



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Student Exploration: Similar Figures

**Vocabulary:** image, preimage, scale factor, similar

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

Amy has a picture that is 6 inches wide by 4 inches tall. She takes the picture to a photo store and asks them to enlarge the picture so that it is 8 inches tall.

1. What are the dimensions of the enlarged picture? \_\_\_\_\_

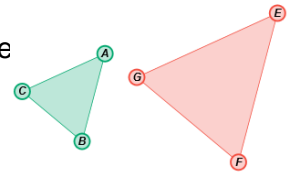
2. Will the enlarged picture fit in an 8-inch by 10-inch frame? \_\_\_\_\_ Explain. \_\_\_\_\_


\_\_\_\_\_

### Gizmo Warm-up

In the *Similar Figures* Gizmo, you will experiment with **similar** figures.

Similar figures have the same shape, but are not necessarily the same size



1. Click the triangle button (  ). Set **Scale factor** to 1.0 and **Rotation, in degrees** to 0. (To set the value of a slider, drag the slider or select the number in the text field, type in a new value, and hit **Enter**.)

A. Do the pink and green triangles appear to be the same size and shape? \_\_\_\_\_

B. These triangles are congruent. What is true about corresponding side lengths and angle measures of congruent triangles? \_\_\_\_\_

Select **Show lengths** and then **Show angle measures** to check.

C. Drag the **Rotation, in degrees** slider. Are the triangles still congruent? \_\_\_\_\_

2. Set **Rotation, in degrees** to 0. Drag the **Scale factor** slider. Notice that the size of  $\triangle EFG$  (the **image**) changes, but  $\triangle ABC$  (the **preimage**) stays the same.

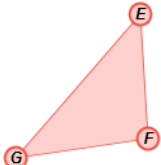
A. How do the image and preimage compare when the scale factor is greater than one?

\_\_\_\_\_

B. How do the image and preimage compare when the scale factor is less than one?

\_\_\_\_\_



<b>Activity A:</b> <b>Similar polygons</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>Set the <b>Scale factor</b> to 3.0 and <b>Rotation, in degrees</b> to 0.</li> </ul>	
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1. Make sure the triangle button (  ) is selected.

A. Similar figures have pairs of corresponding angles and pairs of corresponding sides, just like congruent figures. Name the part of  $\triangle EFG$  that corresponds to each of the following parts of  $\triangle ABC$ .

$\angle ABC$  and \_\_\_\_\_       $\angle BCA$  and \_\_\_\_\_       $\angle CAB$  and \_\_\_\_\_

$\overline{AB}$  and \_\_\_\_\_       $\overline{BC}$  and \_\_\_\_\_       $\overline{CA}$  and \_\_\_\_\_

B. Turn on **Show angle measures**. What is true about the measures of the corresponding angles of these similar triangles? \_\_\_\_\_

C. Select **Show lengths**. Find the ratio of the measures of each pair of corresponding sides in simplest form.

$$\frac{EF}{AB} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = \underline{\phantom{00}} \quad \frac{FG}{BC} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = \underline{\phantom{00}} \quad \frac{GE}{CA} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = \underline{\phantom{00}}$$

D. Compare the simplest forms of the ratios to each other and to the **scale factor**. What do you notice? \_\_\_\_\_

E. Drag the **Rotation, in degrees** slider. Do the triangles remain similar? \_\_\_\_\_

Explain. \_\_\_\_\_

\_\_\_\_\_

2. Experiment more with similar triangles by dragging the vertices of either triangle to reshape.

A. Select **Show angle measures**. What is true about the measures of the corresponding angles? \_\_\_\_\_


B. Select **Show lengths**. What is true about the lengths of the corresponding sides?

\_\_\_\_\_

**(Activity A continued on next page)**



**Activity A (continued from previous page)**

3. Select the  button to change the figures to quadrilaterals. Experiment with a variety of similar quadrilaterals by changing the scale factor and rotation, and dragging their vertices.

A. Select **Show angle measures**. What do you notice? \_\_\_\_\_

\_\_\_\_\_

B. Select **Show lengths**. What do you notice? \_\_\_\_\_

\_\_\_\_\_


4. Use the buttons at the top left of the Gizmo to explore other types of figures. For each type, create a variety of figures, and vary the scale factor and rotation.

A. What do you notice about the angle measures? \_\_\_\_\_

\_\_\_\_\_

B. What do you notice about the side lengths? \_\_\_\_\_

\_\_\_\_\_

5. Select the  button to view two similar trapezoids. With **Show lengths** selected, drag the vertices of trapezoid  $ABCD$  so that  $AB = 16$ ,  $BC = 12$ ,  $CD = 20$ , and  $DA = 12$ .

A. If  $EF = 8$ , what is the scale factor? \_\_\_\_\_ Explain. \_\_\_\_\_

\_\_\_\_\_

- B. Use the scale factor from above to find the lengths of the other three sides of trapezoid  $EFGH$ . Show your work in the space below. Then check your answers in the Gizmo by setting the **Scale factor** to the value you calculated above.

$$FG = \underline{\hspace{2cm}}$$

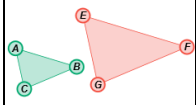
$$GH = \underline{\hspace{2cm}}$$

$$HE = \underline{\hspace{2cm}}$$

- C. If you know the measures of the angles of trapezoid  $ABCD$ , how do you find the measures of the angles of trapezoid  $EFGH$ ? \_\_\_\_\_

\_\_\_\_\_

Select **Show angle measures** and check your answer in the Gizmo.

<b>Activity B:</b> <b>Using similar polygons</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Be sure the triangle button is selected.</li> </ul>	
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- State whether each statement is always, sometimes, or never true. Then explain your answer, and check it in the Gizmo.
  - Congruent triangles are similar. \_\_\_\_\_  
 \_\_\_\_\_
  - Equilateral triangles are similar. \_\_\_\_\_  
 \_\_\_\_\_
  - Isosceles triangles are similar. \_\_\_\_\_  
 \_\_\_\_\_
  - Triangles with three pairs of congruent corresponding angles are similar. \_\_\_\_\_  
 \_\_\_\_\_
  
- Ken wants to find the height of a building, but realizes that the building is too tall to measure directly. He decides to have a friend measure his shadow and the shadow of the building.
  - Ken is 6 feet tall and his shadow is 10 feet long. The shadow of the building is 25 feet long. Make a sketch of this situation in the space at right.
  - How can Ken use similar triangles to find the height of the building? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  - Find the height of the building. Show your work in the space to the right. Then check your answer in the Gizmo.  
  
 Building height = \_\_\_\_\_