

**VOCABULARY**

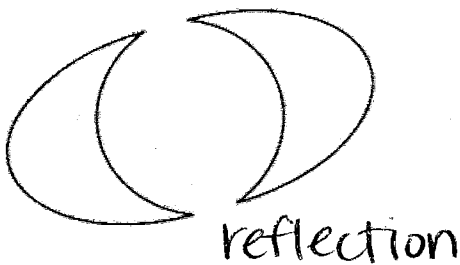
You must know the definitions of the following words, what they look like, how to use and apply them, as well as their notation. Highlight any words that you are not familiar with.

- Transformation
- Preimage
- Image
- Arrow Notation
- Reflection
- Line of Reflection
- Translation
- Vector
- Translation
- Rotation
- Center of Rotation
- Angle of Rotation
- Composition of Transformations

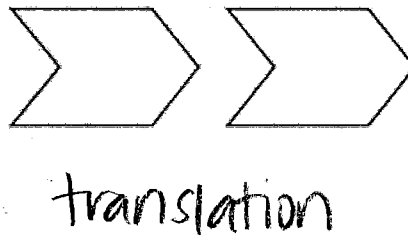
**IDENTIFY**

Tell what type of transformation is each type of preimage and their image.

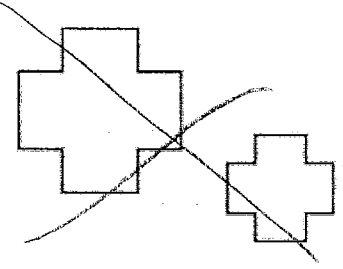
a)



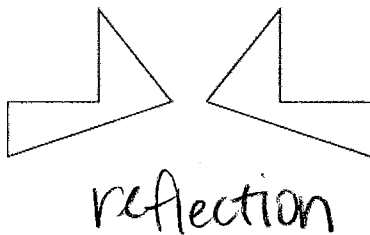
b)



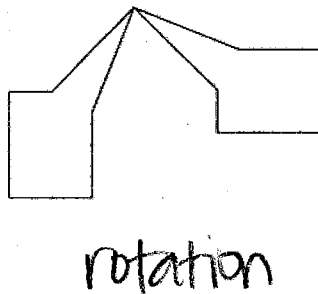
c)



d)



e)

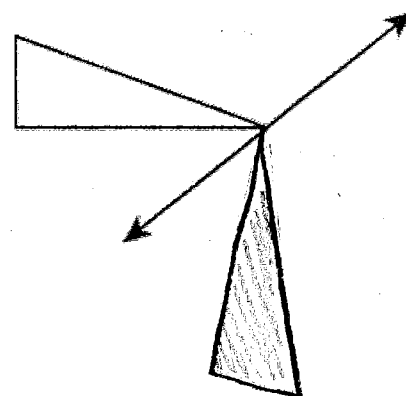
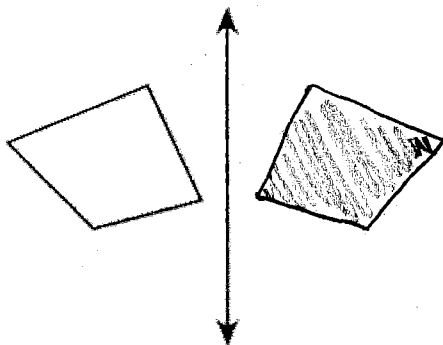


f)

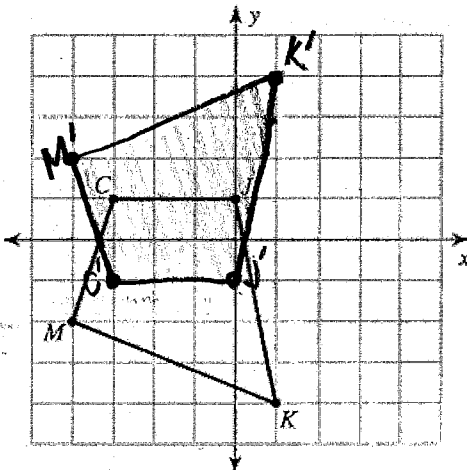


**REFLECTIONS**

You must be able to identify reflections from other transformations, draw them using a straight edge, and find their image in the coordinate plane over the x-axis, the y-axis, and the line  $y=x$ .



