Similarity of Triangles:
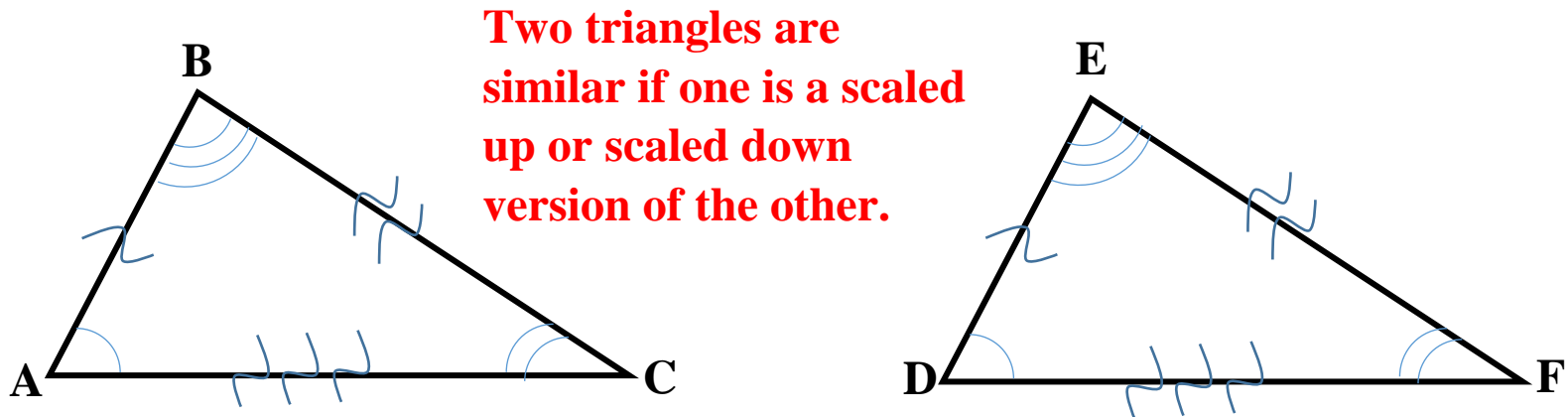
Two triangles are similar if the corresponding angles are congruent, and the corresponding sides are proportional.

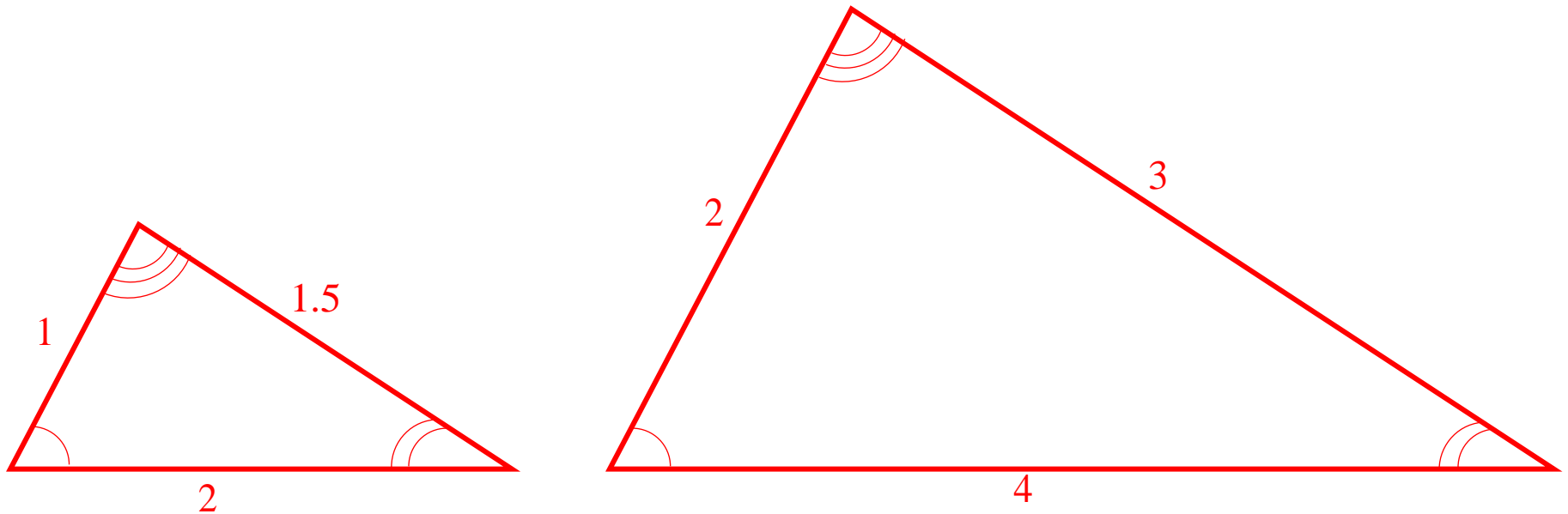**Two triangles are similar if one is a scaled up or scaled down version of the other.**

