

Point C Is $\frac{3}{4}$ Of The Way From Point A(-4,-2) To Point B(8,6). What Are The Coordinates Of C

Point C Is $\frac{3}{4}$ Of The Way From Point A(-4,-2) To Point B(8,6). What Are The Coordinates Of C

Understanding how to find a point that lies along a segment between two other points is a fundamental aspect of coordinate geometry. Whether you're a student preparing for exams, a teacher explaining the concepts, or a math enthusiast exploring the properties of points in a plane, grasping how to calculate such points is essential. In this article, we will explore how to determine the coordinates of point C, which is located three-fourths of the way from point A(-4, -2) to point B(8, 6), through detailed explanations, step-by-step calculations, and practical insights.

Introduction to the Concept of Partway Points in Coordinate Geometry

Before diving into the calculation, it's crucial to understand what it means for a point to be a certain fraction of the way along a line segment. Suppose you have two points:

- Point A with coordinates (-4, -2)
- Point B with coordinates (8, 6)

If you want to find a point C that lies on the line segment connecting A and B, and is, for example, halfway between them, you would find the midpoint. If you want it to be three-fourths of the way, you need to calculate a specific position that is 75% along the path from A to B.

Understanding the Concept of Fractional Distance Along a Line Segment

The idea is based on the concept of vector addition and interpolation. The general approach involves:

1. Calculating the difference in the x-coordinates and y-coordinates between points A and B.
2. Multiplying these differences by the fraction (in this case, $\frac{3}{4}$).
3. Adding the resulting values to the coordinates of the starting point (Point A).

This process effectively "slides" from point A towards point B, stopping at the fraction of the distance specified.

Step-by-Step Calculation of the Coordinates of Point C

Let's now walk through the specific calculation for our points:

- Point A: (-4, -2)
- Point B: (8, 6)
- Fraction along the segment: $\frac{3}{4}$

Step 1: Find the Differences in Coordinates

Determine how far Point B is from Point A in both the x and y directions:

- $\Delta x = x_B - x_A = 8 - (-4) = 8 + 4 = 12$
- $\Delta y = y_B - y_A = 6 - (-2) = 6 + 2 = 8$

Step 2: Calculate the Fractional Differences

Multiply these differences by $\frac{3}{4}$:

- Fractional $\Delta x = (\frac{3}{4}) 12 = (\frac{3}{4}) 12 = 9$
- Fractional $\Delta y = (\frac{3}{4}) 8 = (\frac{3}{4}) 8 = 6$

Step 3: Add the Fractional Differences to Point A

Now, add these values to the coordinates of Point A to find Point C:

- x-coordinate of C: $x_A + \text{fractional } \Delta x = -4 + 9 = 5$
- y-coordinate of C: $y_A + \text{fractional } \Delta y = -2 + 6 = 4$

Result: Coordinates of Point C

Therefore, the coordinates of point C, which is three-fourths of the way from point A to point B, are:

(5, 4)

Visualizing the Position of Point C

Understanding the position of point C in relation to points A and B can be visualized as follows:

- Point A at $(-4, -2)$ is the starting point.
- Point B at $(8, 6)$ is the destination point.
- Point C at $(5, 4)$ lies along the straight line connecting A and B, closer to B since it is 75% along the way.

This visualization helps to reinforce the concept of fractional distance along a line segment.

Applications of Finding a Point Located at a Fraction of the Distance

Calculating points like C is not just a theoretical exercise; it has practical applications across various fields:

- Computer Graphics: For rendering objects and animations, calculating intermediary points ensures smooth transitions.
- Navigation and GPS: Determining intermediate waypoints along a route.
- Engineering and Design: Positioning elements precisely along a line or path.
- Mathematics Education: Teaching concepts related to ratios, proportions, and coordinate geometry.

Additional Examples and Practice Problems

To deepen your understanding, consider practicing with similar problems:

1. Find the point that is $\frac{1}{3}$ of the way from $P(2, 3)$ to $Q(10, 15)$.
2. Determine the coordinates of a point halfway between $R(-6, 4)$ and $S(6, -8)$.
3. Calculate the point that is $\frac{2}{5}$ of the way from $U(0, 0)$ to $V(10, 20)$.

Solution Approach:

- Find the differences in x and y.
- Multiply by the fraction.
- Add to the original starting point.

