9.7 Identify and Perform Dilations

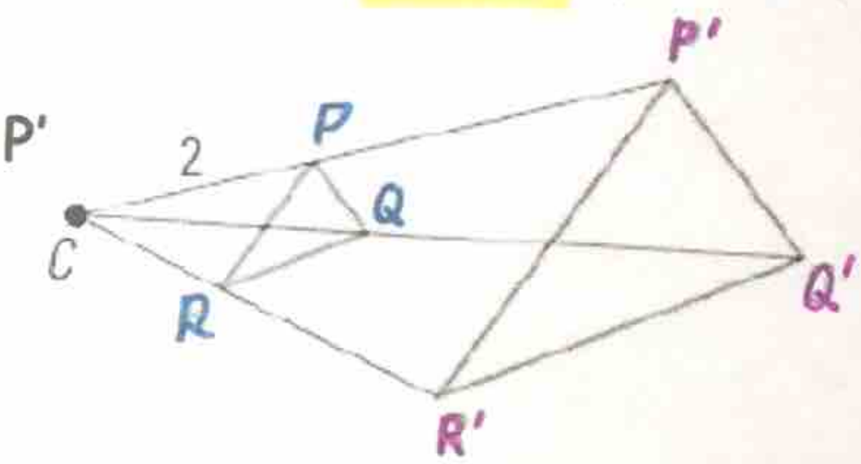
dilation - transformation in which the original figure and its image are similar

A dilation with center **C** and scale factor **k** maps every point **P** in a figure to a point **P'** so that one of the following statements is true:

- 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 $k = \frac{CP'}{CP}$ $\left(k = \frac{\text{new}}{\text{old}}\right)$

  and $k \neq 1$, or
- If **P** is the center point **C**, then **P** = **P'**



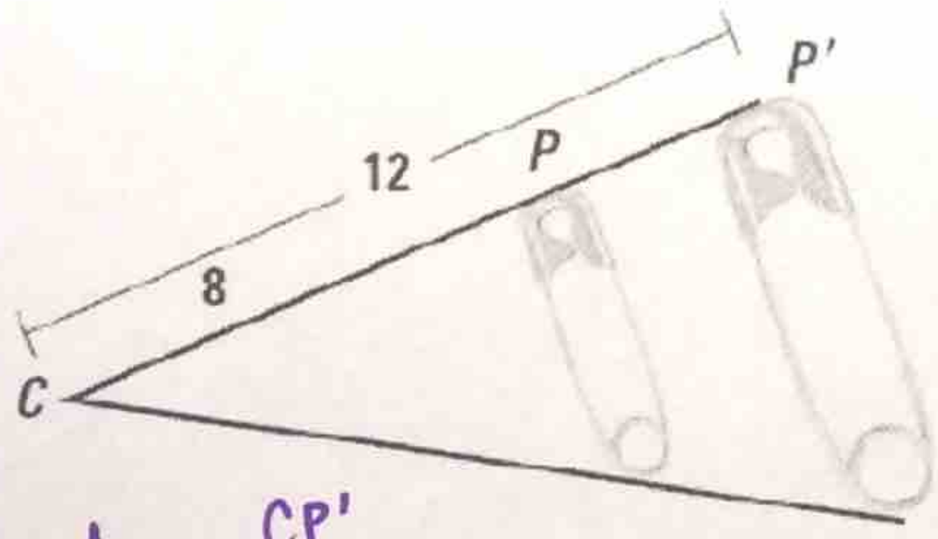
The dilation is a....

reduction if $0 < k < 1$

enlargement if $k > 1$

Ex 1: Find the scale factor of the dilation. Then tell whether the dilation is a reduction or an enlargement.

a.