$$\triangle ABC \sim \triangle DEF$$

Congruency: $\angle A \cong \angle D,\ \angle B \cong \angle E,\ \angle C \cong \angle F$

Corresponding angles must be congruent.

The scaling factor must be the same for all pairs of corresponding sides.

Proportionality: $\dfrac{\overline{AB}}{\overline{DE}} = \dfrac{\overline{BC}}{\overline{EF}} = \dfrac{\overline{AC}}{\overline{DF}}$

The above triangles are similar. The triangle on the right is the triangle on the left scaled up by a factor of 2.

The above triangles are not similar. There is no consistent scaling factor that turns the measurements of one triangle into the measurements of the other triangle.

When is a fewer number of congruences/proportionalities enough to conclude that two triangles are similar?
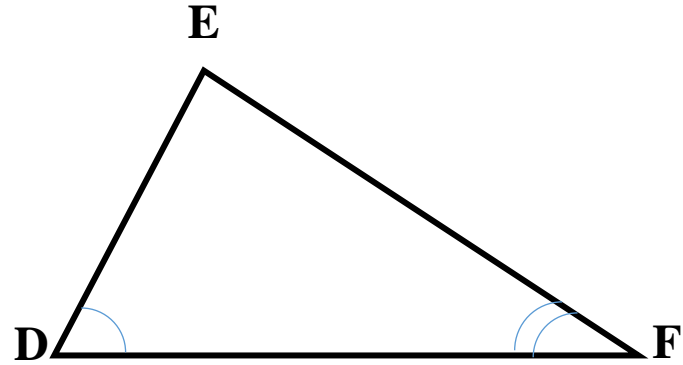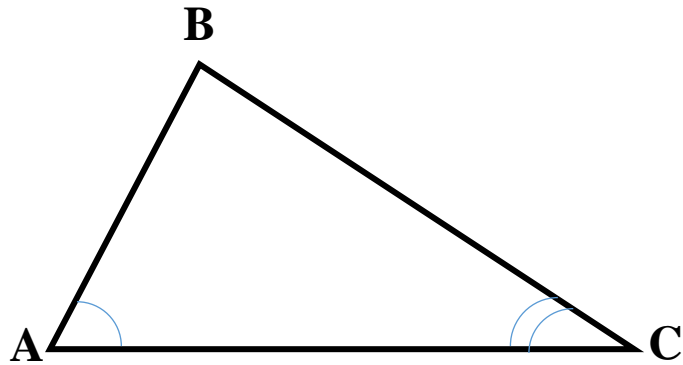
Side-Angle-Side(SAS) Similarity:
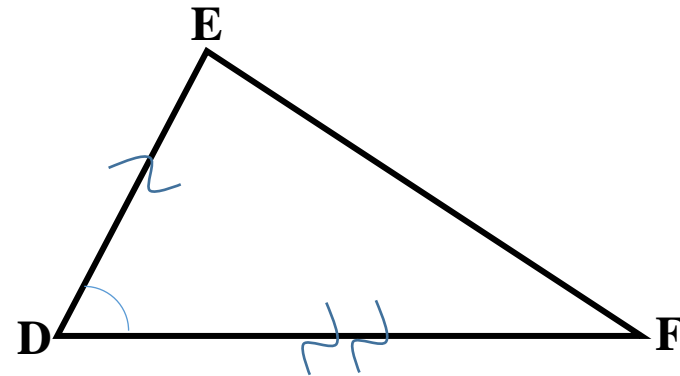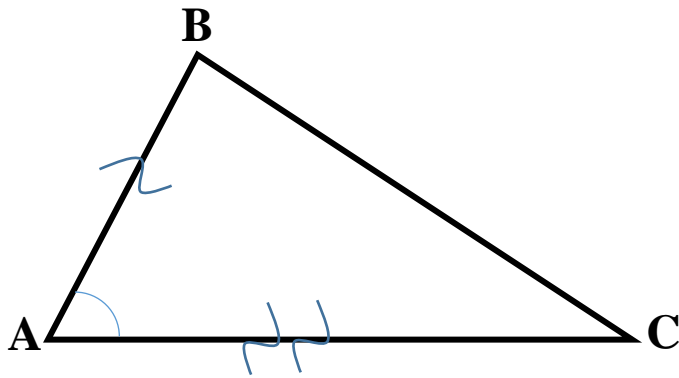
$$\triangle ABC \sim \triangle DEF$$

