

## Lesson: Transformations and Coordinates

### Sixth Grade Objective:

3.03 Transform figures in the coordinate plane and describe the transformation

3.04 Solve problems involving geometric figures in the coordinate plane

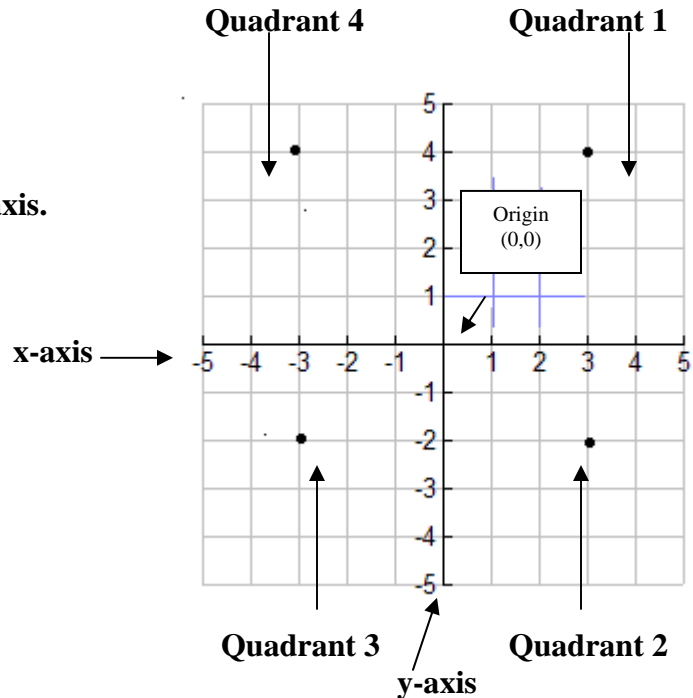
## Lesson: Coordinates

### Step 1:

Identify the origin and x- and y-axis.

### Step 2:

Identify the quadrants.



### Step 3:

Identify the coordinates.

To identify a point you must travel the x-axis and then the y-axis.

(left or right, up or down)

The point in Quadrant 1 has both positive coordinates: (3,4)

The point in Quadrant 2 has a positive and negative coordinate: (3,-2)

The point in Quadrant 3 has both negative coordinates: (-3,-2)

The point in Quadrant 4 has a negative and positive coordinate: (-3,4)

## Lesson: Transformations

Transformation is another word for reflection (flip), translation (slide) and rotation (turn). Let's look how to transform different figures on a grid.

### REFLECTION

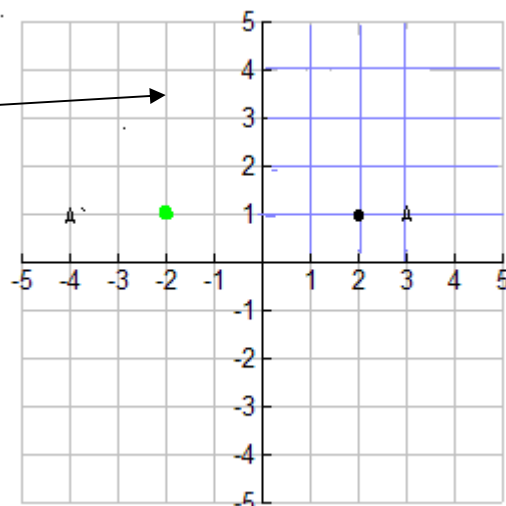
Step 1: Reflect point A over the y-axis.

Locate the y-axis.

y-axis

Step 2: Reflect the point (2,1) over the y-axis.

Step 3: The new ordered pair (-2,1) is referred to as A' or A prime.



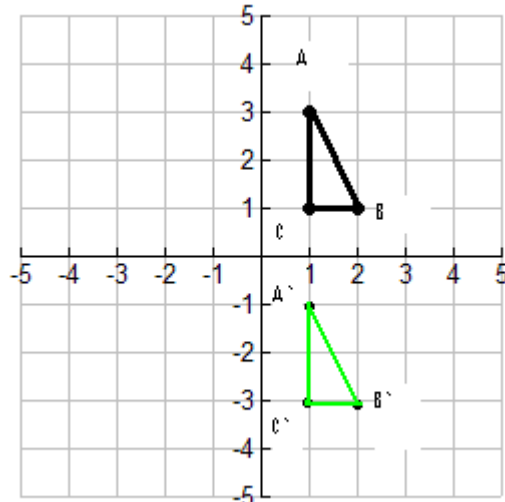
**TRANSLATION:**

**Step 1:**

Translate the triangle four units down.  
The easiest way is to trace the figure on a sheet of paper. Cut it out. Slide the figure down four units and plot your new points.

**Step 2:** Plot your points and record the new coordinates using notation:

- |                 |                   |                    |
|-----------------|-------------------|--------------------|
| $\triangle ABC$ | $\longrightarrow$ | $\triangle A'B'C'$ |
| $A(1, 3)$       | $\longrightarrow$ | $A'(1, -1)$        |
| $B(2, 1)$       | $\longrightarrow$ | $B'(2, -3)$        |
| $C(1, 1)$       | $\longrightarrow$ | $C'(1, -3)$        |



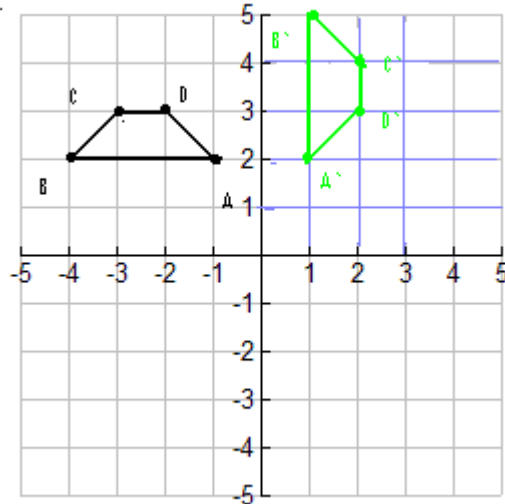
**ROTATION:**

**Step 1:**

Rotate the trapezoid 90° clockwise.  
The easiest way is to trace the figure on a sheet of paper. Cut it out. Rotate the figure 90° clockwise.

