

Grade 6 Playlist: Drawing Polygons in the Coordinate Plane

Aligns with [CCSS.MATH.CONTENT.6.G.A.3](#): Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Related Standards

- [CCSS.MATH.CONTENT.5.G.A.1](#): Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
- [CCSS.MATH.CONTENT.8.G.B.8](#): Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.



In this playlist, you will learn and practice the following skills:

- Draw polygons in the coordinate plane given the coordinates of the vertices.
- Find the length of a side of a polygon that joins points with the same x -coordinate or the same y -coordinate.

Let's get started!

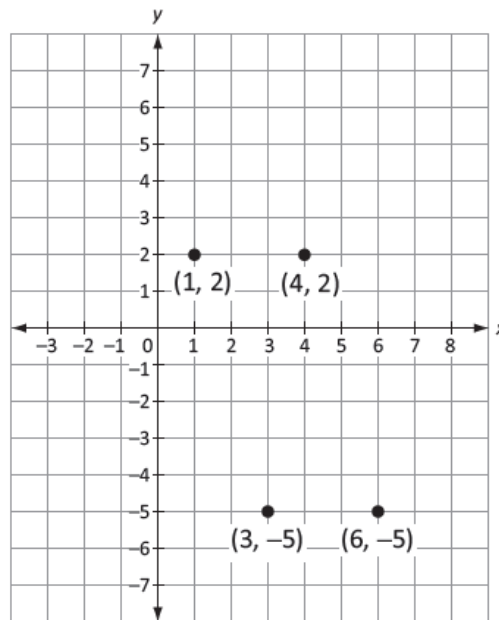
Key Terms

- A **polygon** is a closed, two-dimensional figure with three or more sides.
- The **coordinate plane** is a coordinate system defined by perpendicular axes, x and y , that intersect at 0 on each line.
- A **vertex** is a point of intersection of two sides of a polygon.
- An **ordered pair** gives the coordinates of a point, with the x -coordinate as the first number and the y -coordinate as the second number.
- The **origin** is the point where the x - and y -axes intersect, and has the coordinates $(0, 0)$.
- The **absolute value** of a number is its distance from 0.



You can plot points on a coordinate grid. These points can be the vertices, or corners, of a polygon.

What shape will the vertices form when they are connected?



In order to draw and use polygons in the coordinate plane correctly, you will need to plot points in all four quadrants of the coordinate grid, and use the coordinates to find the side lengths of a polygon.

Watch!

For a quick overview of drawing polygons in the coordinate plane, watch this video:

- https://youtu.be/U40Xj_X2D0k

Focus: The Coordinate Plane

The coordinate plane is defined by a horizontal axis, called the x-axis, and a vertical axis, called the y-axis. The axes intersect at the point (0, 0), which is called the origin.

Points on the coordinate plane are located by **ordered pairs**.

- The first number in the ordered pair is the x-coordinate. It tells you the distance and direction to move from the origin along the x-axis.
- The second number in the ordered pair is the y-coordinate. It tells you the distance and direction to move from the origin along the y-axis.



Answer

a parallelogram

Watch!

For a quick overview of locating points on the coordinate plane, watch this video:

- <https://www.opened.com/video/locate-a-point-on-the-coordinate-plane/412528>

How can you find the area of a triangle, given the coordinates of its vertices?



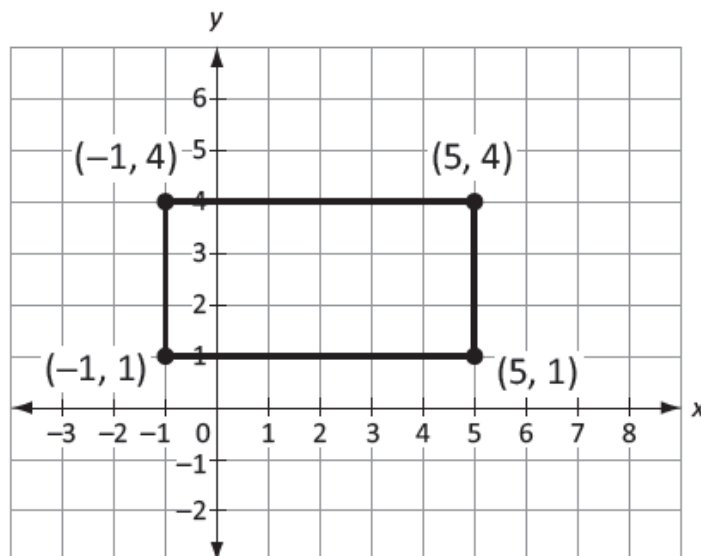
Explore

You can draw **polygons** in the **coordinate plane** by plotting the **vertices** and connecting the points to form the sides of the polygon.