When two sides are proportional and the included angle is congruent, then the two triangles are similar.
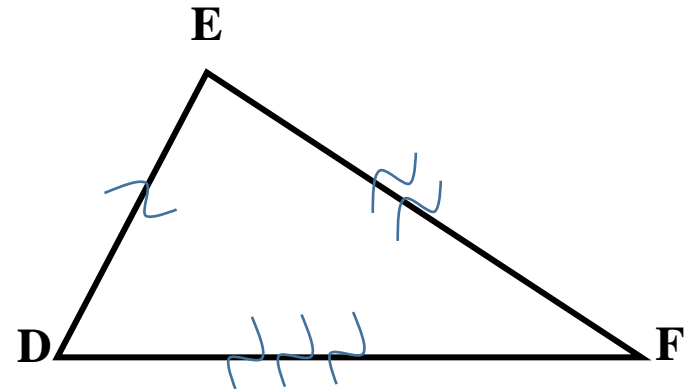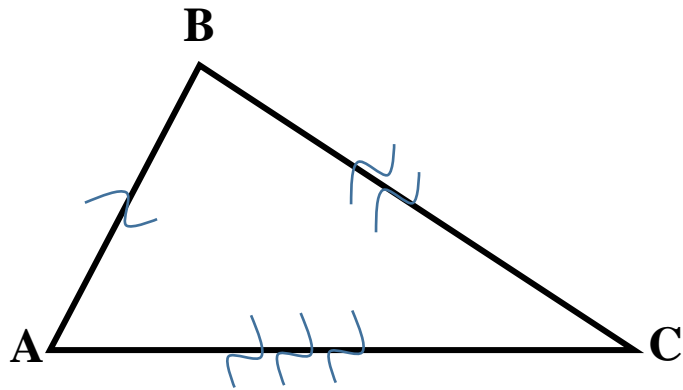
Angle-Angle(AA) Similarity:

