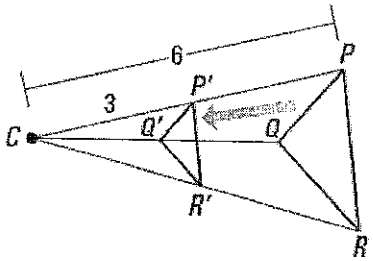
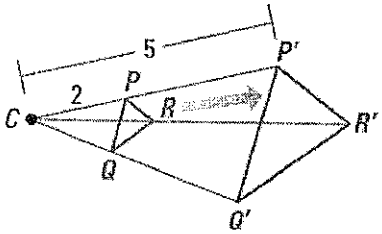
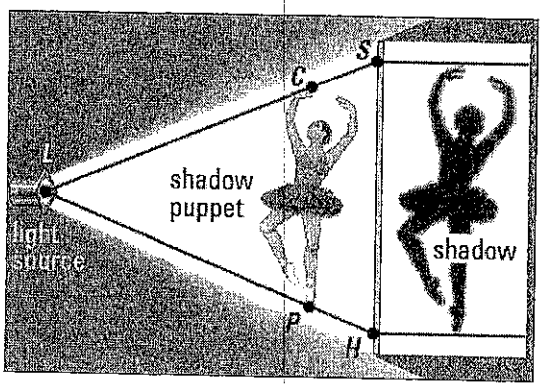
Name: _____ Date: _____

Dilations

The dilation is a **reduction** if $0 < k < 1$ and it is an **enlargement** if $k > 1$.

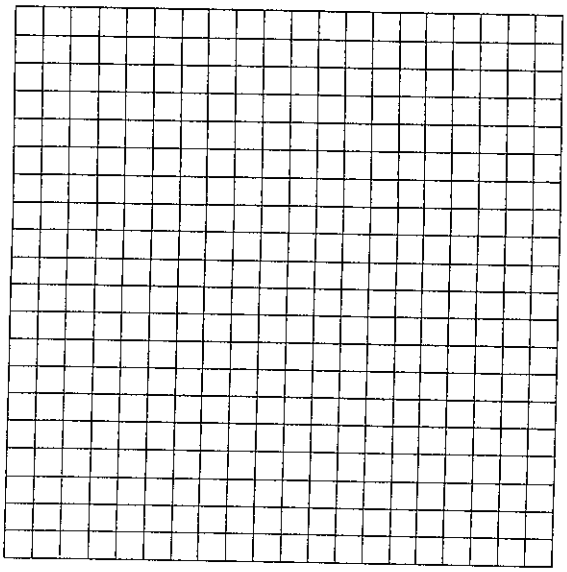






1. What are the coordinates of point $(-1,4)$ under dilation D_{-2}?

2. Triangle ABC has vertices $A(6,6)$, $B(9,0)$, and $C(3,-3)$. State and label the coordinates of $\Delta A'B'C'$, the image of ΔABC after a dilation of $D_{\frac{1}{3}}$.



3.

If the dilation $D_k(-2,4)$ equals $(1,-2)$, the scale factor k is equal to

A) $\frac{1}{2}$ B) -2 C) 2 D) $-\frac{1}{2}$

4. Which transformation represents a dilation?

1) $(8,4) \rightarrow (11,7)$

2) $(8,4) \rightarrow (-8,4)$

3) $(8,4) \rightarrow (-4,-8)$

4) $(8,4) \rightarrow (4,2)$

5. The image of point A after a dilation of 3 is $(6,15)$. What was the original location of point A?

6. The point $A(6,3)$ maps onto $A'(2,1)$ under a dilation with respect to the origin. What is the constant of dilation?

7.

Under a dilation with respect to the origin, the image of P(-15,6) is P′(-5,2). What is the scale of dilation?

A) $\frac{1}{3}$ B) 10 C) -4 D) 3

Dilations

Dilation:

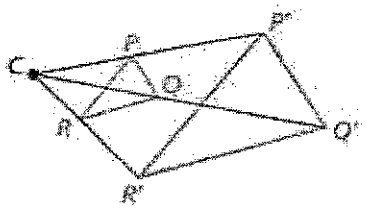
Center of dilation:

scale factor:

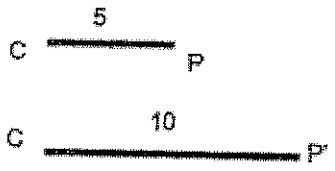
enlargement/expansion:

reduction/contraction:

- 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 _____.
  - If *P* is not the center point *C*, then the image point P′ lies on ray CP. The scale factor *k* is a positive number such that _____.
  - Angle measures are _____.