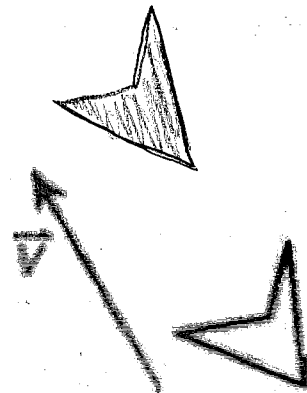
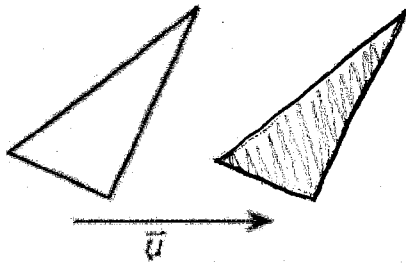
reflection across the x-axis



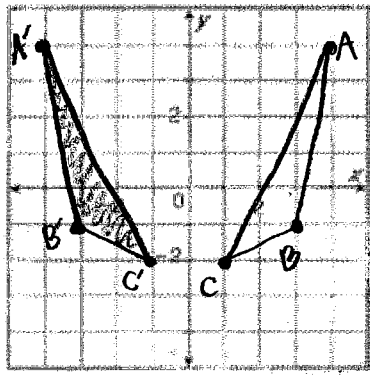
$$(x, y) \rightarrow (x, -y)$$

**TRANSLATIONS**

You must be able to identify translations from other transformations, draw them using a straight edge, and find their image in the coordinate plane given any vector  $\langle a, b \rangle$ .