$\triangle ABC \sim \triangle DEF$

When two angles are congruent, then the two triangles are similar.
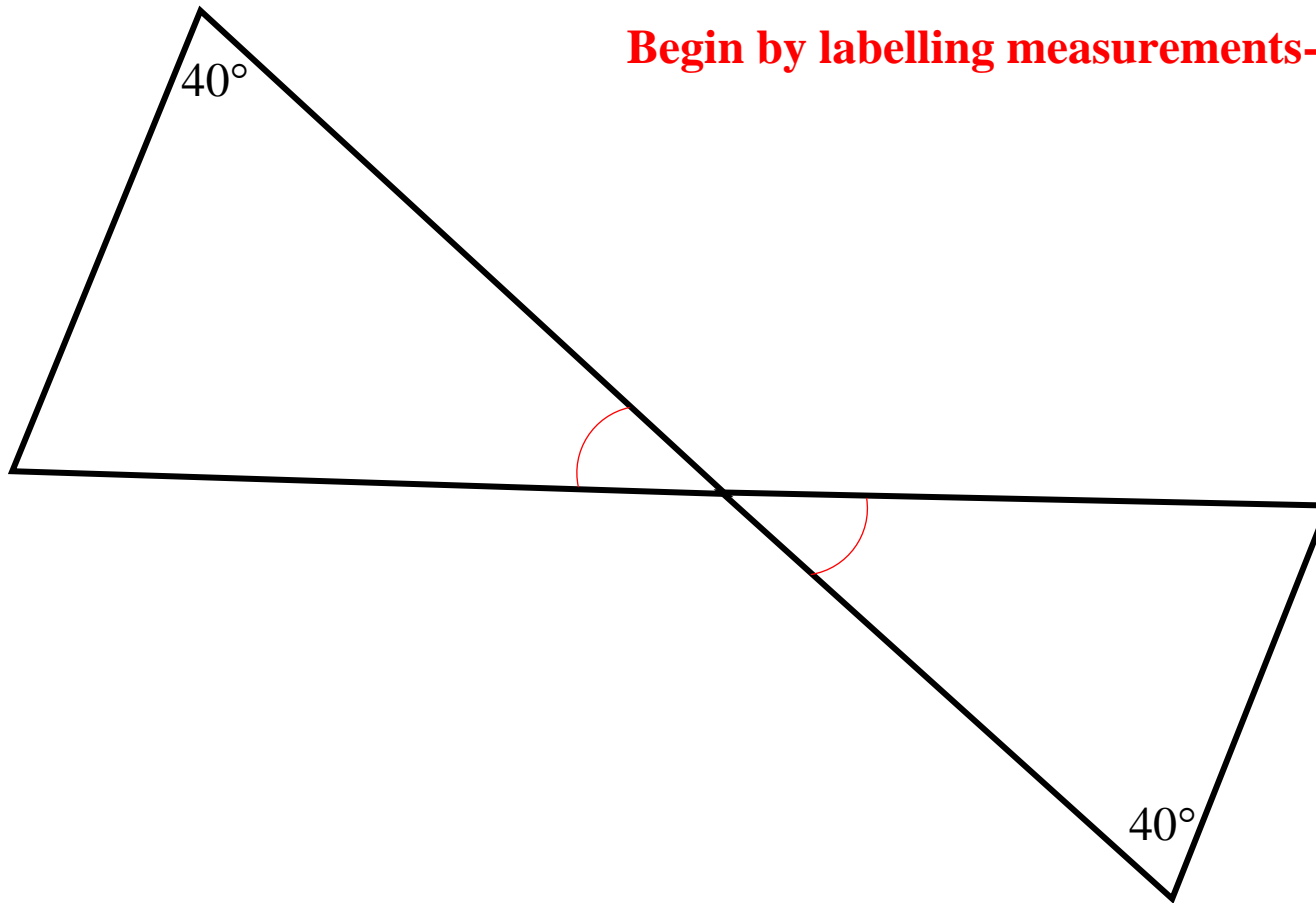
Side-Side-Side(SSS) Similarity:
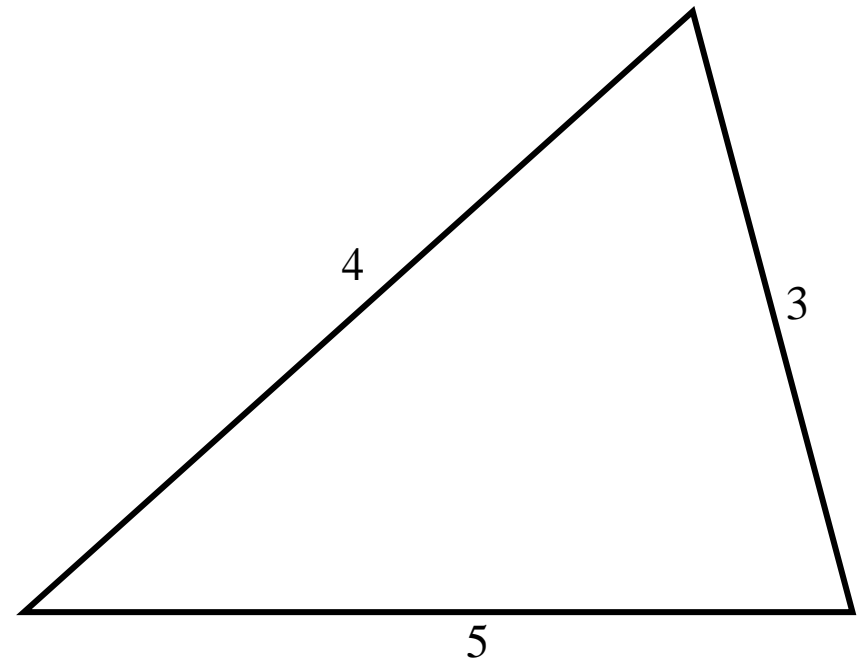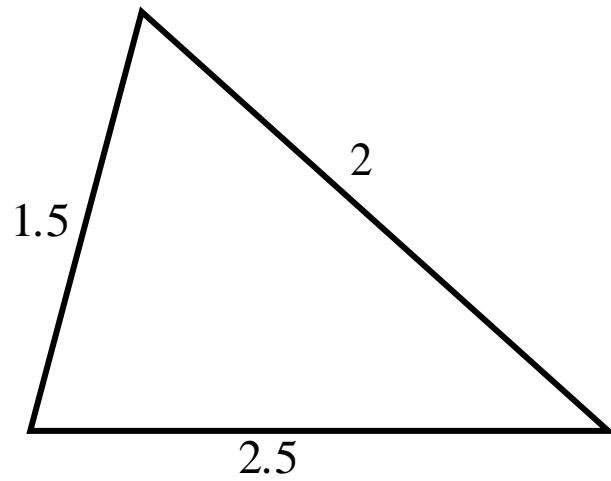