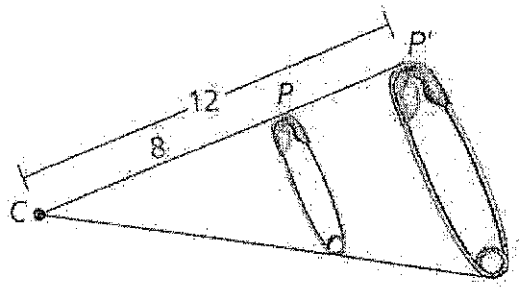


Determining the scale factor



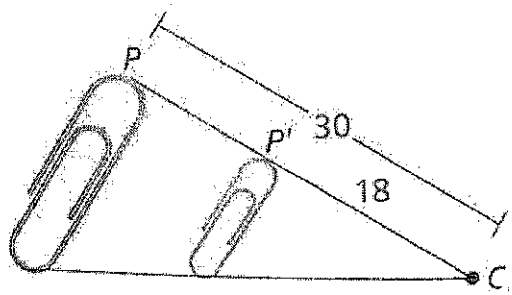
Example 1:

Find the scale factor of the dilation. Then state if it is a reduction or an enlargement and why.

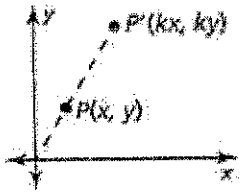


Example 2:

Find the scale factor of the dilation. Then state if it is a reduction or an enlargement and why.



Coordinate Rule for Dilations



If P(x, y) is the preimage of a point, then its image after a dilation centered at the origin (,) with scale factor of _____ is the point P'(,).

Example 3:

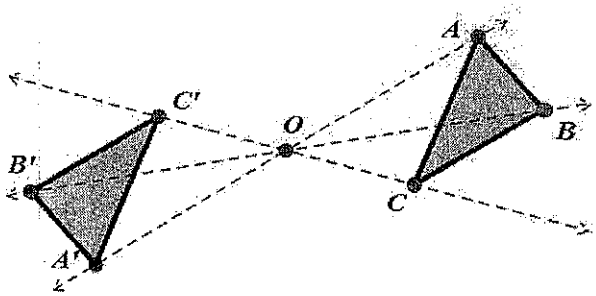
Find the image of point A(-2, 4) after a dilation with a scale factor of 3.

Example 4:

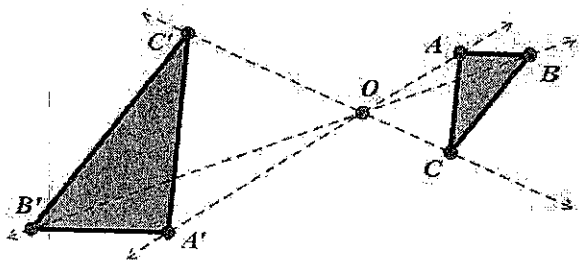
Find the image of triangle QRS with vertices Q(-2, 4), R(6, 6), and S(0, -4) after a dilation of ½.

Negative scale factor

$D_{O,-1}(\triangle ABC)$

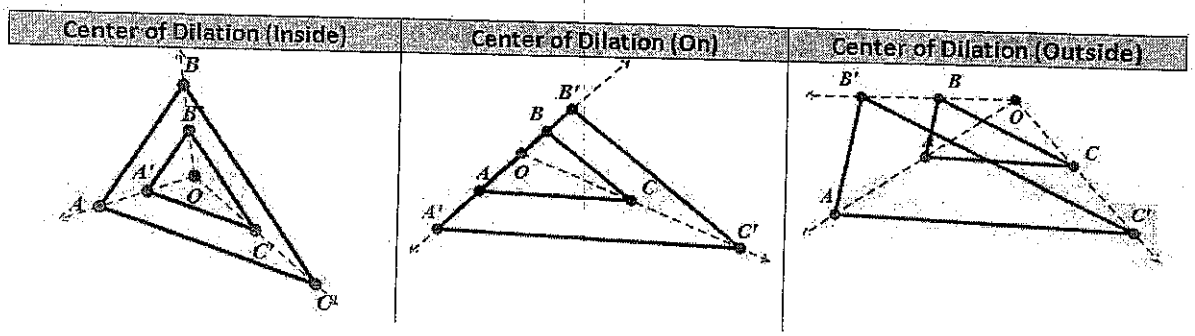


$D_{O,-2}(\triangle ABC)$



- A dilation of -1 is the same as a rotation of _____. Why?

