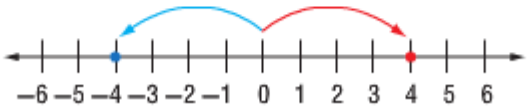
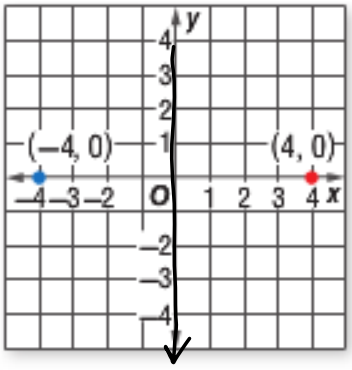
Name: _____ **Date:** _____

Reflections on the Coordinate Plane

You can use what you know about number lines and opposites to compare locations on the coordinate plane. Consider the number line and coordinate plane below.
The number line shows that –4 and 4 are opposites.





What do you notice about numbers that are opposites?

Opposites have the same absolute value because they are the same distance from zero but are on opposite sides of zero.

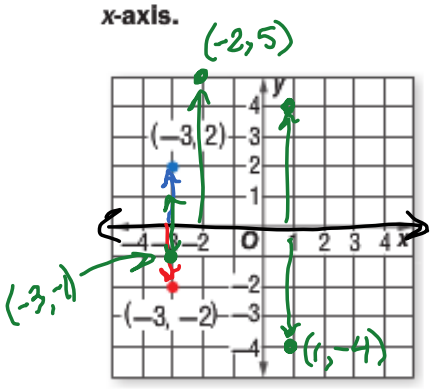
What do the points on the number line and coordinate plane have in common?

Both are the same distance from zero.

The coordinate plane shows that the points (–4, 0) and (4, 0) are the same distance from the y-axis in opposite directions. Because of their placement, they are reflected across the y-axis.

Now consider the following example:

Name the ordered pair that is a reflection of (–3, 2) across the *x*-axis.



The coordinate plane shows that the points (–3, 2) and (–3, –2) are the same distance from the x-axis in opposite directions. Because of their placement, they are reflected across the x-axis.

Got It? Do these problems to find out.

Name the ordered pair that is a reflection of each point across the *x*-axis.

c. (1, –4) (1,4)

d. (–2, 5) (-2,-5)

e. (–3, –1) (-3,1)

Do you notice a special relationship between points reflected across either axis?

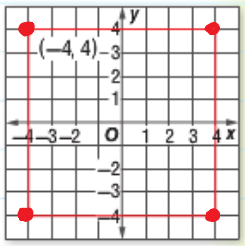
Reflecting over x-axis
x stays the same
y becomes the opposite

Reflecting over y-axis
y stays the same
x becomes the opposite

Got It? Do these problems to find out.

Name the ordered pair that is a reflection of each point across the *x*-axis.

	c. (1, −4)	d. (−2, 5)	e. (−3, −1)
x	(1, 4)	(−2, −5)	(−3, 1)
y	(1, −4)	(2, 5)	(3, −1)



Example

4. **Kendall is building a square fence. She places fence posts at the locations indicated on the grid. What is the location of the post that reflects (−4, 4) across the *y*-axis?**

To reflect across the *y*-axis, keep the same *y*-coordinate, 4.

The opposite of the *x*-coordinate, −4, is 4.

So, (−4, 4) reflected across the *y*-axis is (4, 4).

(4, 4)

Got It? Do this problem to find out.

f. Kendall also placed a fence post at (−4, −4). What is the location of the post that reflects (−4, −4) across the *y*-axis?

f. (4, −4) Show your work.

Graph Reflections on the Coordinate Plane

You can graph points that are reflected across the *x*- and *y*-axes. Remember that points reflected across the *x*-axis will have the same *x*-coordinates and their *y*-coordinates will be opposites. Points reflected across the *y*-axis will have the same *y*-coordinates and their *x*-coordinates will be opposites.

Examples

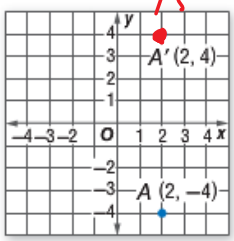
3. **Graph *A*(2, −4). Then graph its reflection across the *x*-axis.**

Graph point *A*.

To reflect across the *x*-axis, keep the same *x*-coordinate, 2, and take the opposite of the *y*-coordinate.

The opposite of −4 is 4.

So, point *A* reflected across the *x*-axis is located at point *A*′(2, 4). Graph point *A*′.



Symbols
Use the notation *A*′ to label the reflection of a point *A*.

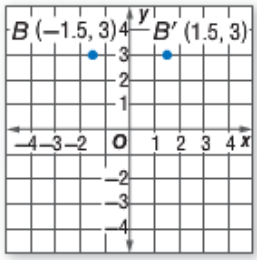
4. **Graph $B(-1.5, 3)$. Then graph its reflection across the y-axis.**

Graph point B.

To reflect across the y-axis, keep the same y-coordinate and take the opposite of the x-coordinate.

The opposite of -1.5 is 1.5.

