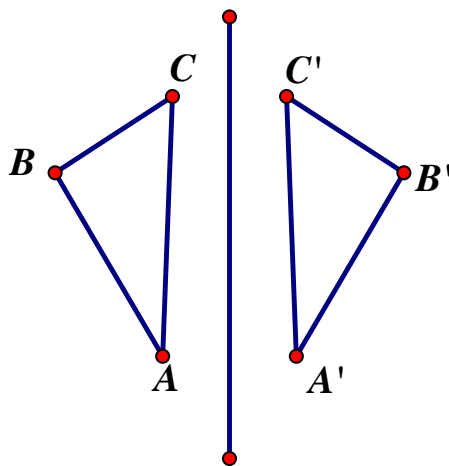# Transformations

## STUDY GUIDE

Name: _____

**1.** For each transformation in the table below, indicate which properties are true by placing a check mark in every appropriate box.

|  | The image and preimage are congruent | The image and preimage are similar but not congruent | Lengths of segments are preserved | Measures of angles are preserved |
|---|---|---|---|---|
| Translation |  |  |  |  |
| Reflection |  |  |  |  |
| Rotation |  |  |  |  |
| Glide Reflection |  |  |  |  |
| Dilation |  |  |  |  |

**2.** A transformation is demonstrated in the figure below.



**Part A:**
Determine the type of transformation that occurs.
Select **all** that apply.
  a. Translation
  b. Reflection
  c. Rotation
  d. Dilation
  e. Rigid Motion
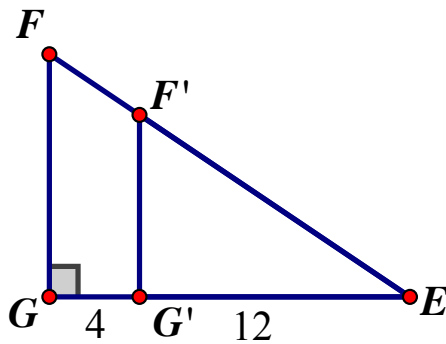  f. Congruence Transformation
  g. Similarity Transformation

**Part B:**
What is the image of angle B?

**Part C:**
What is the preimage of $\overline{B'C'}$?

**3.** A transformation is demonstrated in the figure below.



**Part A:**
Determine the type of transformation that occurs.
Select **all** that apply.
  a. Translation
  b. Reflection
  c. Rotation
  d. Dilation
  e. Rigid Motion
  f. Congruence Transformation
  g. Similarity Transformation

**Part B:**
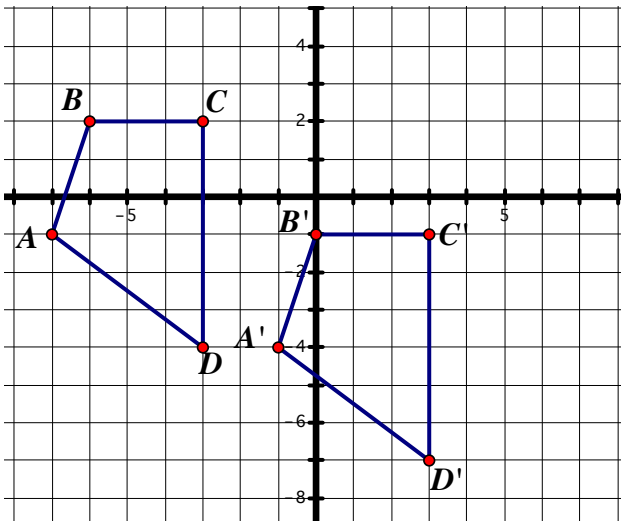What is the image of $\overline{FG}$?

**Part C:**
Which rule describes the transformation?
  a. $R_{FG}$ (EFG) = EF'G'
  b. $r_{(180°, E)}$ (EFG) = EF'G'
  c. $D_{(3/4, E)}$ (EFG) = EF'G'
  d. $T_{<16, 0>}$ :(EFG) = EF'G'

**4.** Which rule describes the translation in the figure below?



  a. $T_{<-6, 3>}$ :(ABCD) = A'B'C'D'
  b. $T_{<6, -3>}$ :(ABCD) = A'B'C'D'
  c. $T_{<3, -6>}$ :(ABCD) = A'B'C'D'
  d. $T_{<-3, 6>}$ :(ABCD) = A'B'C'D'