Center of dilation:



Practice Problems:

Find the scale factor for the following dilation.

1. $A(4, -1) \rightarrow A'(8, -2)$

2. $B(-2, 4) \rightarrow B'(-3, 6)$

3. $C(9, -3) \rightarrow C'(3, -1)$

4. $D(-8, 2) \rightarrow D'(-2, \frac{1}{2})$

Find the images of the preimage after the following dilation

5. Dilation through the origin with a scale factor 2 of point A(2, -4).

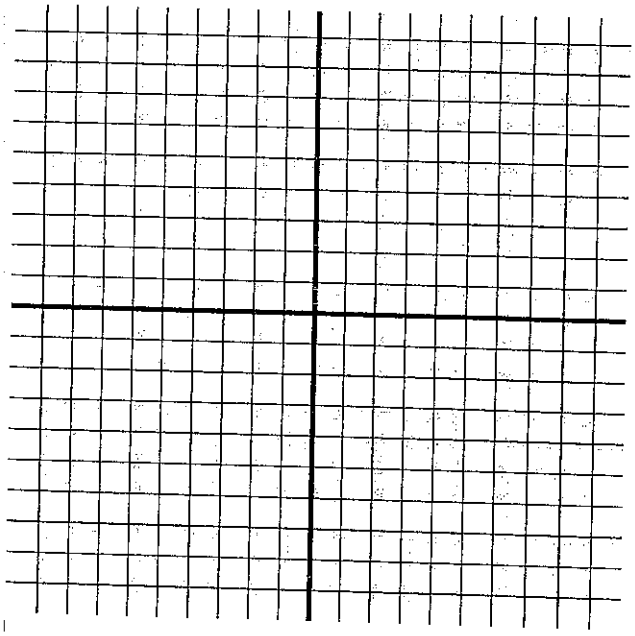
6. Dilation through the origin with a scale factor 4 of point B(-1, 4).

7. Dilation through the origin with a scale factor ⅓ of triangle CDE with C(6, 3), D(3, -3), and E(0, 9).

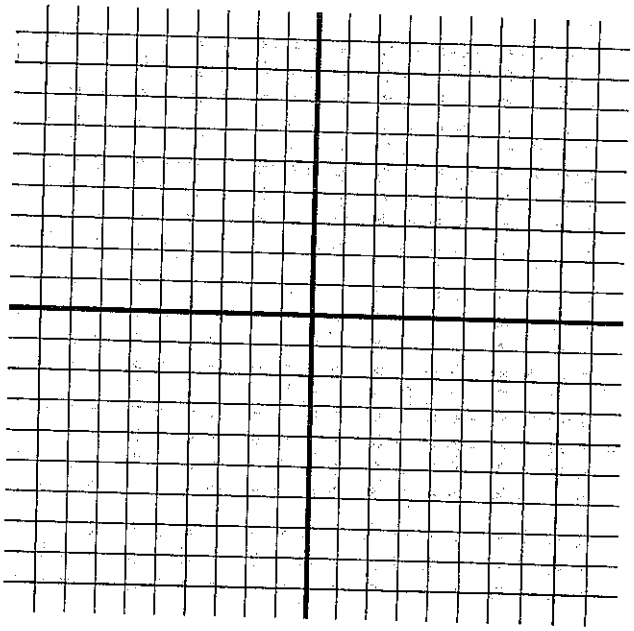
8. Dilation through the origin with a scale factor -¼ of triangle FGH with F(-8, -4), G(4, 4), and H(0,-16).

Graph the polygon and its image after a dilation with a scale factor *k*.