Draw a rectangle with vertices $(-1, 4)$, $(5, 4)$, $(5, 1)$, and $(-1, 1)$:

- $(-1, 4)$ is 1 unit to the left of the **origin** and 4 units above the origin.
- $(5, 4)$ is 5 units to the right of the origin and 4 units above the origin.
- $(5, 1)$ is 5 units to the right of the origin and 1 unit above the origin.
- $(-1, 1)$ is 1 unit to the left of the origin and 1 unit above the origin.

Connect the points with line segments.



You can find the length of a side of a polygon by counting the grid squares between vertices or by comparing the coordinates of the vertices.

- If the vertices have the same y -coordinate, the side is horizontal and its length is the distance between the x -coordinates of the vertices.
- If the vertices have the same x -coordinate, the side is vertical and its length is the distance between the y -coordinates of the vertices.

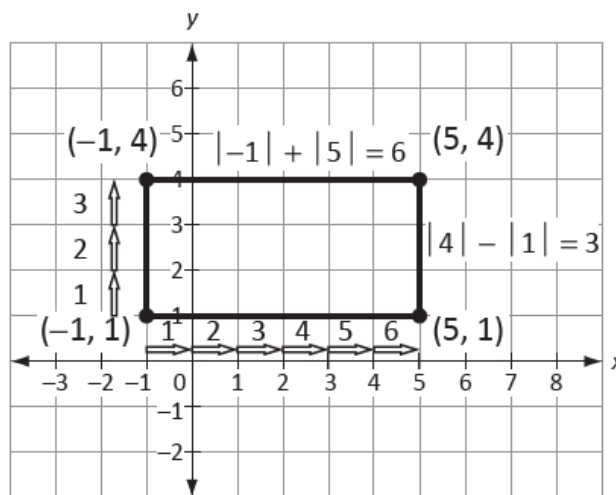


Find the lengths of the sides of the rectangle.

- The points $(-1, 4)$ and $(5, 4)$ are in different quadrants.
 - Add the **absolute values** of the x -coordinates to find the length of the side.

$$|-1| + |5| = 1 + 5 = 6$$
- The points $(5, 1)$ and $(5, 4)$ are in the same quadrant.
 - Subtract the **absolute values** of the y -coordinates to find the length of the side.

$$|4| - |1| = 3$$



The rectangle is 6 units long and 3 units wide.

What is the area of a triangle with vertices $(2, 1)$, $(2, 6)$, and $(5, 1)$?

- Two of the vertices, $(2, 1)$ and $(2, 6)$, have the same x -coordinate, so they form a vertical side.
 Subtract the y -coordinates to find the length of the side: $6 - 1 = 5$
- Two of the vertices, $(2, 1)$ and $(5, 1)$, have the same y -coordinate, so they form a horizontal side.
 Subtract the x -coordinates to find the length of the side: $5 - 2 = 3$

The area of the triangle is $\frac{1}{2}(5 \times 3) = \frac{1}{2}(15) = 7.5$ square units.



For a more information about drawing polygons in the coordinate plane, watch these videos:

- <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-geometry-topic/cc-6th-polygons-in-the-coordinate-plane/v/constructing-polygon-on-coordinate-plane-example>
- <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-geometry-topic/cc-6th-quadrilaterals-on-plane/v/dimensions-of-rectangle-from-coordinates-example>
- <https://www.opened.com/video/find-perimeter-and-area-by-finding-the-length-of-sides-by/139168>
- <https://www.opened.com/video/find-distances-on-a-map-by-comparing-ordered-pairs/139171>

Practice!

You can practice drawing polygons in the coordinate plane by completing these activities:

- <https://www.opened.com/homework/6-g-3-draw-polygons-in-the-coordinate-plane-given-coordinates/3691617?run=true>
- <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-geometry-topic/cc-6th-polygons-in-the-coordinate-plane/e/drawing-polygons>
- <https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-geometry-topic/cc-6th-quadrilaterals-on-plane/e/polygons-in-the-coordinate-plane>