**5.** ΔEFG has coordinates E(2, 5), F(1, 3), and G(6, 4). A translation maps E to E'(-3, 4). What are the coordinates for F' and G' for this translation?
  a. F'(6, 4) and G'(11, 5)
  b. F'(6, 2) and G'(11, 3)
  c. F'(-4, 4) and G'(1, 5)
  d. F'(-4, 2) and G'(1, 3)

**6.** Triangle EFG is graphed in the coordinate plane with the vertices E(-3, -7), F(0, -4), and G(4, -6) as shown in the figure.
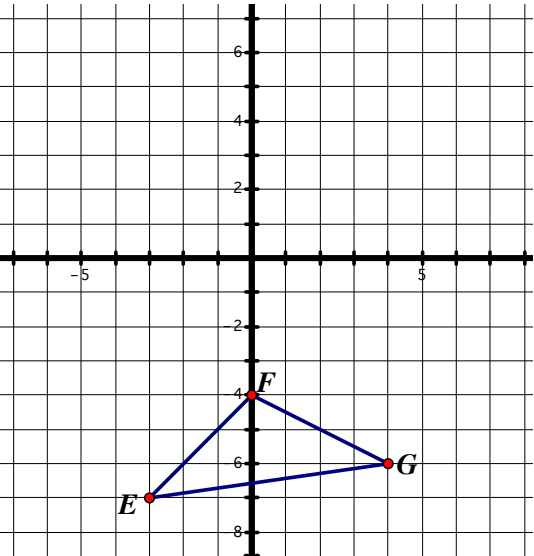


**Part A:**
Triangle EFG will be reflected across the line y = -x to form ΔE'F'G'. Choose **all** quadrants of the xy-coordinate plane that will contain at least one vertex of ΔE'F'G'.
   a. I
   b. II
   c. III
   d. IV

**Part B:**
Triangle EFG will be reflected across the line y = -x to form ΔE'F'G'. What are the coordinates of G'?

**7.** Triangle ABC is shown in the xy-coordinate plane. Triangle ABC is rotated 90° clockwise around the point (3, -2). Indicate whether each of the listed figures of the image will or will not be the same as the corresponding feature in the original triangle.
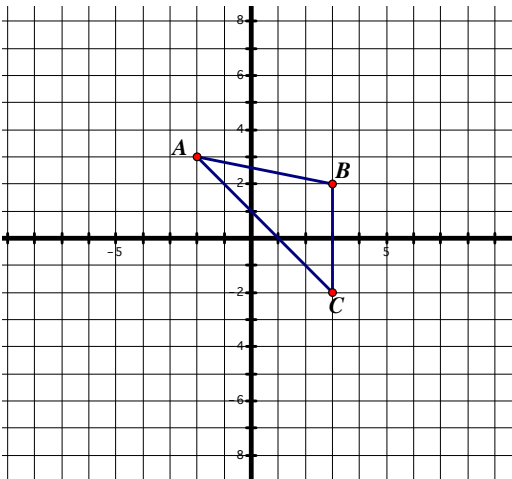


| | The coordinates of A' | The coordinates of C' | The perimeter of Δ A'B'C' | The area of Δ A'B'C' | The measure of ∠B' | The slope of $\overline{A'C'}$ |
|---|---|---|---|---|---|---|
| Will be the same | | | | | | |
| Will not be the same | | | | | | |

**8.** The vertices of quadrilateral *PQRS* have coordinates P(–3, 4), Q(2, 3), R(2, –4), and S(–3, –1). What are the coordinates of the vertices of quadrilateral P'Q'R'S' after a 90° counterclockwise rotation about the origin?
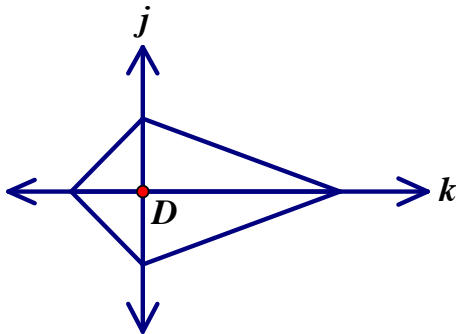
   a. P'(3, -4), Q'(-2, -3), R'(-2, 4), and S'(3, 1)
   b. P'(4, -3), Q'(3, 2), R'(-4, 2), and S'(-1, -3)

c. P'(-3, -4), Q'(2, -3), R'(2, 4), and S'(-3, 1)
d. P'(-4, -3), Q'(-3, 2), R'(4, 2), and S'(1, -3)