Conclusion: Mastering the Calculation of Fractional Points in Coordinate Geometry

Understanding how to determine a point located a specific fraction along a line segment between two points is a fundamental skill in coordinate geometry. The process involves straightforward arithmetic and a solid grasp of the concepts of differences in coordinates and proportional distances. Using the example of points A(-4, -2) and B(8, 6), we found that the point three-fourths of the way from A to B is at (5, 4). This method can be extended to any points and fractions, making it an invaluable tool for students, educators, and professionals alike.

Remember:

- Always calculate the differences in x and y first.
- Multiply these differences by the fractional distance.
- Add the results to the starting point's coordinates.

By mastering these steps, you enhance your ability to work with points along line segments, which is a cornerstone concept in geometry, trigonometry, and many applied mathematical fields.

Frequently Asked Questions

How do you find the coordinates of a point that is a certain fraction of the way between two points?

You use the section formula, which involves calculating the weighted average of the coordinates based on the fraction of the way along the segment.

What are the coordinates of point C if it is $\frac{3}{4}$ of the way from Point A(-4, -2) to Point B(8, 6)?

The coordinates of point C are (4, 4.5).

How is the section formula applied to find a point dividing a segment in a given ratio?

The formula calculates the coordinates as $((mx_2 + nx_1)/(m + n), (my_2 + ny_1)/(m + n))$, where m and n are parts into which the segment is divided.

What is the step-by-step process to find point C

located $\frac{3}{4}$ along from A to B?

First, determine the ratio: $\frac{3}{4}$. Then, apply the section formula with $m=3$ and $n=1$, using the coordinates of A and B to find C.

Can you explain why the point C is closer to Point B than Point A in this case?

Yes, because C is $\frac{3}{4}$ of the way from A to B, it is closer to B (which is at the 1 mark) than to A (at the 0 mark).

What is the significance of the fraction $\frac{3}{4}$ in locating point C between points A and B?

It indicates that point C divides the segment so that it is three parts from A and one part from B, placing it nearer to B.

How do you verify that your calculated point C is correct?

You can check by calculating the distance from C to A and from C to B, ensuring that C is $\frac{3}{4}$ of the way along the segment.

What are common mistakes to avoid when calculating the coordinates of a dividing point?

Common mistakes include mixing up the order of points, using incorrect ratios, or misapplying the section formula. Double-check the ratio and coordinate inputs.

Additional Resources

Point C is $\frac{3}{4}$ of the way from Point A(-4, -2) to Point B(8, 6). What are the coordinates of C?

This intriguing question invites us to explore the concept of dividing a line segment into specific ratios and calculating coordinates accordingly.

Understanding how to find a point that lies a certain fraction along the way between two given points is a fundamental skill in coordinate geometry, with applications ranging from computer graphics to navigation. In this guide, we'll walk through the process step-by-step, ensuring you gain a clear understanding of how to approach similar problems confidently.

Understanding the Problem

Before diving into calculations, it's essential to interpret what the problem asks:

- You are given two points:
- Point A at $(-4, -2)$
- Point B at $(8, 6)$
- You need to find Point C, which is $\frac{3}{4}$ of the way from A to B.

This means:

- Starting at point A, move toward point B.
- Travel along the line segment from A to B.
- Stop at a point that is 75% (or $\frac{3}{4}$) along the way from A to B.

Key Concepts and Formulas

To solve this problem, we need to understand the concept of section formula (or internally dividing a segment), which finds the coordinates of a point dividing a segment into a given ratio.

Section Formula (for internal division):

If a point C divides the segment AB in the ratio $m:n$, then the coordinates of C are given by:

$$\begin{aligned} C_x &= \frac{m \times x_B + n \times x_A}{m + n} \\ C_y &= \frac{m \times y_B + n \times y_A}{m + n} \end{aligned}$$

Alternatively, when the ratio is expressed as a fraction of the total segment length (say, t), and you want a point t of the way from A to B , the formulas simplify to:

$$\begin{aligned} C_x &= x_A + t(x_B - x_A) \\ C_y &= y_A + t(y_B - y_A) \end{aligned}$$

where:

- t is a fraction between 0 and 1, representing how far along the segment the point is from A.

In our case:

- $t = \frac{3}{4}$

Step-by-Step Solution

Let's proceed with the detailed steps to find the coordinates of point C.

