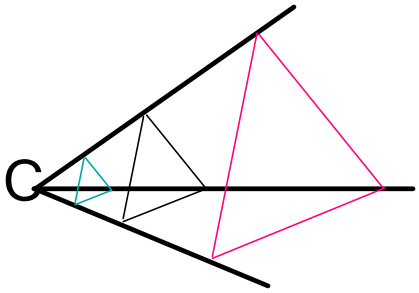
6.6 Dilations

A dilation is a nonrigid transformation that reduces or enlarges. The image and preimage are similar but not congruent.

The scale factor (k) is a positive number such that:

- If $0 < k < 1$, the dilation is a reduction.
- If $k > 1$, the dilation is an enlargement.

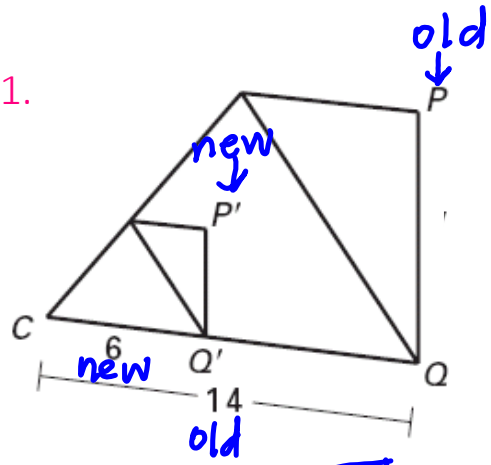


To determine the scale factor if it is not given, divide a segment from the image by a segment from the preimage.

$SF = \frac{\text{new}}{\text{old}}$

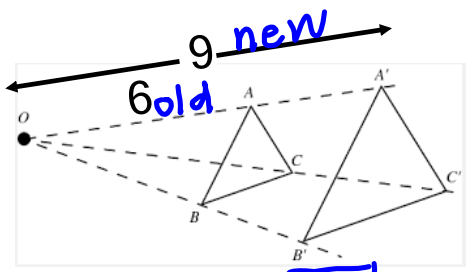
Example: Find the scale factor of each dilation.

1.



$SF = \frac{6}{14} = \boxed{\frac{3}{7}}$

2.



$SF = \frac{9}{6} = \boxed{\frac{3}{2}}$

Example: Find the coordinates of the vertices of each figure after the given transformation and graph.

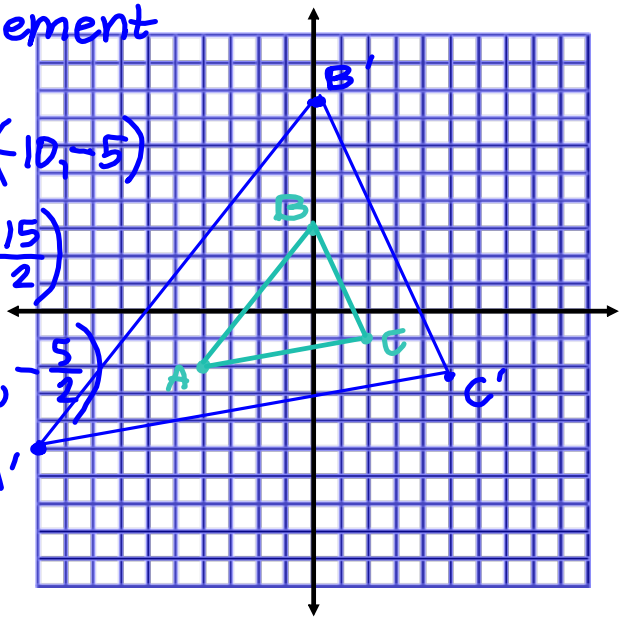
dilation of $\frac{5}{2}$ enlargement

A(-4,-2), B(0,3), C(2,-1)

$A'\left(\frac{5}{2}\cdot -4, \frac{5}{2}\cdot -2\right) \rightarrow (-10,-5)$

$B'\left(\frac{5}{2}\cdot 0, \frac{5}{2}\cdot 3\right) \rightarrow \left(0, \frac{15}{2}\right)$

$C'\left(\frac{5}{2}\cdot 2, \frac{5}{2}\cdot -1\right) \rightarrow \left(5, -\frac{5}{2}\right)$



Example: Find the coordinates of the vertices of each figure after the given transformation and graph.

dilation of $\frac{1}{2}$ ← reduction

A(8,6), B(-4,10), C(0,-7)

$A'\left(\frac{1}{2}\cdot 8, \frac{1}{2}\cdot 6\right) \rightarrow (4,3)$

$B'\left(\frac{1}{2}\cdot -4, \frac{1}{2}\cdot 10\right) \rightarrow (-2,5)$

$C'\left(\frac{1}{2}\cdot 0, \frac{1}{2}\cdot -7\right) \rightarrow \left(0, -\frac{7}{2}\right)$