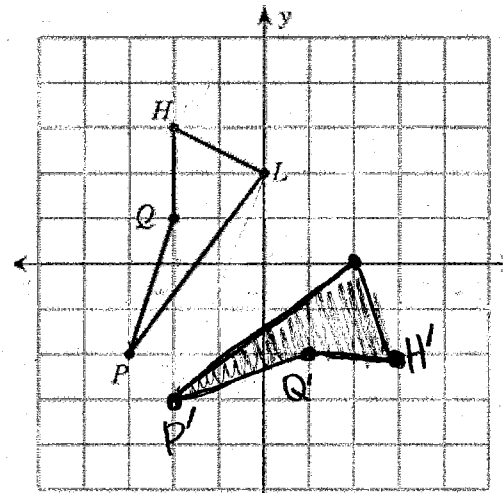


$A(4, 4), B(3, -1), C(1, -2)$ ; y-axis



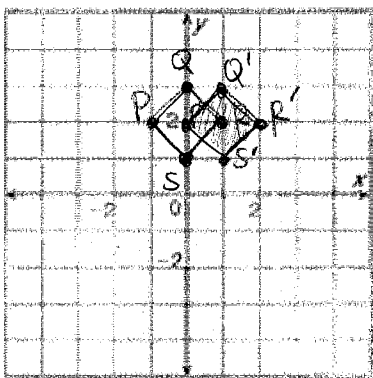
$$(x, y) \rightarrow (-x, y)$$

reflection across  $y = x$

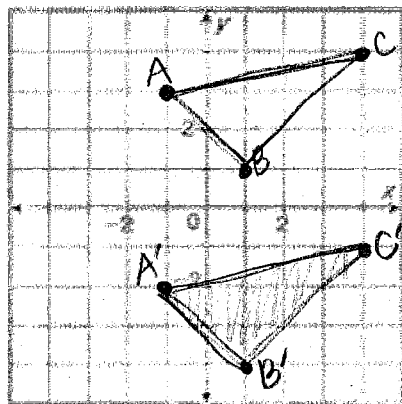


$$(x, y) \rightarrow (y, x)$$

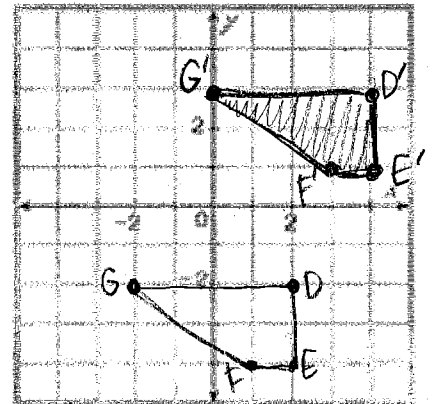
$P(-1, 2), Q(0, 3), R(1, 2), S(0, 1)$ ;  $\langle 1, 0 \rangle$



$A(-1, 3), B(1, 1), C(4, 4)$ ;  $\langle 0, -5 \rangle$



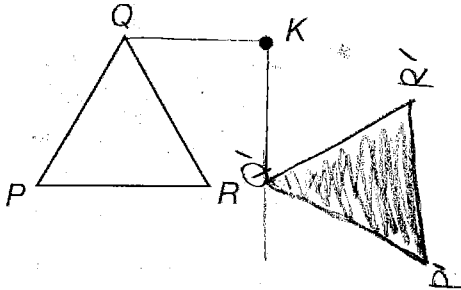
$D(2, -2), E(2, -4), F(1, -4), G(-2, -2)$ ;  $\langle 2, 5 \rangle$



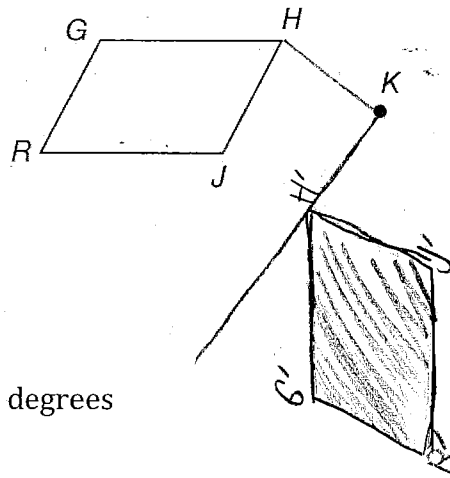
# ROTATIONS

Rotate each figure by 90 degrees and by 180 degrees using the given center of rotation.

