

Plotting Points and Shapes on the Coordinate Plane

Grade 6 math · Lesson · Standards: 6.NS.C.6b, 6.NS.C.6c, 6.NS.C.8, 6.G.A.3

Quick answer: The coordinate plane is made by a horizontal x-axis and a vertical y-axis that meet at the origin (0, 0). An ordered pair (x, y) names a point: move x units left or right, then y units up or down. The signs of x and y show the quadrant, and reflecting across an axis flips one sign.

Standards: 6.NS.C.6b, 6.NS.C.6c, 6.NS.C.8, 6.G.A.3 · **Level:** Grade 6

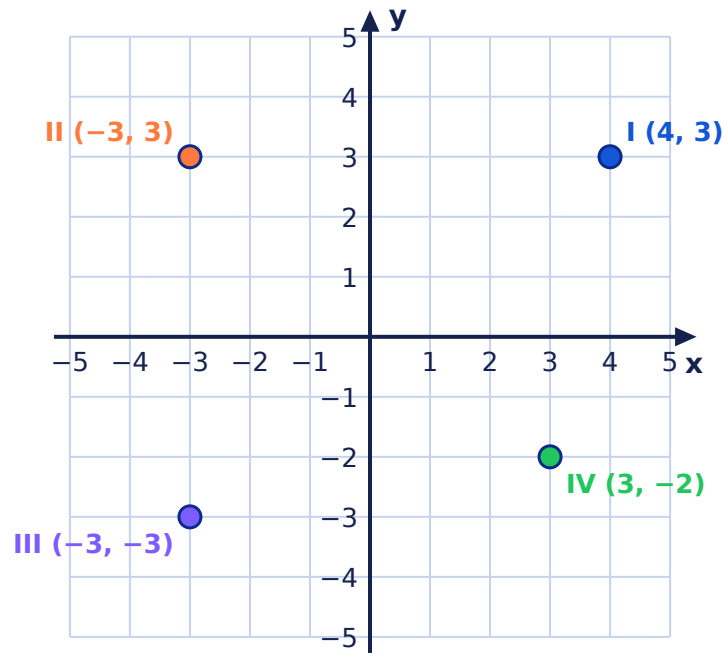
How do ordered pairs locate points on the coordinate plane?

Coordinate plane

Two perpendicular number lines, the horizontal **x-axis** and the vertical **y-axis**, cross at the **origin** (0, 0). An **ordered pair** (x, y) gives a point: first move x units right (positive) or left (negative), then y units up (positive) or down (negative).

The axes split the plane into four **quadrants**. The signs of the coordinates tell you where a point lies.

Quadrant	x	y	Example
I	+	+	(6, 2)
II	–	+	(–5, 4)
III	–	–	(–1, –7)
IV	+	–	(3, –6)



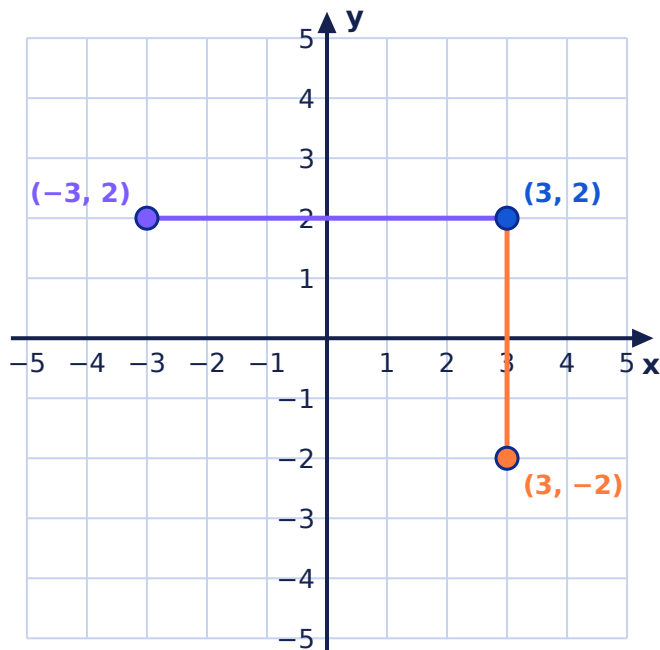
The four quadrants. Quadrant I is upper right; they continue counterclockwise.

A point with a 0 coordinate lies on an axis, not in a quadrant. Decimals and fractions work the same way: $(-1.5, 2.5)$ is in Quadrant II.

How do reflections change a point?

Reflection rules

- Across the x-axis: (x, y) becomes $(x, -y)$.
- Across the y-axis: (x, y) becomes $(-x, y)$.



Reflections of $(3, 2)$: across the x-axis it becomes $(3, -2)$; across the y-axis it becomes $(-3, 2)$.

