  $\overline{AB}$

32.  $\overline{FD}$

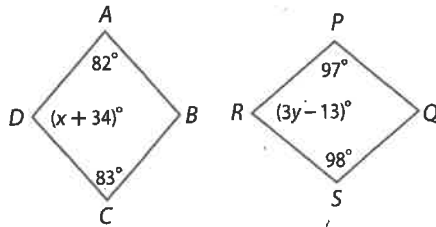
33.  $\angle ACG$

34.  $\angle A$

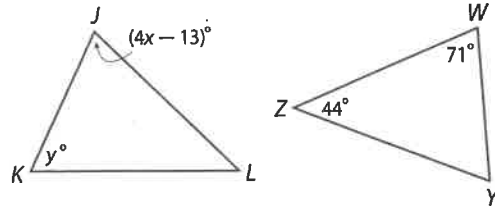


Find the value of each variable.

35.  $ABCD \sim QSRP$



36.  $\triangle JKL \sim \triangle WYZ$



37. **SLIDE SHOW** You are using a digital projector for a slide show. The photos are 13 inches by  $9\frac{1}{4}$  inches on the computer screen, and the scale factor of the computer image to the projected image is 1:4. What are the dimensions of the projected image?

**COORDINATE GEOMETRY** For the given vertices, determine whether rectangle  $ABCD$  is similar to rectangle  $WXYZ$ . Justify your answer.

38.  $A(-1, 5)$ ,  $B(7, 5)$ ,  $C(7, -1)$ ,  $D(-1, -1)$ ;  
 $W(-2, 10)$ ,  $X(14, 10)$ ,  $Y(14, -2)$ ,  $Z(-2, -2)$

39.  $A(5, 5)$ ,  $B(0, 0)$ ,  $C(5, -5)$ ,  $D(10, 0)$ ;  
 $W(1, 6)$ ,  $X(-3, 2)$ ,  $Y(2, -3)$ ,  $Z(6, 1)$

**CCSS ARGUMENTS** Determine whether the polygons are *always*, *sometimes*, or *never* similar. Explain your reasoning.

40. two obtuse triangles

41. a trapezoid and a parallelogram

42. two right triangles

43. two isosceles triangles

44. a scalene triangle and an isosceles triangle

45. two equilateral triangles

46. **PROOF** Write a paragraph proof of Theorem 7.1.

Given:  $\triangle ABC \sim \triangle DEF$  and  $\frac{AB}{DE} = \frac{m}{n}$

Prove:  $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{m}{n}$