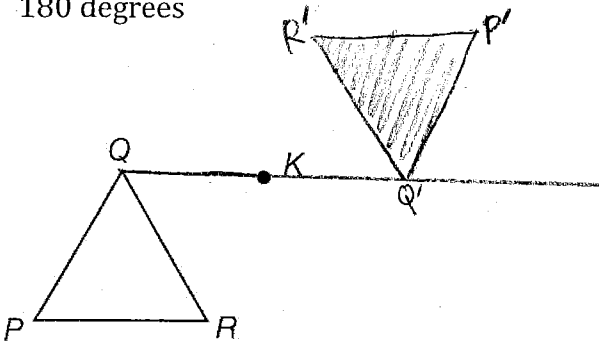
90 degrees



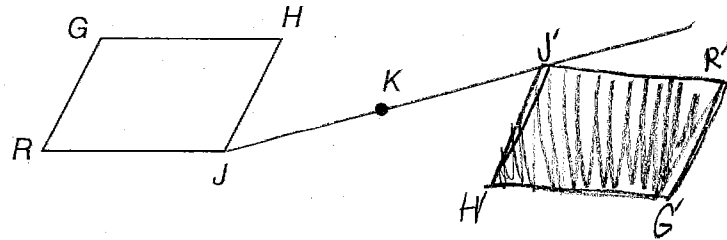
90 degrees



180 degrees

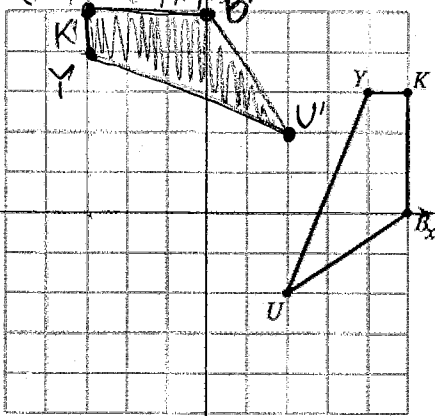


180 degrees



rotation 90° <sup>counter</sup> clockwise about the origin

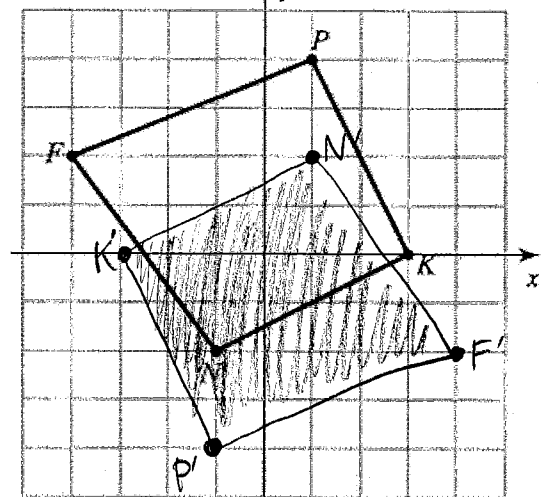
$$(x, y) \rightarrow (-y, x)$$



Y (4,3)	Y' (-3,4)
K (5,3)	K' (-3,5)
U (2,-2)	U' (2,2)
B (5,0)	B' (0,9)

rotation 180° about the origin

$$(x, y) \rightarrow (-x, -y)$$



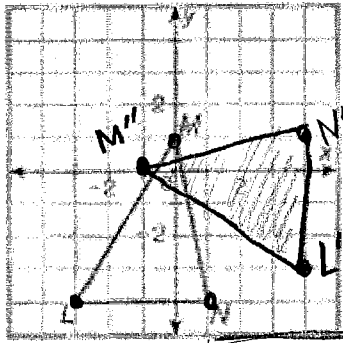
F (-4,2)	F' (4,-2)
P (1,4)	P' (-1,-4)
N (-1,-2)	N' (1,2)
K (3,0)	K' (-3,0)

**COMPOSITIONS**

You must be able to identify the steps taken to compose a figure as well as perform compositions of various transformations in a given order.

$\triangle LMN$  is reflected across the line  $y=x$  and then reflected across the  $y$ -axis. What are the coordinates of the final image of  $\triangle LMN$ ?

$(x,y) \rightarrow (-y,x)$



$(x,y) \rightarrow (y,x)$

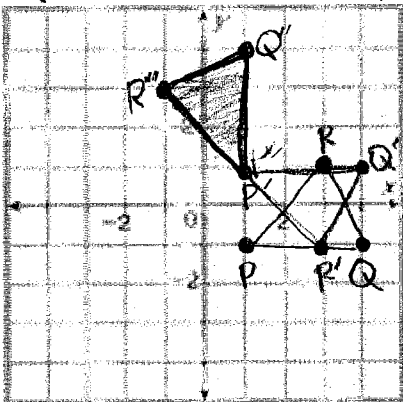
*y stays the same. x is the opposite*

$(x,y) \rightarrow (-x,y)$

- |            |            |             |
|------------|------------|-------------|
| $L(-3,-4)$ | $L'(4,-3)$ | $L''(4,-3)$ |
| $M(0,1)$   | $M'(1,0)$  | $M''(-1,0)$ |
| $N(1,-4)$  | $N'(-4,1)$ | $N''(4,1)$  |

$\triangle PQR$  has vertices  $P(1, -1)$ ,  $Q(4, -1)$ , and  $R(3, 1)$ . Reflect  $\triangle PQR$  across the  $x$ -axis and then reflect it across  $y = x$ .