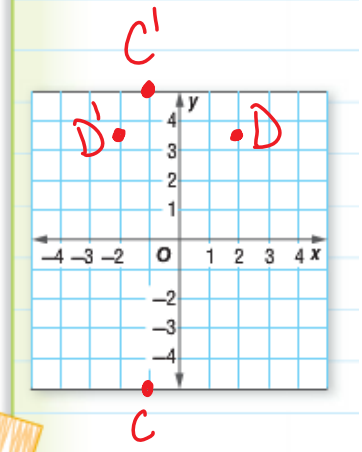
So, point B reflected across the y-axis is point $B'(1.5, 3)$.



Got It? **Do these problems to find out.**

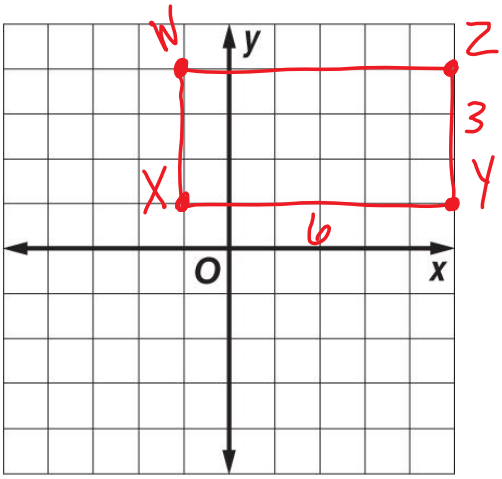
e. Graph $C(-1, -5)$. Then graph its reflection across the x-axis.

f. Graph $D\left(2, 3\frac{1}{2}\right)$. Then graph its reflection across the y-axis.



$C'(-1,5)$ $D'(-2, 3\frac{1}{2})$

2. On the coordinate plane, draw rectangle $WXYZ$ with vertices $W(-1, 4)$, $X(-1, 1)$, $Y(5, 1)$, and $Z(5, 4)$. Find the perimeter of the rectangle



$P = 2(6) + 2(3)$

$= 18$ units

31. **Model with Mathematics** Luke is making a model of a park. He has the basketball court drawn on his model.

a. The swing set is located at the reflection of point B across the x-axis. What ordered pair describes the location of the swing set?

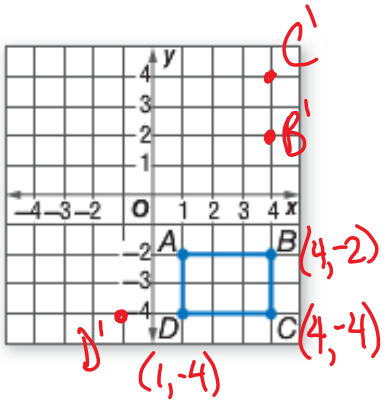
$B'(4, 2)$

b. The slide is located at the reflection of point C across the x-axis. What ordered pair describes the location of the slide?

$C'(4, 4)$

c. A water fountain is located at the reflection of point D across the y-axis. What ordered pair describes the location of the water fountain?

$D'(-1, -4)$



9 Graph $U(3.5, -3)$ on the coordinate plane to the right. Then graph its reflection across the x-axis. (Example 3)

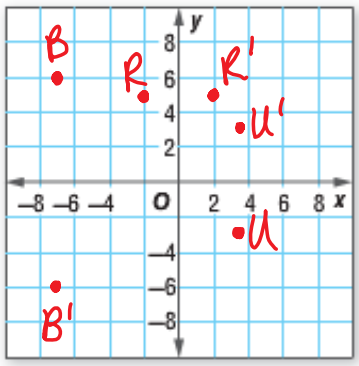
$U'(3.5, 3)$

10. Graph $B(-7, 6)$ on the coordinate plane on the right. Then graph its reflection across the x-axis. (Example 3)

$B'(-7, -6)$

11. Graph $R(-2, 5)$ on the coordinate plane to the right. Then graph its reflection across the y-axis. (Example 4)

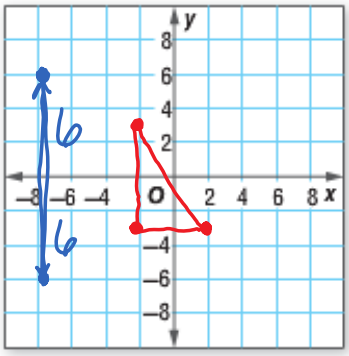
$R'(2, 5)$



12. Amelia is drawing a map of the park. She graphs the entrance at $(2, -3)$. She reflects $(2, -3)$ across the y-axis. Then Amelia reflects the new point across the x-axis. What figure is graphed on the map? (Example 5)

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

triangle



13. A point is reflected across the y-axis. The new point is located at $A'(-4.25, -1.75)$. Write the ordered pair that represents the original point.

$(4.25, -1.75)$

14. CCSS **Model with Mathematics** A point is reflected across the x-axis. The new point is $(-7.5, 6)$. What is the distance between the two points?

12 units

original point $= (-7.5, -6)$