9. X(-1, -1), Y(0, 3), and Z(2, 1); k = 3



10. A(-6, -2), B(10, 4), and C(4, -1); k = ½



Textbook Page 212 #'s 3-6, 15-28, 29, 31-34, 37

Dilations (center not at origin)

Rise and run technique

Step 1:

Step 2:

Step 3:

Step 4:

(If preimage is a figure (has more than 1 point, repeat steps for each vertex of the figure)

Example 1:

A dilation of point H(2, 6) of a scale factor 2, with the center at point T (-3, 4).

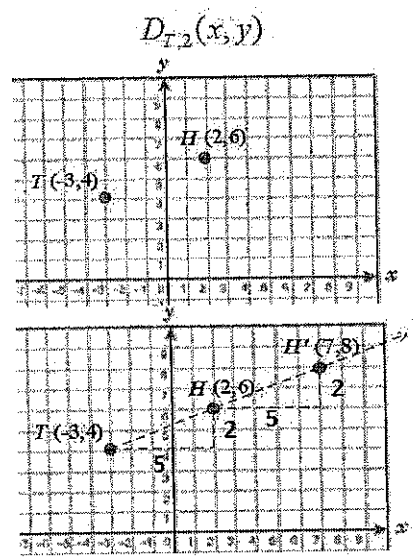
Step 1:

Step 2:

$$\frac{Rise}{Run} = \_\_\_\_\_$$

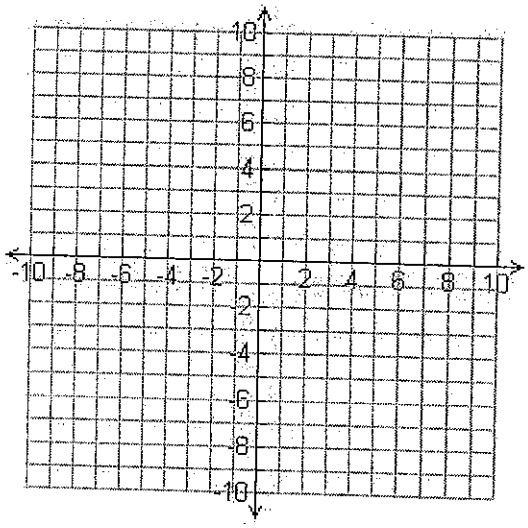
Step 3:

Step 4:



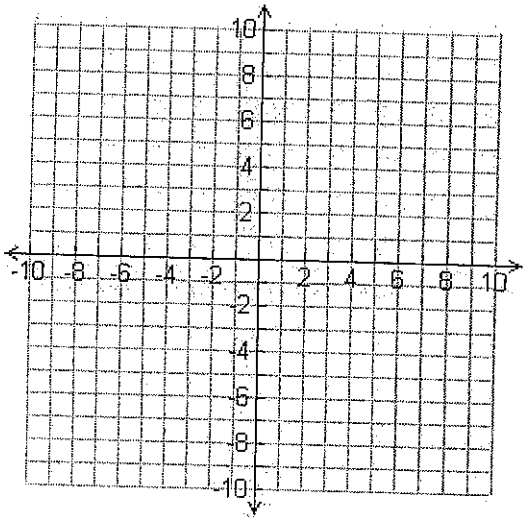
Example 2:

A dilation of point G(-4, 9) of a scale factor ¼ , with the center at point T(8,1).



Example 3:

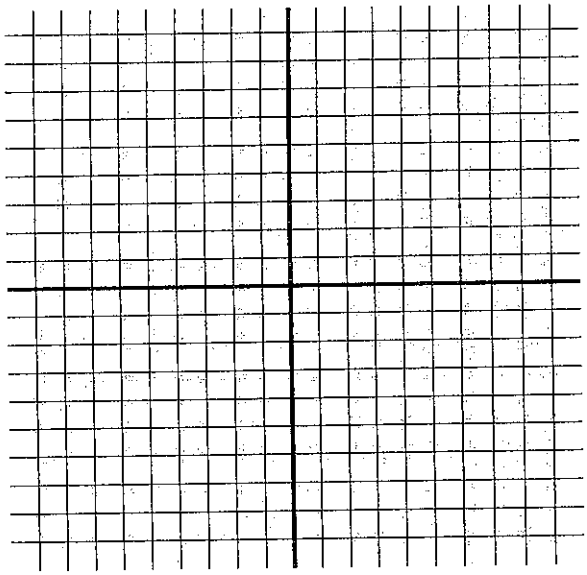
A dilation of point O(-7, 2) of a scale factor 4, with the center at point P(-8, 4).



