

Point A Is At (3, 2.6) And Point B Is At (3, 1.4) On A Coordinate Grid. The Distance Between The Two

Point A Is At (3, 2.6) And Point B Is At (3, 1.4) On A Coordinate Grid. The Distance Between The Two is a fundamental concept in coordinate geometry that helps us understand the spatial relationship between two points on a plane. Whether you're a student learning about the Cartesian coordinate system or a professional applying geometry in real-world scenarios, understanding how to calculate the distance between two points is essential. This article provides a comprehensive explanation of how to determine the distance between Point A at (3, 2.6) and Point B at (3, 1.4), along with practical applications, tips, and related concepts to deepen your understanding.

Understanding the Coordinate System

The Cartesian Plane

The Cartesian coordinate system, named after mathematician René Descartes, is a two-dimensional plane defined by two perpendicular axes:

- The x-axis (horizontal)
- The y-axis (vertical)

Any point on this plane can be represented by an ordered pair (x, y), where:

- x indicates the position along the horizontal axis
- y indicates the position along the vertical axis

Points A and B on the Coordinate Grid

In our case:

- Point A is at (3, 2.6)
- Point B is at (3, 1.4)

This notation reveals that both points share the same x-coordinate, which is 3, but their y-coordinates differ.

Visualizing the Points on the Grid

Imagine a Cartesian plane:

- The vertical line at $x=3$ intersects the points.
- Point A is at 2.6 units above the x-axis.
- Point B is at 1.4 units above the x-axis.

Since both points have the same x-value, they lie on a vertical line parallel to the y-axis at $x=3$.

Calculating the Distance Between Two Points

The Distance Formula

The distance d between any two points (x_1, y_1) and (x_2, y_2) in the coordinate plane can be calculated using the distance formula derived from the Pythagorean theorem:

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

This formula calculates the length of the hypotenuse of a right-angled triangle formed by the horizontal and vertical differences between the points.

Applying the Distance Formula to Points A and B

Given:

- $A = (3, 2.6)$
- $B = (3, 1.4)$

Calculate:

- $\Delta x = x_2 - x_1 = 3 - 3 = 0$
- $\Delta y = y_2 - y_1 = 1.4 - 2.6 = -1.2$

Plug into the formula:

$$d = \sqrt{(0)^2 + (-1.2)^2} = \sqrt{0 + 1.44} = \sqrt{1.44} = 1.2$$

Therefore, the distance between Point A and Point B is 1.2 units.

Significance of the Calculation

Knowing the exact distance between two points is crucial in various fields:

- Geometry and Trigonometry: To analyze shapes, angles, and relationships.
- Physics: To determine displacements and movement.
- Engineering and Architecture: For precise measurements and designs.
- Computer Graphics: To calculate distances between objects on screen.
- Navigation and GIS: To measure distances between locations.

Special Case: When Points Share the Same x-Coordinate

In our scenario, Points A and B are vertically aligned because they share the same x-coordinate. This simplifies the distance calculation significantly.

Vertical Distance Calculation

- When points are on the same vertical line, the distance is simply the absolute difference of their y-coordinates:

$$\sqrt{d = |y_2 - y_1|}$$

Applying this:

$$\sqrt{d = |1.4 - 2.6| = |-1.2| = 1.2}$$

This confirms our previous calculation, demonstrating that in cases where points share the same x-value, the distance reduces to a simple subtraction of y-values.

Practical Applications of Distance Calculation

Calculating the distance between points on a coordinate grid has numerous real-world applications:

- **Mapping and Navigation:** Determining the shortest path between two locations on a map.
- **Robotics:** Calculating the movement or position of robots in a 2D space.
- **Game Development:** Measuring distances between game characters or objects for collision detection.
- **Surveying:** Estimating land distances based on coordinate data.
- **Data Analysis:** Computing Euclidean distances in multidimensional data sets (extensions of this concept).

Extending the Concept to Other Scenarios

While this example involves points sharing the same x-coordinate, the distance formula applies universally. Let's explore other scenarios:

Points with Different Coordinates

Suppose:

- Point C at (1, 4)
- Point D at (5, 1)

Calculate the distance:

$$\begin{aligned} & \backslash[\\ & \Delta x = 5 - 1 = 4 \\ & \backslash] \\ & \backslash[\\ & \Delta y = 1 - 4 = -3 \\ & \backslash] \\ & \backslash[\\ & d = \sqrt{(4)^2 + (-3)^2} = \sqrt{16 + 9} = \sqrt{25} = 5 \end{aligned}$$

\]

The points are 5 units apart, illustrating how the distance formula adapts to any pair of points.