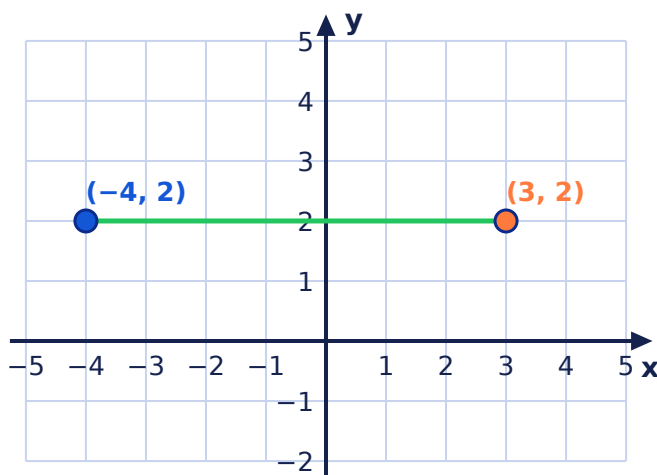
How do you find the distance between two points?

Method: points with the same x- or y-coordinate

1. Check which coordinate matches. The other coordinate changes.
2. Compare the changing coordinates. If they have different signs, add their absolute values; if the same sign, subtract the smaller absolute value from the larger.
3. Label the answer in units.

Worked example

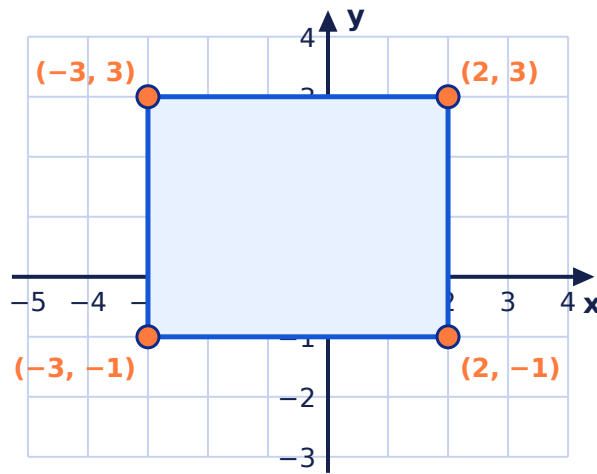
Find the distance from $(-4, 2)$ to $(3, 2)$. The y-coordinates match, so the x-values differ: $|-4| + |3| = 4 + 3 = \mathbf{7 \text{ units}}$.



Same y-coordinate: the segment from $(-4, 2)$ to $(3, 2)$ is $4 + 3 = 7$ units long.

How can you draw a polygon from its vertices?

Plot each vertex, then join them in order. Side lengths along a horizontal or vertical side come from the distance rule: in the rectangle below, the bottom side runs from $x = -3$ to $x = 2$, so it is $3 + 2 = 5$ units, and the right side runs from $y = -1$ to $y = 3$, so it is $1 + 3 = 4$ units.



Rectangle with vertices $(-3, -1)$, $(2, -1)$, $(2, 3)$ and $(-3, 3)$: width 5, height 4.

Common mistake

Swapping the coordinates. The point $(2, 5)$ is not $(5, 2)$: the x-value always comes first.

Mathbot's tip

Walk first, then climb: move along the floor for x, then up or down the stairs for y.

Key points to remember

- Ordered pair (x, y) : horizontal move first, vertical move second.
- Quadrants I, II, III, IV have signs $(+, +)$, $(-, +)$, $(-, -)$, $(+, -)$.
- Reflection across the x-axis changes y to $-y$; across the y-axis changes x to $-x$.
- Points sharing a coordinate are a horizontal or vertical distance apart.
- Points with a 0 coordinate lie on an axis and belong to no quadrant.

Plotting Points and Shapes on the Coordinate Plane: frequently asked questions

What does the order in (x, y) mean?

The first number is the horizontal position and the second is the vertical position. Reversing them gives a different point unless x and y are equal.

Which quadrant has two negative coordinates?

Quadrant III, the lower left. Both the x-value and the y-value are negative there, as in $(-4, -9)$.

How do you reflect a point across the y-axis?

Keep the y-coordinate and change the sign of the x-coordinate. The point $(5, -3)$ reflects to $(-5, -3)$.

-3), the same distance from the y-axis on the other side.

How do you find the distance when the points have the same x-coordinate?

Use the y-coordinates. If their signs differ, add the absolute values; if they match, subtract. From $(2, -6)$ to $(2, 4)$, the distance is $6 + 4 = 10$.

Is the point $(0, 5)$ in a quadrant?

No. A point with a zero coordinate sits on an axis. $(0, 5)$ is on the y-axis, 5 units above the origin.