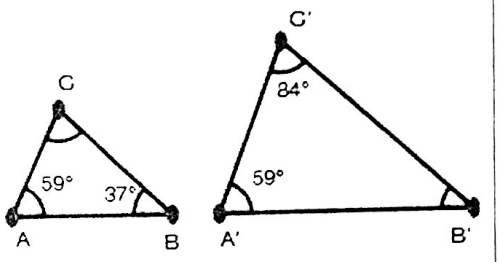
10.3 Proving Triangle Similarity

If two shapes are **similar**, then this means that corresponding angles are congruent and corresponding sides are proportional.

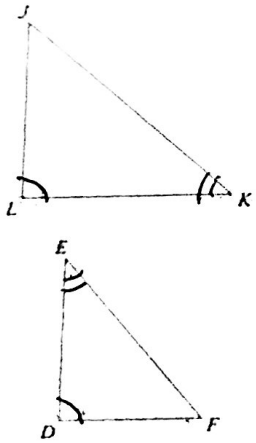
If we want to know if two triangles are similar, then we will be looking to show these two things. Luckily, we don't have to show that every single angle is congruent and that every single side is proportional to show that two shapes are similar. If we can show some of the sides are proportional and some of the angles are congruent, then we can infer that the rest of the sides and angles would follow suit.

There are three different ways that we can show similarity:

Angle-Angle Similarity Theorem	I should use it when...	
If two angles are congruent, then the triangles are similar	... you can show two angles are congruent - given - vertical - parallel line angle relationships	

2. State if the triangles are similar or not. Then complete the similarity statement.

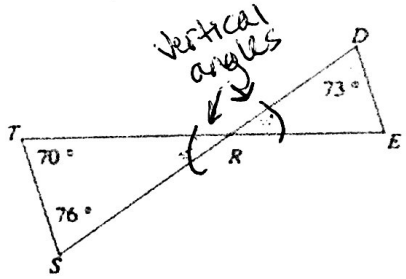
a.



$\triangle LKJ \sim \triangle DEF$

by AA

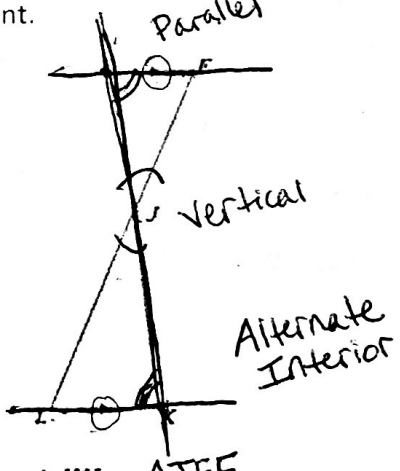
b.



$\triangle RST \sim$ _____

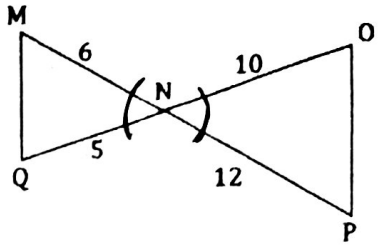
Not similar

c.

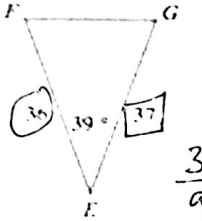


$\triangle JKL \sim \triangle JEF$

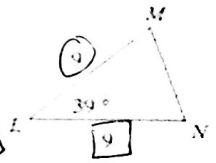
by AA

Side-Angle-Side Similarity Theorem	I should use it when...	
If two sides are proportional and the angle between them is congruent, the triangles are similar	... when you have two sides and one angle	

2) State if the triangles are similar or not. Then complete the similarity statement.

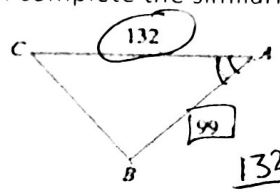
a. 

$\frac{36}{9} \neq \frac{37}{9}$

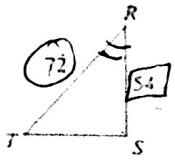


Not similar

$\triangle EFG \sim$ _____

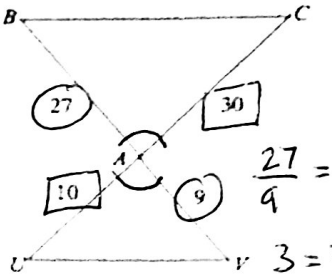
b. 

$\frac{132}{72} = \frac{99}{54}$



$1.83 = 1.83$

$\triangle ABC \sim \triangle RST$ by SAS

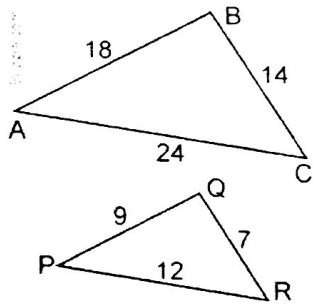
c. 