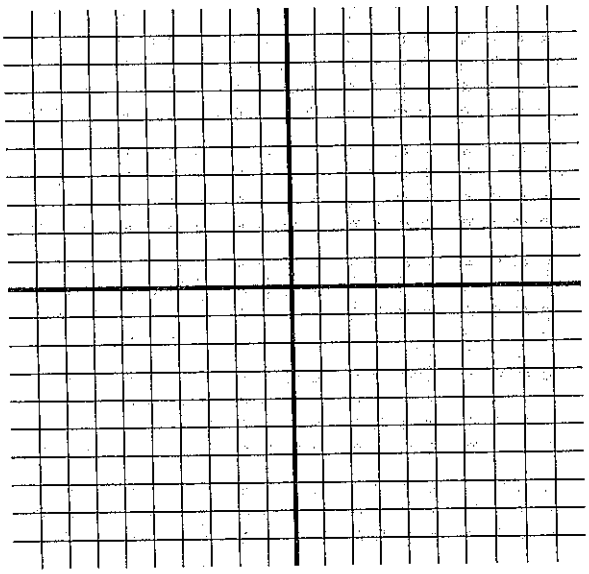
Practice Problems:

Find the image of the following preimages after the following dilation.

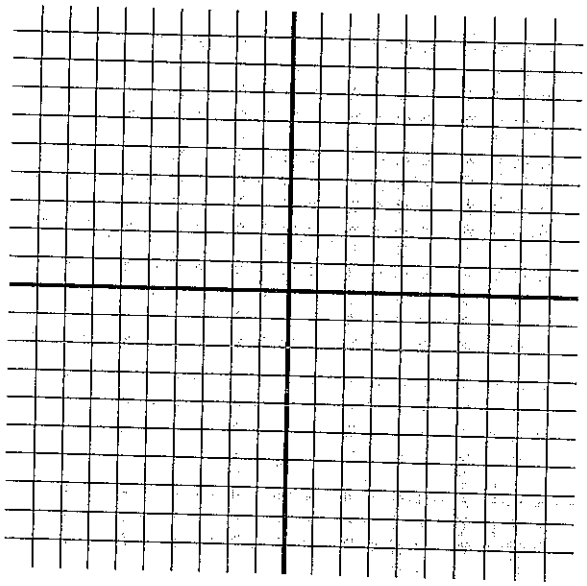
1. Find the image of point D(4,-3) after a dilation of a scale factor of 2 and centered at point C(3,3).



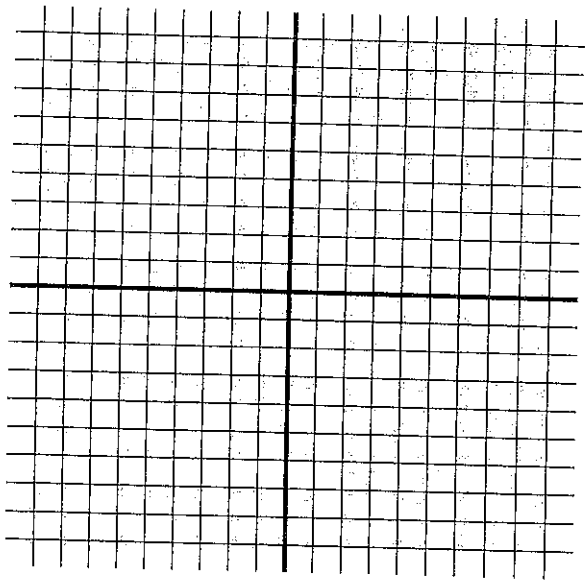
2. Find the image of point G(-1,2) after a dilation of a scale factor of 3 and centered at point H(2,-1).



