Extension 6.5 Reflecting Points in the Coordinate Plane

Check It Out
Lesson Tutorials
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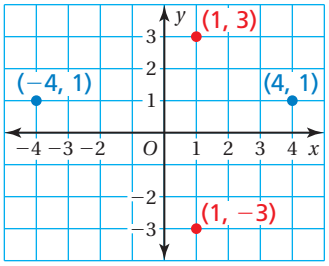
You can *reflect* a point in the x-axis, in the y-axis, or in both axes.



The red points are mirror images of each other in the x-axis because the x-coordinates are the same and the y-coordinates are opposites. So, the red points are 3 units from the x-axis in opposite directions. The red points represent a *reflection in the x-axis*.

The blue points are mirror images of each other in the y-axis because the y-coordinates are the same and the x-coordinates are opposites. So, the blue points are 4 units from the y-axis in opposite directions. The blue points represent a *reflection in the y-axis*.

Key Idea

Reflecting a Point in the Coordinate Plane

- To reflect a point in the x-axis, use the same x-coordinate and take the opposite of the y-coordinate.
- To reflect a point in the y-axis, use the same y-coordinate and take the opposite of the x-coordinate.

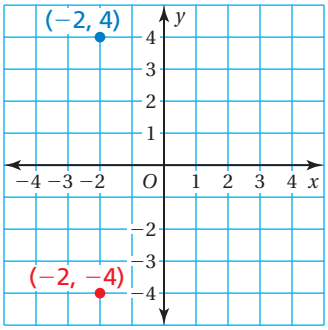
EXAMPLE 1 Reflecting Points in One Axis

a. Reflect $(-2, 4)$ in the x-axis.

Plot $(-2, 4)$.

To reflect $(-2, 4)$ in the x-axis, use the same x-coordinate, -2, and take the opposite of the y-coordinate. The opposite of 4 is -4.

∴ So, the reflection of $(-2, 4)$ in the x-axis is $(-2, -4)$.

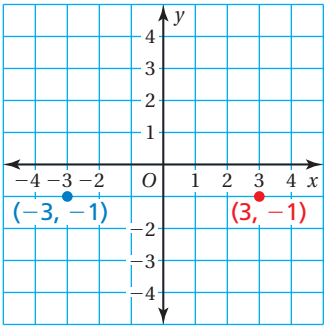


b. Reflect $(-3, -1)$ in the y-axis.

Plot $(-3, -1)$.

To reflect $(-3, -1)$ in the y-axis, use the same y-coordinate, -1, and take the opposite of the x-coordinate. The opposite of -3 is 3.

∴ So, the reflection of $(-3, -1)$ in the y-axis is $(3, -1)$.



COMMON CORE

Coordinate Plane

In this extension, you will
- understand reflections of points in the coordinate plane.

Learning Standard
6.NS.6b

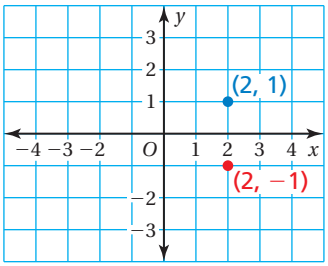
EXAMPLE 2 Reflecting a Point in Both Axes

Reflect (2, 1) in the *x*-axis followed by the *y*-axis.

Step1: First, plot (2, 1).

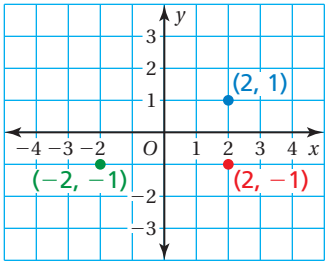
Step 2: Next, reflect (2, 1) in the *x*-axis. Use the same *x*-coordinate, 2, and take the opposite of the *y*-coordinate. The opposite of 1 is −1.

The point (2, 1) reflected in the *x*-axis is (2, −1).



Step 3: Finally, reflect (2, −1) in the *y*-axis. Use the same *y*-coordinate, −1, and take the opposite of the *x*-coordinate. The opposite of 2 is −2.

The point (2, −1) reflected in the *y*-axis is (−2, −1).



∴ So, (2, 1) reflected in the *x*-axis followed by the *y*-axis is (−2, −1).

Common Error

When reflecting a second time, be sure to use the reflected point and not the original point.

Practice

Reflect the point in (a) the *x*-axis and (b) the *y*-axis.

1. (3, 2)
2. (−4, 4)
3. (−5, −6)
4. (4, −7)
5. (0, −1)
6. (−8, 0)
7. (2.5, 4.5)
8. $\left(-5\frac{1}{2}, 3\right)$

Reflect the point in the *x*-axis followed by the *y*-axis.

9. (4, 5)
10. (−1, 7)
11. (−2, −2)
12. (6.5, −10.5)

13. **REASONING** A point is reflected in the *x*-axis. The reflected point is (3, −9). What is the original point? What is the distance between the points?

14. **REASONING** A point is reflected in the *y*-axis. The reflected point is (5.75, 0). What is the original point? What is the distance between the points?

15. **a.** **STRUCTURE** In Exercises 9–12, reflect the point in the *y*-axis followed by the *x*-axis. Do you get the same results? Explain.

b. **LOGIC** Make a conjecture about how to use the coordinates of a point to find its reflection in both axes.

16. **GEOMETRY** The vertices of a triangle are (−1, 3), (−5, 3), and (−5, 7). How would you reflect the triangle in the *x*-axis? in the *y*-axis? Give the coordinates of the reflected triangle for each case.