

Grade 6 · The Coordinate Plane · Lesson

Common Core 6.NS.C.6b, 6.NS.C.6c, 6.NS.C.8, 6.G.A.3 · mathovore.fr

The coordinate plane is a grid formed by a horizontal x-axis and a vertical y-axis that cross at the origin. Each point has an ordered pair (x,y) and lies in one of four quadrants or on an axis. Reflections change the sign of a coordinate, and the distance between points on a grid line comes from absolute values.

Grade 6 Common Core: 6.NS.C.6b · 6.NS.C.6c · 6.NS.C.8 · 6.G.A.3

Key facts:

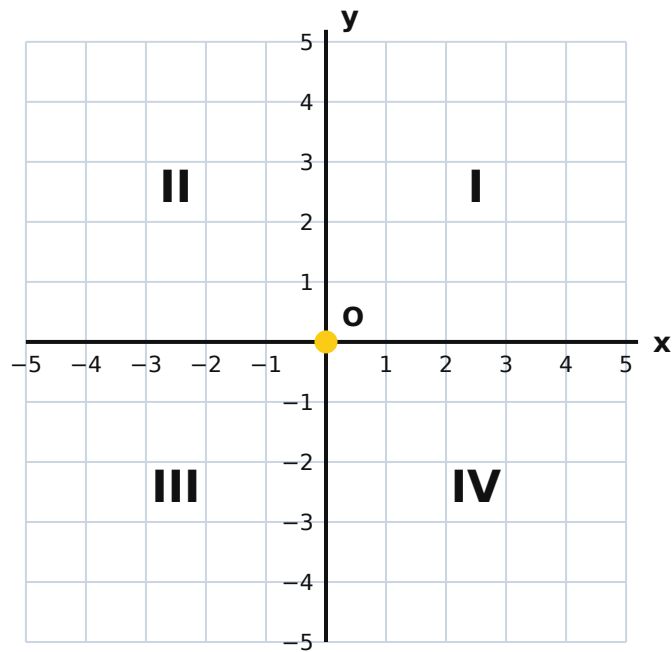
- An ordered pair (x,y) gives the horizontal move first and the vertical move second.
- The signs of the coordinates tell the quadrant: Quadrant I is $(+,+)$ and Quadrant III is $(-,-)$.
- Reflecting across the x-axis changes the sign of y; across the y-axis it changes the sign of x.
- For points with the same x or y, add absolute values on opposite sides of 0 and subtract on the same side.
- A polygon is drawn by plotting its vertices and connecting them in order.

What is the coordinate plane?

The coordinate plane is a flat grid formed by two number lines that cross at right angles. The horizontal line is the x-axis, the vertical line is the y-axis, and they meet at the origin $(0,0)$. The axes split the plane into four quadrants, numbered I to IV counterclockwise starting at the upper right.

Ordered pair

An ordered pair (x,y) names one point. The first number, x , tells how far to move right (positive) or left (negative) from the origin. The second number, y , tells how far to move up (positive) or down (negative).

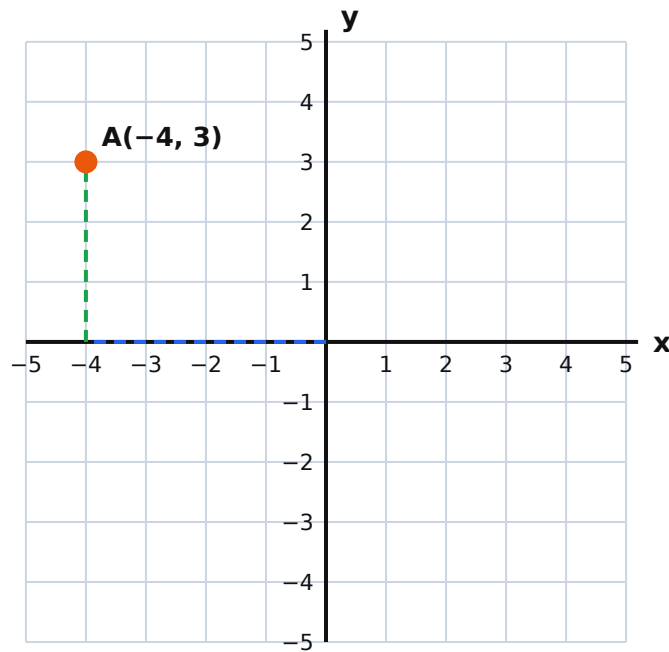


The four quadrants of the coordinate plane.

