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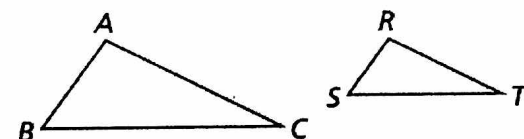
Proving Triangles Similar: SSS~ and SAS~

Lesson Objective INBAT prove 2 Δ s are ~ by SSS~ and SAS~

Side-Side-Side Similarity Theorem (SSS~)

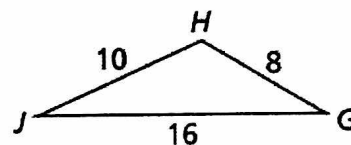
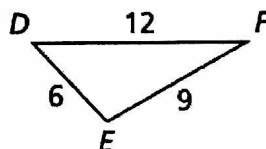
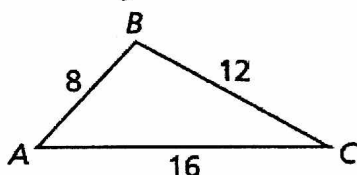
If the corresponding side lengths of two triangles are proportional, then the triangles are similar.

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



Examples:

1. Is either ΔDEF or ΔGHJ similar to ΔABC ?



$$\frac{6}{8} = \left(\frac{3}{4}\right) \quad \frac{9}{12} = \left(\frac{3}{4}\right) \quad \frac{12}{16} = \left(\frac{3}{4}\right) \quad \checkmark$$

$$\frac{8}{8} = 1 \quad \frac{12}{10} \neq 1$$

$$\Delta DEF \sim \Delta ABC$$

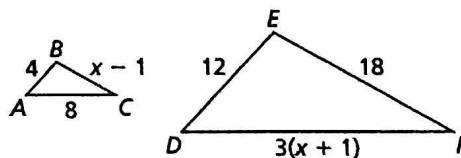
2. Find the value of x that makes $\Delta ABC \sim \Delta DEF$.

$$\frac{4}{3} = \frac{x-1}{18}$$

$$3(x-1) = 18$$

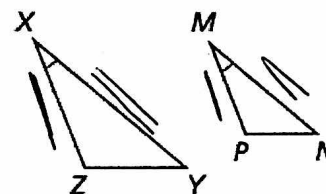
$$x-1 = 6$$

$$x = 7$$



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.



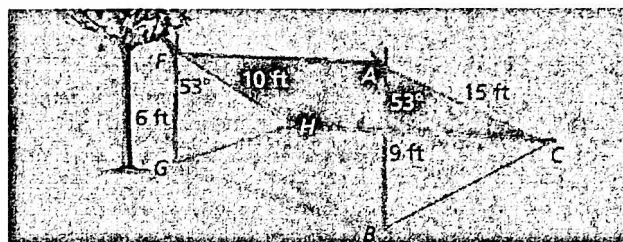
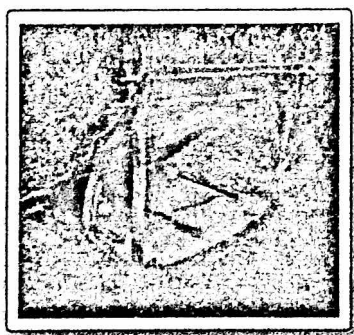
$$\frac{XZ}{MP} = \frac{XY}{MN} \quad \text{and}$$

$$\angle X \cong \angle M$$

$$\rightarrow \Delta XYZ \sim \Delta MNP$$

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?



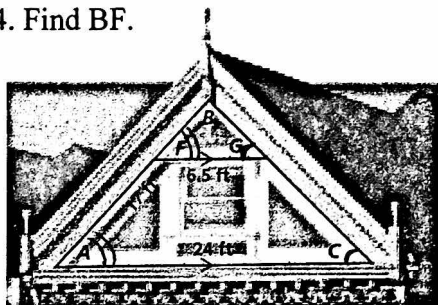
$$\angle F \cong \angle A \text{ (both } 53^\circ)$$

$$\frac{6}{9} = \frac{2}{3}$$

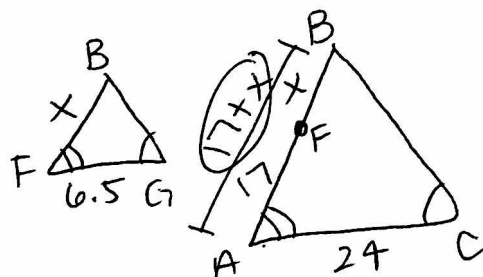
$$\frac{10}{15} = \frac{2}{3}$$

yes, $\Delta s \sim$
by SAS~

4. Find BF.



$$* AF = 17$$



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

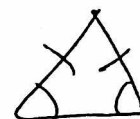
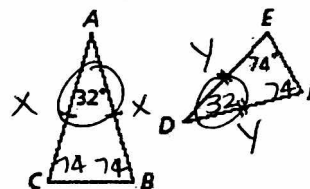
$$24x = 110.5 + 6.5x$$

$$17.5x = 110.5$$

$$x \approx 6.31$$

$$\boxed{BF \approx 6.31}$$

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



$\Delta ABC \sim \Delta DEF$
by AA~

OR

$$\frac{x}{y} = \frac{x}{y} \quad \left(\frac{AB}{DE} = \frac{AC}{DF} \right)$$

and $\angle A \cong \angle D$

$\Delta ABC \sim \Delta DEF$
by SAS~