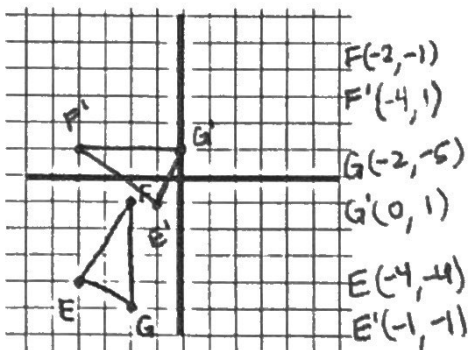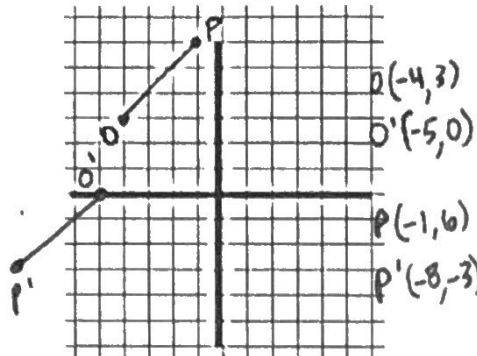**Directions: Complete each sequence of transformations. Write the final rule for each sequence.**

1) Translate 3 units right & 5 units up. Then, rotate 90°CCW about the origin.
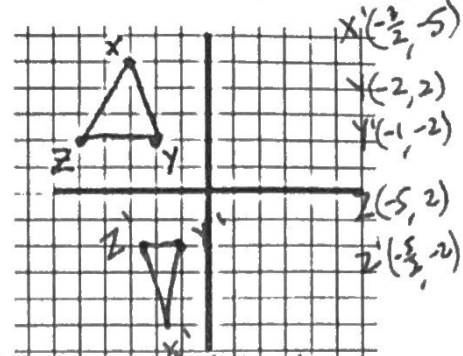
$F(-2,-1)$
$F'(-4,1)$
$G(-2,-5)$
$G'(0,1)$
$E(-4,-4)$
$E'(-1,-1)$

$(x,y) \rightarrow (x+3, y+5) \rightarrow (-y-5, x+3)$

2) Rotate 180° CCW about (−2, −1). Then, reflect over y = x.

$0(-4,3)$
$0'(-5,0)$
$P(-1,6)$
$P'(-8,-3)$

$(x,y) \rightarrow (x+2, y+1) \rightarrow (-x-2, -y-1)$
$\rightarrow (-x-4, -y-2) \rightarrow (-y-2, -x-4)$

3) Shrink horizontally by ½. Then, reflect over y = 0.

$X(-3,5)$
$X'(-\frac{3}{2}, 5)$
$Y(-2,2)$
$Y'(-1,-2)$
$Z(-5,2)$
$Z'(-\frac{5}{2}, -2)$

$(x,y) \rightarrow (\frac{x}{2}, y) \rightarrow (\frac{x}{2}, -y)$

Directions: Find A″ given the sequence of transformations.

4) A(4, −2); Reflect over y = −x; then, dilate by a scale factor of 2 with the origin as a center.

$(x,y) \rightarrow (-y, -x) \rightarrow (-2y, -2x) \qquad A''(4,-8)$

5) A(0, −3); Rotate 90° CW about the origin; then, horizontally stretch by 3.

$(x,y) \rightarrow (y, -x) \rightarrow (3y, -x) \qquad A''(-9,0)$

6) A(−2, 2); Translate 6 units down; then, dilate by a scale factor of ½ with a center of (4, −1). $A''(4,-4)$

$(x,y) \rightarrow (x, y-6) \rightarrow (x-4, y-5) \rightarrow (\frac{x}{2}-2, \frac{y}{2}-\frac{5}{2}) \rightarrow (\frac{x}{2}+2, \frac{y}{2}-\frac{7}{2})$

Directions: Use the rule for the sequence of transformations to find B″. Then describe the transformation in words.

7) $(x, y) \rightarrow (x - 3, -y)$ when B(4, 5) $B''(1,-5)$
Translated Left 3 units and reflected over x-axis.

8) $(x, y) \rightarrow (y, 4x)$ when B(−1, 6) $B''(6,-4)$
Horizontal Stretch by 4 and then reflected over y=x.

