Dilations

A *dilation* is an enlargement or reduction of a figure.

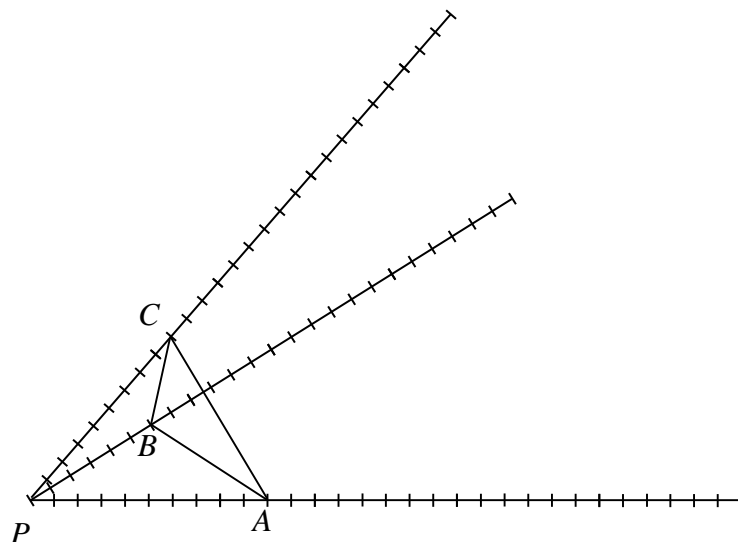If point *P* be the *center of dilation*, then

   Enlargement: All points move

   Reduction: All points move

The factor (or ratio) by which everything is
enlarged or reduced is the *constant of dilation*, *k*.

Ex: In the figure at right,

   a. Find Δ*A'B'C'*, the dilation of Δ*ABC*
       by a factor of 3 from the point *P*.

   a. Find Δ*A"B"C"*, the dilation of Δ*ABC*
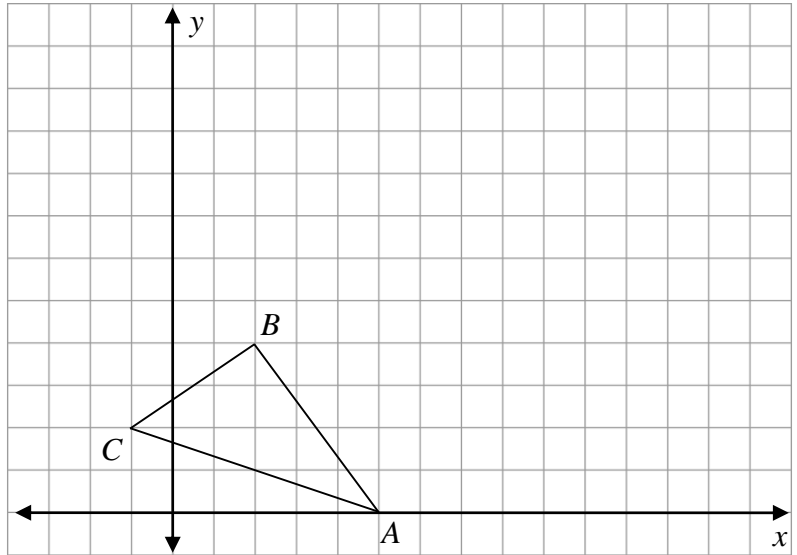   by a factor of 1/2 from the point *P*.

Dilations with Coordinates

Ex: $\triangle ABC$ has vertices at $A(5, 0)$, $B(2, 4)$ and $C(-1, 2)$. Dilate $\triangle ABC$ by a factor of 3 from the origin.

$A(5, 0) \rightarrow A'$

$B(2, 4) \rightarrow B'$

$C(-1, 2) \rightarrow C'$
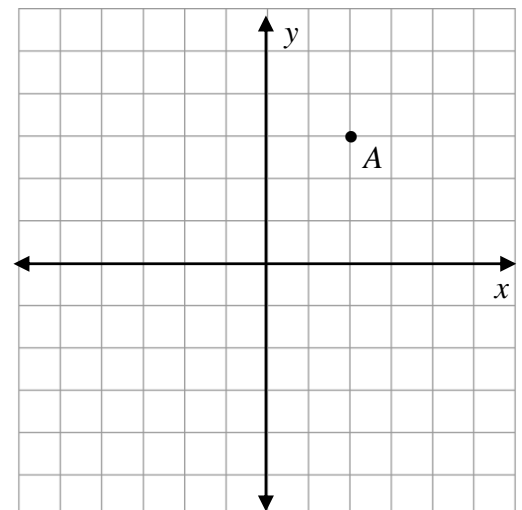
Ex: 1) $D_4(-3, 5) =$

2) $D_{3/4}(8, -12) =$

3) Find the value of k if $D_k(6, -9) = (10, -15)$

4) $D_{-2}(2, 3) =$

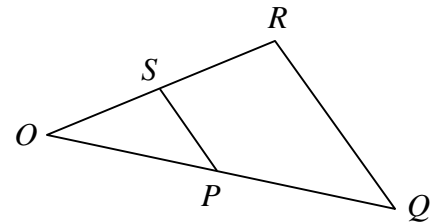A dilation by a negative constant is a combination of

1.

2.

Geometry HW: Transformations - 5

1. Using the rule $(x, y) \rightarrow (4x, 4y)$ find the image of $(2, -1)$

2. Evaluate $D_3(-2, 5)$.

3. Find the image of $(4, -12)$ under a dilation of constant $1/2$.

4. If $D_k(-3, 4) = (-12, 16)$, find the value of k.

5. What is the constant of dilation for a dilation in which the image of $(12, -9)$ is $(8, -6)$?

6. In the diagram at right, O is the center of dilation and $D_k(\triangle OQR) = \triangle OPS$.
    a. What is the image of R under the dilation?

    b. $D_k(Q) =$ c. $D_k(O) =$ d. $D_k\left(\overline{OR}\right) =$

    e. If P is the midpoint of $\overline{OQ}$, what is the constant of dilation k?

    f. Using the value of k from part e, if $SP = 6$, find RQ.

7. a. Under what dilation will the image of $(0, 2)$ be $(0, 8)$?

    b. Under what translation will the image of $(0, 2)$ be $(0, 8)$?

    c. Under a reflection in what point will the image of $(0, 2)$ be $(0, 8)$?

    d. Under a reflection in what line will the image of $(0, 2)$ be $(0, 8)$?

8. a. Graph $\triangle ABC$ with vertices $A(1, 3)$, $B(4, 1)$, and $C(1, 1)$.

b. Graph $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation D_3.

c. Find the lengths of $\overline{AB}$ and $\overline{A'B'}$ in simplest radical form.

d. How many times longer is $\overline{A'B'}$ than $\overline{AB}$?

e. Find the areas of $\triangle ABC$ and $\triangle A'B'C'$.

f. How many times larger is the area of $\triangle A'B'C'$ than the area of $\triangle ABC$?

9. A certain hexagon has a perimeter of 30 and an area of 54.
   a. Find the perimeter and the area of the hexagon after a dilation of 3.

   b. Find the perimeter and the area of the hexagon after a dilation of 1/2.

10. a. Graph the line l, $y = \dfrac{1}{2}x$.

    b. Graph the image of l after a dilation of 3 in the origin.

    c. Graph the line k, $y = \dfrac{1}{2}x + 2$

    d. Graph the image of k after a dilation of 3 in the origin.

    e. Complete (and remember) the following:
       After a dilation, the image of a line passing through the center of dilation is the _____ line.
       After a dilation, the image of a line *not* passing through the center of dilation is a _____ line.