**9.** Does the figure have line symmetry? If so draw the line(s) of symmetry. Does the figure have rotational symmetry? If so state the degree(s) of rotation.
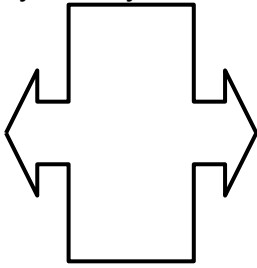


**10.** The figure shows two perpendicular lines j and k intersecting at point D in the interior of a kite.



Which transformation will always carry the figure onto itself? Select **all** that apply.
   a. a reflection across line j
   b. a reflection across line k
   c. a rotation of 90° clockwise about point D
   d. a rotation of 180° clockwise about point D
   e. a rotation of 270° clockwise about point D
   f. no rotational symmetry exists

**11.** The vertices of quadrilateral *PQRS* have coordinates $P(-3, 4)$, $Q(2, 3)$, $R(2, -4)$, and $S(-3, -1)$. What are the coordinates of the vertices of quadrilateral P'Q'R'S' after a 180° rotation about the origin followed by a translation 3 units left and 4 units up?
   a. P'(6, -8), Q'(1, -7), R'(1, 0), and S'(6, -3)
   b. P'(1, 1), Q'(0, 6), R'(-7, 6), and S'(-2, 1)
   c. P'(0, 0), Q'(-5, 1), R'(-5, 8), and S'(0, 3)
   d. P'(-7, 1), Q'(-6, 6), R'(1, 6), and S'(-2, 1)

**12.** Line segment CD with endpoints C(-5, 16) and D(-20, -4) lies in the coordinate plane. The segment will be dilated with a scale factor of 4/5 and a center at the origin to create $\overline{C'D'}$. What will be the length of $\overline{C'D'}$?
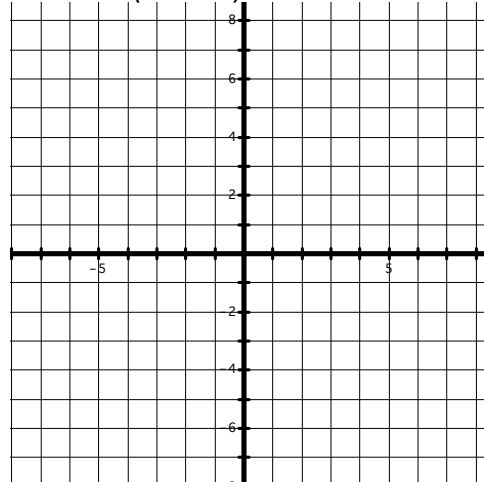   a. 20
   b. 16
   c. 5
   d. 4

