

Plot And Connect The Points A(-4,-1), B(6,-1), C(6,4), D(-4,4), And Find The Area Of The Rectangle It

Plot And Connect The Points A(-4,-1), B(6,-1), C(6,4), D(-4,4), And Find The Area Of The Rectangle It is a fundamental exercise in coordinate geometry that helps students and enthusiasts understand how to visualize geometric shapes on the Cartesian plane, determine their properties, and calculate their areas. By plotting these specific points and connecting them, we essentially form a rectangle, whose dimensions and area can be computed through basic algebra and geometry principles. This process not only reinforces the understanding of coordinates and shape properties but also offers practical skills in spatial reasoning and mathematical problem-solving.

In this article, we will walk through the step-by-step process of plotting the points, connecting them to form the rectangle, analyzing its properties, and calculating its area. Whether you are a student preparing for exams, a teacher looking for a detailed explanation, or simply someone interested in geometry, this comprehensive guide aims to clarify every aspect of this problem.

Understanding the Coordinates and the Points

Before diving into plotting and connecting the points, it is essential to understand what each coordinate represents.

Coordinate System Basics

- The coordinate plane consists of two perpendicular axes:
- The x-axis (horizontal)
- The y-axis (vertical)
- Each point on the plane is identified by an ordered pair (x, y), where:
- x indicates the position along the horizontal axis
- y indicates the position along the vertical axis

Points Given

The points provided are:

- A(-4, -1)
- B(6, -1)
- C(6, 4)
- D(-4, 4)

These points are plotted based on their x and y coordinates, which will help us visualize the shape they form.

Plotting the Points on the Coordinate Plane

To accurately visualize the rectangle formed by these points:

Step-by-Step Plotting

1. Draw the coordinate axes, labeling the x-axis and y-axis.
2. Mark the scale appropriately, considering the range of coordinates:
 - The x-values range from -4 to 6
 - The y-values range from -1 to 4
3. Plot each point:
 - Point A at (-4, -1): move 4 units left from the origin along the x-axis, then 1 unit down along the y-axis.
 - Point B at (6, -1): move 6 units right from the origin, then 1 unit down.
 - Point C at (6, 4): move 6 units right, then 4 units up.
 - Point D at (-4, 4): move 4 units left, then 4 units up.

Once plotted, these points should form the vertices of a rectangle.

Connecting the Points to Form the Rectangle

Connecting the points in an appropriate order helps visualize the rectangle clearly.

Order of Connection

- Connect A to B
- Connect B to C
- Connect C to D
- Connect D back to A

This sequence ensures the shape is a rectangle with sides aligned parallel to the axes.

Visual Confirmation

- Points A and D share the same x-coordinate (-4), indicating they are vertically aligned.
- Points B and C share the same x-coordinate (6), indicating they are vertically aligned.
- Points A and B share the same y-coordinate (-1), indicating they are horizontally aligned.
- Points D and C share the same y-coordinate (4), also horizontally aligned.

This confirms the shape is a rectangle aligned with the axes, simplifying area calculation.

Analyzing the Dimensions of the Rectangle

Having established the rectangle, the next step is to determine its dimensions: length and width.

Calculating Length and Width

- Horizontal side length (width):
- Distance between points A and B (or D and C):
- x-coordinate difference: $|6 - (-4)| = 6 + 4 = 10$ units
- Vertical side length (height):
- Distance between points A and D (or B and C):
- y-coordinate difference: $|4 - (-1)| = 4 + 1 = 5$ units

Thus, the rectangle's sides measure:

- Width = 10 units
- Height = 5 units

Calculating the Area of the Rectangle

With the side lengths identified, calculating the area becomes a straightforward process.

Area Formula

The area (A) of a rectangle is given by:

$$[A = \text{length} \times \text{width}]$$

Applying the measurements:

$$[A = 10 \times 5 = 50 \text{ square units}]$$

Therefore, the area of the rectangle formed by points A, B, C, D is 50 square units.

Additional Insights and Applications

Understanding how to plot points, connect them, and compute areas has broad applications beyond this specific problem.

Practical Applications

- Architecture and construction planning
- Land surveying
- Computer graphics and design
- Robotics path planning
- Educational assessments in geometry

Extensions of the Problem

- Find the perimeter of the rectangle.
- Determine whether the shape is a square or a rectangle.
- Calculate the diagonal length using the Pythagorean theorem.
- Explore how changing the coordinates affects the area.

Conclusion

Plotting and connecting the points A(-4, -1), B(6, -1), C(6, 4), and D(-4, 4) allows us to visualize a rectangle on the coordinate plane. By analyzing the coordinates, we determine that the rectangle's length is 10 units and its width is 5 units. Multiplying these dimensions yields an area of 50 square units. This exercise reinforces fundamental concepts in coordinate geometry and underscores the importance of spatial visualization in mathematical problem-solving. Whether for academic purposes or practical applications, mastering such techniques enhances one's understanding of geometric figures and their properties.

