

## Objectives

In this lesson, you will:

- Understand the relationship between similarity and congruence.
- Identify corresponding angles and corresponding sides in congruent polygons.
- Determine whether two polygons are congruent.
- Find unknown measures in polygons.

## Key Terms

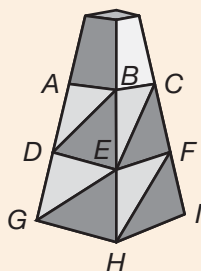
- corresponding angles
- corresponding sides
- congruent



**SCENARIO** Glass lanterns can be used outdoors to light pathways or indoors as decorative elements. One style of glass lantern, often called a Moroccan lantern, is made of a metal frame that encloses colored pieces of glass that are usually in the shapes of polygons.

### Problem 1 Lighting the Way

A simple Moroccan lantern is shown below.



- A. In the figure above,  $\triangle DAB \sim \triangle GDE$ . Name the pairs of corresponding angles and name the pairs of corresponding sides.

How do the lengths of the sides in a pair of corresponding sides compare, and how do the measures of the angles in a pair of corresponding angles compare? Use complete sentences in your answer.

What do you know about the ratios of the lengths of the corresponding sides of the triangles? Use a complete sentence in your answer.

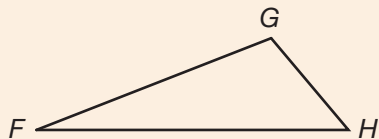
## Problem 1 Lighting the Way

- B. In the figure on the previous page,  $\triangle GDE \cong \triangle HEF$ . Name the pairs of corresponding angles, and name the pairs of corresponding sides.

How do the lengths of the sides in a pair of corresponding sides compare, and how do the measures of the angles in a pair of corresponding angles compare? Use complete sentences in your answer.

What do you know about the ratios of the lengths of the corresponding sides of the triangles? Use a complete sentence in your answer.

- C. Consider  $\triangle FGH$  below.



If you were to create a triangle that is similar to  $\triangle FGH$ , how would the triangles be alike? How would the triangles be different? Use complete sentences in your answer.

If you were to create a triangle that is congruent to  $\triangle FGH$ , how would the triangles be alike? How would the triangles be different? Use complete sentences in your answer.

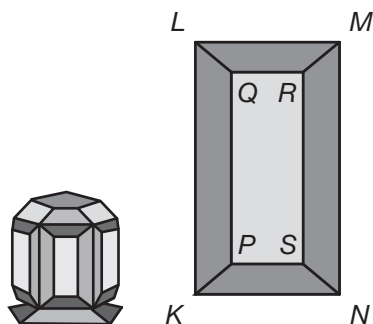


- D. How are similar and congruent figures related? Explain your reasoning. Use complete sentences in your answer.

## Investigate Problem 1



1. The figure on the right shows one side of the Moroccan lantern on the left.



The opposing trapezoids that surround the rectangle in the figure on the right are congruent. For each pair of trapezoids, use symbols to write a statement that says that the two trapezoids are congruent.

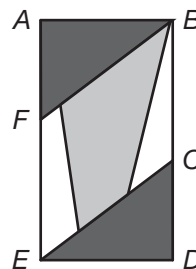
List the corresponding angles and the corresponding sides of each pair of congruent trapezoids.

Suppose that in trapezoid  $LQRM$  and trapezoid  $KPSN$   $m\angle Q = 132^\circ$ ,  $m\angle K = 48^\circ$ ,  $\angle Q \cong \angle R$ , and  $\angle K \cong \angle N$ . Determine the unknown angle measures of these trapezoids. Explain your reasoning. Use complete sentences in your answer.

Suppose that  $KL = 15$  centimeters,  $RS = 11$  centimeters, and the height of trapezoid  $KPQL$  is 2 centimeters. Find the area of trapezoid  $KPQL$ . Show all your work and use a complete sentence to explain how you found your answer.

## Investigate Problem 1

2. The glass portion of a side of a different Moroccan lantern is shown at the right. Triangle  $ABF$  and  $\triangle DEC$  are right triangles. Suppose that  $AB = 12$  centimeters,  $BF = 15$  centimeters,  $m\angle ABF = 37^\circ$ ,  $CD = 9$  centimeters,  $DE = 12$  centimeters, and  $m\angle DCE = 53^\circ$ . Determine whether the triangles are congruent. Show all your work and use a complete sentence to explain your reasoning.



3. The glass side in one more Moroccan lantern design is shown below. All of the triangles in the design are isosceles triangles. Suppose that  $m\angle VXW = 70^\circ$ . What must the measure of  $m\angle XYZ$  be in order for  $\triangle VXW \cong \triangle YXZ$ ? Use complete sentences to explain your reasoning.