Using the Distance Formula in Three Dimensions

In three-dimensional space, the distance between points $((x_1, y_1, z_1))$ and $((x_2, y_2, z_2))$ extends as:

\[

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

\]

This concept is vital in fields like 3D modeling, physics, and engineering.

Summary: Key Takeaways

- Points with the same x-coordinate lie on a vertical line, simplifying distance calculations.
- The distance between two points is found using the Pythagorean theorem.
- When points are vertically aligned, the distance equals the absolute difference of their y-coordinates.
- Accurate distance calculations are vital across multiple disciplines.

Conclusion

Understanding how to compute the distance between two points on a coordinate grid is a cornerstone of coordinate geometry. In the specific case of Point A at (3, 2.6) and Point B at (3, 1.4), the calculation is straightforward due to their shared x-coordinate, resulting in a vertical distance of 1.2 units. Mastering this concept enables students and professionals alike to navigate and analyze spatial relationships effectively, whether in academic exercises, practical projects, or technological applications.

Meta Description: Learn how to calculate the distance between Point A at (3, 2.6) and Point B at (3, 1.4) on a coordinate grid. Step-by-step explanation of the distance formula, special cases, and real-world applications.

Frequently Asked Questions

What is the distance between Point A at (3, 2.6) and Point B at (3, 1.4)?

The distance is 1.2 units because they share the same x-coordinate, and the difference in y-coordinates is $|2.6 - 1.4| = 1.2$.

How do you calculate the distance between two points with the same x-coordinate?

When two points share the same x-coordinate, the distance is simply the absolute difference of their y-coordinates.

What is the general formula to find the distance between two points (x_1, y_1) and (x_2, y_2) ?

The distance is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Is the distance between Point A and Point B a vertical or horizontal distance?

It is a vertical distance because the x-coordinates are the same, and only the y-coordinates differ.

If Point A is at (3, 2.6) and Point B is at (3, 1.4), what is the slope of the line connecting them?

The slope is undefined because the line is vertical, having the same x-coordinate for both points.

Can the distance between these two points be zero?

No, because their y-coordinates are different, so the points are distinct and separated by 1.2 units.

How would the distance change if Point B moved to (3, 3.4)?

The new distance would be $|2.6 - 3.4| = 0.8$ units, which is shorter than the original 1.2 units.

Additional Resources

Point A Is At (3, 2.6) And Point B Is At (3, 1.4) On A Coordinate Grid. The Distance Between The Two is an intriguing topic that combines fundamental concepts of coordinate geometry with practical applications

in various fields such as mathematics, physics, engineering, and even navigation. Understanding how to determine the distance between two points on a coordinate plane is essential for students, educators, and professionals alike. This article aims to thoroughly explore this topic by breaking down the core concepts, explaining the calculations involved, and discussing the significance of these measurements.

Introduction to Coordinate Geometry

Coordinate geometry, also known as analytic geometry, is a branch of mathematics that uses algebraic techniques to study geometric figures and their properties. It involves plotting points, lines, and shapes on a coordinate plane defined by two perpendicular axes: the x-axis (horizontal) and the y-axis (vertical). Each point on this plane is identified by an ordered pair (x, y) , where x and y are numerical values representing the point's position relative to the axes.

Understanding the position of points like Point A at $(3, 2.6)$ and Point B at $(3, 1.4)$ is fundamental in analyzing their spatial relationship. The coordinate system allows for precise calculations, such as the distance between two points, which is crucial in real-world applications like navigation, computer graphics, and physics.

Understanding the Coordinates of Point A and Point B

Point A at $(3, 2.6)$

- X-coordinate (3): This indicates that Point A is located 3 units along the x-axis from the origin $(0,0)$.
- Y-coordinate (2.6): This shows that Point A is positioned 2.6 units above (or in the positive y-direction) from the x-axis.

Point B at $(3, 1.4)$

- X-coordinate (3): Like Point A, Point B is also aligned vertically with the same x-coordinate, meaning both points are on the vertical line $x=3$.
- Y-coordinate (1.4): Point B is positioned 1.4 units above the x-axis, which is lower than Point A's y-coordinate.