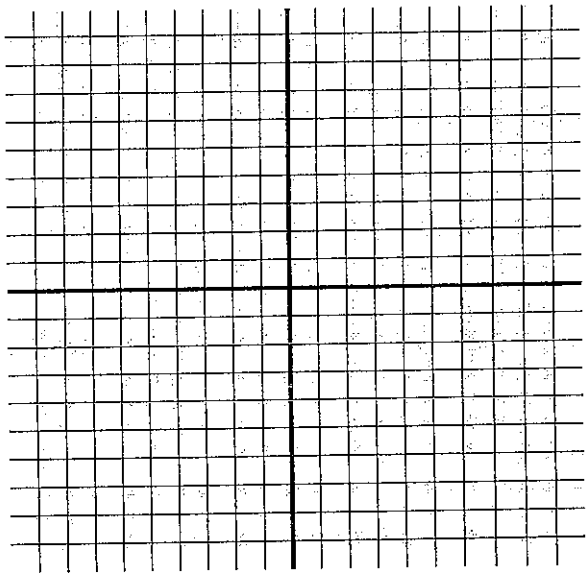
3. Find the image of point T(-8, -10) after a dilation of a scale factor of ⅓ and centered at point U(-2, 8).



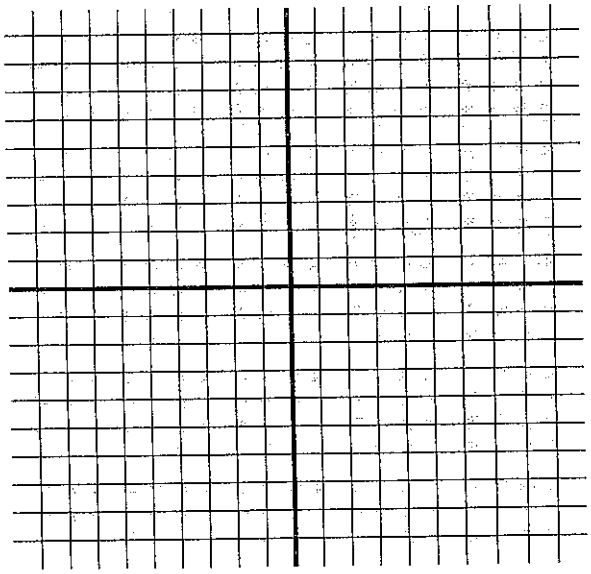
4. Find the image of point L(-7,-9) after a dilation of a scale factor of ½ and centered at point M(-1, 5).



5. Find the image of triangle OPQ with vertices, O(-1, 4), P(-1, -2), and Q(5, -8) after a dilation of a scale factor of ⅙ and centered at point R(-7, -2).



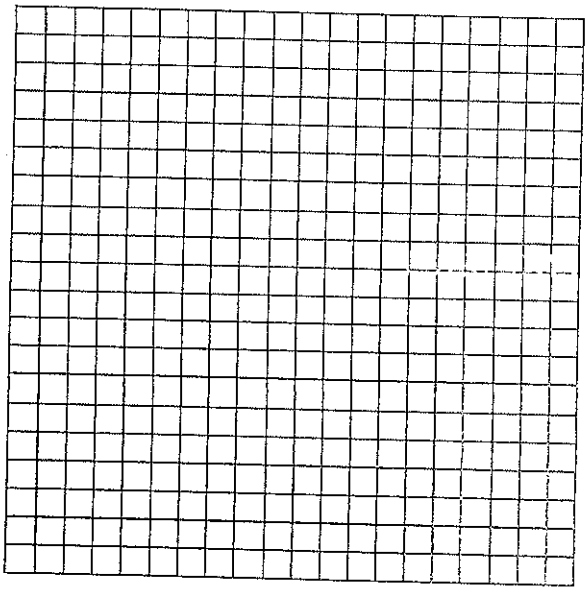
6. Find the image of triangle RST with vertices, R(4, -2), S(5, 0), and T(2, -1) after a dilation of a scale factor of 5 and centered at point U(4, -2).