**13.** The coordinates of quadrilateral EFGH are E(-7, 2), F(-7, 6), G(-3, 7), and H(-4, 1).  Graph quadrilateral EFGH and its image after each given transformation.
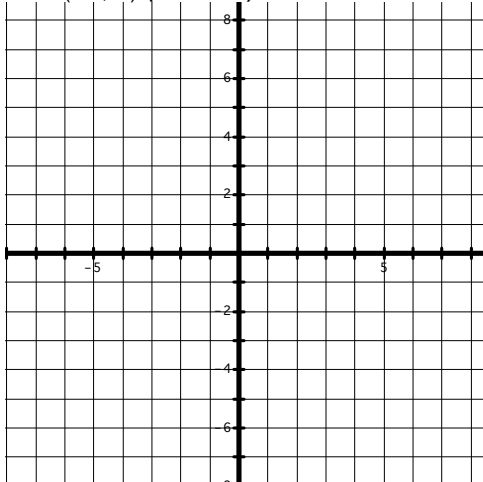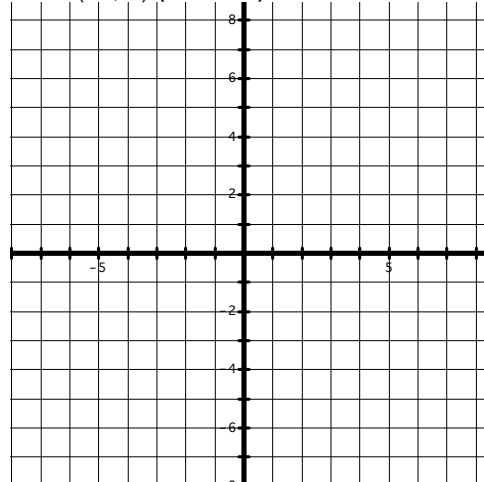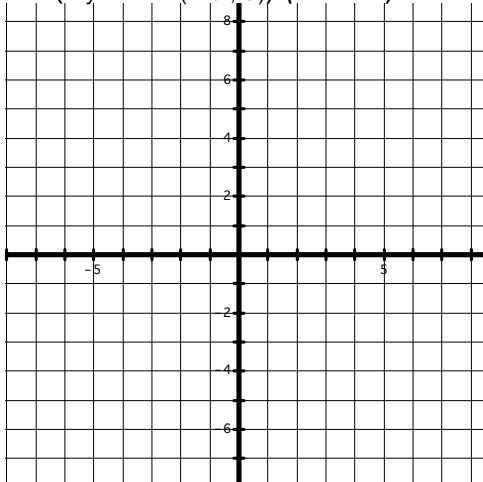
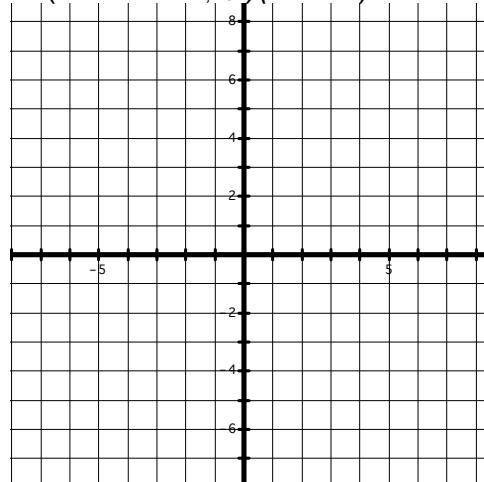e. $T_{<2, -5>}:(EFGH)$

b. $R_{x = 1}(EFGH)$

c. $r_{(90°, O)}(EFGH)$

d. $D_{(0.5, O)}(EFGH)$
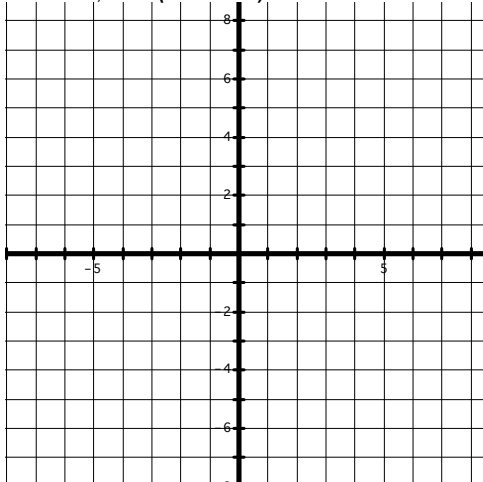
e. $(R_{y = 1} \circ r_{(270°, O)})(EFGH)$
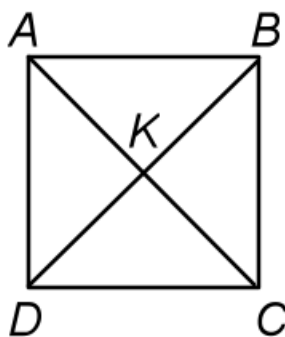
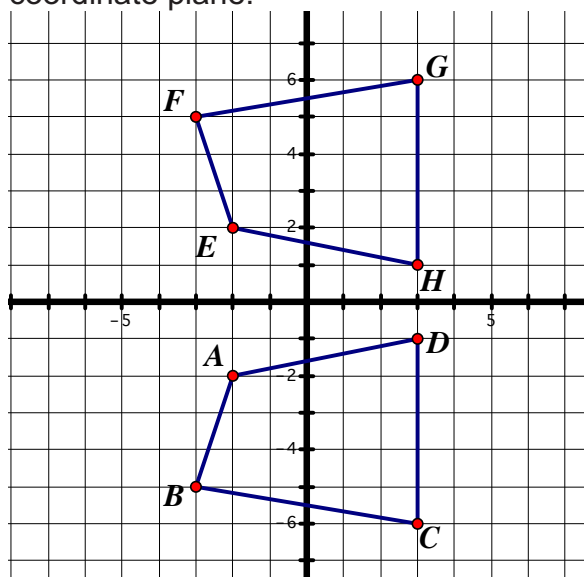f. $(R_{x = 2} \circ T_{<2, -3>})(EFGH)$

