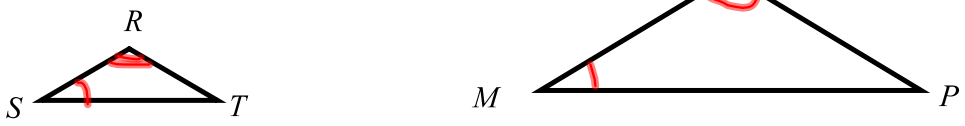
Proving Triangles Similar

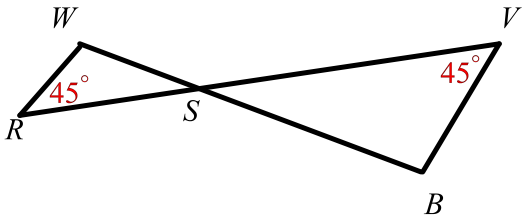
Just as when we were proving triangles were congruent (using SSS, SAS, ASA, or AAS), we have similar ways to show triangles are similar.

Angle - Angle Similarity (AA~) - If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

IF.... $\angle S \cong \angle M$ and $\angle R \cong \angle L$ THEN.... $\triangle SRT \sim \triangle MLP$



Are the two triangles similar? Explain.



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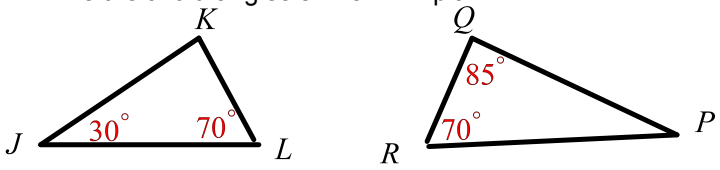
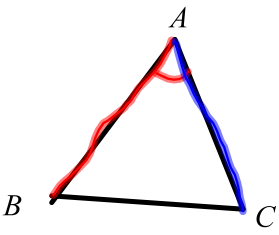
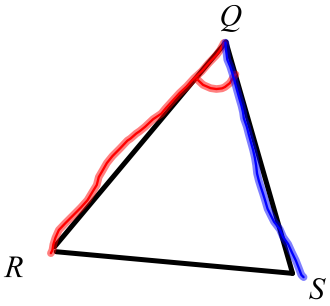


Side - Angle - Side ~ Theorem (SAS) - If an angle of one triangle is congruent to the angle of a second triangle and the sides that include the two angles are proportional, then the triangles are similar.

IF.... $\frac{AB}{QR} = \frac{AC}{QS}$ and $\angle A \cong \angle Q$

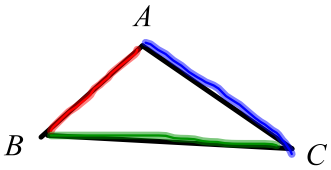


THEN.... $\triangle ABC \sim \triangle QRS$

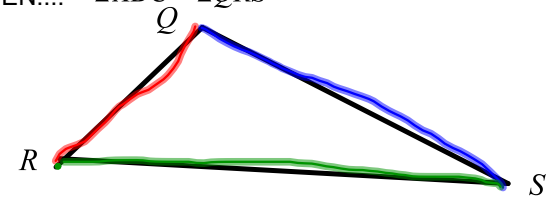


Side - Side - Side ~ Theorem (SSS) - If the corresponding sides of two triangles are proportional, then the triangles are similar.

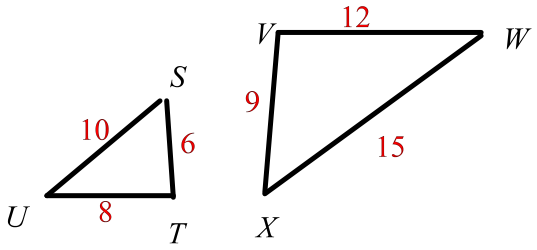
IF.... $\frac{AB}{QR} = \frac{AC}{QS} = \frac{BC}{RS}$



THEN.... $\triangle ABC \sim \triangle QRS$



Are the triangles similar? If so write a similarity statement for the triangles.



