

# 7-3

## Proving Triangles Similar



### Vocabulary

#### Review

Write the converse of each *theorem*.

1. If the diagonals of a parallelogram are perpendicular, then the parallelogram is a rhombus.

If \_\_\_\_\_,  
then \_\_\_\_\_.

2. If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.

If \_\_\_\_\_,  
then \_\_\_\_\_.

#### Vocabulary Builder

**verify** (verb) VEHR uh fy

**Related Word:** proof (noun)

**Definition:** To **verify** something means to find the truth or accuracy of it.

**Math Usage:** A proof is a way to **verify** a conjecture or statement.

#### Use Your Vocabulary

Write T for *true* or F for *false*.

3. You can *verify* that two triangles are similar by showing that corresponding angles are proportional.
4. You can use properties, postulates, and previously proven *theorems* to *verify* steps in a proof.

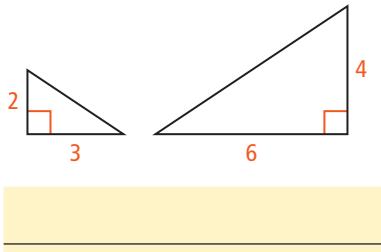
**Key Concept** Postulate 7-1, Theorem 7-1, Theorem 7-2

**Postulate 7-1 Angle-Angle Similarity (AA ~) Postulate** If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

**Theorem 7-1 Side-Angle-Side Similarity (SAS ~) Theorem** If an angle of one triangle is congruent to an angle of a second triangle, and the sides that include the two angles are proportional, then the triangles are similar.

**Theorem 7-2 Side-Side-Side Similarity (SSS ~) Theorem** If the corresponding sides of two triangles are proportional, then the triangles are similar.

5. Write the postulate or theorem that proves the triangles similar.



\_\_\_\_\_

\_\_\_\_\_



**Problem 1** Using the AA ~ Postulate

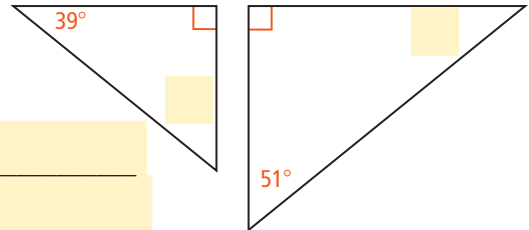
**Got It?** Are the two triangles similar? How do you know?

6. Complete the diagram.
7. Are the triangles similar? Explain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Problem 2** Verifying Triangle Similarity

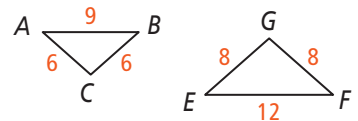
**Got It?** Are the triangles similar? If so, write a similarity statement for the triangles and explain how you know the triangles are similar.

8. Write ratios for each pair of corresponding sides.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



9. Circle the postulate or theorem you can use to verify that the triangles are similar.

AA ~ Postulate      SAS ~ Theorem      SSS ~ Theorem

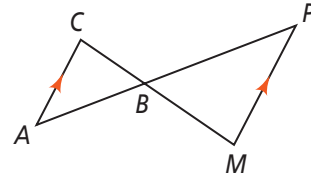
10. Complete the similarity statement.

$\triangle ABC \sim \triangle$  \_\_\_\_\_



### Problem 3 Proving Triangles Similar

**Got It?** Given:  $\overline{AC} \parallel \overline{MP}$  Prove:  $\triangle ABC \sim \triangle PBM$



11. The proof is shown below. Write a reason from the box for each statement.

AA ~ Postulate  
Given  
Vertical angles are congruent.

Statements	Reasons
1) $\overline{AC} \parallel \overline{MP}$	1) _____
2) $\angle A \cong \angle P$	2) If parallel lines are cut by a transversal, alternate interior angles are congruent.
3) $\angle ABC \cong \angle PBM$	3) _____
4) $\triangle ABC \sim \triangle PBM$	4) _____



### Problem 4 Finding Lengths in Similar Triangles

**Got It? Reasoning** Why is it important that the ground be flat to use the method of indirect measurement illustrated in the problem below? Explain.

Before rock climbing, Darius wants to know how high he will climb. He places a mirror on the ground and walks backward until he can see the top of the cliff in the mirror.



12. If the ground is NOT flat, will  $\angle HTV$  and  $\angle JSV$  be right angles? Yes / No
13. If the ground is NOT flat, will you be able to find congruent angles? Yes / No
14. Why is it important that the ground be flat? Explain.

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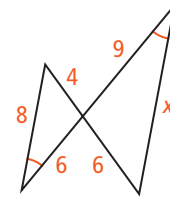


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## Lesson Check • Do you UNDERSTAND?

**Error Analysis** Which solution for the value of  $x$  in the figure at the right is *not* correct? Explain.



A.

$$\begin{aligned}\frac{4}{8} &= \frac{8}{x} \\ \frac{4x}{8} &= \frac{8x}{x} \\ 4x &= 72 \\ x &= 18\end{aligned}$$

B.

$$\begin{aligned}\frac{8}{x} &= \frac{4}{6} \\ \frac{8x}{x} &= \frac{4x}{6} \\ 48 &= 4x \\ 12 &= x\end{aligned}$$

15. Write the side lengths of the triangles.

Triangle	Shortest Side	Longest Side	Third Side
Larger	6	<input type="text"/>	<input type="text"/>
Smaller	<input type="text"/>	<input type="text"/>	<input type="text"/>

16. Write ratios to compare the lengths of the corresponding sides.

shortest sides:

longest sides:

third sides:

17. Cross out the proportion that does NOT show ratios of corresponding sides.

$$\frac{9}{6} = \frac{6}{4}$$

$$\frac{9}{4} = \frac{x}{8}$$

$$\frac{x}{8} = \frac{6}{4}$$

$$\frac{x}{8} = \frac{9}{6}$$

18. Cross out the solution that does NOT show ratios of corresponding sides.

Solution A

Solution B

19. Explain why the solution you crossed out does NOT show the correct value of  $x$ .



## Math Success

Check off the vocabulary words that you understand.

indirect measurement

similar triangles

Rate how well you can *prove triangles similar*.

