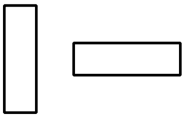
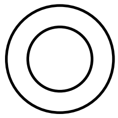
Name ______________________________________ Date ___________ Class ____________

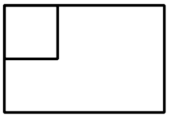
LESSON 12-7

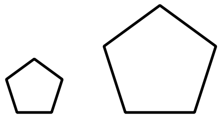
Practice B
Dilations

Tell whether each transformation appears to be a dilation.

1.  ________

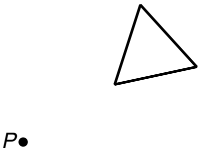
2.  ________

3.  ________

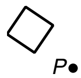
4.  ________

Draw the dilation of each figure under the given scale factor with center of dilation *P*.

5. scale factor: $\frac{1}{2}$



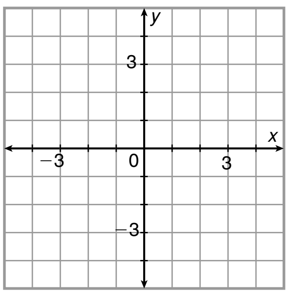
6. scale factor: -2



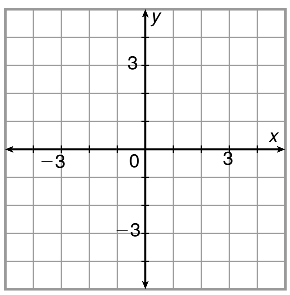
7. A sign painter creates a rectangular sign for Mom's Diner on his computer desktop. The desktop version is 12 inches by 4 inches. The actual sign will be 15 feet by 5 feet. If the capital *M* in "Mom's" will be 4 feet tall, find the height of the *M* on his desktop version. ____________________

Draw the image of the figure with the given vertices under a dilation with the given scale factor centered at the origin.

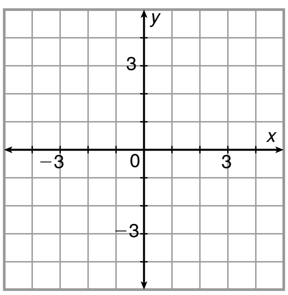
8. $A(2, -2)$, $B(2, 3)$, $C(-3, 3)$, $D(-3, -2)$; scale factor: $\frac{1}{2}$



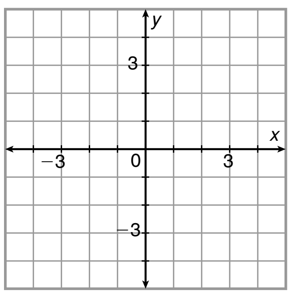
9. $P(-4, 4)$, $Q(-3, 1)$, $R(2, 3)$; scale factor: -1



10. $J(0, 2)$, $K(-2, 1)$, $L(0, -2)$, $M(2, -1)$; scale factor: 2



11. $D(0, 0)$, $E(-1, 0)$, $F(-1, -1)$; scale factor: -2



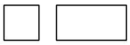
LESSON **12-7**

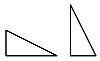
Practice A
Dilations

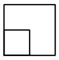
Fill in the blanks to complete the definition.

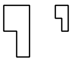
1. A dilation, or similarity transformation, is a transformation in which the lines connecting every point P with its image P' all intersect at a point C, called the center of dilation. $\frac{CP'}{CP}$ is the same for every point P.

Tell whether each transformation appears to be a dilation.

2.  no

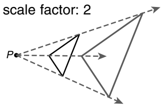
3.  no

4.  yes

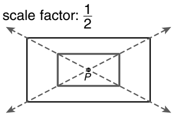
5.  yes

Draw the dilation of each figure under the given scale factor with center of dilation P. To do this, draw a dashed line from each vertex to point P. Use a ruler to measure the distance from each vertex to point P and then plot the new vertex that same distance multiplied by the scale factor along the dashed line.

6. scale factor: 2



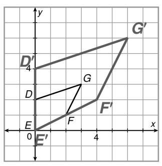
7. scale factor: $\frac{1}{2}$



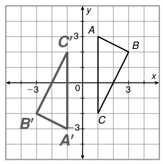
8. An engraver is designing a stamp to celebrate Asian American history. Her original version of the stamp is a rectangle 6 inches by 9 inches. When the stamp is produced, it will be a rectangle 1 inch by $1\frac{1}{2}$ inches. Find the scale factor of the reduction. $\frac{1}{6}$

Draw the image of the figure with the given vertices under a dilation with the given scale factor centered at the origin.

9. $D(0, 2)$, $E(0, 0)$, $F(2, 1)$, $G(3, 3)$; scale factor: 2



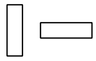
10. $A(1, 3)$, $B(3, 2)$, $C(1, -2)$; scale factor: -1

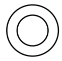


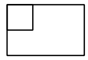
LESSON **12-7**

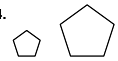
Practice B
Dilations

Tell whether each transformation appears to be a dilation.

1.  no

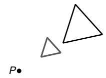
2.  yes

3.  no

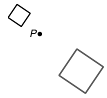
4.  yes

Draw the dilation of each figure under the given scale factor with center of dilation P.