How do you plot an ordered pair?

Here is the method for $(-4, 3)$.

1. Start at the origin $(0, 0)$.
2. Read $x = -4$. It is negative, so move 4 units left along the x-axis.
3. Read $y = 3$. It is positive, so move 3 units up.
4. Mark the point and label it $A(-4, 3)$.
5. Check: the point is left of the y-axis and above the x-axis, so it is in Quadrant II.



Plotting $A(-4, 3)$: 4 left, then 3 up.

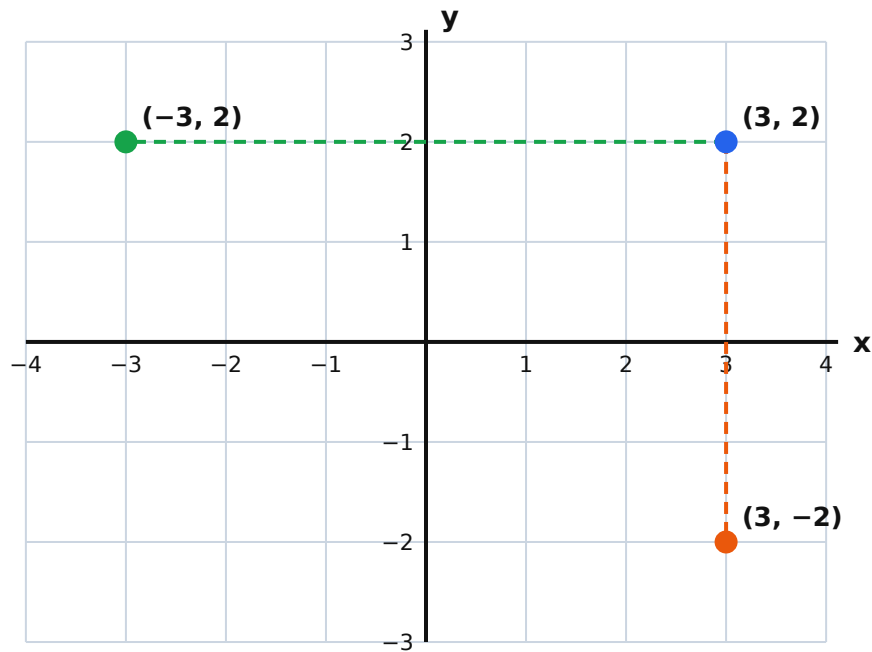
What do the signs of the coordinates tell you?

Quadrant	Sign of x	Sign of y	Example
I	positive	positive	$(3, 4)$
II	negative	positive	$(-3, 4)$
III	negative	negative	$(-3, -4)$
IV	positive	negative	$(3, -4)$

A point on an axis is in no quadrant. If $y = 0$, the point is on the x-axis; if $x = 0$, it is on the y-axis.

How do reflections change coordinates?

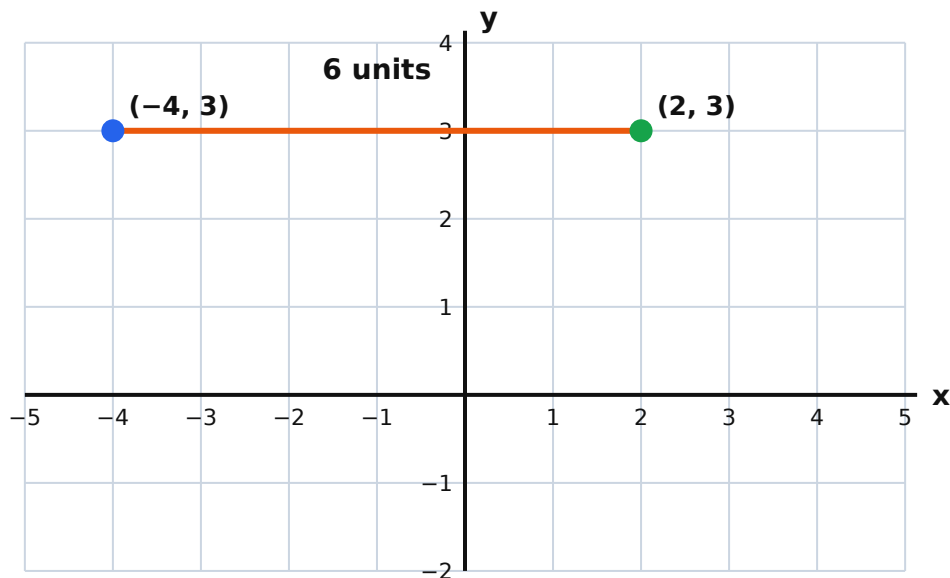
A reflection across the x-axis changes the sign of the y-coordinate: (x, y) becomes $(x, -y)$. A reflection across the y-axis changes the sign of the x-coordinate: (x, y) becomes $(-x, y)$. The point $(3, 2)$ reflects to $(3, -2)$ across the x-axis and to $(-3, 2)$ across the y-axis.



