

# Chapter 4

# Transformations



4.1 - Translations

4.2 - Reflections

4.3 - Rotations

4.4 - Congruence and Transformations

**4.5 - Dilations**

4.6 - Similarity and Transformations

# 4.5 - Dilations

## Vocabulary

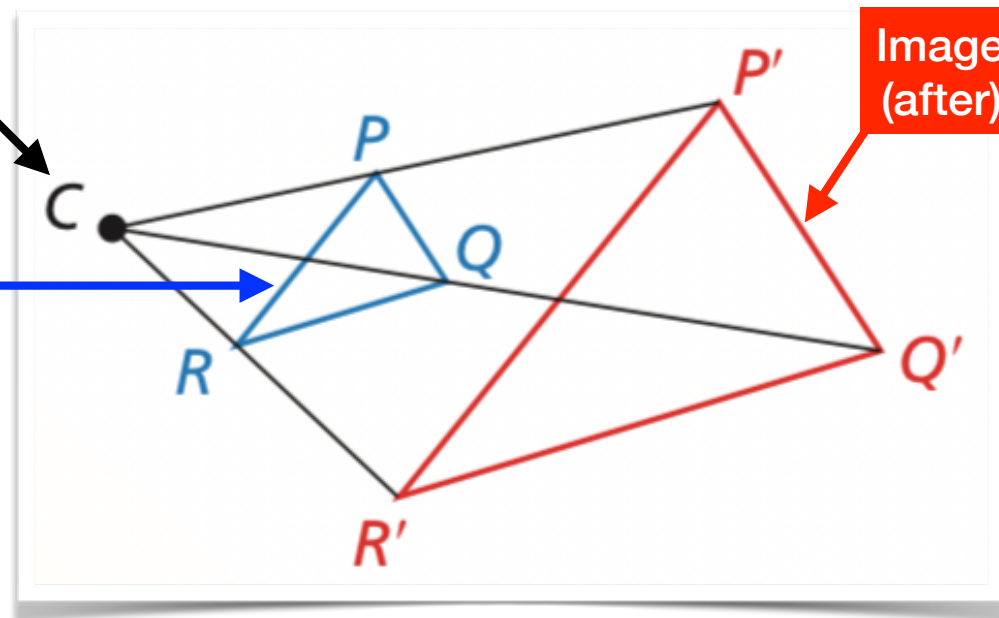
### Dilation

a transformation in which a figure is enlarged or reduced with respect to a fixed point  $C$

Dilation is not a rigid motion! Why?

Center of  
Dilation

Pre-image  
(before)

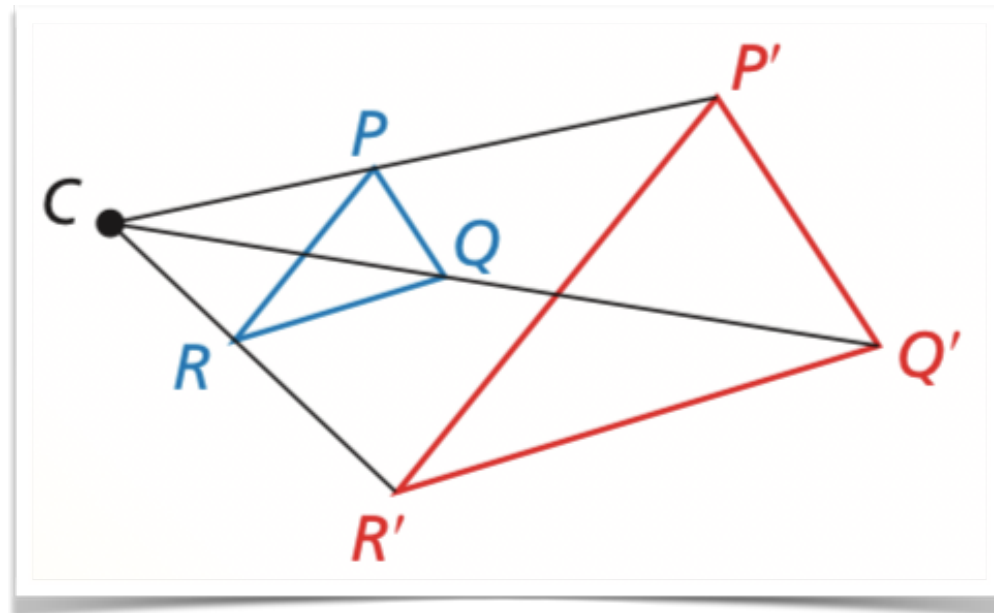


# 4.5 - Dilations

## Definition:

A dilation with **center of dilation**  $C$  and **scale factor**  $k$  maps every point  $P$  in a figure to a point  $P'$  so that the following are true.

