

LESSON
6.3

Study Guide

For use with pages 371–379
GOAL Use proportions to identify similar polygons.
Vocabulary

Two polygons are **similar polygons** if corresponding angles are congruent and corresponding side lengths are proportional.

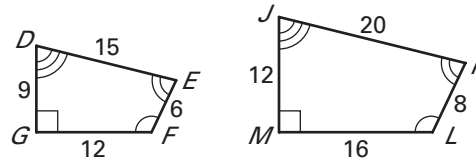
If two polygons are similar, then the ratio of the lengths of two corresponding sides is called the **scale factor**.

Theorem 6.1 Perimeters of Similar Polygons: If two polygons are similar, then the ratio of their perimeters is equal to the ratios of their corresponding side lengths.

Corresponding Lengths in Similar Polygons: If two polygons are similar, then the ratio of any two corresponding lengths in the polygons is equal to the scale factor of the similar polygons.

EXAMPLE 1 Find the scale factor

Determine whether the polygons are similar. If they are, write a similarity statement and find the scale factor of $DEFG$ to $JKLM$.


Solution

From the diagram, you can see that $\angle D \cong \angle J$, $\angle E \cong \angle K$, $\angle F \cong \angle L$, and $\angle G \cong \angle M$. So, the corresponding angles are congruent.

$$\frac{DE}{JK} = \frac{15}{20} = \frac{3}{4} \qquad \frac{EF}{KL} = \frac{6}{8} = \frac{3}{4} \qquad \frac{FG}{LM} = \frac{12}{16} = \frac{3}{4} \qquad \frac{GD}{MJ} = \frac{9}{12} = \frac{3}{4}$$

The ratios are equal, so the corresponding side lengths are proportional.

So, $DEFG \sim JKLM$. The scale factor of $DEFG$ to $JKLM$ is $\frac{3}{4}$.

EXAMPLE 2 Use similar polygons

In the diagram, $\triangle ABC \sim \triangle PQR$. Find the value of x .

Solution

$$\frac{AB}{PQ} = \frac{BC}{QR}$$

Write proportion.

$$\frac{14}{x} = \frac{6}{9}$$

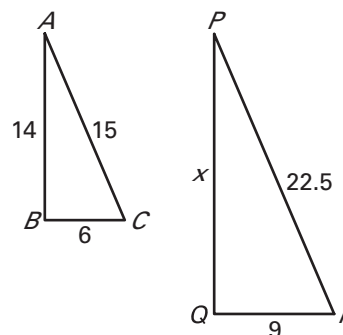
Substitute.

$$6x = 126$$

Cross Products Property

$$x = 21$$

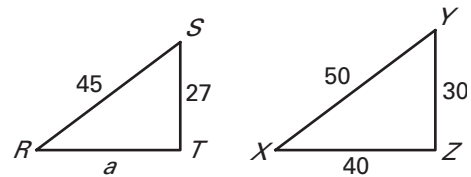
Solve for x .



LESSON
6.3
Study Guide *continued*
For use with pages 371–379
Exercises for Examples 1 and 2

In the diagram, $\triangle RST \sim \triangle XYZ$.

- Find the scale factor of $\triangle RST$ to $\triangle XYZ$.
- Find the value of a .


EXAMPLE 3 Find perimeters of similar figures

In the diagram, $ABCD \sim FGHJ$.

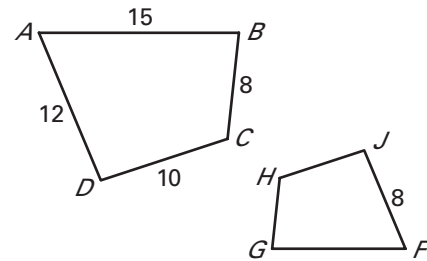
- Find the scale factor of $FGHJ$ to $ABCD$.
- Find the perimeter of $FGHJ$.

Solution

- Because the figures are similar, the scale factor is the ratio of corresponding sides.

$$\frac{FJ}{AD} = \frac{8}{12} = \frac{2}{3}$$

- The perimeter of $ABCD$ is 45. Let x be the perimeter of $FGHJ$. Using Theorem 6.1, you can write the proportion $\frac{x}{45} = \frac{2}{3}$. So, the perimeter of $FGHJ$ is $x = 30$.


EXAMPLE 4 Use a scale factor

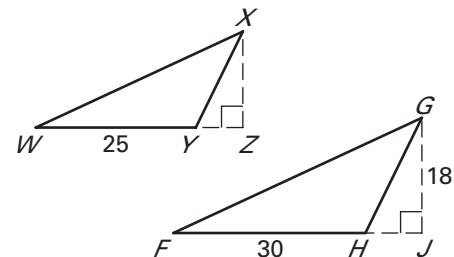
In the diagram, $\triangle WXY \sim \triangle FGH$.
 Find the length of the altitude \overline{XZ} .

Solution

First, find the scale factor of $\triangle WXY$ to $\triangle FGH$.

$$\frac{WY}{FH} = \frac{25}{30} = \frac{5}{6}$$

Because the ratio of the lengths of the altitudes in similar triangles is equal to the scale factor, you can write the proportion $\frac{XZ}{GJ} = \frac{5}{6}$. Then substitute 18 for GJ and solve for XZ to find that the length of the altitude \overline{XZ} is 15.


Exercises for Examples 3 and 4

In the diagram, $LMNOP \sim RSTUV$.

- Find the scale factor of $RSTUV$ to $LMNOP$.
- Find the perimeter of $RSTUV$.
- Find the length of diagonal \overline{MO} .