$\frac{27}{9} = \frac{30}{10}$

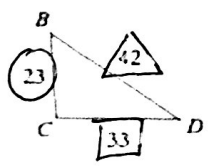
$3 = 3$

$\triangle ABC \sim \triangle AVU$ by SAS

* biggest goes with biggest, smallest goes with smallest

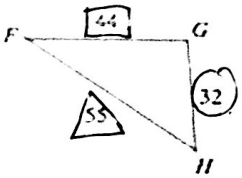
Side-Side-Side Similarity Theorem	I should use it when...	
If all three sides are proportional, then the triangles are similar	... you have all three sides of both triangles	

3) State if the triangles are similar or not. Then complete the similarity statement.

a. 

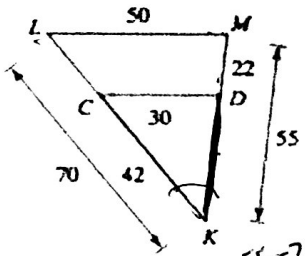
$\frac{23}{32} = .71$

$\frac{33}{44} = .75$



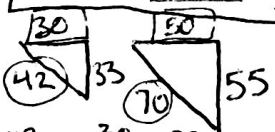
$\triangle FGH \sim$ _____

Not Similar

b. 

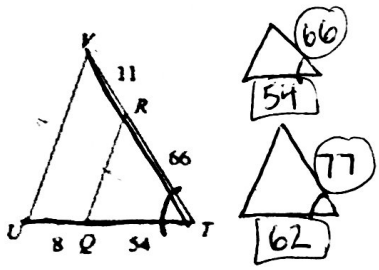
$55 - 22 = 33$

$\triangle KLM \sim \triangle KCD$ by SSS



$\frac{42}{70} = \frac{30}{50} = \frac{33}{55}$

$.6 = .6 = .6$

c. 

$\triangle TUV \sim$ _____

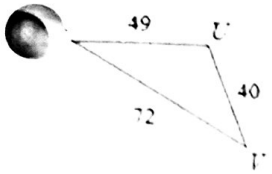
$\frac{66}{77} = \frac{54}{62}$

$.86 \neq .87$

Not Similar

4) State if the triangles are similar or not. State how you know and complete the similarity statement.

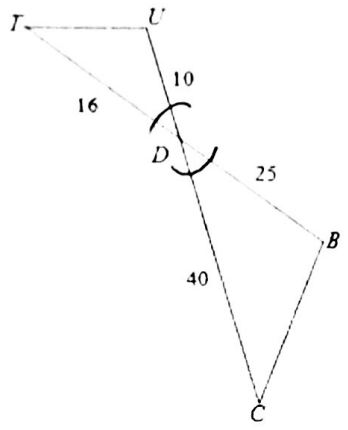
a)



$\triangle TUT \sim$ _____

by SSS

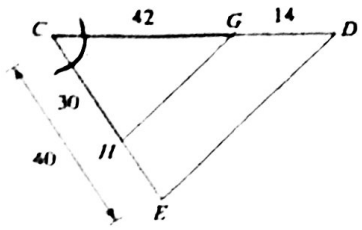
b)



$\triangle DCB \sim$ _____

by SAS

c)



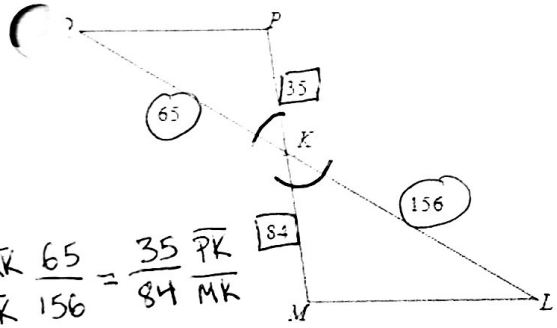
$\triangle CDE \sim$ _____

by SAS

Two Column Proofs

Sometimes you will be asked to give a more formal proof, which is traditionally done in a two-column format. The left column is where you state what you know, and the right column is where you state how you know it.

5) Prove that the two triangles are similar.

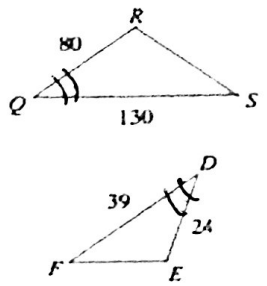


$\frac{QK}{LK} \frac{65}{156} = \frac{35}{84} \frac{PK}{MK}$

$.41 = .41$

Statement	Reason
$\angle KQP \cong \angle KLM$	Vertical Angles
$\overline{QK} \sim \overline{LK}$, $\overline{PK} \sim \overline{MK}$	$\frac{\overline{QK}}{\overline{LK}} = \frac{\overline{PK}}{\overline{MK}}$
$\Delta KQP \sim \Delta KLM$	SAS Similarity

6) Prove that the two triangles are similar.



Statement	Reason
$\angle Q \cong \angle D$	Given