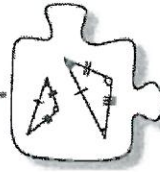


3.2.1 What information do I need?

Conditions for Triangle Similarity

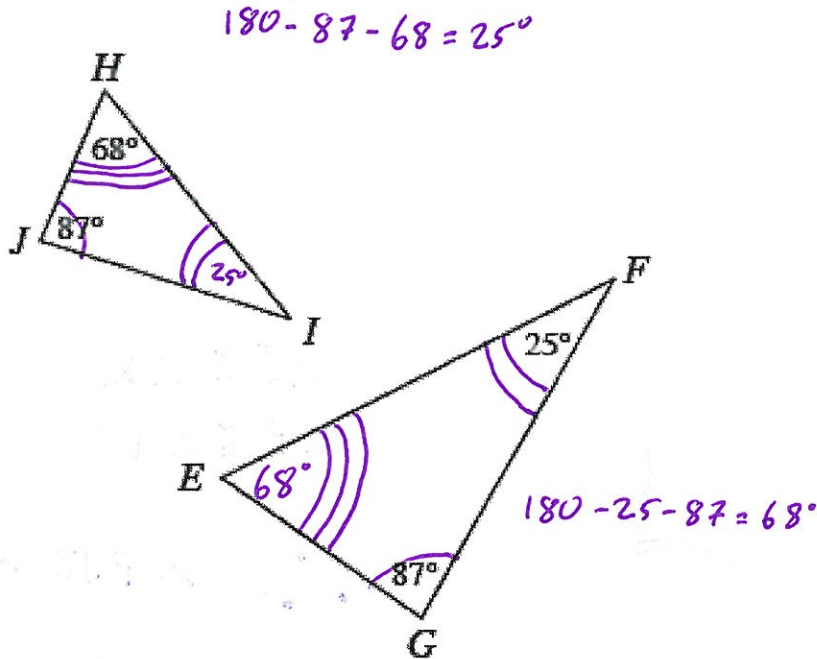


Copy the Angle Angle Postulate from the glossary, under the "A" section. Include an example.

AA-

If 2 \angle s of 1 Δ are \cong to the 2 corresponding \angle s of another Δ then the Δ s are \sim .

3-49. Scott is looking at the set of shapes below. He thinks that $\Delta EFG \sim \Delta HIJ$ but he is not sure that the shapes are drawn to scale.



- a. Are the corresponding angles equal? Convince Scott that these triangles are similar.

Yes,
 ① $\angle G \cong \angle I$
 ② $\angle E \cong \angle H$

The Δ s are \sim by AA \sim
 $\Delta HJI \sim \Delta EGF$

b. How many pairs of angles need to be congruent to be sure that triangles are similar? How could you abbreviate this similarity condition?

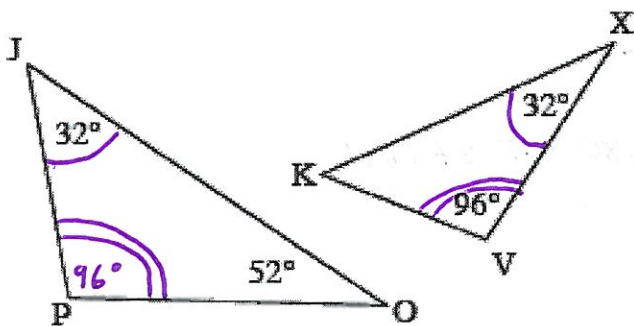
2 ~~AA~~ AA ~

Copy down the definition from the book (page 860) on Side Angle Side Theorem from the glossary.

If 2 Δ s have 2 pairs of corresponding sides that are proportional, and have \cong included \angle s, then the Δ s are similar.

3-51. Based on your conclusions from problems 3-49 and 3-50, decide if each pair of triangles below is similar. If they are similar, describe a sequence of transformations that carry one onto the other. Explain your reasoning.

a.



$$180 - 32 - 52 =$$

$$\angle J \cong \angle X$$

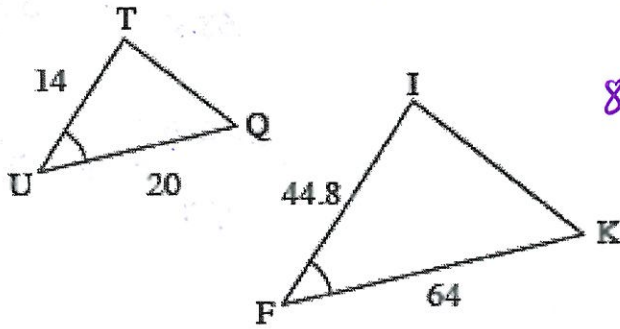
$$\angle P \cong \angle V$$

$$\therefore \triangle PJO \sim \triangle VXK$$

by AA ~

Dilation and the ~~at~~ translation

b.