**14.** Point *K* is the center of regular quadrilateral *ABCD*. Find the image of the given point or segment for the given rotation. (counterclockwise)

    **a.** $r_{(90°,\ K)}(A)$

    **b.** $r_{(270°,\ K)}(D)$

    **c.** $r_{(180°,\ K)}(DC)$

    **d.** $r_{(360°,\ K)}(KB)$

    **e.** $r_{(90°,\ K)}(BC)$

**15.** Quadrilaterals ABCD and EFGH are shown in the coordinate plane.

**Part A:**

Quadrilateral EFGH is the image of quadrilateral ABCD after a transformation or a sequence of transformations. Which could be the transformation or sequence of transformations? Select **all** that apply.

    a. a translation 2 units up followed by a reflection across the line y = 1

    b. a reflection across the x-axis

    c. a rotation of 180° about the origin

    d. a reflection across the line y = x followed by a rotation of 90° clockwise
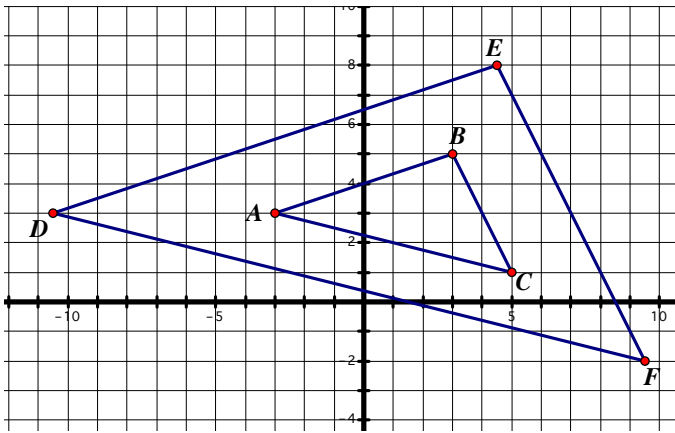
    e. a translation 7 units up

**Part B:**

Quadrilateral ABCD will be reflected about the x-axis and then translated 4 units left and 5 units down to create Quadrilateral A'B'C'D'. What will be the x-coordinate of C'?

**16.** The letter J is reflected across line *m* and then line *n*. Describe the resulting transformation.
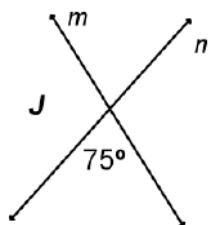
**17.** In the coordinate plane shown, ΔABC has vertices A(-3, 3), B(3, 5), and C(5, 1).



What are the scale factor and the center of dilation that will carry ΔABC to ΔDEF? Write your answers in the blank spaces provided.

The scale factor is _____
and the center of dilation is

(_____, _____).

**18.** Parallelogram ABCD is the pre-image of parallelogram A'B'C'D' before a transformation. Determine if these two figures are similar.
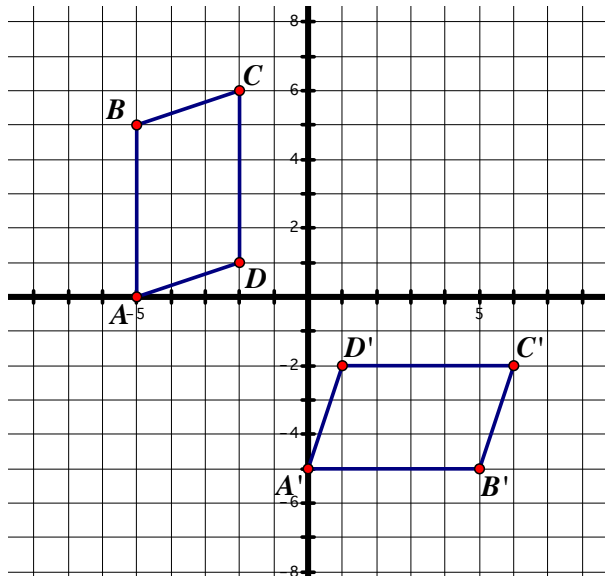


Select an answer from each group of choices to correctly complete the sentence.

