

Day 1 – Dilations and Scale Factor

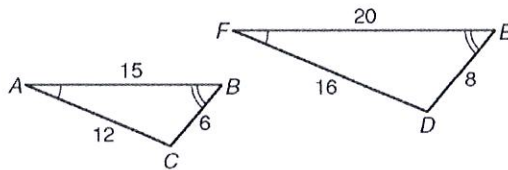
Ratios in Similar Polygons

1. A similarity ratio is the ratio of the lengths of the corresponding sides of two similar polygons.
2. Two polygons are similar if and only if their corresponding angles are congruent and their corresponding sides are proportional.
3. Figures that are similar have the same shape but not necessarily the same size.
4. We denote similarity with the symbol: ~.

Use the figure for Exercises 4 and 5. The triangles are similar.

4. Name the pairs of congruent angles.

$\angle A \cong \angle F$
 $\angle B \cong \angle E$
 $\angle C \cong \angle D$



5. Write the corresponding side lengths in the proportion.

$$\frac{AB}{FE} = \frac{CB}{DE} = \frac{AC}{FD}$$

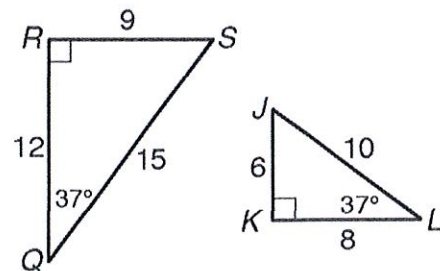
Use the figure to the right for Exercises 6 and 7. The triangles are similar.

6. Circle the correct similarity statement.

$\triangle QRS \sim \triangle KJL$ $\triangle RSQ \sim \triangle KJL$ $\triangle QSR \sim \triangle LKJ$

7. Write the corresponding side lengths in the proportion.

$$\frac{RS}{KJ} = \frac{RQ}{KL} = \frac{SQ}{JL}$$

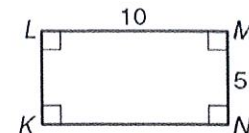
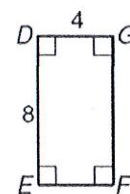


Use the figure to the right for Exercise 8.

8. Substitute numbers for the side lengths and reduce each ratio to simplest form.

$$\frac{DG}{MN} = \frac{4}{5}$$

$$\frac{DE}{LM} = \frac{8}{10} = \frac{4}{5}$$



Dilations and Scale Factor

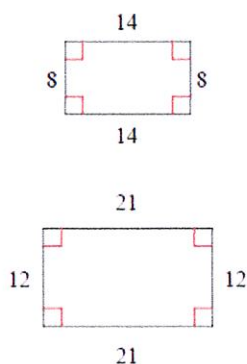
A **dilation** is a proportional enlargement or reduction of a figure through a point called the center of dilation. The size of the enlargement or reduction is called the **scale factor** (the ratio of corresponding sides).

- If the dilated image is larger than the original figure, then the scale factor is greater than 1. This is called an enlargement.
- If the dilated image is the same as the original, then the scale factor is 1. The figures are congruent.
- If the dilated image is smaller than the original figure, then the scale factor is less than 1. This is called a reduction.

A figure and its dilated image are always **similar**. Similar figures will always have the same angle measures, but their side lengths will be different (will remain proportional to each other). **This means dilations do not preserve congruency.** If two figures are congruent, they are also similar.

If two polygons are similar, then the ratio of the lengths of the two corresponding sides is the scale factor.

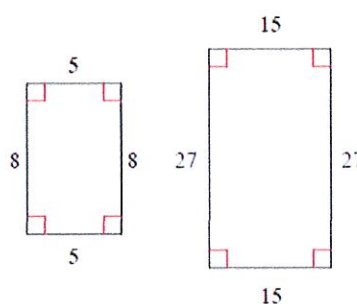
Practice: Determine if the following figures are similar.



$$\frac{8}{12} = \frac{14}{21}$$

$$\frac{2}{3} = \frac{2}{3} \checkmark$$

similar



$$\frac{5}{15} = \frac{8}{27}$$

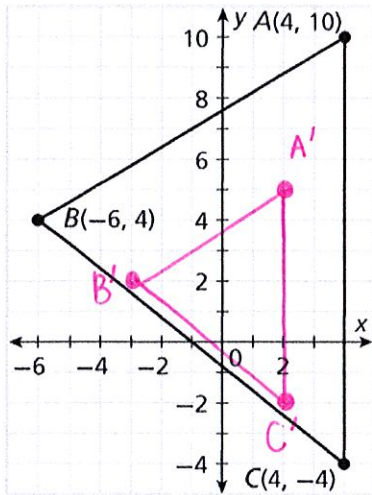
$$\frac{1}{3} \neq \frac{8}{27}$$

NOT similar

Practice: Apply the dilation D to the polygon with the given vertices. Name the coordinates of the image points. Identify and describe the transformation as an enlargement or reduction.

$$9. D(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$$

$A(4, 10)$, $B(-6, 4)$, and $C(4, -4)$



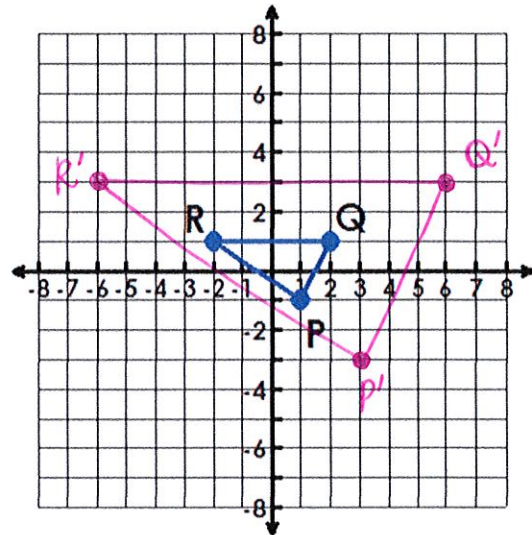
A' $(2, 5)$, B' $(-3, 2)$, and C' $(2, -2)$

This shape is a/n reduction.

The scale factor is $\frac{1}{2}$.

$$10. D(x, y) \rightarrow (3x, 3y)$$

$P(1, -1)$, $Q(2, 1)$, $R(-2, 1)$



P' $(3, -3)$, Q' $(6, 3)$, and R' $(-6, 3)$

This shape is a/n enlargement.

The scale factor is 3.