14-5 Dilations

Date April 18

Definition: A dilation is a similarity transformation, which uses a rule $(x,y) \to (kx, ky)$, where k is a nonzero number (scale factor)

If $k > 1$ or $k < -1$, the dilation is an expansion (enlargement)

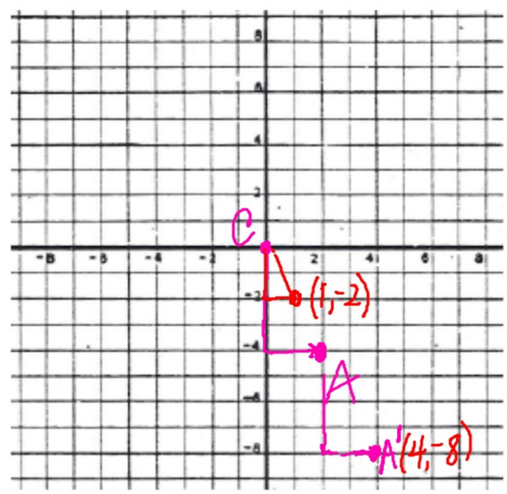
If $-1 < k < 1$, the dilation is a contraction.

If $k = 1$, the dilation is a congruence.

Ex. 1: Locate $A(2, -4)$ on the graph grid.
Find the image of A after each dilation.

a) dilation with center at (0, 0) and scale factor 2. K (4, -8)
Expansion

b) dilation with center at (0, 0) and scale factor 1/2. K
Contraction (1, -2)



***Ex. 2*:** Locate $B(1, 2)$ on the graph grid.
Find the image of B after each dilation.

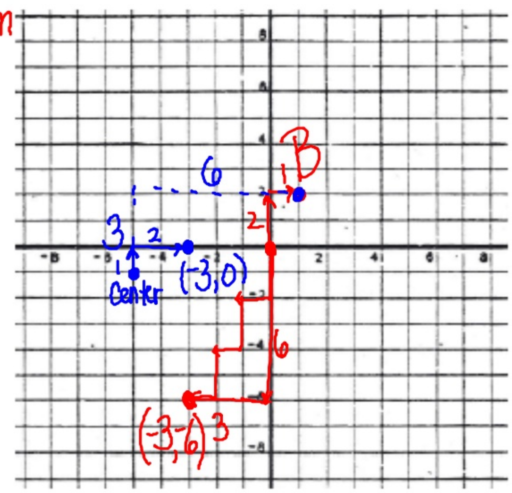
opp. direction

a) dilation with center at (0, 0) and scale factor -3.

$(-3,-6)$

b) dilation with center at (-5, -1) and scale factor 1/3.

$(-3,0)$



***Ex. 3*:** If a dilation with center (0, 0) maps $(x, y) \rightarrow (-4x, -4y)$,
then (3, -2) maps onto which point?

$(3, -2) \longrightarrow (-12, 8)$

$\times(-4) \quad \times(-4)$

Ex. 4: If a dilation with center (0, 0) maps (20, 30) onto (4, 6),

$(20, 30) \rightarrow (4, 6)$

$\times\frac{1}{5}$ $\times\frac{1}{5}$

a) what is the scale factor?

$1/5$

b) what is the image of the point (-10, 15) ?

$\times\frac{1}{5}$ $\times\frac{1}{5}$

$= (-2, 3)$