Frequently Asked Questions

What are the coordinates of points A, B, C, and D in the rectangle?

The coordinates are A(-4, -1), B(6, -1), C(6, 4), and D(-4, 4).

How can I plot points A, B, C, and D on a coordinate plane?

Plot each point by locating its x-coordinate along the horizontal axis and its y-coordinate along the vertical axis, then mark and label each point accordingly.

What is the shape formed by connecting points A, B, C, and D?

Connecting these points forms a rectangle.

How do I determine the length of the sides of the rectangle?

Calculate the distance between points with the same y-coordinate for the width (AB or DC) and the same x-coordinate for the height (AD or BC).

What is the length of side AB?

Since A(-4, -1) and B(6, -1), the length AB is $|6 - (-4)| = 10$ units.

What is the length of side AD?

Since A(-4, -1) and D(-4, 4), the length AD is $|4 - (-1)| = 5$ units.

How do I find the area of the rectangle formed by these points?

Multiply the length of one side by the length of the adjacent side: Area = length $\times$ width.

What is the area of the rectangle with vertices A, B, C, and D?

The area is 10 units (length) $\times$ 5 units (width) = 50 square units.

Can I verify the shape is a rectangle using the coordinates?

Yes, by checking that adjacent sides are perpendicular (their slopes multiply to -1) and opposite sides are equal.

How can I visually confirm the rectangle on a graph?

Plot the points accurately on graph paper or a coordinate plane, connect them in order, and verify that the shape has right angles and opposite sides equal.

Additional Resources

Plot And Connect The Points A(-4,-1), B(6,-1), C(6,4), D(-4,4), And Find The Area Of The Rectangle It

Understanding the fundamentals of coordinate geometry is essential for solving various geometric problems involving points, lines, and shapes on the Cartesian plane. This comprehensive guide will walk you through plotting specific points, connecting them to form a rectangle, and calculating its area with detailed explanations and step-by-step procedures.

Introduction to Coordinate Geometry and Its

Significance

Coordinate geometry, also known as analytic geometry, combines algebra and geometry to analyze and interpret geometric figures through their coordinate representations. It allows us to:

- Plot points with precise positions using (x, y) coordinates.
- Connect points to visualize geometric shapes.
- Calculate distances, slopes, areas, and other properties mathematically.

The ability to visualize and manipulate shapes using algebraic methods is fundamental in fields such as engineering, architecture, computer graphics, and mathematics education.

Understanding the Given Points and Their Coordinates

Let's examine the points provided:

- Point A: (-4, -1)
- Point B: (6, -1)
- Point C: (6, 4)
- Point D: (-4, 4)

Each point is expressed in the form (x, y), where:

- x represents the horizontal position.
- y indicates the vertical position.

These points are chosen such that they potentially form a rectangle, but we need to verify this by analyzing their positions on the Cartesian plane.

Plotting the Points on the Cartesian Plane

Before connecting the points, it's crucial to visualize their positions:

1. Plot Point A (-4, -1):
 - x = -4, which is 4 units left of the y-axis.
 - y = -1, which is 1 unit below the x-axis.
2. Plot Point B (6, -1):
 - x = 6, 6 units right of the y-axis.
 - y = -1, same vertical level as point A.

3. Plot Point C (6, 4):

- $x = 6$, same as point B.
- $y = 4$, which is above the x-axis.

4. Plot Point D (-4, 4):

- $x = -4$, same as point A.
- $y = 4$, above the x-axis.

Plotting these points on graph paper or a digital graphing tool helps to visualize their relative positions clearly:

- Points A and D are vertically aligned, sharing the same x-coordinate (-4).
- Points B and C are vertically aligned, sharing the same x-coordinate (6).
- Points A and B are horizontally aligned at $y = -1$.
- Points D and C are horizontally aligned at $y = 4$.

Connecting the Points to Form a Rectangle

Once the points are plotted, connecting them in order will reveal the shape:

- Connect A to B: Draw a straight line from (-4, -1) to (6, -1).
- Connect B to C: Draw a line from (6, -1) to (6, 4).
- Connect C to D: Draw a line from (6, 4) to (-4, 4).
- Connect D back to A: Draw a line from (-4, 4) to (-4, -1).

This sequence creates a closed quadrilateral with four right angles, confirming it's a rectangle.

Properties of this rectangle:

- Opposite sides are parallel:
- AB is horizontal, and DC is horizontal.
- BC is vertical, and AD is vertical.
- All interior angles are 90° , satisfying the definition of a rectangle.