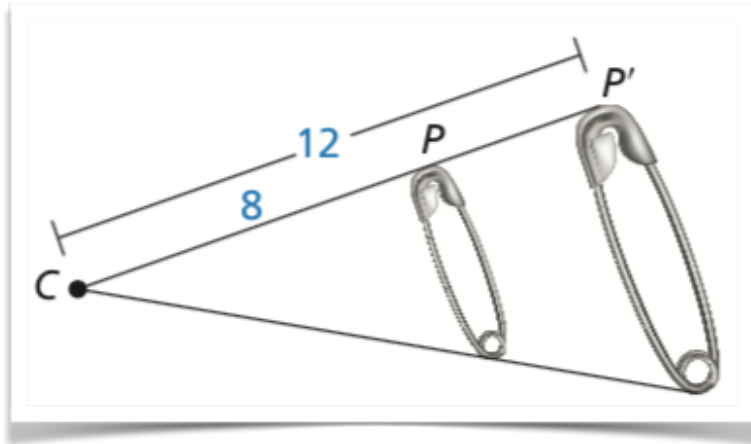
- If  $P$  is the center point  $C$ , then  $P = P'$ .
- If  $P$  is not the center point  $C$ , then the image point  $P'$  lies on  $\overrightarrow{CP}$ . The scale factor  $k$  is a positive number such that  $k = \frac{CP'}{CP}$ .
- Angle measures are preserved.



# 4.5 - Dilations

## Scale Factor

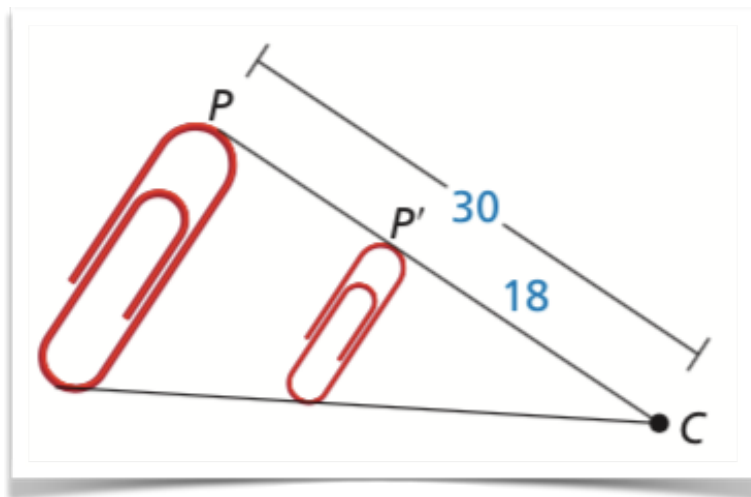
When scale factor  $k > 1$ , the dilation is an **enlargement**.



$$k = \frac{12}{8} = \frac{3}{2}$$

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When scale factor  $0 < k < 1$ , the dilation is a **reduction**.