$$\triangle ABC \sim \triangle DEF$$

When three sides are proportional, then the two triangles are similar.

Determine if the following pairs of triangles are similar:

40°

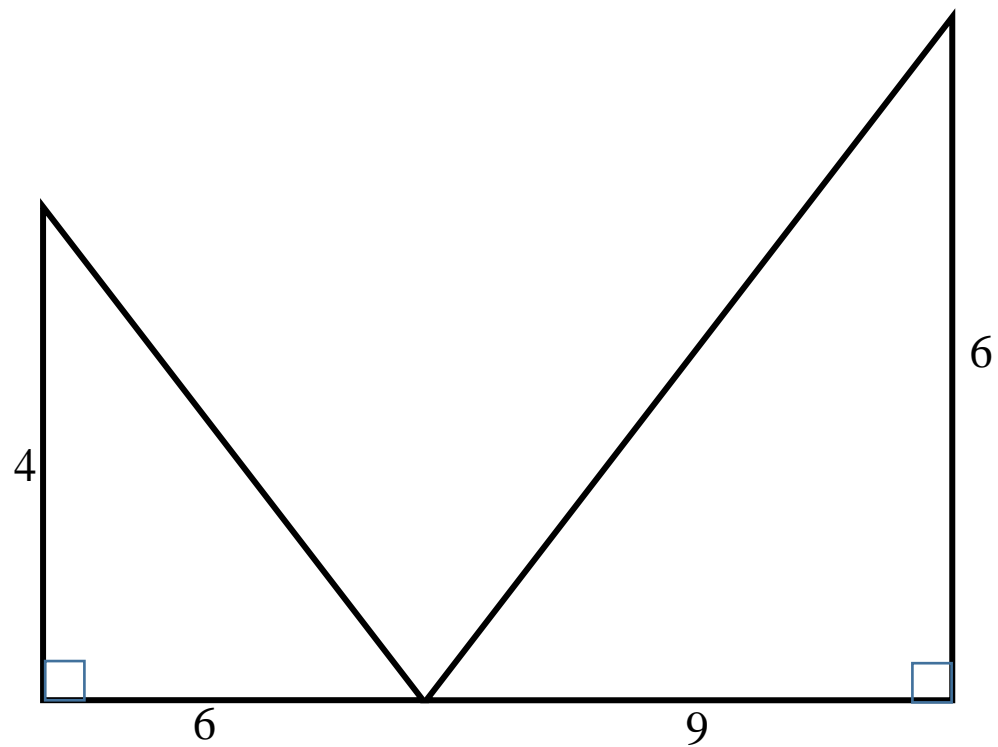**Begin by labelling measurements-vertical angles.**

