

LAUNCH: Work alone or in pairs on p.330

Make drawings to support your thinking for each question.

In-Class Experiment

The main tests for congruent triangles are SAS, ASA, AAS, and SSS. Are there similar tests for similar triangles? Below are some possibilities. For each proposed test, draw a pair of triangles that share the attributes listed. Then check to see whether they must be similar. See if you can find a counterexample.

1. Three angles of one triangle are congruent to three angles of the other. Must the two triangles be similar? (AAA similarity)
2. Two triangles have a pair of proportional side lengths and a pair of congruent corresponding angles. Must the two triangles be similar? (SA similarity)
3. Two triangles have two pairs of proportional side lengths and the included angles are congruent. Must the two triangles be similar? (SAS similarity)
4. Two triangles have three pairs of proportional side lengths. Must the two triangles be similar? (SSS similarity)



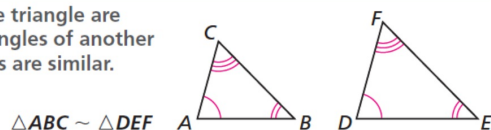
4.15 Tests for Similar Triangles

Objective: Students will develop and use the AAA, SAS, or SSS tests for similarity in triangles

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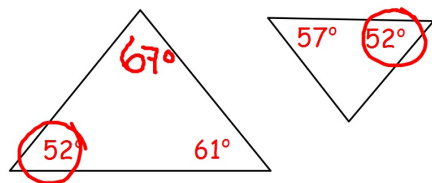
Theorem 4.3 AAA Similarity Theorem

If three angles of one triangle are congruent to three angles of another triangle, the triangles are similar.



Example 1 : Are the triangles similar?

No.



Developing Habits of Mind

Simplify. In a sense, the requirement that the three angles of one triangle be congruent to the three angles of the other triangle is too much.

The AAA test can actually be replaced by an AA test. Once you know the measures of two angles of a triangle, the measure of the third angle is completely determined, since the sum of the measures of the three angles of a triangle is 180° . Thus, you can rewrite the theorem as follows.

If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

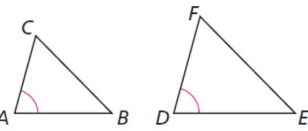


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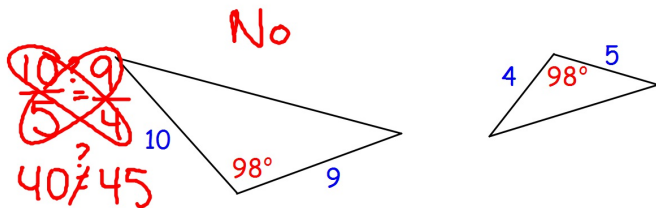
Theorem 4.4 SAS Similarity Theorem

If two triangles have two pairs of proportional side lengths and the included angles are congruent, the triangles are similar.

$$\frac{AC}{AB} = \frac{DF}{DE}; \angle A \cong \angle D \Rightarrow \triangle ABC \sim \triangle DEF$$



Example 2: Are the triangles similar?

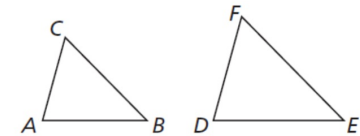


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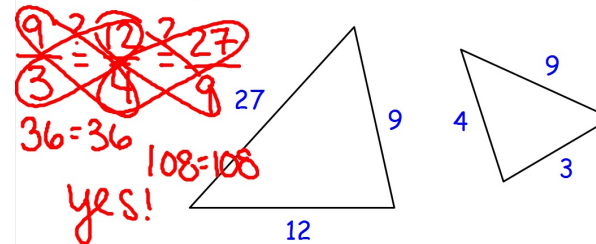
Theorem 4.5 SSS Similarity Theorem

If two triangles have all three pairs of side lengths proportional, the triangles are similar.

$$\frac{AC}{DF} = \frac{AB}{DE} = \frac{CB}{FE} \Rightarrow \triangle ABC \sim \triangle DEF$$



Example 3: Are the triangles similar?

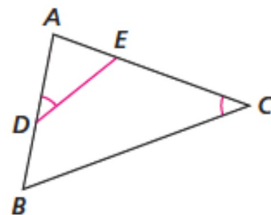


Check Your Understanding

6. **Standardized Test Prep** Suppose $\triangle ABC \sim \triangle FGH$. $AB = 10$ ft, $AC = 20$ ft, $BC = 25$ ft, and $\frac{AB}{FH} = 2.5$ ft. What is FG ?
- A. 4 ft B. 8 ft C. 10 ft D. 50 ft

7. The sides of a triangle have lengths 4, 5, and 8. Another triangle similar to it has one side of length 3. What are the lengths of its other two sides? Is more than one answer possible?
8. A triangle has sides of lengths 2, 3, and 4 inches. Another triangle similar to it has a perimeter of 6 inches. What are the side lengths of this triangle?

9. In the figure at the right, $\angle ADE \cong \angle ACB$. Explain why $\triangle ADE \sim \triangle ACB$.



Homework: Worksheet 4.14/4.15