**Step 2:** Plot your points and record the new coordinates using notation:

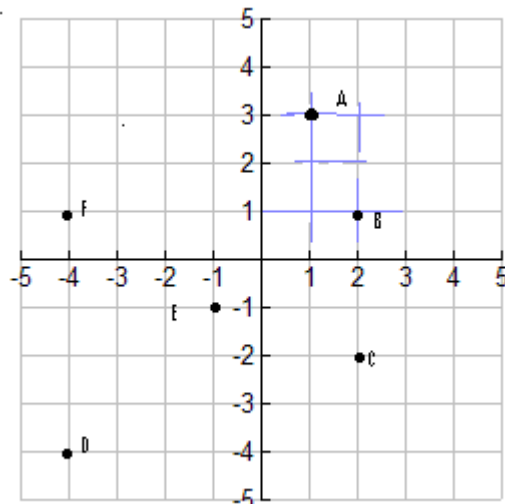
- |            |                   |            |
|------------|-------------------|------------|
| $ABCD$     | $\longrightarrow$ | $A'B'C'D'$ |
| $A(-1, 2)$ | $\longrightarrow$ | $A'(1, 2)$ |
| $B(-4, 2)$ | $\longrightarrow$ | $B'(1, 5)$ |
| $C(-3, 3)$ | $\longrightarrow$ | $C'(2, 4)$ |
| $D(-2, 3)$ | $\longrightarrow$ | $D'(2, 3)$ |



Try these on your own!

Identify each point and the quadrant.

- A.
- B.
- C.
- D.
- E.
- F.



**Check your answers!**

- A. (1,3) Quadrant 1**
- B. (2,1) Quadrant 1**
- C. (2,-2) Quadrant 2**
- D. (-4,-4) Quadrant 3**
- E. (-1,-1) Quadrant 3**
- F. (-4,1) Quadrant 4**

**Quiz Yourself!**

- 1. On graph paper draw an x- and y- axis. Plot these coordinates: (1,2), (2,0), (1,-2), (-1,-2), (-2,0), (-1,2). Connect the points and name the figure.**
- 2. Use the figure in problem number one and translate it two units to the left and two units down. What are the new vertices of the figure?**
- 3. On graph paper draw an x- and y-axis. Plot the following coordinates: A(2,-1), B(4,-2), C(2,-3), D(0, -2). Connect the points and reflect figure ABCD over the x-axis. What is the coordinate for A prime? A' (2,1)**

**Extra Practice!**

**Click on these websites for extra help!**

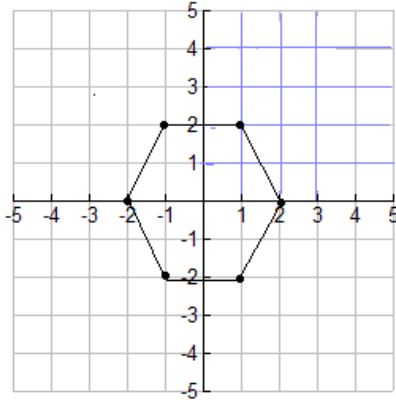
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[http://nlvm.usu.edu/EN/NAV/frames\\_asid\\_299\\_g\\_2\\_t\\_3.html?open=activities&from=grade\\_g\\_2.html](http://nlvm.usu.edu/EN/NAV/frames_asid_299_g_2_t_3.html?open=activities&from=grade_g_2.html)

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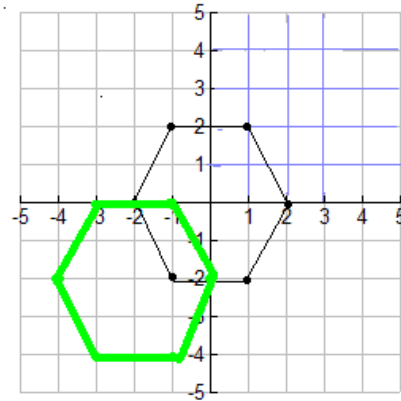
Check your answers!

1. On graph paper draw an x- and y- axis. Plot these coordinates:  $(1,2)$ ,  $(2,0)$ ,  $(1,-2)$ ,  $(-1,-2)$ ,  $(-2,0)$ ,  $(-1,2)$ . Connect the points and name the figure.



Hexagon

2. Use the figure in problem number one and translate it two units to the left and two units down. What are the new vertices of the figure?  $(-1,0)$ ,  $(-2,0)$ ,  $(-1,-4)$ ,  $(-3,-4)$ ,  $(-4,-2)$ ,  $(-3,0)$



3. On graph paper draw an x- and y-axis. Plot the following coordinates:  $A(2,-1)$ ,  $B(4,-2)$ ,  $C(2,-3)$ ,  $D(0,-2)$ . Connect the points and reflect figure ABCD over the x-axis. What is the coordinate for A prime?  $A'(2,1)$