9) $(x, y) \rightarrow (−4x, y)$ when B(−5, −1) $B''(20,-1)$
Reflected over y-axis and horizontal stretch by 4

10) $(x, y) \rightarrow (−3y, 3x)$ when B(0, 2) $B''(-6,0)$
Rotated 90° ccw and Dilated by S.F. of 3

Directions: Describe the sequence of transformations displayed in each rule.

11) $(x, y) \rightarrow (x − 3, −y)$
Translated left 3 and reflected over x-axis

12) $(x, y) \rightarrow (y, 4x)$
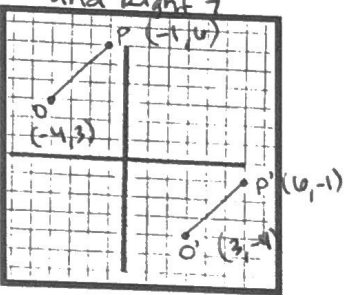Horizontal stretch by 4 and then reflected over y=x

13) $(x, y) \rightarrow (−4x, y)$
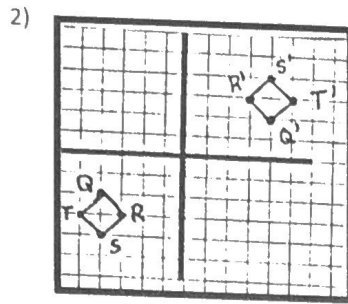Horizontal stretch by 4 and reflected over y-axis

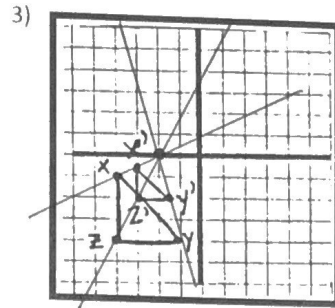14) $(x, y) \rightarrow (−3y, 3x)$
Rotated 90° ccw and dilated by S.F. of 3

Name **Key**

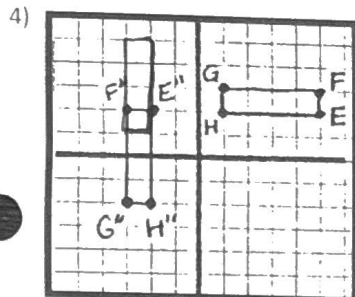**Directions: Describe how each pre-image can be mapped onto the image using ONE transformation.**

1) * Translate down 7 and Right 7

P (-1, 6)
D (-4, 3)
P' (6, -1)
O' (3, -4)

Reflected over
y = x

2)

R'   S'
     T'
Q'

Q
F   R
  S

Rotate 180° cw/ccw

3)

X'
X
Z'   Y'
Z   Y
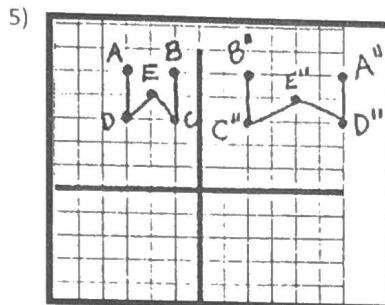
Dilate △ZXY by ½
about (-2, 0)

Directions: Describe how each pre-image can be mapped onto the image using TWO transformations.

4)

F" E" G   F
         H   E
G" H"

Rotate 90°CCW/270°CW
Translate down 3 units.

5)

A   B   B"   A"
  E   E"
D   C C"   D"

Horizontal stretch by 4
and reflect over the
Y-axis.

6)

A   B
D" C"   D   C
A'   B"

Reflect over y = -3.5
and Translate Left
4 units.

✳ Answers may vary → Different possible solutions exist!

Directions: Describe how each pre-image can be mapped onto itself using the specified number of transformations.

7) A(3, 5) & B(2, 1); 1 transformation involving a rotation

360° Rotation about (0,0)

8) A(3, 5) & B(2, 1); 2 transformations involving 2 dilations

Dilate by $\frac{5}{2}$ about (0,0) and Dilate by $\frac{2}{5}$ about (0,0)

9) A(3, 5) & B(2, 1); 3 transformations using a rotation & 2 reflections

Rotate 180° about (0,0), Reflect over y-axis, and
Reflect over the x-axis.