Name: _____ Date: _____

Dilations

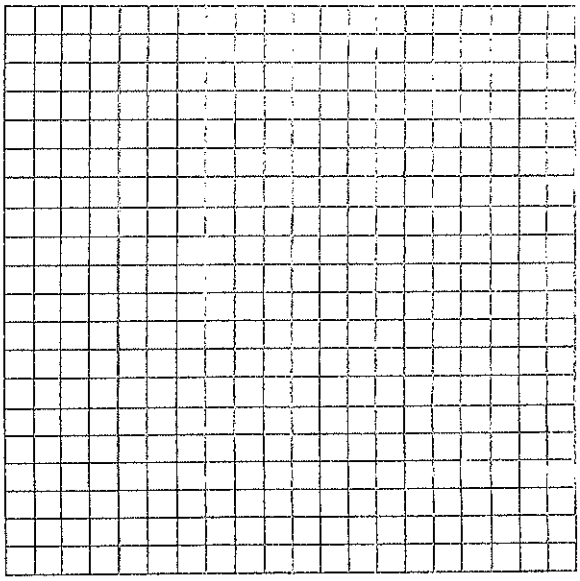
1. What are the coordinates of point $(-1,4)$ under dilation D_{-2}, centered at the origin?



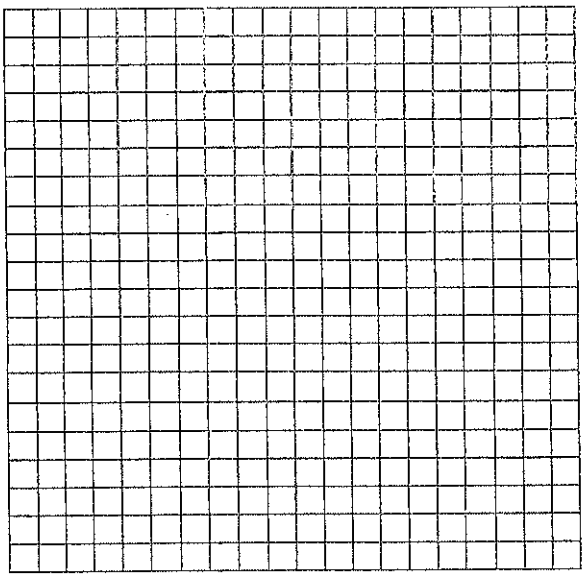
2. A. The image of point *A* after a dilation, centered at the origin, of 3 is $(6,15)$. What was the original location of point *A*?

B. Find the image of A(2, -3) after the dilation described above.

3. A. Find a coordinate rule for the dilation with center (5, -3) and scale factor 2.



B. Using your coordinate rule, find the image of A(2, -3) after the dilation described above.

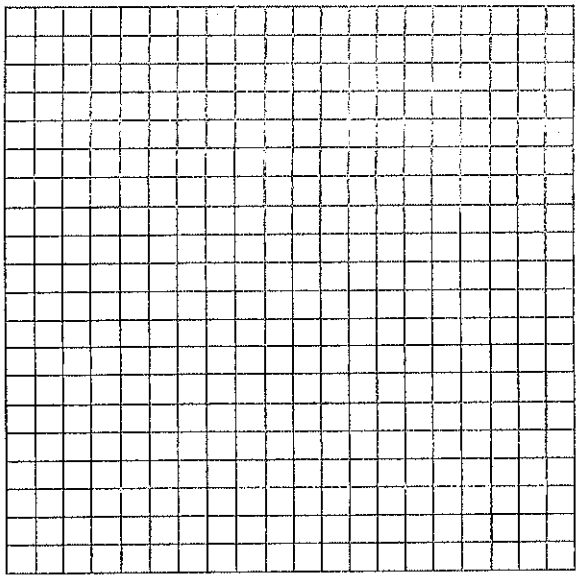


9) What are the coordinates of point $(-1,4)$ under dilation D_{-2}, centered at the origin?

10. Find the coordinates of (-4, 9) after a dilation of scale factor ¼ with the center of dilation at (8, 1).

11. The image of point *A* after a dilation, centered at the origin, of 3 is $(6,15)$. What was the original location of point *A*?

~~12~~. On the accompanying grid, graph and label quadrilateral *ABCD*, whose coordinates are $A(-1,3)$,
7) $B(2,0)$, $C(2,-1)$, and $D(-3,-1)$. Graph, label, and state the coordinates of $A'B'C'D'$, the image of *ABCD* under a dilation of 2, where the center of dilation is (1, 3).



