

Name:

Date:

Period: 6

# Proving Triangle Similar by Side-Side-Side and Side-Angle-Side Similarity

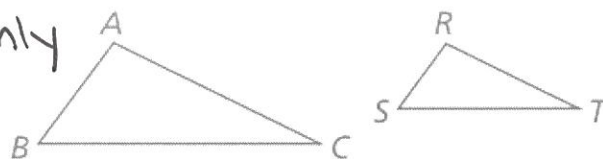
Lesson Objective

IN BIAT use the SSS ~ thm  
and the SAS ~ thm

In addition to using congruent corresponding angles to show that two triangles are similar, you can use proportional corresponding side lengths.

## Side-Side-Side Similarity Theorem (SSS ~) \*Δs only

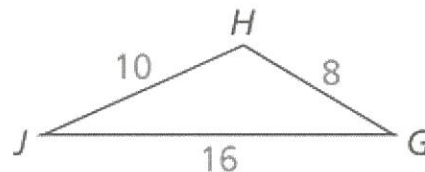
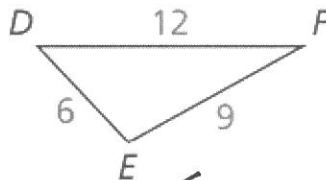
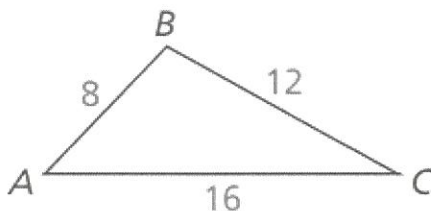
If the corresponding side lengths of two triangles are proportional, then the triangles are similar.



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

Examples:

1. Is either  $\triangle DEF$  or  $\triangle GHJ$  similar to  $\triangle ABC$ ?



short:  $\frac{8}{6} = \left(\frac{4}{3}\right)$

medium:  $\frac{12}{9} = \left(\frac{4}{3}\right)$

long:  $\frac{16}{12} = \left(\frac{4}{3}\right)$

yes  
 $\triangle ABC \sim \triangle DEF$

short:  $\frac{8}{8} = 1$

medium:  $\frac{12}{10} \neq 1$

No, not  
all corresp.  
side ratios  
are =

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

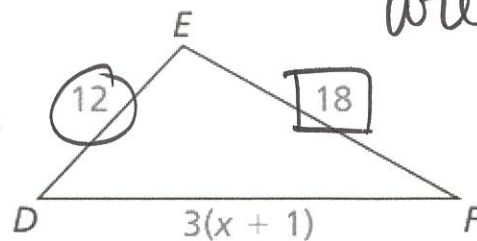
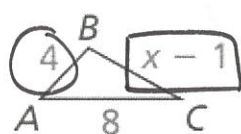
$$\frac{4}{12} = \frac{x-1}{18}$$

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

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

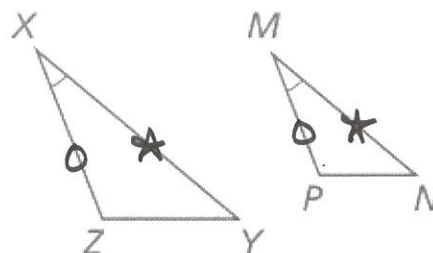
$$x-1 = 6$$

$$x = 7$$



## Side-Angle-Side Similarity Theorem (SAS ~)

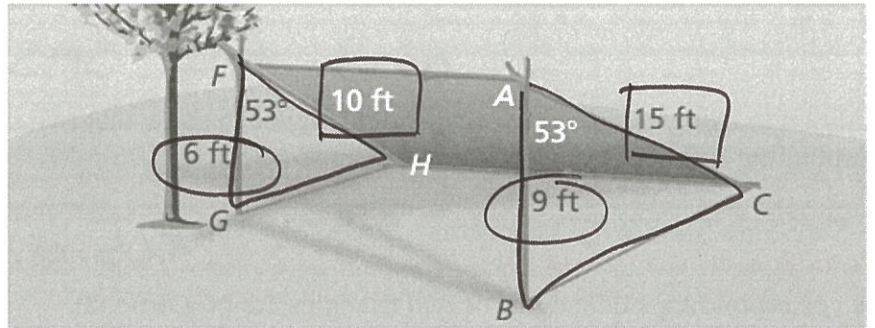
If an angle of one triangle is congruent to an angle of a second triangle, and the length of the sides including these angles are proportional, then the triangles are similar.



if  $\angle X \cong \angle M$  AND  $\frac{XZ}{MP} = \frac{XY}{MN} \rightarrow \triangle MNP \sim \triangle XYZ$

Example:

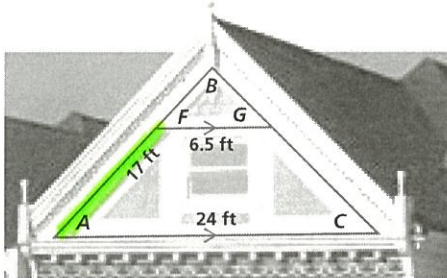
3. You just got cast on the show Survivor (aka best show on TV ever) and are building a lean-to shelter starting from a tree branch with your tribe, as shown. Can you construct the right end so it is similar to the left end using the angle measure and lengths shown?



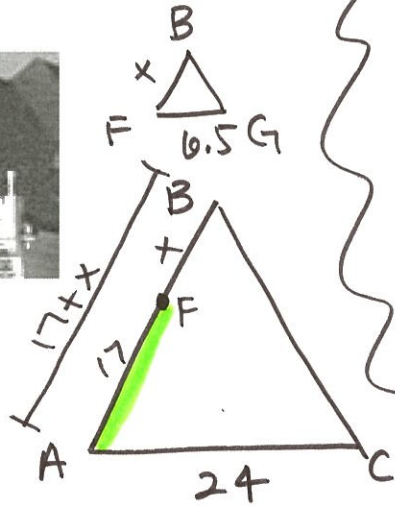
① included  $\angle \cong$ ? yes  
(both  $53^\circ$ )

② side ratios =? yes  
 $\frac{9}{6} = \left(\frac{3}{2}\right) \dots \frac{15}{10} = \left(\frac{3}{2}\right)$

4. Find BF.

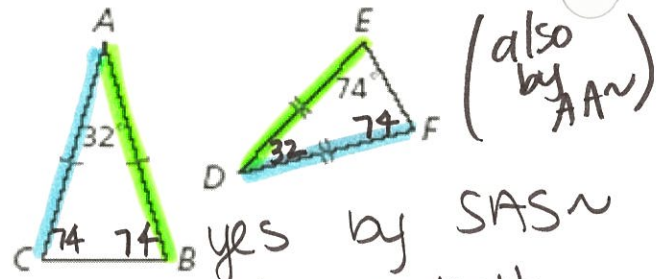


$$\frac{x}{6.5} = \frac{x+17}{24}$$



lengths of sides that include the  $\cong \angle$  are proportional (= in ratio)  
So,  $\triangle ABC \sim \triangle FGH$  by SAS~

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



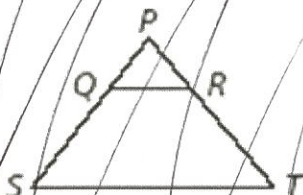
yes by SAS~  
\*even though we don't know side lengths...

$$\frac{1 \text{ tick}}{2 \text{ ticks}} = \frac{1 \text{ tick}}{2 \text{ ticks}} \text{ AND } \angle A \cong \angle D$$

6. Write a two-column proof.

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

Prove:  $\triangle PQR \sim \triangle PST$



Statements

Reasons