Parallelogram ABCD (is or is not) similar to parallelogram A'B'C'D', which we can determine by a _____.

c. translation 3 units right and 3 units down
d. dilation of scale factor -1.5 centered at the origin
e. dilation of scale factor -1 centered at the origin
f. reflection about the y-axis followed by a reflection about the x-axis
g. reflection about the line y = x

## Transformations Study Guide KEY

1. For each transformation in the table below, indicate which properties are true by placing a check mark in every appropriate box.

| | The image and preimage are congruent | The image and preimage are similar but not congruent |
|---|---|---|
| Translation | X | |
| Reflection | X | |
| Rotation | X | |
| Glide Reflection | X | |
| Dilation | | X |

| | Lengths of segments are preserved | Measures of angles are preserved |
|---|---|---|
| Translation | X | X |
| Reflection | X | X |
| Rotation | X | X |
| Glide Reflection | X | X |
| Dilation | | X |

2. Part A: B, E, F, and G
   Part B: $\angle B'$
   Part C: $\overline{BC}$

3. Part A: D and G
   Part B: $\overline{F'G'}$
   Part C: C

4. B

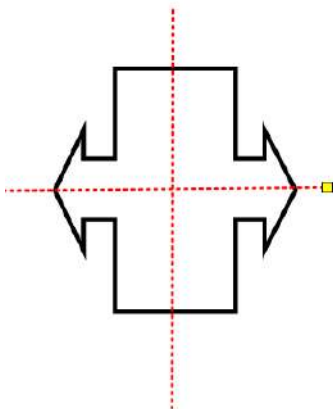5. D

**6.** Part A: A and D
Part B: G'(6, -4)

7.

| | The coordinates of A' | The coordinates of C' | The perimeter of ΔA'B'C' |
|---|---|---|---|
| Will be the same | | X | X |
| Will not be the same | X | | |

| | The area of ΔA'B'C' | The measure of $\angle B'$ | The slope of $\overline{A'C'}$ |
|---|---|---|---|
| Will be the same | X | X | |
| Will not be the same | | | X |

**8.** D

**9.** 180° rotational symmetry



**10.** B and F

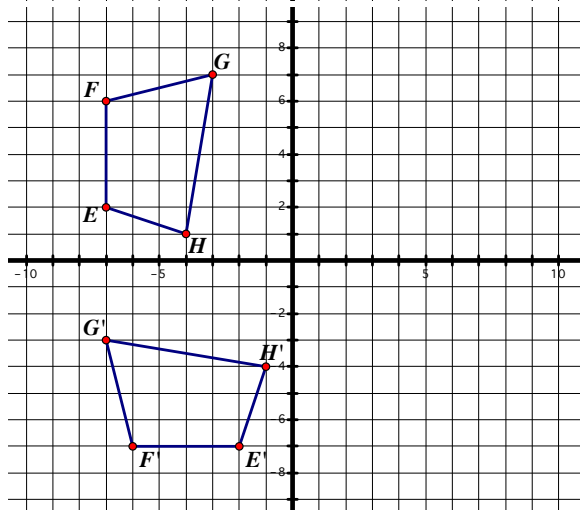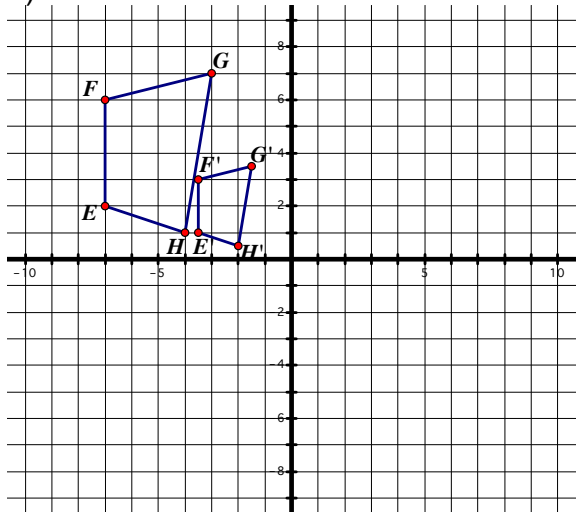**11.** C
**12.** A

