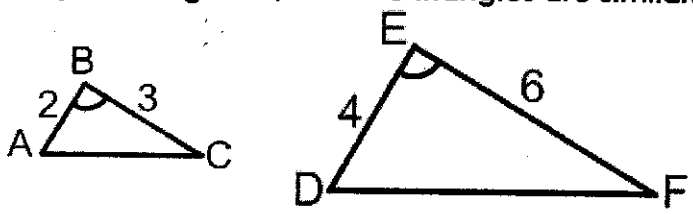
Side-Angle-Side Similarity (SAS~)

If two sides of one triangle are proportional to two sides of another triangle and their included angles **are congruent, then the triangles are similar.**

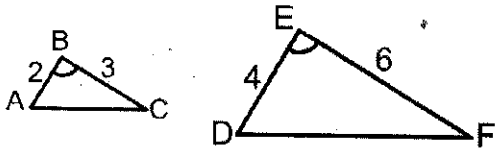


Step 1: Find a pair of congruent angles

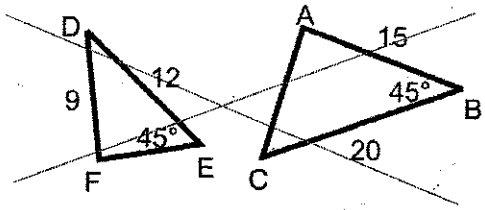
In this example, it is given that $< B \cong < E$. In some cases you will have to establish this from vertical angles.

Step 2: Make sure the angle is sandwiched between the given sides

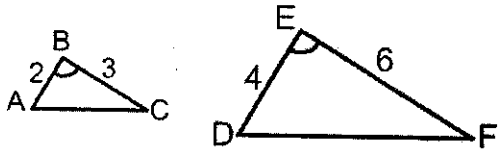
In this case, AB and BC are given, with angle B sandwiched between, and DE and EF are given, with angle E sandwiched between.



An example of where this would not be true because it doesn't go in the exact order of side then angle then side:



Step 3: Match up the corresponding sides (shortest with shortest, longest with longest)



AB matches with DE (2 and 4 are the shortest) and BC matches with EF (3 and 6 are the longest)

Step 4: See if sides have matching scale factors

Shorter Sides: k= $\frac{2}{4}$ which simplifies to $\frac{1}{2}$

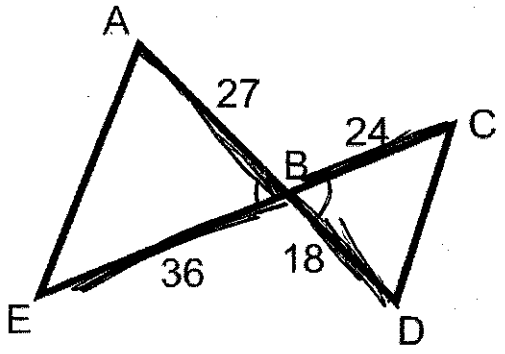
Longer Sides: k=$\frac{3}{6}$ which simplifies to $\frac{1}{2}$

Step 5: Write the similarity statement (same rules apply with order as SSS) if the scale factors are the same

$\triangle ABC \sim \triangle DEF$.

You try (hint: look for vertical angles)

1.



Angle: $\angle ABE \cong \angle CBD$ (vertical)

Sides

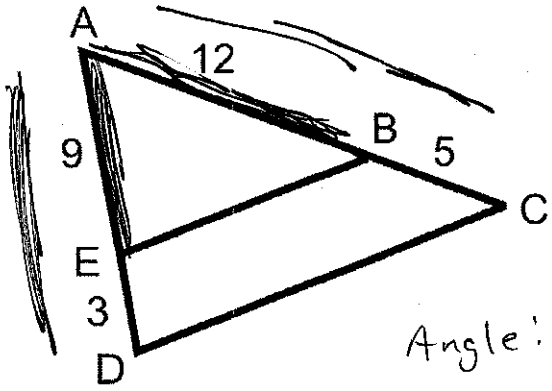
$\frac{24}{36} = \frac{2}{3}$

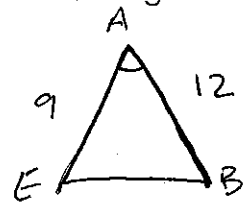
$\frac{18}{27} = \frac{2}{3}$

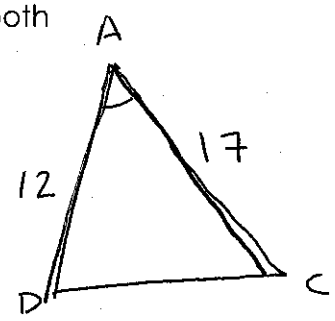
Yes, sides are proportional, their included angle is congruent.

$\triangle ABE \sim \triangle DBC$

2. Hint: Draw the two separate triangles, and notice that angle A is in both







Angle: $\angle EAB \cong \angle DAC$ (they are the same angle)

Sides: $\frac{9}{12} = \frac{3}{4}$

$\frac{12}{17} = \frac{12}{17}$

NOT Similar

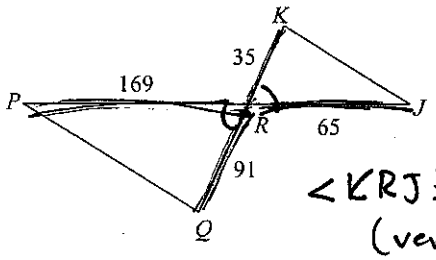
Geometry Name_____ ID: 1

Side Angle Side Similarity

Date_____ Period____

State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement.