Step 1: Identify the given points

- Point A: $(-4, -2)$
- Point B: $(8, 6)$

Step 2: Find the difference in coordinates

- $\Delta x = x_B - x_A = 8 - (-4) = 8 + 4 = 12$
- $\Delta y = y_B - y_A = 6 - (-2) = 6 + 2 = 8$

Step 3: Calculate the coordinates of C using the fraction $t = \frac{3}{4}$

Applying the formula:

$$\begin{aligned} C_x &= x_A + t \times \Delta x = -4 + \frac{3}{4} \times 12 \\ C_y &= y_A + t \times \Delta y = -2 + \frac{3}{4} \times 8 \end{aligned}$$

Calculations:

- $C_x = -4 + \frac{3}{4} \times 12 = -4 + 3 \times 3 = -4 + 9 = 5$
- $C_y = -2 + \frac{3}{4} \times 8 = -2 + 3 \times 2 = -2 + 6 = 4$

Result:

$$\boxed{C = (5, 4)}$$

```
}  
\]
```

Interpreting the Result

The coordinates $(5, 4)$ indicate that point C lies along the line segment from A to B, exactly 75% of the way from A to B. To visualize this:

- Starting at $(-4, -2)$,
- Moving toward $(8, 6)$,
- You traverse 75% of the total distance, arriving at $(5, 4)$.

This point is closer to B than to A, as expected, since it's three-quarters of the way along the segment.

Additional Insights and Checks

To ensure our calculation is accurate, consider the following:

- Distance from A to C:

$$\begin{aligned} \text{Distance} &= \sqrt{(C_x - x_A)^2 + (C_y - y_A)^2} = \sqrt{(5 - (-4))^2 + (4 - (-2))^2} \\ &= \sqrt{9^2 + 6^2} = \sqrt{81 + 36} = \sqrt{117} \approx 10.816 \end{aligned}$$

- Total distance from A to B:

$$\begin{aligned} &\sqrt{(8 - (-4))^2 + (6 - (-2))^2} = \sqrt{12^2 + 8^2} = \sqrt{144 + 64} = \sqrt{208} \approx 14.422 \end{aligned}$$

- Check the ratio:

$$\begin{aligned} \frac{\text{Distance from A to C}}{\text{Total distance from A to B}} &\approx \frac{10.816}{14.422} \approx 0.75 \end{aligned}$$

which confirms our calculation matches the intended ratio.

Summary of the Process

Here's a quick recap of the steps involved:

1. Identify the points: $(A = (x_A, y_A))$, $(B = (x_B, y_B))$.
2. Determine the fraction (t) : the proportion of the segment from (A) to (B) where point (C) lies.
3. Calculate the differences: $(\Delta x = x_B - x_A)$, $(\Delta y = y_B - y_A)$.
4. Apply the formula:

$$\begin{aligned} C_x &= x_A + t \times \Delta x \\ C_y &= y_A + t \times \Delta y \end{aligned}$$

5. Compute and interpret the results.

Extensions and Practical Applications

Understanding how to find a point that divides a segment in a given ratio or at a specific fraction has multiple practical uses:

- Graphics and Design: Positioning objects precisely along a line.
- Navigation: Calculating waypoints between two locations.
- Physics: Determining the center of mass or the point of balance.
- Mathematics Education: Enhancing comprehension of coordinate geometry concepts.

Conclusion

Finding the coordinates of a point that is a specific fraction of the way between two points in the coordinate plane is straightforward once you understand the underlying formulas. In this example, calculating the point (C) that is $3/4$ of the way from $(A(-4, -2))$ to $(B(8, 6))$ yields the coordinates $(5, 4)$. This process reinforces foundational skills in coordinate

geometry and paves the way for tackling more complex geometric problems with confidence.

Remember: Always verify your calculations and visualize the problem whenever possible to deepen your understanding!

Point C Is 3/4 Of The Way From Point A (4, 2) To Point B (8, 6) **What Are The Coordinates Of C**

Point C Is 3/4 Of The Way From Point A (4, 2) To Point B (8, 6) What Are The Coordinates Of C

Related Articles

- [How Does The Theme That Stories Can Help Us Understand One Another Develop In "The Speech"?](#)
- [Triangle May Not Be Drawn To Scale. Suppose \$\angle B = 60^\circ\$ And \$B = 4\$. Find: \$A = C = m\angle A =\$ Degrees](#)
- [Describe How Two Concurrently Executed Bank ATM Transactions Can Ensure Data Integrity.](#)

[Back to Home](#)