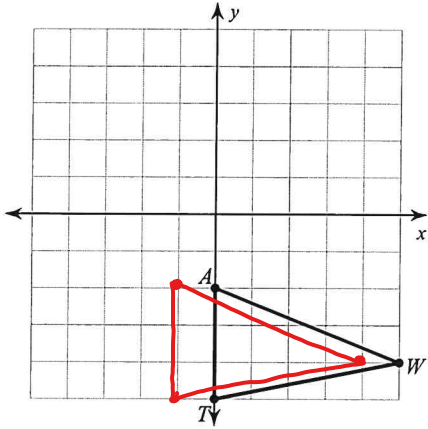


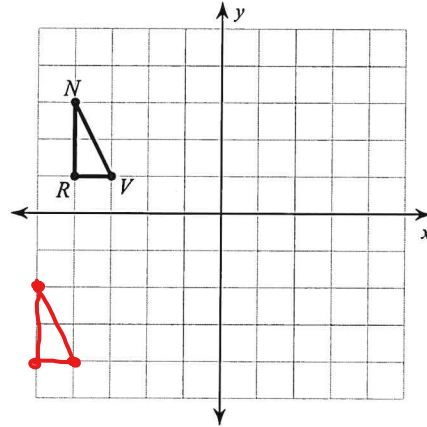
# Translations, Rotations, and Reflections

Graph the image of the figure using the transformation given.

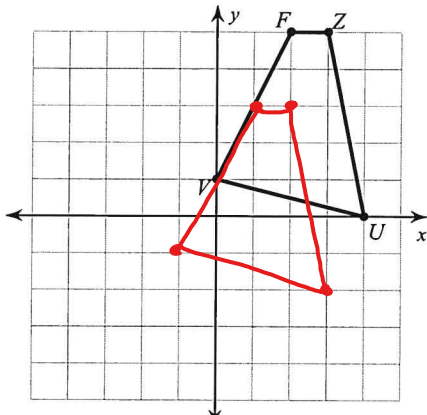
1) translation: 1 unit left



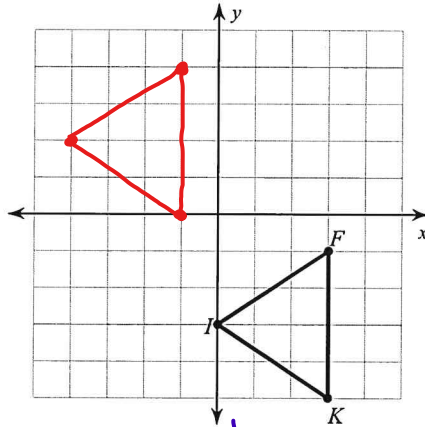
2) translation: 1 unit left and 5 units down



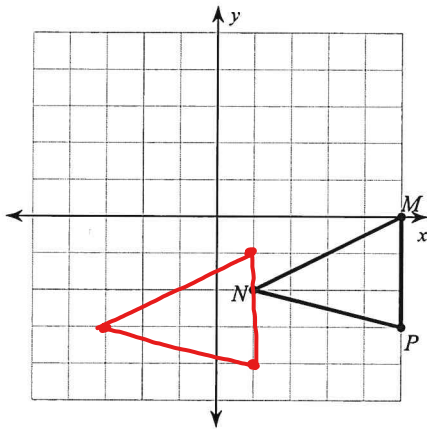
3) translation:  $(x, y) \rightarrow (x - 1, y - 2)$  *left down*



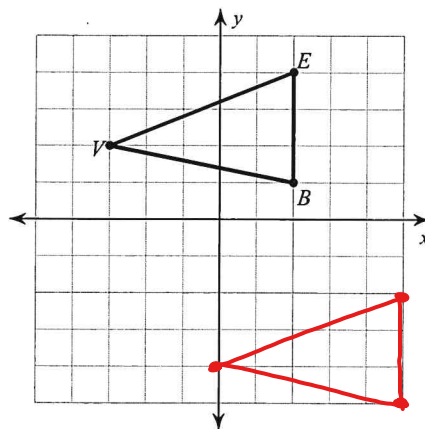
4) translation:  $(x, y) \rightarrow (x - 4, y + 5)$  *left up*