1)



$\angle KRJ \cong \angle PRQ$ (vertical) ✓

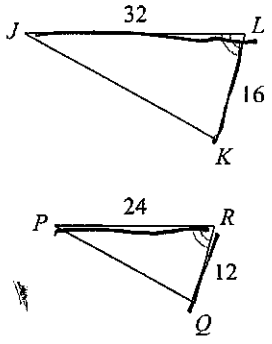
$\triangle RQP \sim \triangle RKJ$

$\frac{35}{91} = \frac{5}{13}$ ✓

yes, similar

$\frac{65}{169} = \frac{5}{13}$ ✓

2)



Angle: ✓

$\angle JLK \cong \angle PRQ$ (given)

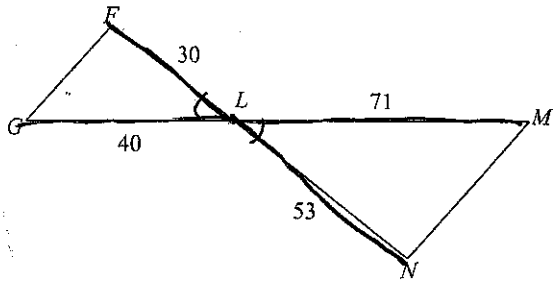
$\frac{32}{24} = \frac{4}{3}$ ✓

$\triangle LKJ \sim \triangle RQP$

$\frac{16}{12} = \frac{4}{3}$ ✓

Yes, similar

3)



$\triangle LMN \sim$ _____

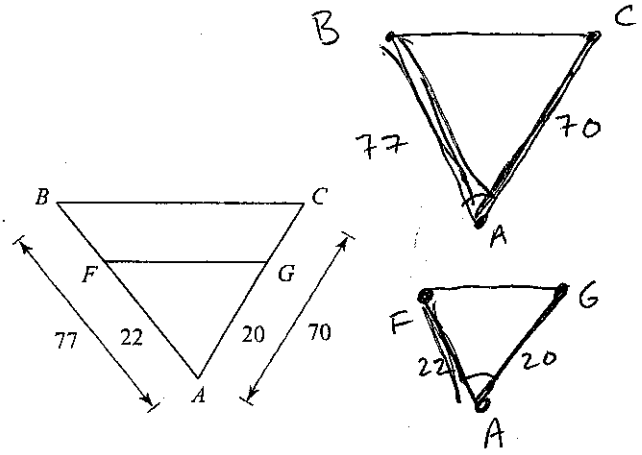
$\angle FLG \cong \angle MLN$ (vertical)

$\frac{30}{53} = \frac{30}{53}$

$\frac{40}{71} = \frac{40}{71}$

Not Similar

4)



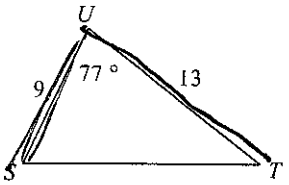
$\triangle ABC \sim \triangle AFG$

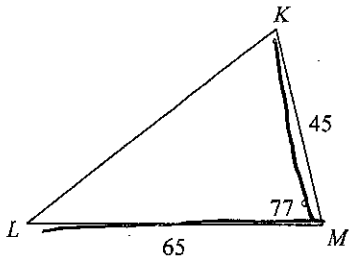
$\angle BAC \cong \angle GAF$ (same angle)

$\frac{77}{22} = \frac{7}{2}$ ✓

$\frac{70}{20} = \frac{7}{2}$ ✓

5)





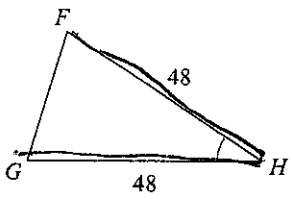
$\triangle MLK \sim \underline{\triangle UTS}$

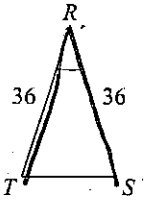
$\angle SUT \cong \angle LMK$ (given ... 77°)

$\frac{65}{13} = 5$

$\frac{45}{9} = 5$

6)





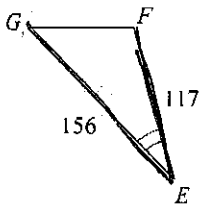
$\triangle HGF \sim \underline{\triangle RST}$

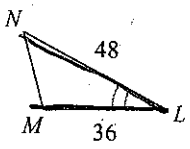
$\angle FHG \cong \angle TRS$ (given)

$\frac{48}{36} = \frac{4}{3}$ ✓

$\frac{48}{36} = \frac{4}{3}$ ✓

7)





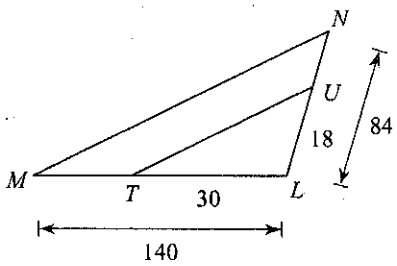
$\triangle EFG \sim \underline{\triangle LMN}$

$\angle NLM \cong \angle GEF$ (given)

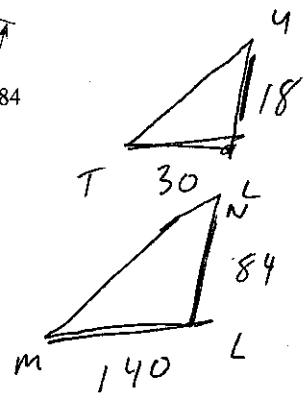
$\frac{117}{36} = \frac{13}{4}$ ✓

$\frac{156}{48} = \frac{13}{4}$ ✓

8)



$\triangle LMN \sim \underline{\triangle LTU}$



$\angle ULT \cong \angle NLM$ (same angle)

$\frac{18}{84} = \frac{3}{14}$ ✓

$\frac{30}{140} = \frac{3}{14}$ ✓