5. scale factor: $\frac{1}{2}$



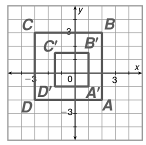
6. scale factor: -2



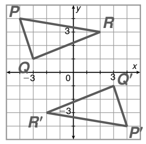
7. A sign painter creates a rectangular sign for Mom's Diner on his computer desktop. The desktop version is 12 inches by 4 inches. The actual sign will be 15 feet by 5 feet. If the capital M in "Mom's" will be 4 feet tall, find the height of the M on his desktop version. $3\frac{1}{5}$ inches

Draw the image of the figure with the given vertices under a dilation with the given scale factor centered at the origin.

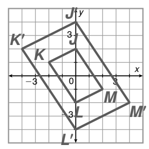
8. $A(2, -2)$, $B(2, 3)$, $C(-3, 3)$, $D(-3, -2)$; scale factor: $\frac{1}{2}$



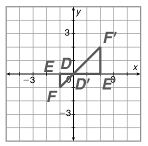
9. $P(-4, 4)$, $Q(-3, 1)$, $R(2, 3)$; scale factor: -1



10. $J(0, 2)$, $K(-2, 1)$, $L(0, -2)$, $M(2, -1)$; scale factor: 2



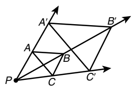
11. $D(0, 0)$, $E(-1, 0)$, $F(-1, -1)$; scale factor: -2



LESSON **12-7**

Practice C
Dilations

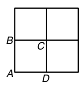
1. Jacob constructed this dilation of a triangle with center of dilation P and scale factor 2. Write a paragraph proof to prove that the construction produces a triangle similar to the original, but twice as large.



Given: $PA = AA'$, $PB = BB'$, $PC = CC'$

Prove: $\triangle ABC \sim \triangle A'B'C'$; $k = 2$ Possible answer: It is given that $PA = AA'$, $PB = BB'$, and $PC = CC'$. Therefore, $PA' = 2PA$, $PB' = 2PB$, and $PC' = 2PC$. So $\frac{PA'}{PA} = 2$ and $\frac{PB'}{PB} = 2$. $\angle APB$ is the same angle as $\angle A'P'B'$, so they are congruent. By SAS similarity, $\triangle PAB \sim \triangle PA'B'$. Thus $\frac{A'B'}{AB} = 2$. Likewise, $\frac{PB'}{PB} = 2$ and $\frac{PC'}{PC} = 2$. $\angle CPB \cong \angle C'P'B'$. By SAS similarity, $\triangle PCB \sim \triangle PC'B'$. Thus $\frac{C'B'}{CB} = 2$. Because $\frac{PA'}{PA} = 2$, $\frac{PC'}{PC} = 2$, and $\angle APC \cong \angle A'P'C'$, $\triangle PAC \sim \triangle PA'C'$. Thus $\frac{A'C'}{AC} = 2$. Because $\frac{A'B'}{AB} = \frac{C'B'}{CB} = \frac{A'C'}{AC} = 2$, $\triangle ABC \sim \triangle A'B'C'$ by SSS similarity, and the scale factor k is 2.

2. Describe two successive dilations of square $ABCD$ that will create the figure shown. Possible answer: first, a dilation of $ABCD$ with scale factor 2 and center of dilation A, and then a dilation of $ABCD$ with scale factor -1 and center of dilation C



Find the vertices of the image of each triangle with the given vertices, scale factor, and center of dilation P.

3. $X(3, 6)$, $Y(3, 0)$, $Z(6, 5)$; $k = \frac{1}{2}$
$\overleftrightarrow{PX}: y = 2x$
$\overleftrightarrow{PY}: y = -x + 3$
$X'(2, 4)$, $Y'(2, 1)$, $Z'(3.5, 3.5)$

4. $E(2, -2)$, $F(-2, 0)$, $G(1, 2)$; $k = -2$
$\overleftrightarrow{PE}: y = x - 4$
$\overleftrightarrow{PF}: y = -x - 2$
$E'(-1, -5)$, $F'(7, -9)$, $G'(1, -13)$

$\triangle ABC$ has vertices $A(2, 0)$, $B(1, 1)$, and $C(2, 2)$. $\triangle A'B'C'$ has vertices $A'(-2, 0)$, $B'(-4, 2)$, and $C'(-2, 4)$. Use this preimage and image for Exercises 5 and 6. (*Hint:* Plotting the triangles on a grid may help.)

5. Describe a single dilation that will cause the preimage to coincide with its image.
a dilation with scale factor 2 and center of dilation $P(6, 0)$

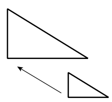
6. Describe two successive dilations that will cause the preimage to coincide with its image.
Possible answer: a dilation with scale factor -2 and center of dilation $P(0, 0)$, and then a dilation with scale factor -1 and center of dilation $P(-3, 0)$

LESSON **12-7**

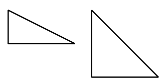
Reteach
Dilations

A dilation is a transformation that changes the size of a figure but not the shape.

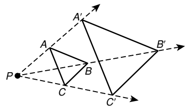
Dilation



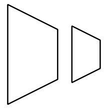
Not a Dilation

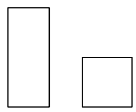


A dilation is a transformation in which the lines connecting every point A with its image A' all intersect at point P, called the **center of dilation**.



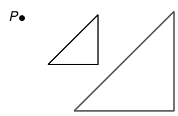
Tell whether each transformation appears to be a dilation.

1.  yes

2.  no

Copy teach triangle and center of dilation. Draw the image of the triangle under a dilation with the given scale factor.

3. scale factor: 2



4. scale factor: $\frac{1}{2}$