Name_______________________________________________ Date__________

# 8.3 Proving Triangle Similarity by SSS and SAS

**For use with Exploration 8.3**

**Essential Question** What are two ways to use corresponding sides of two triangles to determine that the triangles are similar?

## 1 EXPLORATION: Deciding Whether Triangles Are Similar

**Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.**

**Work with a partner.** Use dynamic geometry software.

**a.** Construct $\triangle ABC$ and $\triangle DEF$ with the side lengths given in column 1 of the table below.

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| ***AB*** | 5 | 5 | 6 | 15 | 9 | 24 | |
| ***BC*** | 8 | 8 | 8 | 20 | 12 | 18 | |
| ***AC*** | 10 | 10 | 10 | 10 | 8 | 16 | |
| ***DE*** | 10 | 15 | 9 | 12 | 12 | 8 | |
| ***EF*** | 16 | 24 | 12 | 16 | 15 | 6 | |
| ***DF*** | 20 | 30 | 15 | 8 | 10 | 8 | |
| $m\angle A$ | | | | | | | |
| $m\angle B$ | | | | | | | |
| $m\angle C$ | | | | | | | |
| $m\angle D$ | | | | | | | |
| $m\angle E$ | | | | | | | |
| $m\angle F$ | | | | | | | |

**b.** Complete column 1 in the table above.

**c.** Are the triangles similar? Explain your reasoning.

**d.** Repeat parts (a)–(c) for columns 2–6 in the table.

**e.** How are the corresponding side lengths related in each pair of triangles that are similar? Is this true for each pair of triangles that are not similar?

## 1 EXPLORATION: Deciding Whether Triangles Are Similar (continued)

**f.** Make a conjecture about the similarity of two triangles based on their corresponding side lengths.

**g.** Use your conjecture to write another set of side lengths of two similar triangles. Use the side lengths to complete column 7 of the table.

## 2 EXPLORATION: Deciding Whether Triangles Are Similar

**Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.**

**Work with a partner.** Use dynamic geometry software. Construct any $\triangle ABC$.

**a.** Find $AB$, $AC$, and $m\angle A$. Choose any positive rational number $k$ and construct $\triangle DEF$ so that $DE = k \bullet AB$, $DF = k \bullet AC$, and $m\angle D = m\angle A$.

**b.** Is $\triangle DEF$ similar to $\triangle ABC$? Explain your reasoning.

**c.** Repeat parts (a) and (b) several times by changing $\triangle ABC$ and $k$. Describe your results.

## Communicate Your Answer

**3.** What are two ways to use corresponding sides of two triangles to determine that the triangles are similar?

Name________________________________________________________ Date __________

# 8.3 Notetaking with Vocabulary

**For use after Lesson 8.3**

**In your own words, write the meaning of each vocabulary term.**

similar figures

corresponding parts

slope

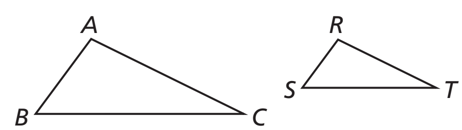
parallel lines

perpendicular lines

## Theorems

### Theorem 8.4 Side-Side-Side (SSS) Similarity Theorem

If the corresponding side lengths of two triangles are proportional, then the triangles are similar.

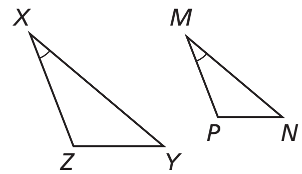



If $\frac{AB}{RS} = \frac{BC}{ST} = \frac{CA}{TR}$, then $\triangle ABC \sim \triangle RST$.

**Notes:**

### Theorem 8.5 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.

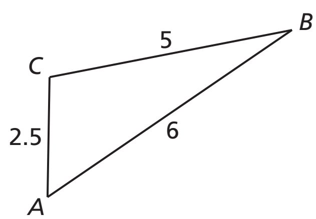



If $\angle X \cong \angle M$ and $\frac{ZX}{PM} = \frac{XY}{MN}$, then $\triangle XYZ \sim \triangle MNP$.

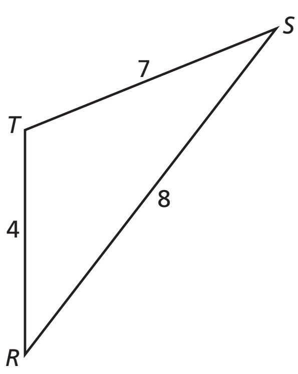
**Notes:**

## Extra Practice

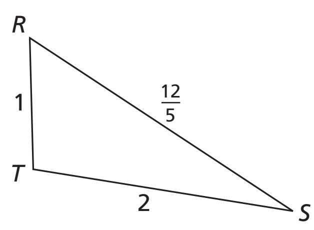
**In Exercises 1 and 2, determine whether $\triangle RST$ is similar to $\triangle ABC$.**




**1.**

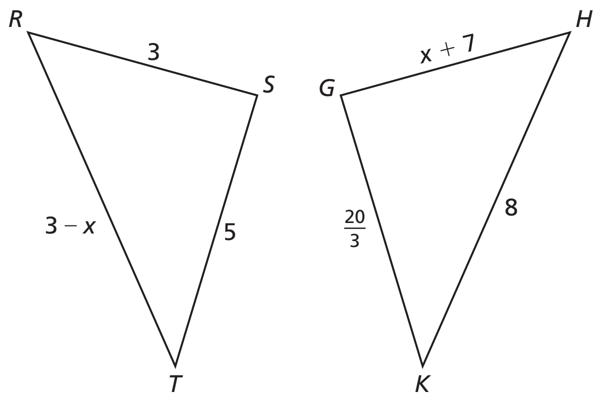



**2.**



## 8.3 Notetaking with Vocabulary (continued)

**3.** Find the value of $x$ that makes $\triangle RST \sim \triangle HGK$.

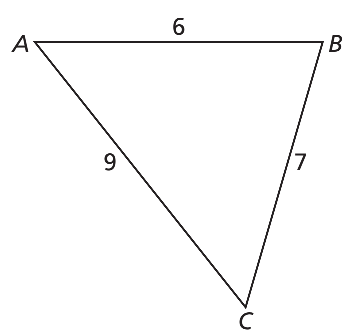



**4.** Verify that $\triangle RST \sim \triangle XYZ$. Find the scale factor of $\triangle RST$ to $\triangle XYZ$.

$$\triangle RST : RS = 12, ST = 15, TR = 24$$
$$\triangle XYZ : XY = 28, YZ = 35, ZX = 56$$

**In Exercises 5 and 6, use $\triangle ABC$.**

**5.** The shortest side of a triangle similar to $\triangle ABC$ is 15 units long. Find the other side lengths of the triangle.




**6.** The longest side of a triangle similar to $\triangle ABC$ is 6 units long. Find the other side lengths of the triangle.