Name ______________________________ Date ______________

LESSON 6.3

Study Guide

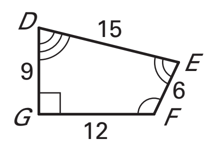
For use with pages 371–379

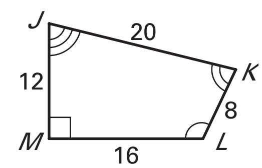
GOAL **Use proportions to identify similar polygons.**

> ### 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 ≥ $D \cong$ ≥ J, ≥ $E \cong$ ≥ K, ≥ $F \cong$ ≥ L, and ≥ $G \cong$ ≥ M. So, the corresponding angles are congruent.

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

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.

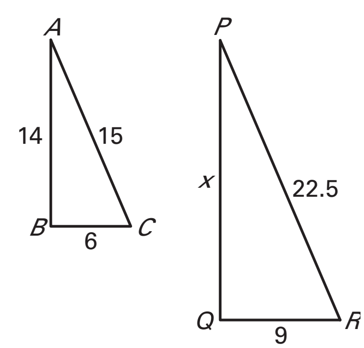
Solution

$\frac{AB}{PQ} = \frac{BC}{QR}$ Write proportion.

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

$6x = 126$ Cross Products Property

$x = 21$ Solve for x.



LESSON 6.3

Name ______________________ Date ____________

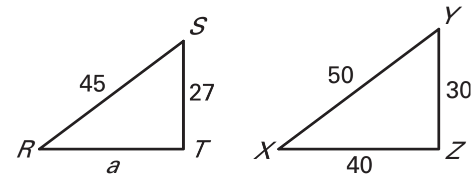
LESSON 6.3

Study Guide *continued*

For use with pages 371–379

Exercises for Examples 1 and 2

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

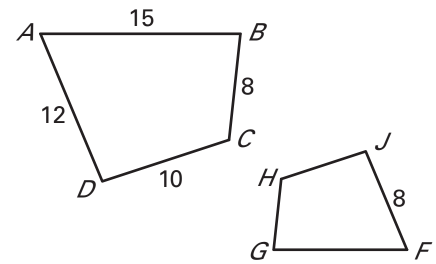


1. Find the scale factor of $\triangle RST$ to $\triangle XYZ$.

2. Find the value of a.

EXAMPLE 3 Find perimeters of similar figures

In the diagram, $ABCD \sim FGHJ$.



a. Find the scale factor of $FGHJ$ to $ABCD$.

b. Find the perimeter of $FGHJ$.

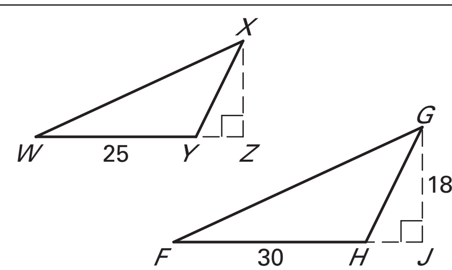
Solution

a. Because the figures are similar, the scale factor is the ratio of corresponding sides.
$\frac{FJ}{AD} = \frac{8}{12} = \frac{2}{3}$

b. 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

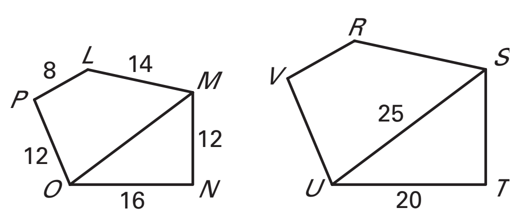
First, find the scale factor of $\triangle WXY$ to $\triangle FGH$.

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

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, $LMNOP \sim RSTUV$.



3. Find the scale factor of $RSTUV$ to $LMNOP$.

4. Find the perimeter of $RSTUV$.

5. Find the length of diagonal $\overline{MO}$.

LESSON 6.3