6.5 Prove Triangles Similar by SSS and SAS

Goal • Use the SSS and SAS Similarity Theorems.

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

THEOREM *For Your Notebook*

THEOREM 6.2 Side-Side-Side (SSS) Similarity Theorem

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

If $\frac{AB}{RS} = \frac{BC}{ST} = \frac{CA}{TR}$, then $\triangle ABC \sim \triangle RST$.

Proof: p. 389

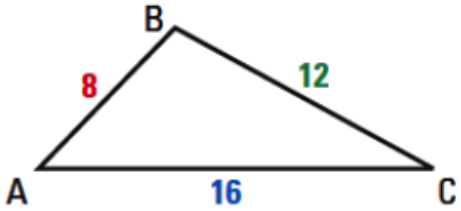
PROOF **SSS Similarity Theorem**

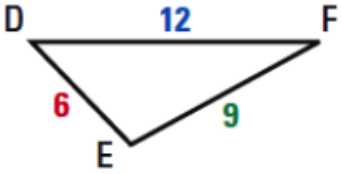
APPLY THEOREMS

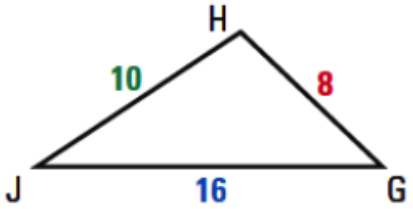
When using the SSS Similarity Theorem, compare the shortest sides, the longest sides, and then the remaining sides.

EXAMPLE 1 Use the SSS Similarity Theorem

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

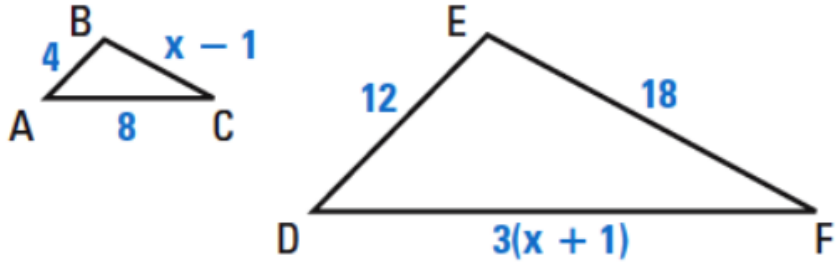






EXAMPLE 2 Use the SSS Similarity Theorem

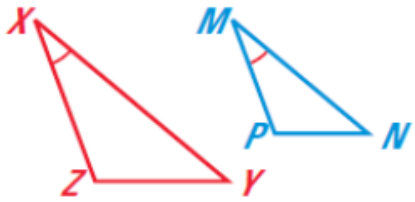
ALGEBRA Find the value of x that makes $\triangle ABC \sim \triangle DEF$.



THEOREM *For Your Notebook*

THEOREM 6.3 Side-Angle-Side (SAS) Similarity Theorem

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

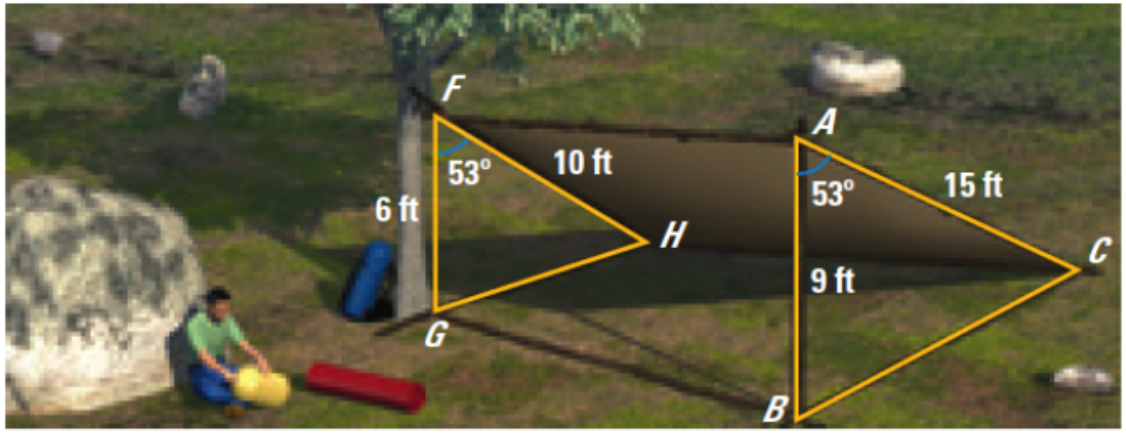


If $\angle X \cong \angle M$ and $\frac{ZX}{PM} = \frac{XY}{MN}$, then $\triangle XYZ \sim \triangle MNP$.

Proof: Ex. 37, p. 395

EXAMPLE 3 Use the SAS Similarity Theorem

LEAN-TO SHELTER You are building a lean-to shelter starting from a tree branch, as shown. Can you construct the right end so it is similar to the left end using the angle measure and lengths shown?