5) translation:  $(-4, -1)$  *left down*

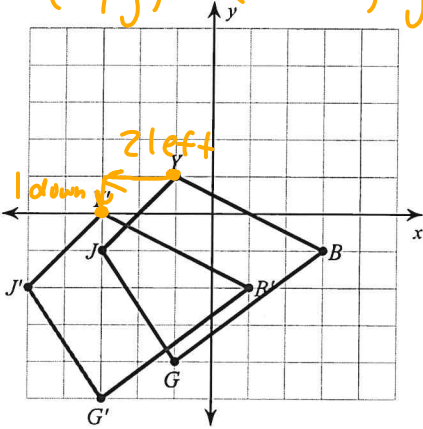


6) translation:  $(3, -6)$  *right down*

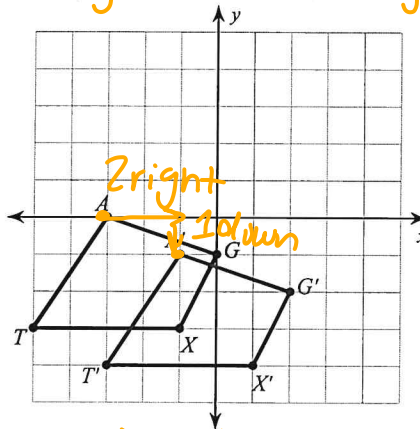


Write a rule to describe each transformation.

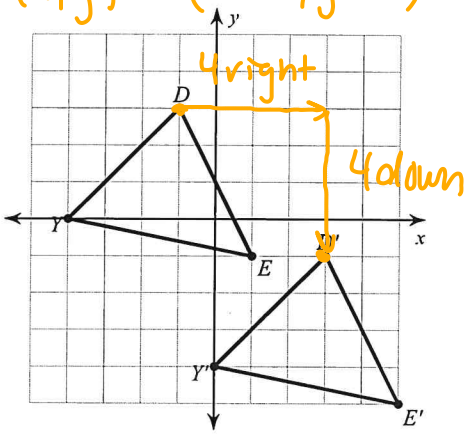
7)  $(x, y) \rightarrow (x-2, y-1)$



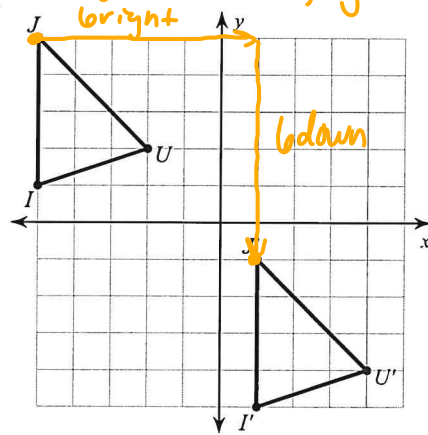
8)  $(x, y) \rightarrow (x+2, y-1)$



9)  $(x, y) \rightarrow (x+4, y-4)$

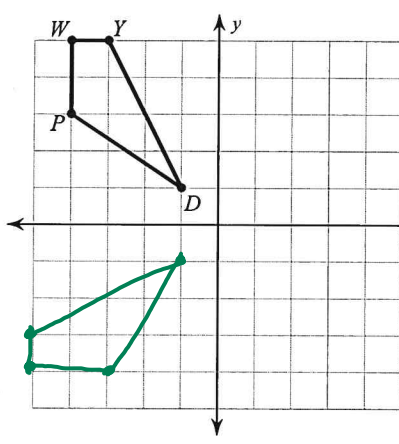


10)  $(x, y) \rightarrow (x+6, y-6)$



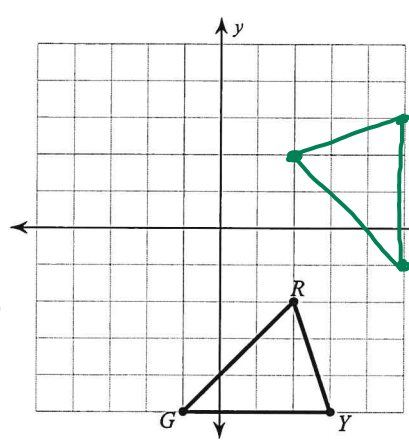
Graph the image of the figure using the transformation given.