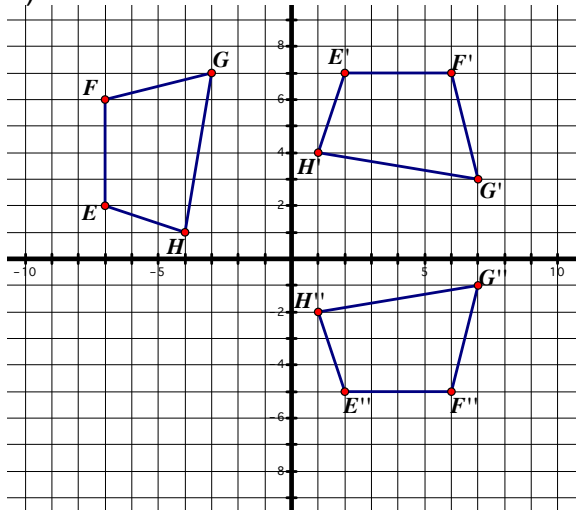**13.** a)
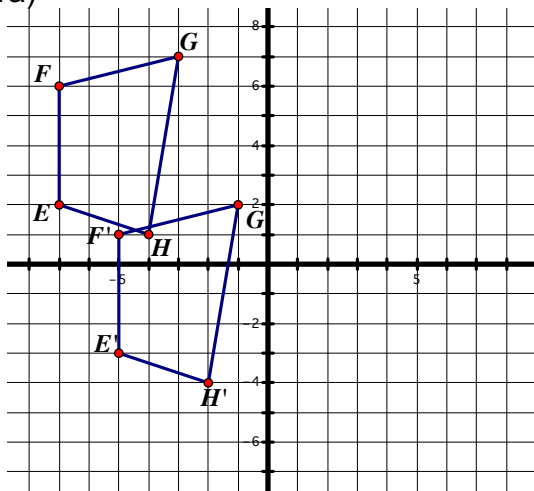


b)
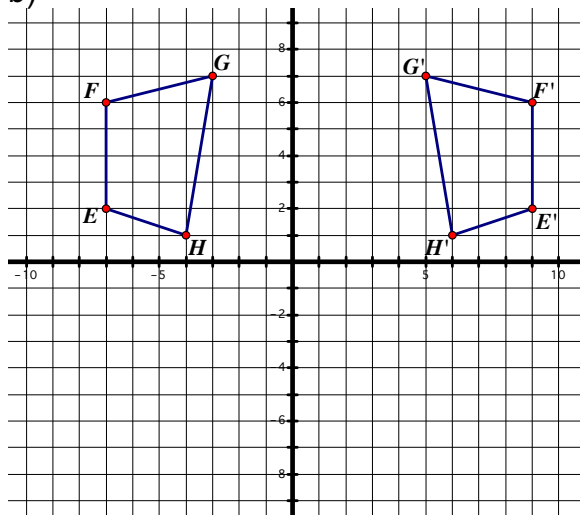


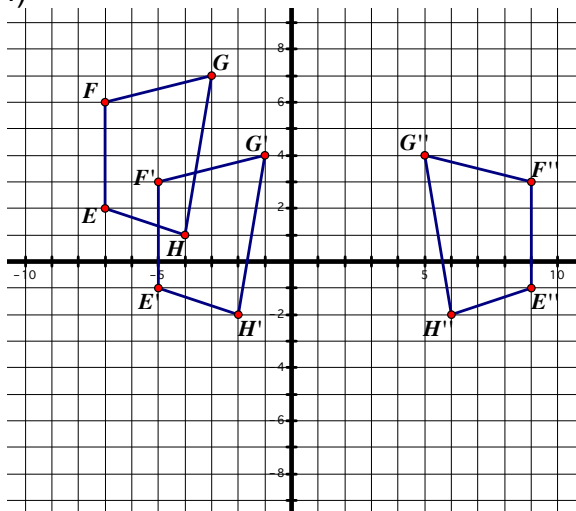c)

d)



e)



f)

**14.** a) point D
   b) point A
   c) $\overline{AB}$
   d) $\overline{KB}$
   e) $\overline{AB}$

**15.** Part A: A, B, and D
   Part B: C'(-1, 1)

**16.** 150° rotation clockwise

**17.** scale factor = 5/2 or 2.5
   center of dilation = (2, 3)

**18.** A and G