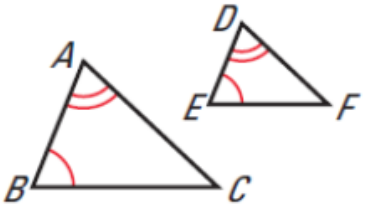


CONCEPT SUMMARY

For Your Notebook

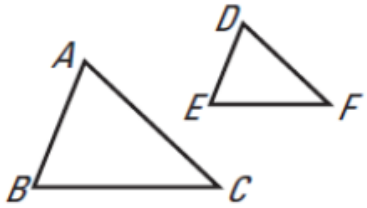
Triangle Similarity Postulate and Theorems

AA Similarity Postulate



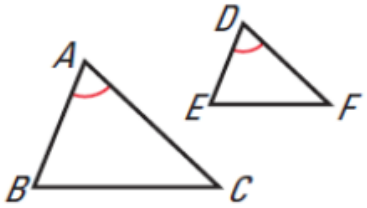
If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\triangle ABC \sim \triangle DEF$.

SSS Similarity Theorem



If $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$, then $\triangle ABC \sim \triangle DEF$.

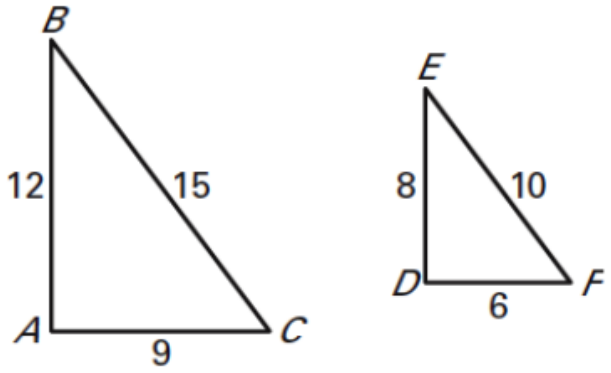
SAS Similarity Theorem



If $\angle A \cong \angle D$ and $\frac{AB}{DE} = \frac{AC}{DF}$, then $\triangle ABC \sim \triangle DEF$.

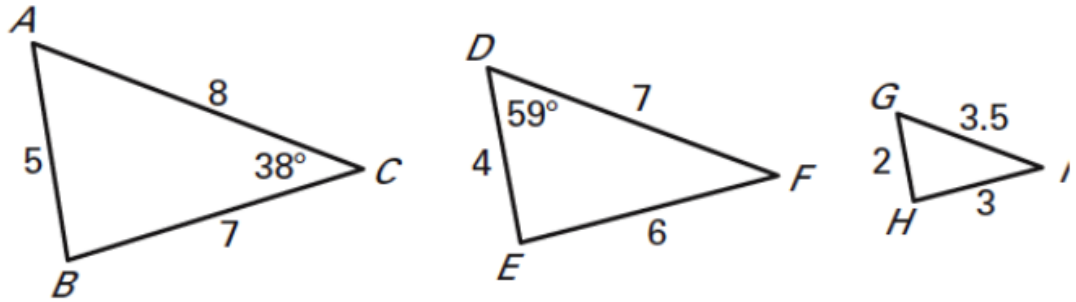
Verify that $\triangle ABC \sim \triangle DEF$. Find the scale factor of $\triangle ABC$ to $\triangle DEF$.

1.



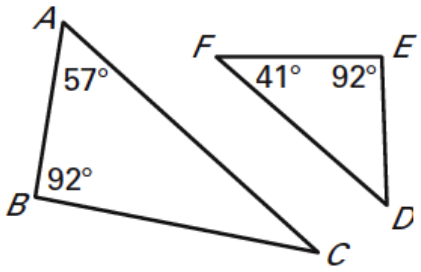
Determine which two of the three triangles are similar. Find the scale factor for the pair.

3.

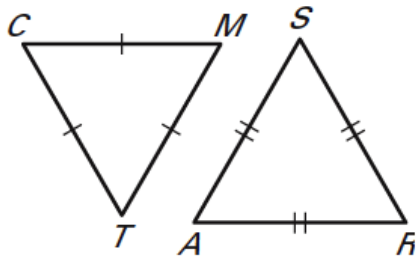


Are the triangles similar? If so, state the similarity and the postulate or theorem that justifies your answer.

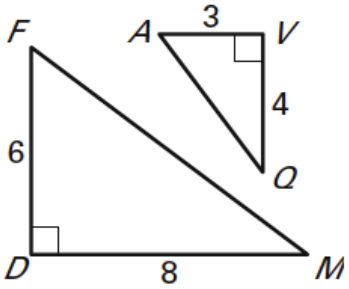
10.



11.



12.



Assignment:

p. 391 (3-23, 39-44)