- $P'(1,1)$   $Q'(4,1)$   $R'(3,-1)$

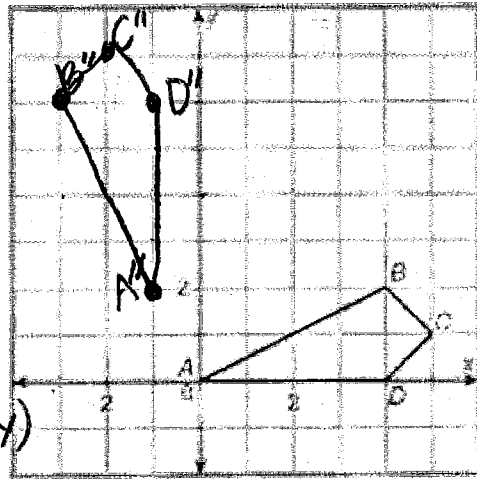


- $P''(1,1)$   
 $Q''(1,4)$   
 $R''(-1,3)$

$\triangle EFG$  has vertices  $E(1, 5)$ ,  $F(0, -3)$ , and  $G(-1, 2)$ .  $\triangle EFG$  is translated along the vector  $(7, 1)$ , and the image is reflected across the  $x$ -axis. What are the coordinates of the final image of  $G$ ?

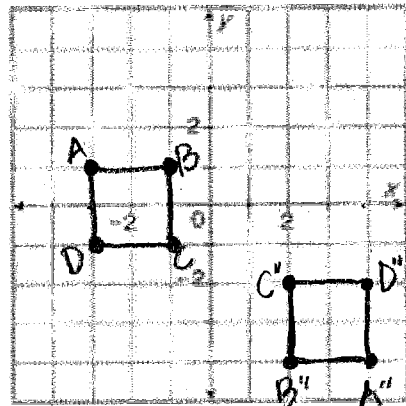
- (A)  $(6, -3)$       C  $(-6, 3)$        $G''(6, 3)$   
 B  $(6, 3)$       D  $(-6, -3)$

A pattern for a new fabric is made by rotating the figure  $90^\circ$  counterclockwise about the origin and then translating along the vector  $(-1, 2)$ . Draw the resulting figure in the pattern.



- $K(0,0)$   
 $B(4,2)$   
 $C(5,1)$   
 $D(4,0)$   
 $A'(0,0)$   
 $B'(-2,4)$   
 $C'(-1,5)$   
 $D'(0,4)$

$A''(-1,2)$   $B''(-3,6)$   $C''(-2,7)$   $D''(-1,4)$   
 $ABCD$  has vertices  $A(-3, 1)$ ,  $B(-1, 1)$ ,  $C(-1, -1)$ , and  $D(-3, -1)$ . Rotate  $ABCD$   $180^\circ$  about the origin and then translate it along the vector  $(1, -3)$ .



- $A'(3,-1)$   
 $B'(1,-1)$   
 $C'(1,1)$   
 $D'(3,1)$   
 $A''(4,-4)$   
 $B''(2,-4)$   
 $C''(2,-2)$   
 $D''(4,-2)$

$\triangle KLM$  with vertices  $K(8, -1)$ ,  $L(-1, -4)$ , and  $M(2, 3)$  is rotated  $180^\circ$  about the origin. The image is then translated. The final image of  $K$  has coordinates  $(-2, -3)$ . What is the translation vector?

- F  $(6, 4)$       H  $(-1, -11)$   
 (G)  $(6, -4)$       J  $(-10, -2)$

$K'(-8, 1)$  to  $K''(-2, -3)$