40°
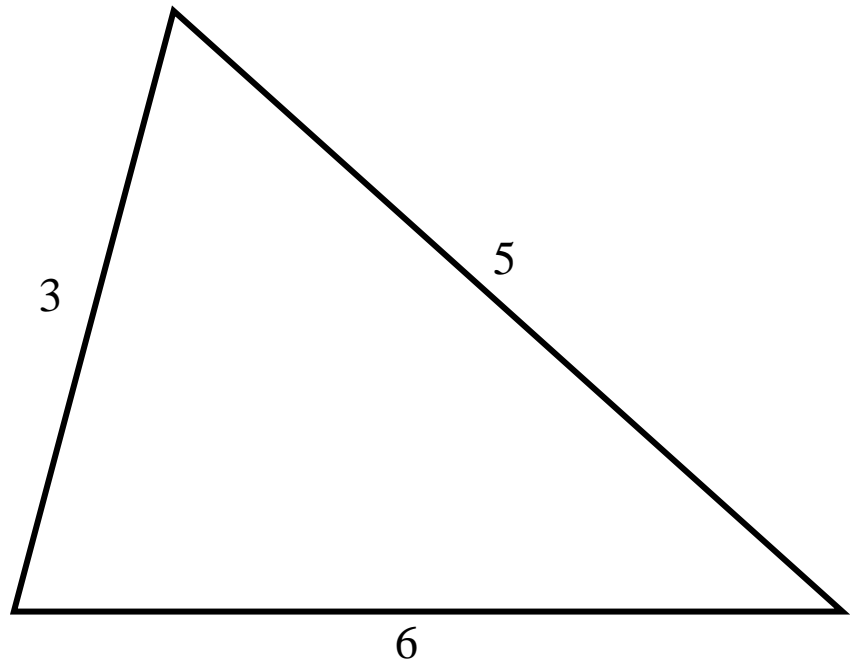
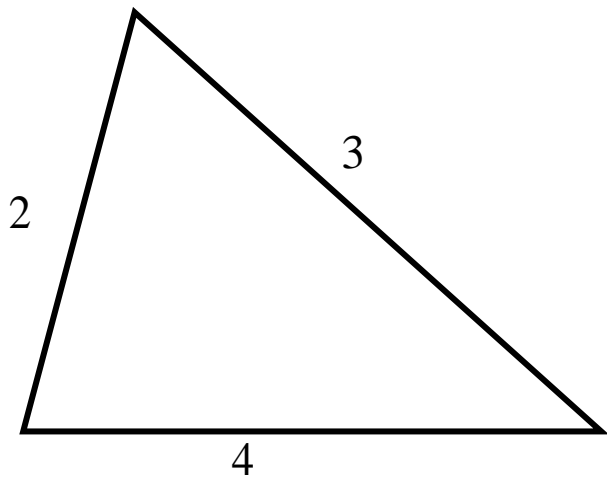**The two triangles are similar by AA similarity.**