11) rotation  $90^\circ$  counterclockwise about the origin



$(-4, 5) \rightarrow (-5, -4)$   
 $(-3, 5) \rightarrow (-5, -3)$   
 $(-4, 3) \rightarrow (-3, -4)$   
 $(-1, 1) \rightarrow (-1, -1)$

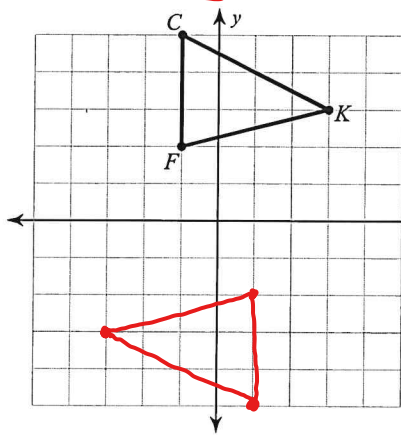
12) rotation  $90^\circ$  counterclockwise about the origin



$(2, -2) \rightarrow (-2, 2)$   
 $(-1, -5) \rightarrow (-5, -1)$   
 $(3, -5) \rightarrow (-5, 3)$

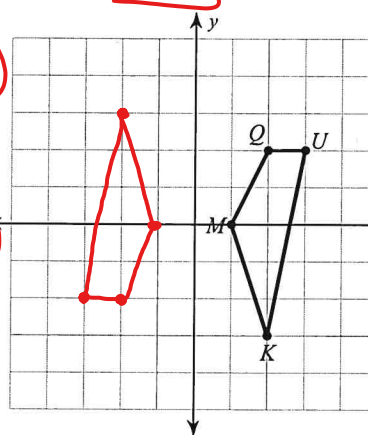
$180^\circ: (x, y) \rightarrow (-x, -y)$     
 $90^\circ \text{ CW}: (x, y) \rightarrow (y, -x)$     
 $90^\circ \text{ CCW}: (x, y) \rightarrow (-y, x)$

13) rotation  $180^\circ$  about the origin



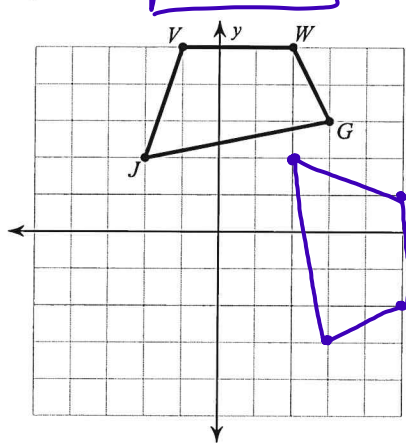
$(-1, 5) \rightarrow (1, -5)$   
 $(-1, 2) \rightarrow (1, -2)$   
 $(3, 3) \rightarrow (-3, -3)$

14) rotation  $180^\circ$  about the origin



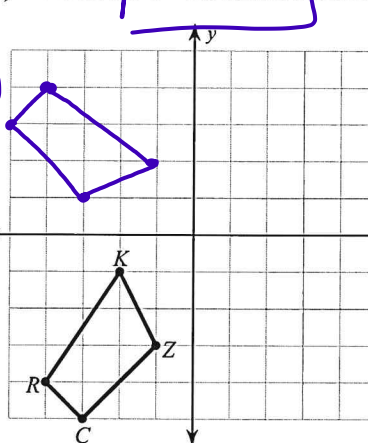
$(1, 0) \rightarrow (-1, 0)$   
 $(2, 2) \rightarrow (-2, -2)$   
 $(2, -3) \rightarrow (-2, 3)$   
 $(3, 2) \rightarrow (-3, -2)$

15) rotation  $90^\circ$  clockwise about the origin



$(-2, 2) \rightarrow (2, -2)$   
 $(-1, 5) \rightarrow (5, -1)$   
 $(2, 5) \rightarrow (5, -2)$   
 $(3, 3) \rightarrow (3, -3)$

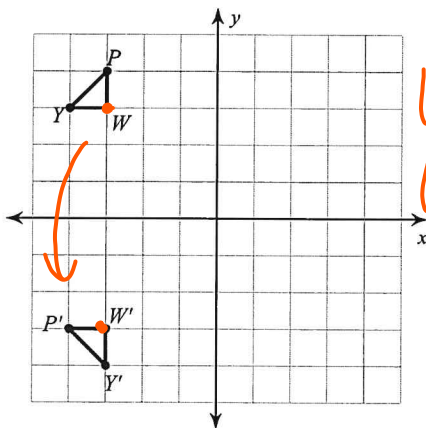
16) rotation  $90^\circ$  clockwise about the origin



$(-4, -4) \rightarrow (-4, +4)$   
 $(-3, -5) \rightarrow (-5, +3)$   
 $(-2, -1) \rightarrow (-1, +2)$   
 $(-1, -3) \rightarrow (-3, +1)$

Write a rule to describe each transformation.

