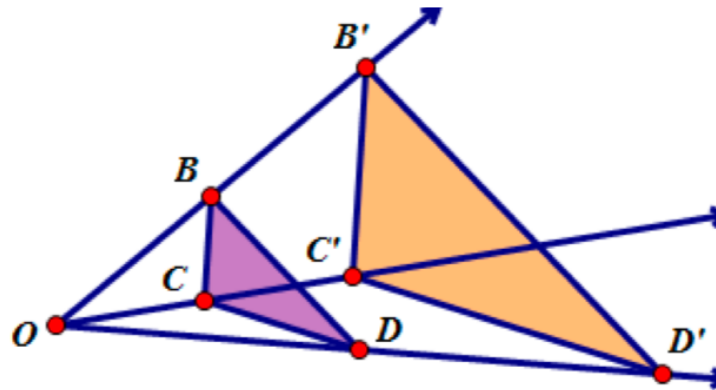


## Dilation - Notes

A **dilation** is a transformation that produces an image that is the same \_\_\_\_\_ as the original but a \_\_\_\_\_ size.



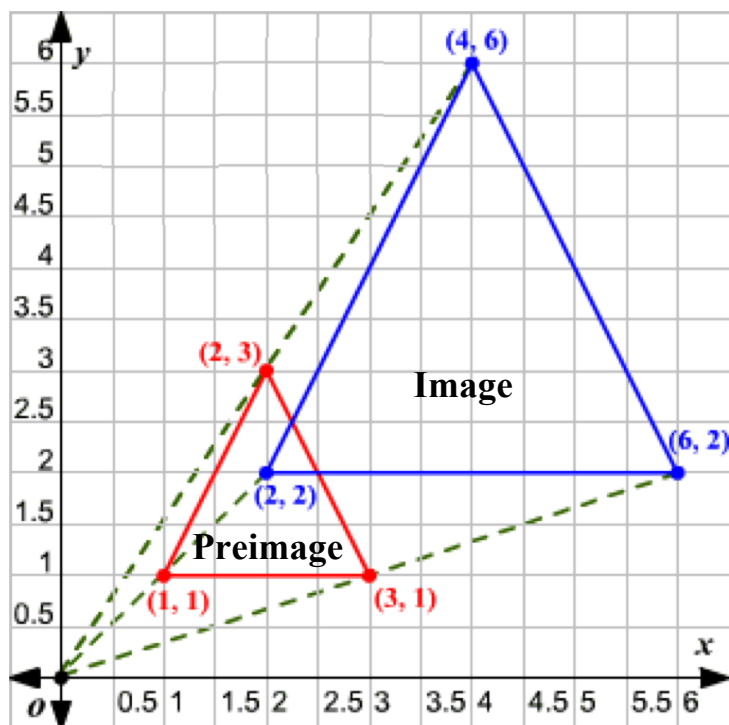
### Rules for Dilations:

- Dilations are centered around the origin (0, 0) unless otherwise stated.
- The image and the preimage are \_\_\_\_\_.
- Dilations involve a \_\_\_\_\_ factor.

### Scale Factors:

- Scale factor is:  $\frac{\text{image length}}{\text{pre-image length}}$  which is a \_\_\_\_\_.
- If the scale factor is greater than 1, the figure becomes \_\_\_\_\_.
- If the scale factor is between 0 and 1, the figure becomes \_\_\_\_\_.

**Example 1:** How can we calculate the scale factor?



Let's compare the lengths of the base of each triangle:

$$\frac{\text{image length}}{\text{pre-image length}} = \underline{\hspace{2cm}} =$$

Let's look at what is happening to each point that is dilated:

$$(1, 1) \rightarrow (2, 2)$$

$$(2, 3) \rightarrow (4, 6)$$

$$(3, 1) \rightarrow (6, 2)$$

The rule for dilations is:

$$(x, y) \rightarrow (fx, fy) \text{ where } f \text{ represents the } \underline{\hspace{4cm}}.$$

If the scale factor is 3, how would you write the rule?