$$k = \frac{18}{30} = \frac{3}{5}$$

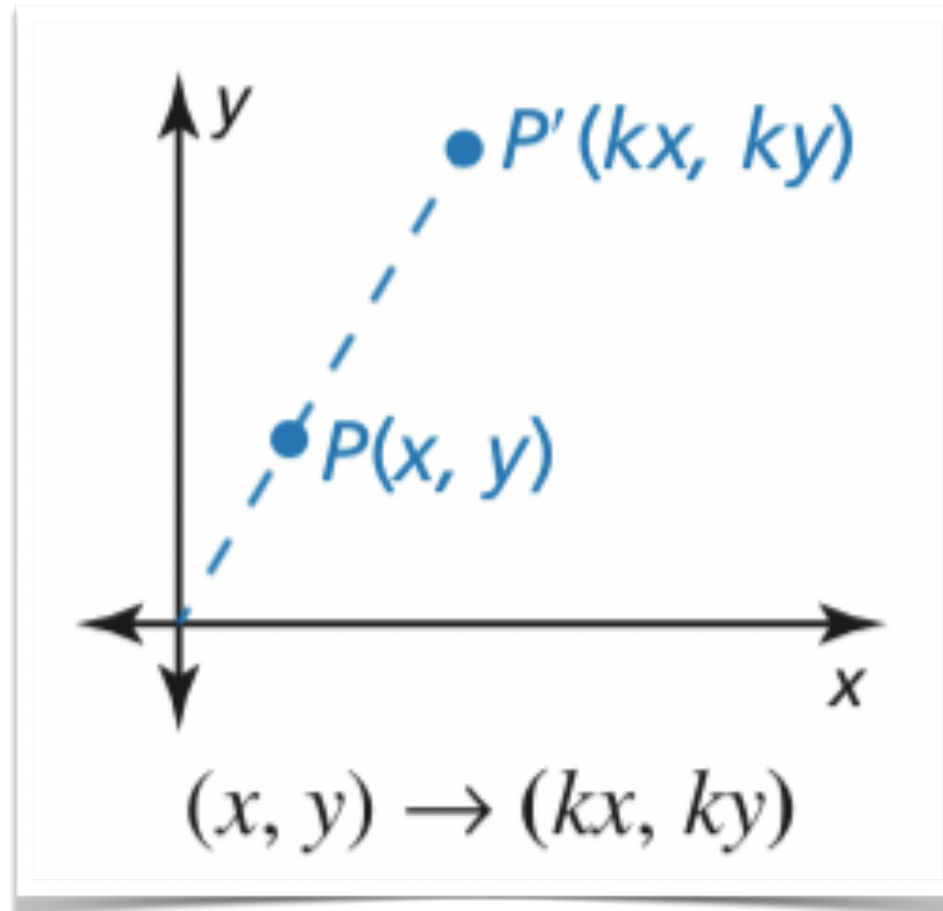
# 4.5 - Dilations

## Rule of Dilation

Rule of Dilations

$$(x, y) \rightarrow (kx, ky)$$

In which **k** is the scale factor.

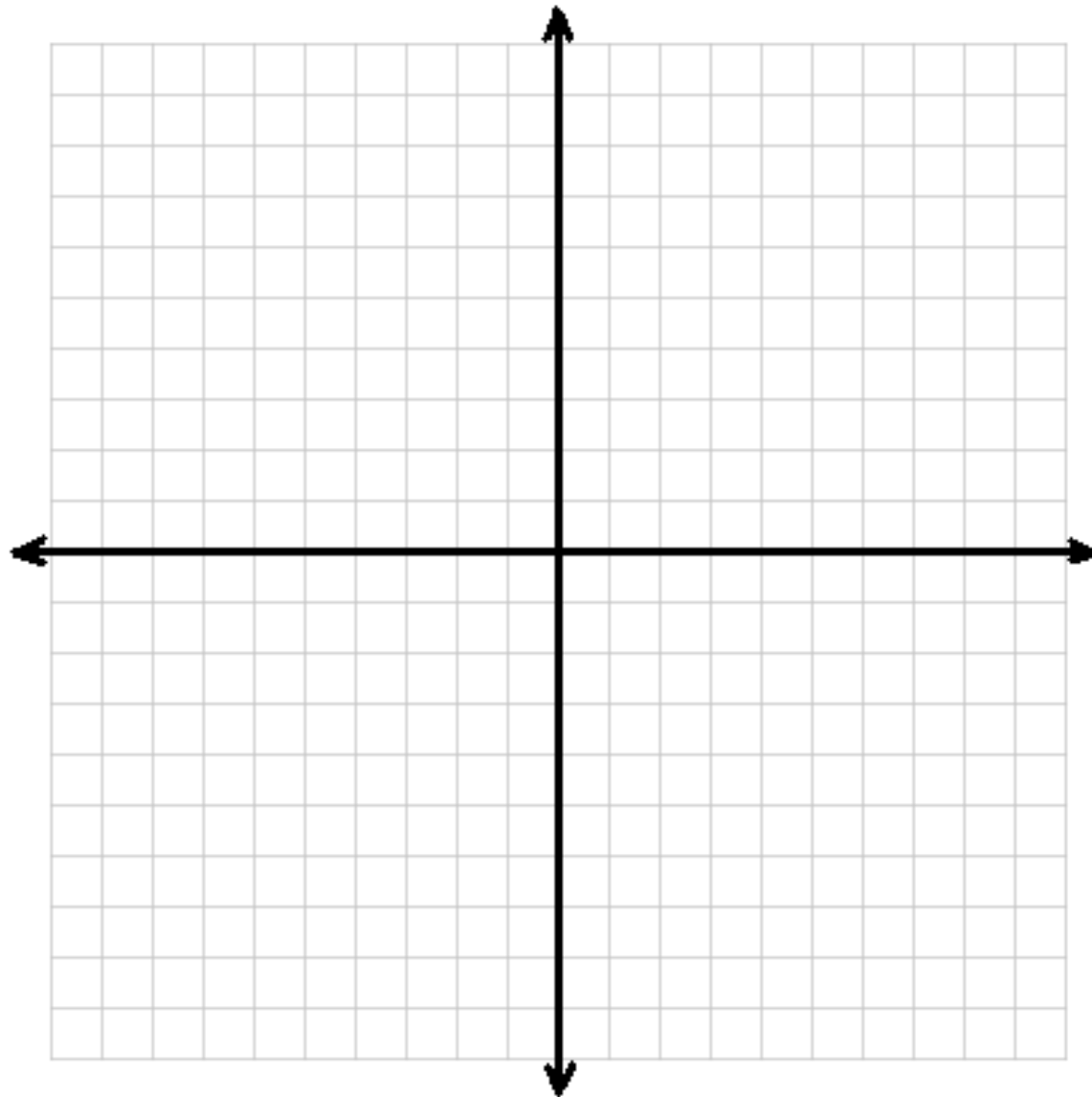


# 4.5 - Dilations

## Graph dilation:

Pre-image is  $K(-3, 6)$ ,  $L(0, 6)$ ,  $M(3, 3)$ , and  $N(-3, -3)$ .