Reflections of $(3, 2)$ across each axis.

How do you find the distance between two points?

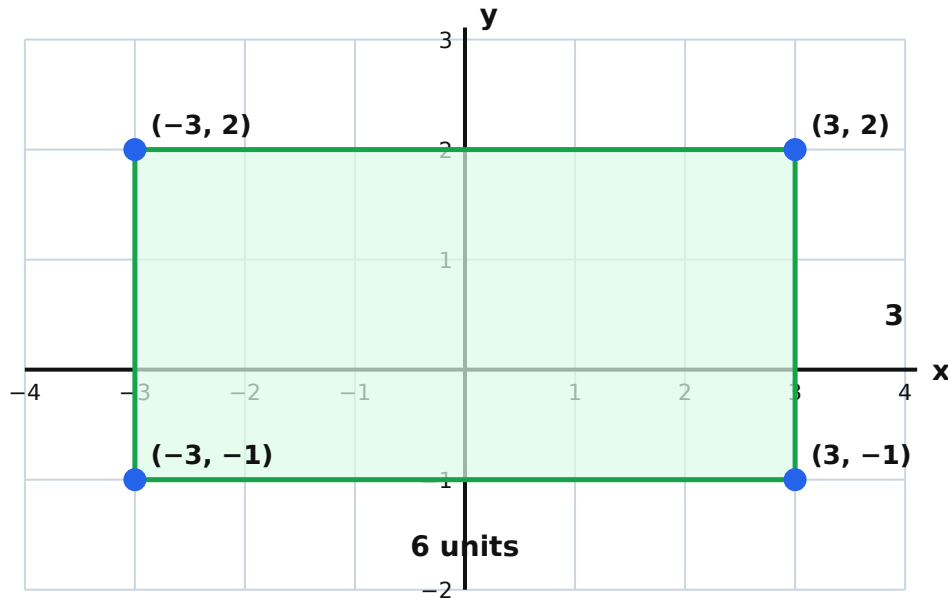
When two points share the same y-coordinate (or the same x-coordinate), the distance is found from the other coordinates with absolute value. If the numbers are on opposite sides of 0, add the absolute values. If they are on the same side, subtract. For $(-4, 3)$ and $(2, 3)$, the distance is $|-4| + |2| = 4 + 2 = 6$ units.



Same y-coordinate: distance is $|-4| + |2| = 6$ units.

How do you draw a polygon on the coordinate plane?

Plot each vertex, then connect the points in order. Use the distance rule to find the side lengths. The rectangle with vertices $(-3, -1)$, $(3, -1)$, $(3, 2)$, and $(-3, 2)$ has a base of $|-3| + |3| = 6$ units and a height of $|-1| + |2| = 3$ units.



A rectangle drawn from its vertices: base 6, height 3.

The Coordinate Plane: frequently asked questions

Which coordinate comes first in an ordered pair?

The x-coordinate always comes first and the y-coordinate second. To remember, you walk across before you climb up: move along the x-axis first, then parallel to the y-axis.

What is the origin?

The origin is the point where the x-axis and y-axis cross. Its coordinates are $(0, 0)$, and it is the starting point for plotting every other point.

How do you know which quadrant a point is in?

Look at the signs of the coordinates. For example, $(-2, -5)$ has two negative coordinates, so it is in Quadrant III. A point with a zero coordinate lies on an axis and is in no quadrant.

How do you find the distance between two points on the same horizontal line?

Use the x-coordinates. Add their absolute values if the points are on opposite sides of the y-

axis, or subtract if they are on the same side. For $(-5,2)$ and $(4,2)$, the distance is $5+4=9$.

What happens to a point when it is reflected across the x-axis?

Its x-coordinate stays the same and its y-coordinate changes sign. The point $(6,1)$ becomes $(6,-1)$. The point and its image are the same distance from the x-axis.