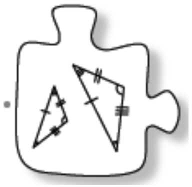
Name:________________________ Period:______ Date:______________

# 3.2.1 What information do I need?

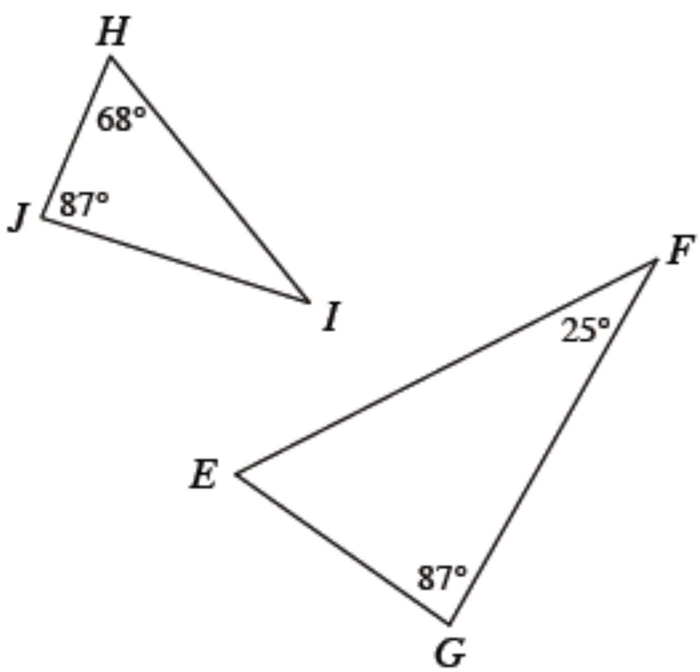
## Conditions for Triangle Similarity



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

AA-

**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.

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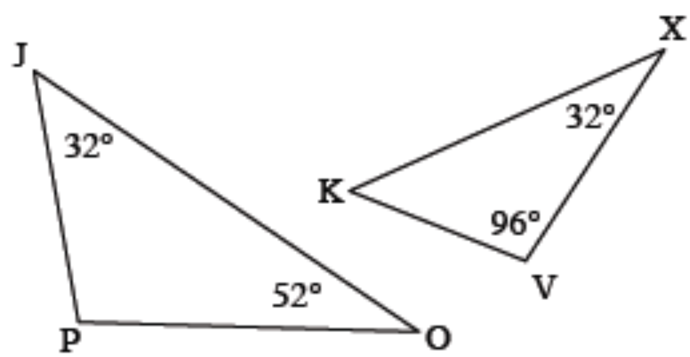
b. How many pairs of angles need to be congruent to be sure that triangles are similar? How could you abbreviate this similarity condition?

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

**3-51.** Based on your conclusions from problems 3-49and 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.



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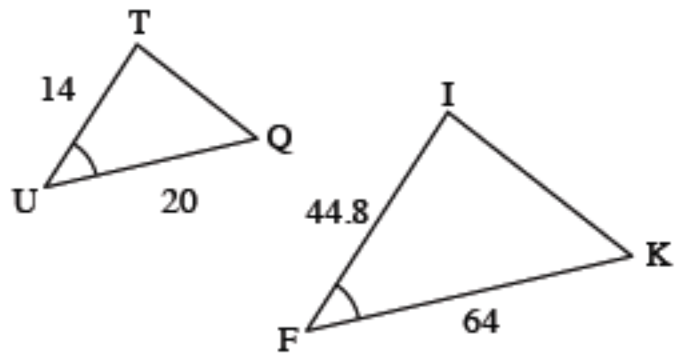
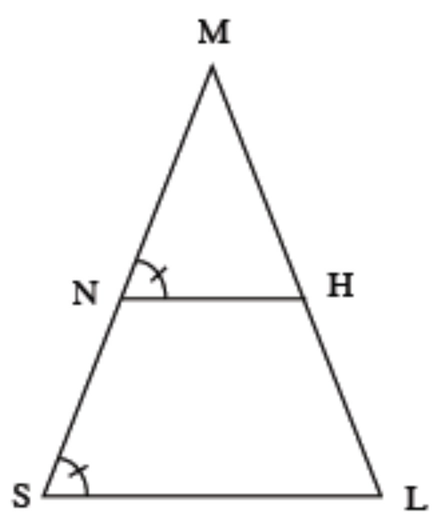
b.




c.



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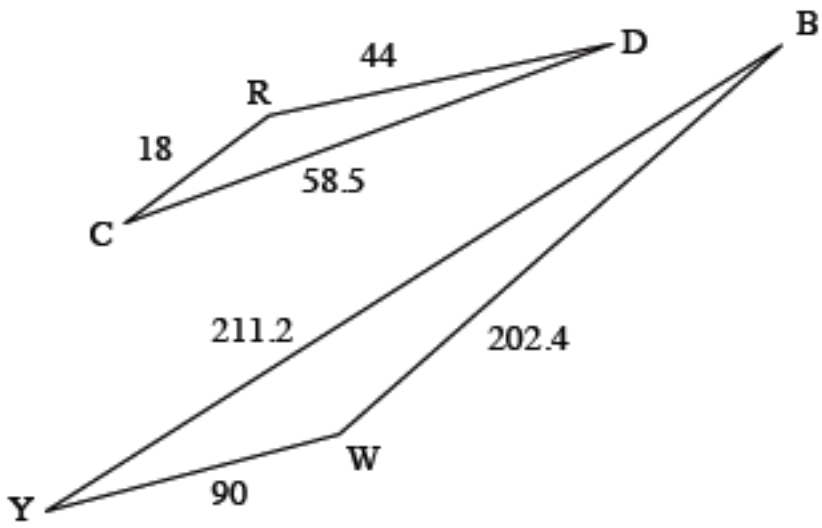
d.




**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 ~ and SAS ~" and include today's date.

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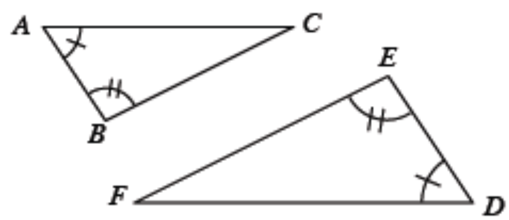
## MATH NOTES: Conditions for Triangle Similarity

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 $\Delta ABC$ and $\Delta DEF$ *below*), use rigid transformations to move the image $A'$ to point $D$, the image $B'$ to $\overrightarrow{DE}$ and $C'$ to $\overrightarrow{DF}$. Then you know that $\overleftrightarrow{B'C'}$ and $\overleftrightarrow{EF}$ are parallel because corresponding angles are congruent. This means that the dilation of triangle $\Delta A'B'C'$ from point $D$ to take the image$B'$ to point $E$ will also carry $C'$ to point $F$. Therefore, $\Delta A'B'C'$ will move onto $\Delta DEF$ and you have found a similarity transformation taking $\Delta ABC$ to $\Delta DEF$.




**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.