This alignment along the same x-coordinate indicates that the segment connecting these two points is vertical, which simplifies the calculation of the distance between them.

The Concept of Distance Between Two Points

The distance between two points in a plane is the length of the straight line segment connecting them. It is a fundamental concept rooted in the Pythagorean theorem, which relates the lengths of the sides of a right-angled triangle.

In a coordinate plane, if you have two points, (x_1, y_1) and (x_2, y_2) , the distance d between them is given by the distance formula:

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

This formula derives from the Pythagorean theorem, where the differences in x-coordinates and y-coordinates form the legs of a right triangle, and the distance is the hypotenuse.

Key features of the distance formula:

- It accounts for both horizontal and vertical differences.
- It applies to any two points on a plane.
- It yields a non-negative real number, representing the length of the segment.

Pros:

- Provides an exact measure of the distance.
- Simple to apply with coordinate pairs.
- Widely used in various calculations and algorithms.

Cons:

- Assumes a flat, Euclidean plane.
- Requires precise coordinate data.

Calculating the Distance Between Point A and Point B

Given:

- Point A at (3, 2.6)
- Point B at (3, 1.4)

Applying the distance formula:

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

Substituting the known coordinates:

$$\sqrt{d = \sqrt{(3 - 3)^2 + (1.4 - 2.6)^2}}$$

Simplify the differences:

- $(3 - 3) = 0$
- $(1.4 - 2.6) = -1.2$

Square the differences:

- $0^2 = 0$
- $(-1.2)^2 = 1.44$

Add these squares:

$$\sqrt{d = \sqrt{0 + 1.44} = \sqrt{1.44}}$$

Calculate the square root:

$$\sqrt{d = 1.2}$$

Result:

The distance between Point A at (3, 2.6) and Point B at (3, 1.4) is 1.2 units.

This straightforward calculation confirms that the two points are vertically aligned, and the distance is simply the absolute difference in their y-coordinates.

Implications of the Distance Calculation

Knowing the precise distance between two points has several practical implications:

- Navigation and Mapping: Helps determine the straight-line distance between two locations on a map.
- Physics: Calculates the displacement between two points in space, which is essential in kinematics.
- Engineering: Assists in designing components and measuring spatial relationships.
- Computer Graphics: Used in algorithms for rendering, collision detection, and spatial analysis.

Additional observations:

- Since both points share the same x-coordinate, their distance is purely vertical.
- The calculation confirms that in this specific case, the distance is simply the difference in y-values, which is a quick shortcut.

Visual Representation on a Coordinate Grid

Visualizing the points on a Cartesian plane enhances understanding:

- Plot Point A at (3, 2.6) — 3 units right of the origin, 2.6 units above.
- Plot Point B at (3, 1.4) — same x-coordinate, but 1.4 units above the origin.
- Connect the points with a straight vertical line segment.

This visual confirms that the segment is vertical and the length is the difference in y-coordinates, which is consistent with the calculated distance of 1.2 units.

Extensions and Related Concepts

Beyond this specific example, understanding how to compute distances between points has broader applications:

- Distance between points with different x-coordinates: The full formula applies, involving both x and y differences.
- Midpoint calculation: Finding a point exactly halfway between two points, useful in design and analysis.
- Coordinate transformations: Rotations, translations, and scaling affect how distances are perceived and calculated.
- 3D distance calculations: Extends the formula into three dimensions with an additional z-coordinate.

Features of the General Distance Formula:

- Flexibility for various coordinate systems.
- Foundation for more complex geometric operations.

Limitations:

- Assumes Euclidean space; non-Euclidean geometries require different approaches.

Conclusion

The analysis of the points Point A at (3, 2.6) and Point B at (3, 1.4) demonstrates the practical utility and simplicity of the distance formula in coordinate geometry. The calculation reveals that the distance between these two points is 1.2 units, a straightforward result due to their shared x-coordinate. This example underscores the importance of understanding coordinate systems and the fundamental formulas that enable precise measurements in both theoretical and real-world contexts.

Whether used in navigation, physics, engineering, or computer graphics, calculating distances on a coordinate grid is an essential skill. Mastery of the distance formula and its applications not only enhances mathematical proficiency but also broadens one's ability to analyze and interpret spatial relationships effectively. As such, this fundamental concept forms a cornerstone of analytic geometry and continues to be relevant across numerous disciplines.

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