Two triangles are **similar** if they have the same shape but not necessarily the same size. There are three similarity statements using only sides and angles that guarantee similar triangles. They are **side-side-side similarity** (SSS~), **angle-angle similarity** (AA~), and **side-angle-side similarity** (SAS~). In side-angle-side similarity the angle must be between the two sides.

**Example 1**

The two triangles shown at right illustrate the SSS~ theorem. The ratios of corresponding sides are equal: \( \frac{9}{3} = \frac{18}{6} = \frac{12}{4} \). Therefore \( \triangle ABC \sim \triangle DEF \) by SSS~.

**Example 2**

AA~ is demonstrated by the two triangles at right. Since the sum of the angles of any triangle equal 180 degrees, \( m \angle F = 40^\circ \). The measures of two angles in the first triangle are equal to the measures of two angles in the second triangle. Therefore \( \triangle ABC \sim \triangle DEF \) by AA~.

**Example 3**

The two triangles at right illustrate the SAS~ theorem. The ratios of two sets of corresponding sides are equal: \( \frac{5}{10} = \frac{8}{16} \). Also the measures of the included angles are equal: \( m \angle C = m \angle F \). Therefore \( \triangle ABC \sim \triangle DEF \) by SAS~.

Determine if each pair of triangles is similar. If they are similar, justify your answer.

1. 
   ![Triangle 1](123)

2. 
   ![Triangle 2](456)

3. 
   ![Triangle 3](123)

Extra Practice
Answers

1. AA~
2. SSS~
3. AA~
4. SAS~
5. not~
6. not~
7. SAS~ or SSS~
8. not~
9. AA~
10. SSS~
11. AA~
12. AA~

GEOMETRY Connections