$$\frac{20}{64} = \frac{14}{44.8}$$

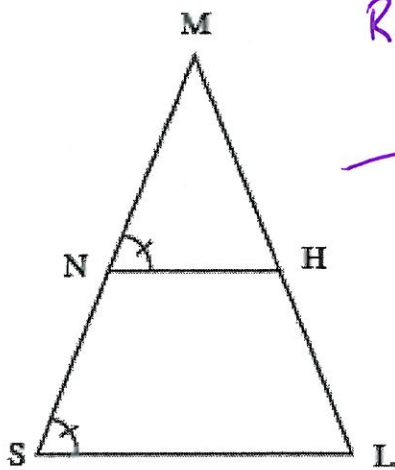
$$896 = 896 \checkmark$$

$$\angle U \cong \angle F \checkmark$$

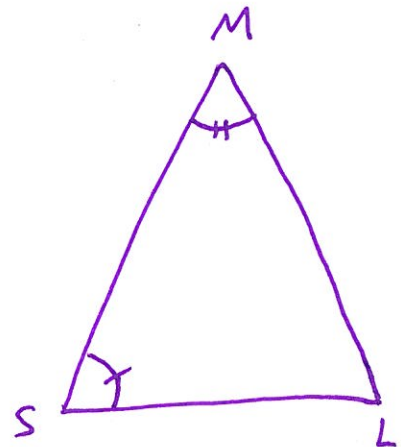
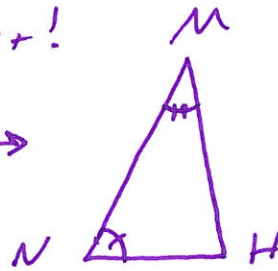
$\therefore \Delta UTQ \sim \Delta FIK$
by SAS \sim

Dilate and translate

c.



Redraw it!



$$\angle N \cong \angle S$$

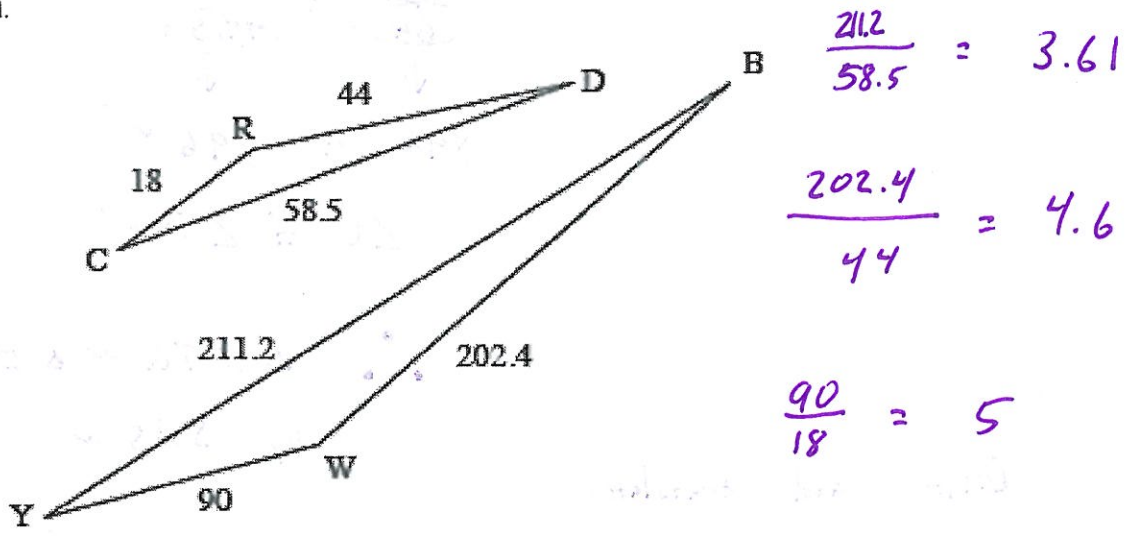
$$\angle M \cong \angle M$$

$\therefore \Delta NMH \sim \Delta SML$

by AA \sim

Dilate

d.



Not enough info! No \angle s \cong nor any sides proportional!

3-52. LEARNING LOG

Read the Math Notes box for this lesson, which introduces new names for the observations you made in problems 3-49 and 3-50. Then write a Learning Log entry about what you learned today. Be sure to address the question: *How much information do I need about a pair of triangles in order to be sure that they are similar?* Title this entry "AA \sim and SAS \sim " and include today's date.

Name: _____ Period: _____ Date: _____

MATH NOTES: Conditions for Triangle Similarity

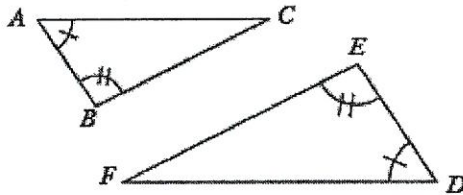
When two figures are similar, there is a similarity transformation that takes one onto the other. Since both dilations and rigid motions preserve angles, the corresponding angles must have equal measure. In the same way, since every similarity transformation preserves ratios of lengths, you know that corresponding sides must be proportional. For two shapes to be similar, corresponding angles must have equal measure and corresponding sides must be proportional.

These relationships can also help you decide if two figures are similar. When two pairs of corresponding angles have equal measures, the two triangles must be similar. This is because the third pair of angles must also be equal. This is known as the **AA Triangle Similarity** condition (which can be abbreviated as “AA Similarity” or “AA ~” for short).

To prove that AA ~ is true for a pair of triangles with two pairs of congruent angles (like $\triangle ABC$ and $\triangle DEF$ below), use

rigid transformations to move the image A' to point D , the image B' to \overline{DE} and C' to \overline{DF} . Then you know

that $\overline{B'C'}$ and \overline{EF} are parallel because corresponding angles are congruent. This means that the dilation of triangle $\triangle A'B'C'$ from point D to take the image B' to point E will also carry C' to point F . Therefore, $\triangle A'B'C'$ will move onto $\triangle DEF$ and you have found a similarity transformation taking $\triangle ABC$ to $\triangle DEF$.



AA ~: If two pairs of angles have equal measures, then the triangles are similar.

Another condition that guarantees similarity is referred to as the **SAS Triangle Similarity** condition (which can be abbreviated as “SAS Similarity” or “SAS ~” for short.) The “A” is placed between the two “S”s because the angle is *between* the two sides. Its proof is very similar to the proof for AA ~ above.