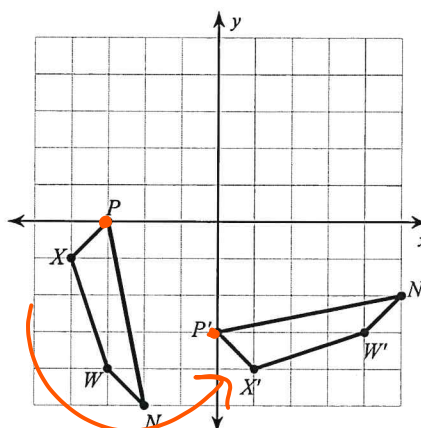
17)



$(-3, 3) \rightarrow (-3, -3)$   
 $(-3, 0) \rightarrow (-3, 0)$   
 $(-3, -3) \rightarrow (-3, 3)$

$90^\circ$  CCW

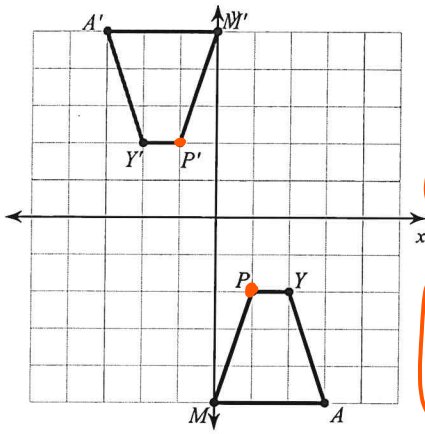
18)



$(-3, 0) \rightarrow (-3, 0)$   
 $(-3, -3) \rightarrow (-3, -3)$   
 $(-3, -3) \rightarrow (-3, -3)$   
 $(-3, -3) \rightarrow (-3, -3)$

$90^\circ$  CCW

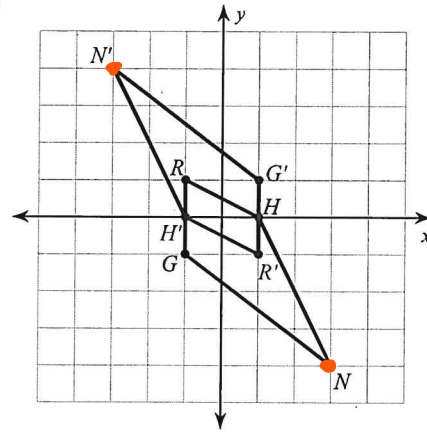
19)



$(1, -2)$   
 $(-1, 2)$

$180^\circ$

20)

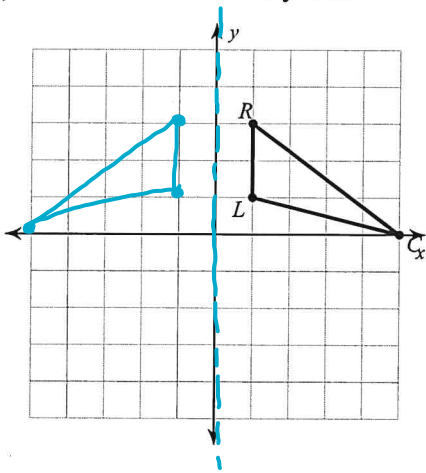


$(3, -4)$   
 $(-3, 4)$

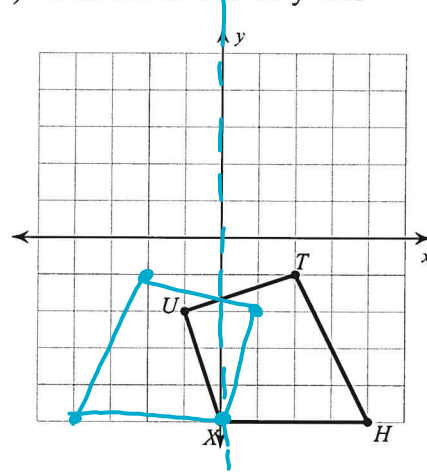
$180^\circ$

Graph the image of the figure using the transformation given.

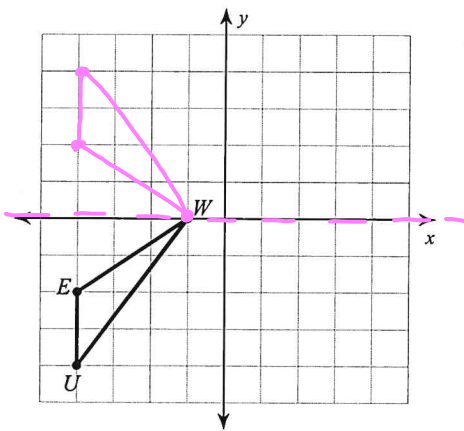
21) reflection across the y-axis



22) reflection across the y-axis



23) reflection across the x-axis



24) reflection across the x-axis

