Name _____ Date _____

LESSON 6.5

Study Guide

For use with pages 388–395

GOAL **Use the SSS and SAS Similarity Theorems.**

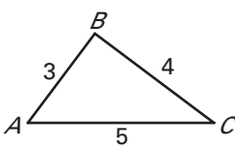
Vocabulary

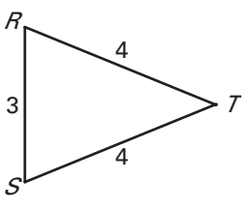
Theorem 6.2 Side-Side-Side (SSS) Similarity Theorem: If the corresponding side lengths of two triangles are proportional, then the triangles are similar.

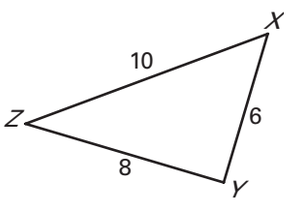
Theorem 6.3 Side-Angle-Side (SAS) Similarity Theorem: If an angle of one triangle is congruent to an angle of a second triangle and the lengths of the sides including these angles are proportional, then the triangles are similar.

EXAMPLE 1 Use the SSS Similarity Theorem

Is either $\triangle RST$ or $\triangle XYZ$ similar to $\triangle ABC$?







Solution

Compare $\triangle ABC$ and $\triangle RST$ by finding ratios of corresponding side lengths.

Shortest sides	Longest sides	Remaining sides
$\frac{AB}{RS} = \frac{3}{3} = 1$	$\frac{CA}{RT} = \frac{5}{4}$	$\frac{BC}{ST} = \frac{4}{4} = 1$

The ratios are not all equal, so $\triangle ABC$ and $\triangle RST$ are not similar.

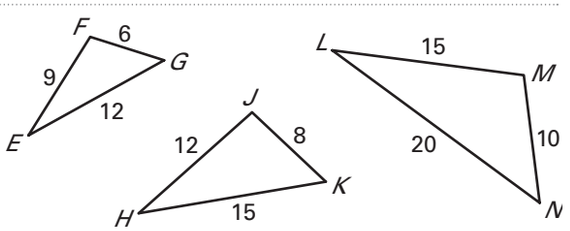
Compare $\triangle ABC$ and $\triangle XYZ$ by finding ratios of corresponding side lengths.

Shortest sides	Longest sides	Remaining sides
$\frac{AB}{XY} = \frac{3}{6} = \frac{1}{2}$	$\frac{CA}{ZX} = \frac{5}{10} = \frac{1}{2}$	$\frac{BC}{YZ} = \frac{4}{8} = \frac{1}{2}$

All of the ratios are equal, so $\triangle ABC \sim \triangle XYZ$.

Exercise for Example 1

1. Which of the three triangles are similar? Write a similarity statement.



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LESSON 6.5

Study Guide *continued*

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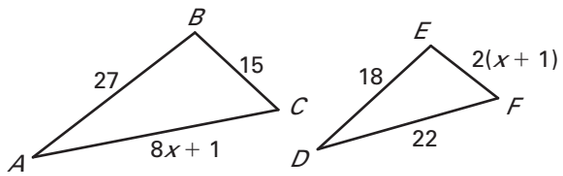
EXAMPLE 2 Use the SSS Similarity Theorem

Find the value of *x* that makes $\triangle ABC \sim \triangle DEF$.



Solution

STEP 1 **Find** the value of x that makes corresponding side lengths proportional.

$$\frac{27}{18} = \frac{15}{2(x+1)}$$ Write proportion.

$27 \cdot 2(x+1) = 18 \cdot 15$ Cross Products Property

$54x + 54 = 270$ Simplify.

$x = 4$ Solve for x.

STEP 2 **Check** that the side lengths are proportional when $x = 4$.

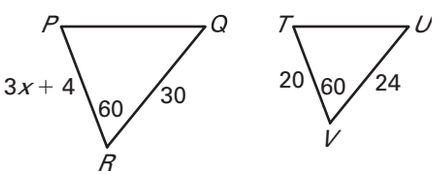
$AC = 8x + 1 = 33$ $\quad EF = 2(x+1) = 10$

$$\frac{AB}{DE} = \frac{27}{18} = \frac{3}{2} \qquad \frac{BC}{EF} = \frac{15}{10} = \frac{3}{2} \qquad \frac{AC}{DF} = \frac{33}{22} = \frac{3}{2}$$

When $x = 4$, the triangles are similar by the SSS Similarity Theorem.

EXAMPLE 3 Use the SAS Similarity Theorem

Find the value of *x* that makes $\triangle PQR \sim \triangle TUV$.



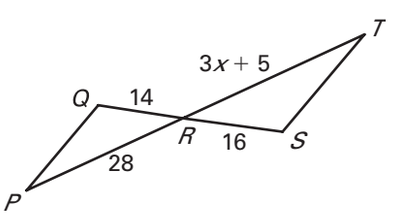
Solution

Both $m\angle R$ and $m\angle V$ equal 60°, so $\angle R \cong \angle V$. Next, find the value of x that makes the sides including these angles proportional. Solving the proportion $\frac{3x+4}{20} = \frac{30}{24}$, you obtain $x = 7$. So, by the SAS Similarity Theorem, the triangles are similar when $x = 7$.

Exercises for Examples 2 and 3

Find the value of *x* that makes the triangles similar.

2.



3.