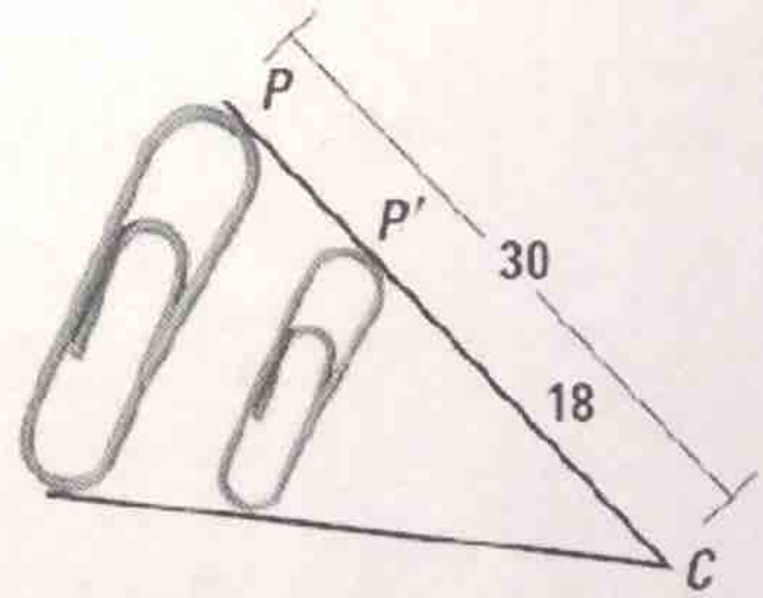


$k = \frac{CP'}{CP}$

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

$\boxed{k = \frac{3}{2}}$ $\boxed{\text{enlargement}}$

b.

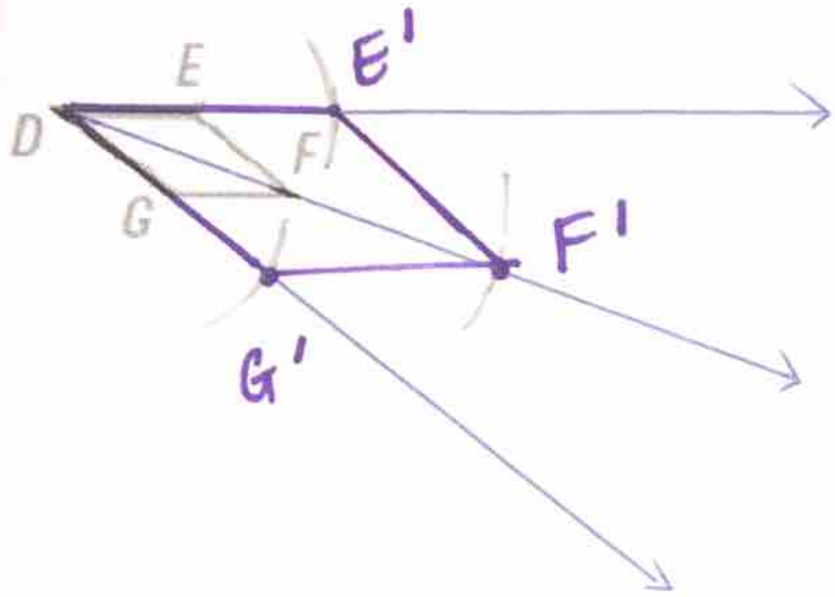


$k = \frac{CP'}{CP}$

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

$\boxed{k = \frac{3}{5}}$ $\boxed{\text{reduction}}$

Ex 2: Draw and label a parallelogram DEFG. Then construct a dilation of the parallelogram with point D as the center of dilation and a scale factor of 2.



Ex 3: The vertices of ΔABC are A(-4, 1), B(-2, 2), C(-2, 1). Find the image of ΔABC after the given composition.

Translation: (x, y) → (x + 5, y + 1)

Dilation: centered at the origin with a scale factor of 2

A(-4,1) → A'(1,2)
B(-2,2) → B'(3,3)
C(-2,1) → C'(3,2)

A'(1,2) → A''(2,4)
B'(3,3) → B''(6,6)
C'(3,2) → C''(6,4)