Verifying the Shape as a Rectangle

To confirm that the shape is a rectangle, consider these properties:

1. Parallelism of Opposite Sides

- Horizontal sides:
- AB: $y = -1$ (constant y)

- DC: $y = 4$ (constant y)
- Since both are horizontal lines, they are parallel.
- Vertical sides:
 - AD: $x = -4$ (constant x)
 - BC: $x = 6$ (constant x)
 - Both are vertical lines, hence parallel.

2. Equal Lengths of Opposite Sides

Calculating the lengths:

- Length of AB:
 - Distance between A(-4, -1) and B(6, -1)
 - $\Delta x = 6 - (-4) = 10$
 - $\Delta y = -1 - (-1) = 0$
 - Length = $\sqrt{(\Delta x)^2 + (\Delta y)^2} = \sqrt{10^2 + 0^2} = 10$ units
- Length of DC:
 - Distance between D(-4, 4) and C(6, 4)
 - $\Delta x = 6 - (-4) = 10$
 - $\Delta y = 4 - 4 = 0$
 - Length = 10 units
- Length of AD:
 - Distance between A(-4, -1) and D(-4, 4)
 - $\Delta x = -4 - (-4) = 0$
 - $\Delta y = 4 - (-1) = 5$
 - Length = $\sqrt{0^2 + 5^2} = 5$ units
- Length of BC:
 - Distance between B(6, -1) and C(6, 4)
 - $\Delta x = 6 - 6 = 0$
 - $\Delta y = 4 - (-1) = 5$
 - Length = 5 units

Since the lengths of opposite sides are equal, the shape is confirmed as a rectangle.

3. Right Angles

- The sides are perpendicular because:
 - Horizontal and vertical segments meet at right angles.
 - For example, at point A, sides AB (horizontal) and AD (vertical) meet at a right angle.

Summary:

- Opposite sides are parallel and equal in length.
- Adjacent sides meet at right angles.

Therefore, the four points form a rectangle on the coordinate plane.

Calculating the Area of the Rectangle

The area of a rectangle is straightforward to compute once the lengths of its sides are known:

$$\text{Area} = \text{length} \times \text{breadth}$$

From our previous calculations:

- Length (AB or DC): 10 units
- Breadth (AD or BC): 5 units

Thus:

$$\boxed{\text{Area} = 10 \times 5 = 50 \text{ square units}}$$

This area represents the total space enclosed within the rectangle formed by the four points.

Deep Dive: Step-by-Step Calculation and Explanation

To reinforce understanding, here's an in-depth breakdown:

Step 1: Confirm Coordinates and Plot Points

- Verify the coordinates are accurate.
- Plot the points accurately on graph paper or using digital tools.

Step 2: Connect the Points in Proper Sequence

- Connect A to B, B to C, C to D, and D back to A.
- Visualize the shape to ensure it appears as a rectangle.

Step 3: Determine Side Lengths

- Use the distance formula:

$$\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

\]

- Calculate for each pair of connected points.

Step 4: Confirm Parallelism and Right Angles

- Check slopes of sides:

- Slope of AB: $\frac{-1 - (-1)}{6 - (-4)} = 0$ (horizontal line)

- Slope of AD: $\frac{4 - (-1)}{-4 - (-4)}$ → undefined (vertical line)

- Since one side is horizontal and the adjacent side is vertical, they are perpendicular, confirming right angles.

Step 5: Calculate Area

- Multiply the lengths of adjacent sides:

\[

$\text{Area} = \text{length of AB} \times \text{length of AD} = 10 \times 5 = 50$

\]

Optional: Cross-Verification Using Coordinate Geometry Formula

Alternatively, the area of a polygon with vertices $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ can be found using the shoelace formula:

\[

$$\text{Area} = \frac{1}{2} \left| x_1 y_2 + x_2 y_3 + \dots + x_{n-1} y_n + x_n y_1 - (y_1 x_2 + y_2 x_3 + \dots + y_{n-1} x_n + y_n x_1) \right|$$

\]

Applying this formula:

\[

$$\begin{aligned} \text{Sum}_1 &= (-4)(-1) + 6(4) + 6(4) + (-4)(-1) \end{aligned}$$

Plot And Connect The Points A 4 1 B 6 1 C 6 4 D 4 4 And Find The Area Of The Rectangle It

Plot And Connect The Points A 4 1 B 6 1 C 6 4 D 4 4 And Find The Area Of The Rectangle It

Related Articles

- [Repeated Irrigation In Dry Climates Leads To Accumulation Of Salts In The Upper Layers Of The Soil, A](#)
- [N Units 13, You Have Learned About The Holocaust, World War II, Elie Wiesels Experiences In Night And](#)
- [One Of The Brightest Comets Of The 20th Century Was Comet Hyakutake, Which Passed Close To The Sun In](#)

[Back to Home](#)