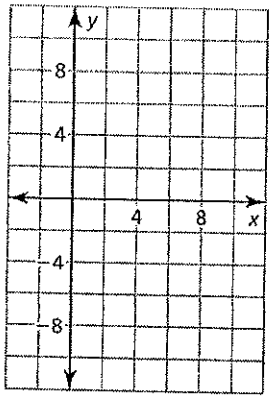
~~13~~. Under a dilation where the center of dilation is the origin, the image of $A(-2,-3)$ is $A'(-6,-9)$. What
8) are the coordinates of B', the image of $B(4,0)$ under the same dilation?

Name: _____ Date: _____

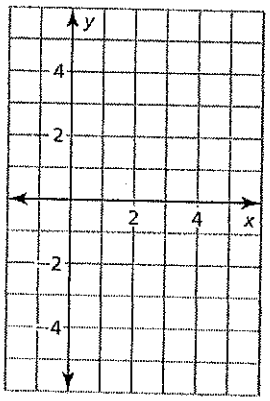
Dilations & Review Homework

1. Graph ΔJKL with vertices $J(3, 3)$, $K(0, 0)$, and $L(0, -3)$ and its image after a dilation with scale factor k.

a) $k = 3$

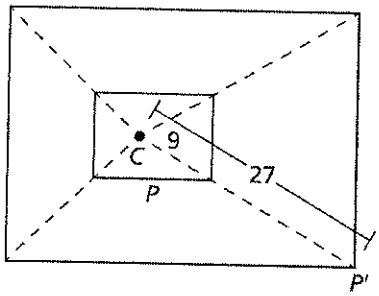


b) $k = \frac{1}{3}$

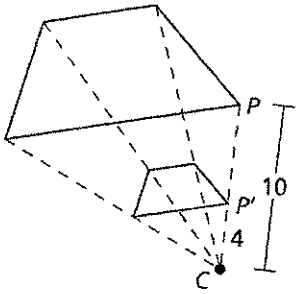


In Exercises 2 and 3, find the scale factor of the dilation. Then tell whether the dilation is a *reduction* or an *enlargement*.

2.



3.



4. What are the coordinates of point K(3,-7) under dilation D_{-4} ?

5. Factor completely: $36 - 4x^2$

6. Is the transformation given by $(x, y) \rightarrow (2x + 2, y + 1)$ a dilation? Explain your reasoning.

7. The vertices of ΔABC are $A(2, 3)$, $B(-1, 2)$, and $C(0, 1)$. Translate ΔABC using the vector $\langle 1, -4 \rangle$.

8. If the alphabet were printed in simple block printing,

a) which capital letters would have vertical line symmetry?

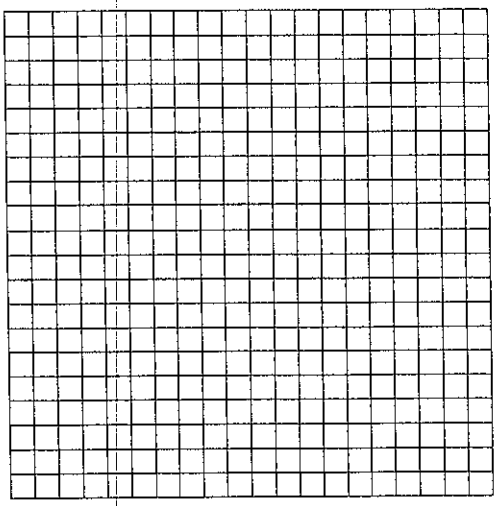
b) which capital letters would have horizontal line symmetry?

c) which capital letters would have BOTH vertical and horizontal symmetry?

9. The vertices of ΔDEF are $D(-2, -2)$, $E(0, -3)$ and $F(2, 0)$.

a. Draw ΔDEF on graph paper.

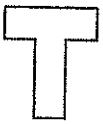
b. Draw the image of ΔDEF under a reflection in the line whose equation is $y = x$.



10. Find the number of sides of a regular polygon if the measure of each interior angle is 162°.

11. Find the sum of the measures of the interior angles of a regular polygon if each exterior angle is 9°.

12. Determine the number of lines of symmetry for the figure.

a) 

b) 

13. Identify the line symmetry (if any) of the word CHECKBOOK?

14. You want to plot the collinear points $A(-2, 3)$, $A'(x, y)$, and $A''(3, 7)$ on the same coordinate plane. Do you have enough information to find the values of x and y? Explain your reasoning.