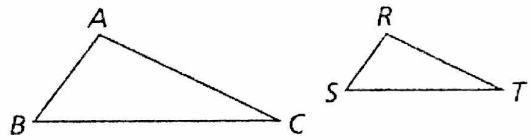
Name: Date: Period: 5

Proving Triangles Similar: SSS~ and SAS~

Lesson Objective IWBAT prove 2 Δs are ~ by SSS~ and SAS~

Side-Side-Side Similarity Theorem (SSS~)

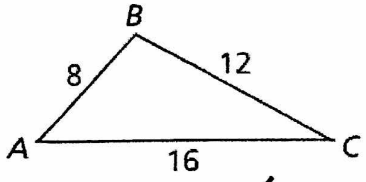
If the corresponding side lengths of two triangles are proportional, then the triangles are similar.

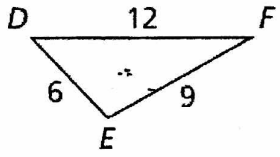


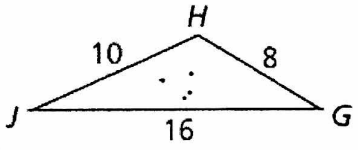
$$\frac{AB}{RS} = \frac{AC}{RT} = \frac{BC}{ST} \rightarrow \Delta ABC \sim \Delta RST$$

Examples:

1. Is either ΔDEF or ΔGHJ similar to ΔABC?







ΔDEF?

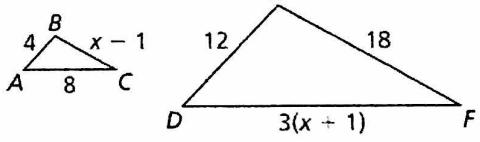
$\frac{8}{6} = \frac{4}{3}$ $\frac{12}{9} = \frac{4}{3}$ $\frac{16}{12} = \frac{4}{3}$ Yes!

ΔGHJ?

$\frac{8}{8} = 1$ $\frac{12}{10} = \frac{6}{5} \neq 1$ NO!

$\Delta ABC \sim \Delta DEF$

2. Find the value of x that makes $\Delta ABC \sim \Delta DEF$.



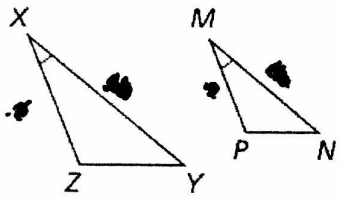
$$\frac{4}{12} = \frac{x-1}{18}$$

$$3x - 3 = 18$$

$$\boxed{x = 7}$$

Side-Angle-Side Similarity Theorem (SAS~)

If an angle of one triangle is congruent to an angle of a second triangle, and the length of the sides including these angles are proportional, then the triangles are similar.

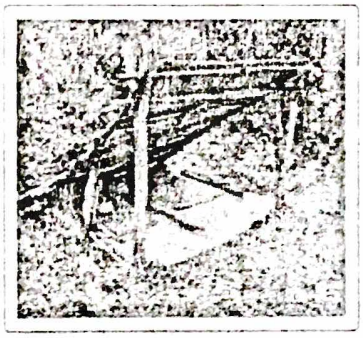


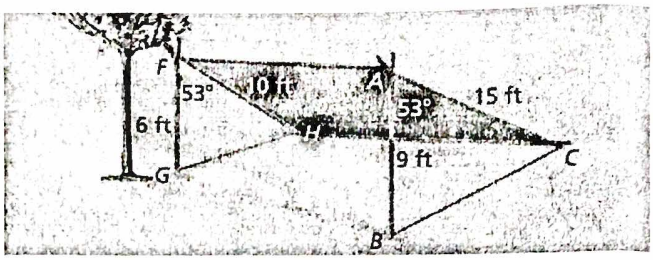
$\angle X \cong \angle M$

$\frac{XY}{MN} = \frac{XZ}{MP}$ $\rightarrow \Delta XYZ \sim \Delta MNP$

Example:

3. You just got cast on the show Survivor (aka best show on TV ever) and are building a lean-to shelter starting from a tree branch with your tribe, as shown. Can you construct the right end so it is similar to the left end using the angle measure and lengths shown?





$\angle A \cong \angle F$

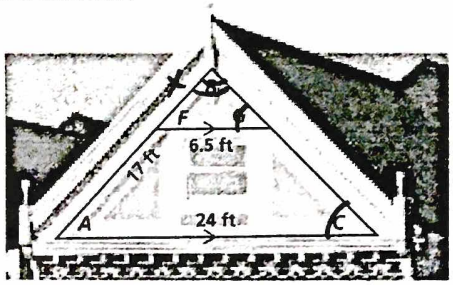
$\frac{6}{9} = \frac{10}{15}$

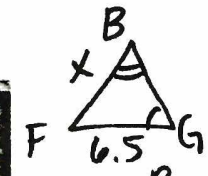
$90 = 90$ ✓

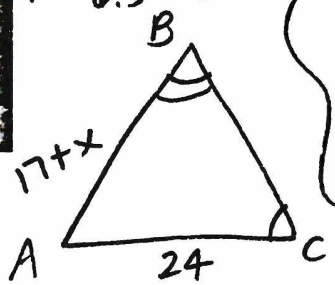
yes you can!

$\triangle ABC \sim \triangle FGH$ by SAS ~

4. Find BF.







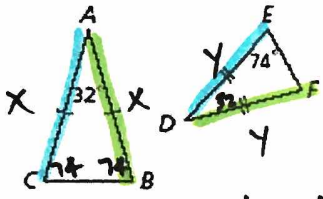
$\frac{x}{6.5} = \frac{17+x}{24}$

$24x = 110.5 + 6.5x$

$110.5 = 17.5x$

$x = \frac{110.5}{17.5} = \frac{1105}{175} = \boxed{\frac{221}{35}}$

5. Is $\Delta ABC \sim \Delta DEF$? How do you know?

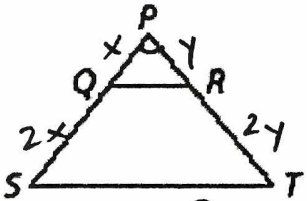


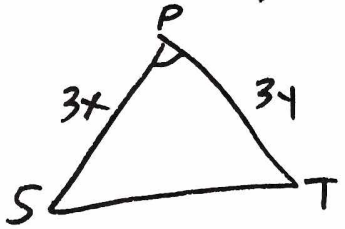
yes! AA ~ or SAS ~

6. Write a two-column proof.

Given: $SQ = 2QP$, $TR = 2RP$

Prove: $\Delta PQR \sim \Delta PST$





Statements	Reasons
① $SQ = 2QP$, $TR = 2RP$	① given
② $SP = 3QP$, $TP = 3RP$	② "seg. add. post"
③ $\frac{SP}{QP} = 3$, $\frac{TP}{RP} = 3$	③ division prop. =
④ $\frac{SP}{QP} = \frac{TP}{RP}$	④ Trans. prop. =
⑤ $\angle P \cong \angle P$	⑤ reflex. prop. $\cong$
⑥ $\Delta PQR \sim \Delta PST$	⑥ SAS ~