Scale factor  $k = \frac{1}{3}$

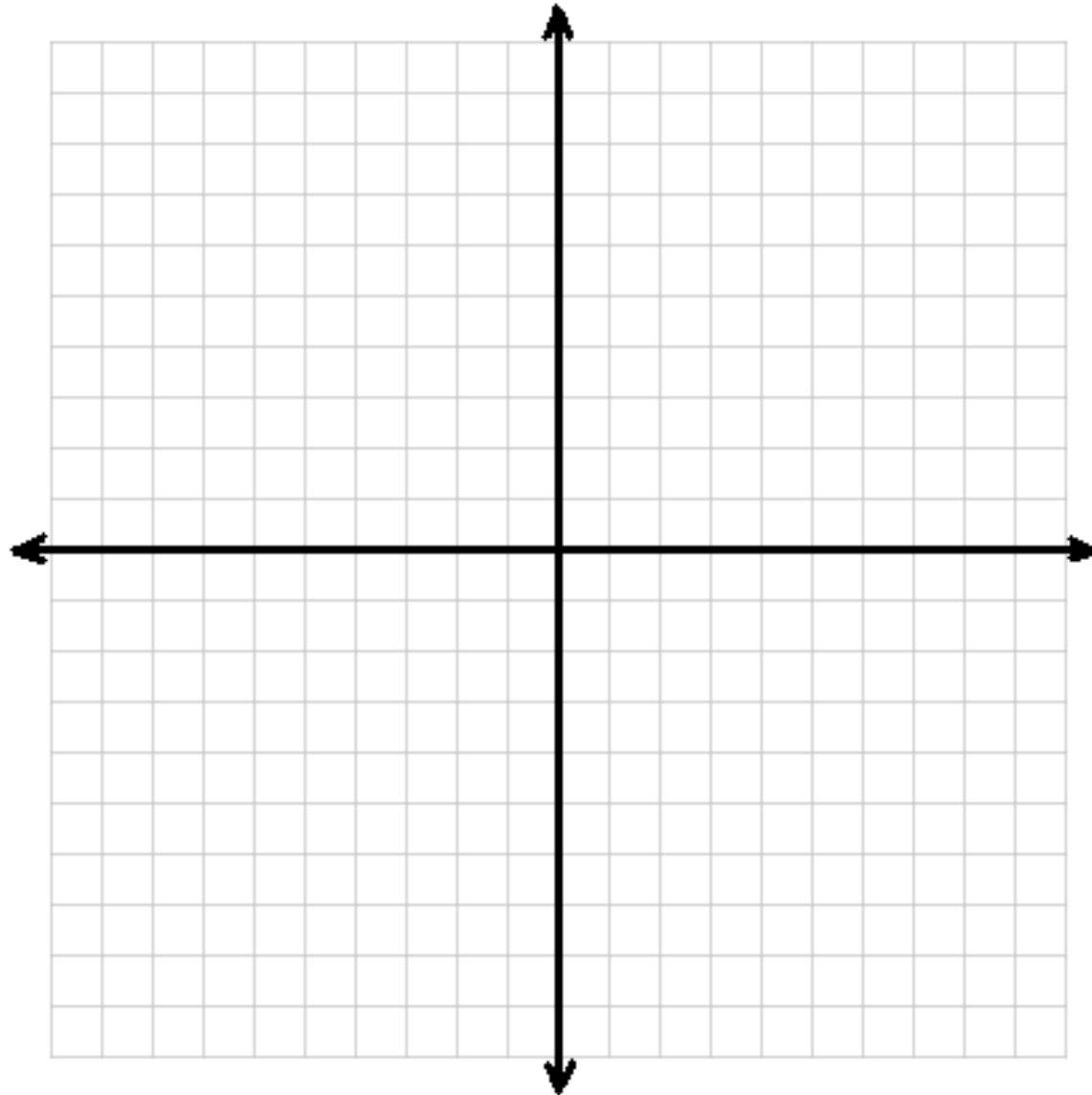


# 4.5 - Dilations

## Graph dilation:

Pre-image is  $F(-4, -2)$ ,  $G(-2, 4)$ , and  $H(-2, -2)$

Scale factor  $k = -\frac{1}{2}$



# 4.5 - Dilations

## Problem solving:

You are using a magnifying glass that shows the image of an object that is six times the object's actual size.

Determine the length of the image of the spider seen through the magnifying glass.