$$(x, y) \rightarrow ( \quad , \quad )$$

**Example 2:**

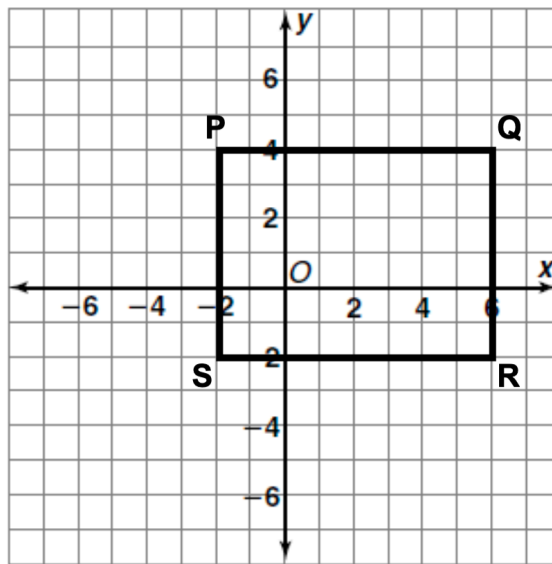
Triangle ABC has vertices A (0, 2), B (4, 4), and C (-1, 4). What are the vertices of its image with a scale factor of 4?

**Example 3:**

Quadrilateral PQRS has vertices P (-2, 4), Q (6, 4), R (6, -2), and S (-2, -2). It is dilated by a scale factor of 1/2.

a. What are the coordinates of the image (after dilation)? Graph them.

P' (     ,     )     Q' (     ,     )     R' (     ,     )     S' (     ,     )



b. Demonstrate these quadrilaterals are similar by comparing the ratios of the lengths.

$$\frac{P'Q'}{PQ} = \quad \frac{Q'R'}{QR} = \quad \frac{R'S'}{RS} = \quad \frac{S'P'}{SP} =$$

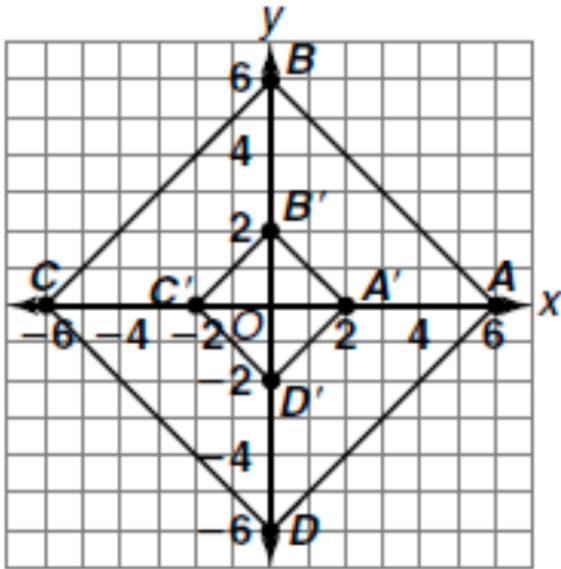
c. What do you notice about the angle measurements of the two figures?

**Example 4:**

If the scale factor is  $\frac{5}{2}$ , how would you write the general rule? Is this an enlargement or a reduction?

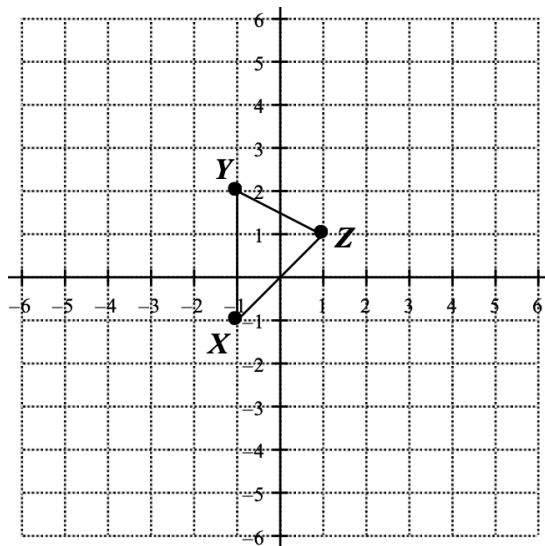
**Example 5:**

Quadrilateral  $A'B'C'D'$  is a dilation of quadrilateral  $ABCD$ . Find the scale factor. Classify the dilation as an enlargement or a reduction.



**Example 6:**

$\triangle XYZ$  is graphed below. Draw and label  $\triangle X'Y'Z'$  after a dilation with scale factor of two.



What will be the coordinates of point  $Y''$  after a reflection of  $\triangle X'Y'Z'$  over the x-axis?