$$\frac{3}{1.5} = \frac{4}{2} = \frac{5}{2.5}$$

The two triangles are similar by SSS similarity.
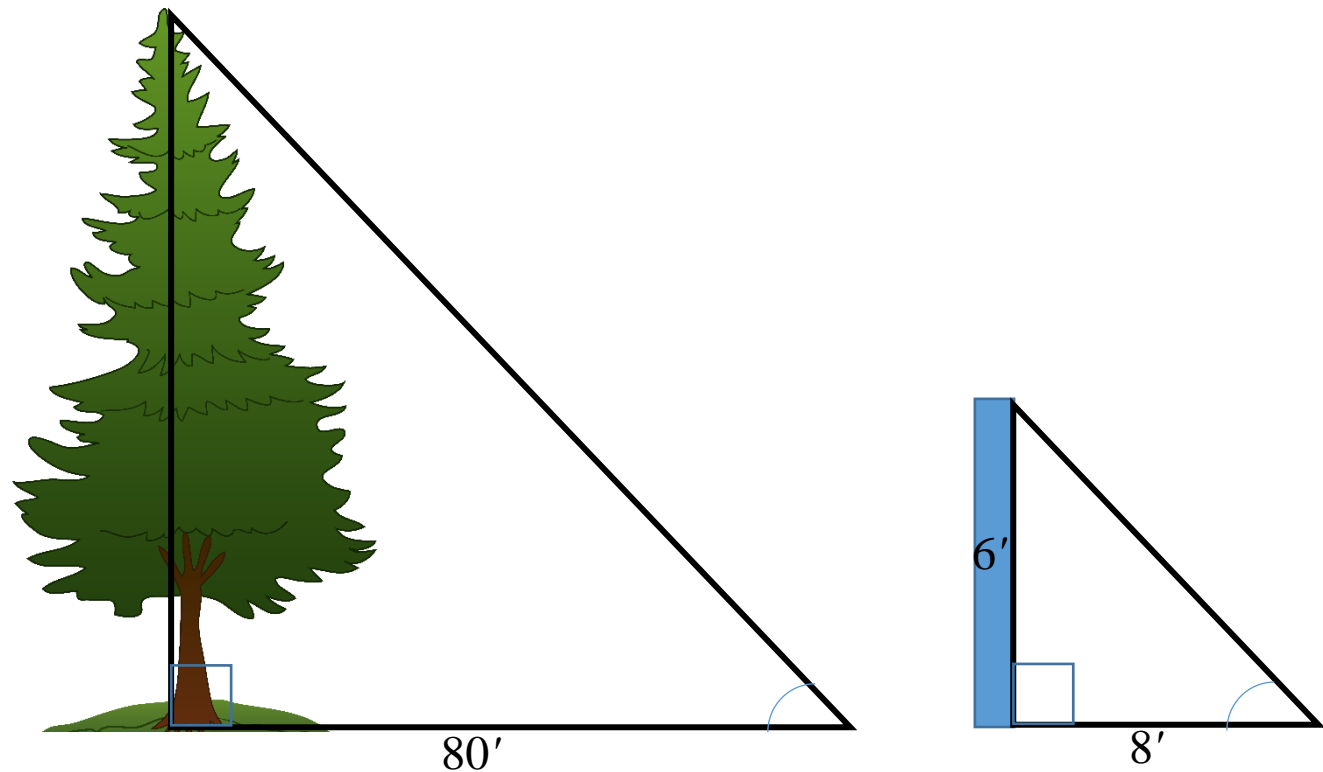
$$\frac{6}{4} = \frac{9}{6}$$

The two triangles are similar by SAS similarity .

$$\frac{3}{2} = \frac{6}{4} \neq \frac{5}{3}$$

The sides are not proportional, so the two triangles are not similar.

How tall is the tree?

80′

6′

8′

The two triangles are similar. To turn 8' into 80', you multiply by 10, so the height of the tree must be 10 times 6', or 60'.

$\triangle ABC \sim \triangle DEF$

Find the missing side measurements in $\triangle DEF$.

The scaling factor is $\frac{1}{2}$.

B

4

8

A

10

C

E

2

4

D

5

F