Short Sides $\frac{ST}{XV} = \frac{6}{9} = \frac{2}{3}$

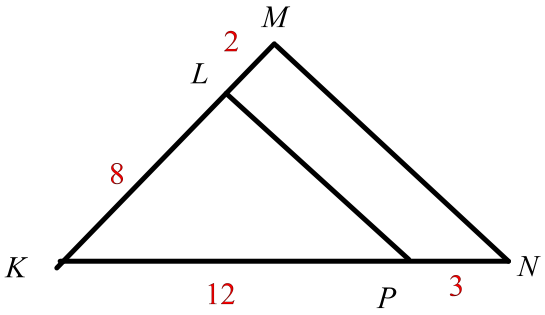
Longest Sides $\frac{SU}{WX} = \frac{10}{15} = \frac{2}{3}$

Remaining Sides $\frac{TU}{VW} = \frac{8}{12} = \frac{2}{3}$

They all have the same ratios, so the sides are proportional. That means

$\triangle STU \sim \triangle XVW$ by the SSS ~ Theorem

Are the triangles similar? If so write a similarity statement for the triangles.



Compare the two triangles: $\triangle KLP$ and $\triangle KMN$

They both share angle K. Now compare KL and KM. Then compare KP and KN.

$\frac{KL}{KM} = \frac{8}{8+2} = \frac{8}{10} = \frac{4}{5}$

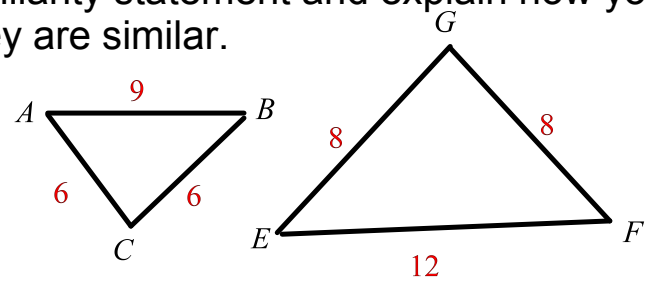
$\frac{KP}{KN} = \frac{12}{12+3} = \frac{12}{15} = \frac{4}{5}$

The sides are proportional and the included angles are congruent. So,

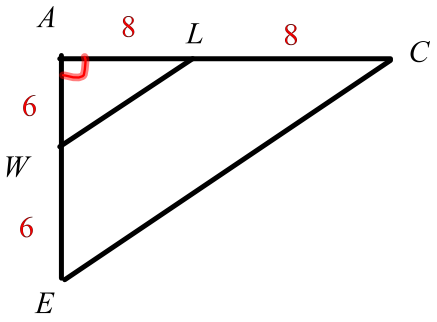
$\triangle KLP \sim \triangle KMN$ by the SAS ~ Theorem

TRY: Are the triangles similar? If so, write the similarity statement and explain how you know they are similar.

a.



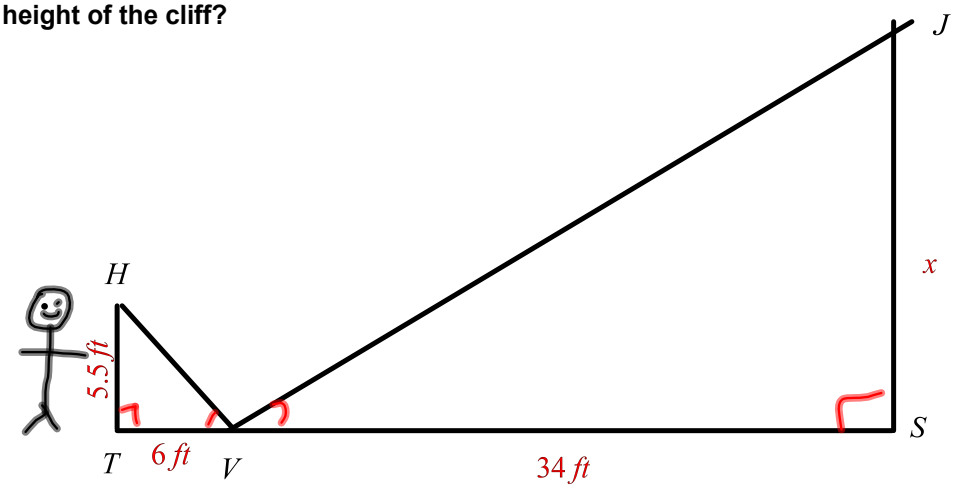
b.



We have AA, SAS, and SSS for similarity of triangles. Why do you think we do not use ASA or AAS for triangle similarity?

We can use proportions and **indirect meausurememt** to find lengths that would otherwise be difficult to measure directly.

Before rock climbing, Darius wants to know how high he will climb. He places a mirror on the ground and walks backward until he can see the top of the cliff in the mirror. Using the diagram below, what is the height of the cliff?



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