Find The Distance, To The Nearest Tenth, Between (6, 5) And (-3, -4).

Find The Distance, To The Nearest Tenth, Between (6, 5) And (-3, -4). Calculating the distance between two points in a coordinate plane is a fundamental skill in geometry that helps us understand spatial relationships and measure how far apart points are from each other. Whether you're a student working on a math assignment or someone interested in practical applications like navigation or design, knowing how to accurately find this distance is essential. In this article, we will walk through the process of determining the distance between the points (6, 5) and (-3, -4), rounding our answer to the nearest tenth, and explore related concepts and tips to master this skill.

Understanding the Coordinates

Before diving into the calculation, it's important to understand what the coordinates represent and how they define a point on the Cartesian plane.

What Are Coordinates?

Coordinates are a pair of values (x, y) that specify a point's position relative to the origin (0, 0) on a two-dimensional plane.
- The first value, x, indicates the position along the horizontal axis (left or right).
- The second value, y, indicates the position along the vertical axis (up or down).

Example Points

- Point A: (6, 5) — located 6 units right and 5 units up from the origin.
- Point B: (-3, -4) — located 3 units left and 4 units down from the origin.

Understanding this layout helps visualize the points and their relative positions, which is crucial when calculating the distance between them.

The Distance Formula

The distance between any two points in a plane can be calculated using the distance formula, derived from the Pythagorean theorem. This formula provides a straightforward method to compute the straight-line, or Euclidean, distance.

The Formula

Given two points, (x_1, y_1) and (x_2, y_2), the distance d is:

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

This formula considers the difference in the x-coordinates and y-coordinates, squares these differences, sums them, and then takes the square root to find the straight-line distance.

Applying the Formula to Our Points

For points (6, 5) and (-3, -4):

- $x_1 = 6$, $y_1 = 5$
- $x_2 = -3$, $y_2 = -4$

Plugging into the formula:

$$
d = \sqrt{(-3 - 6)^2 + (-4 - 5)^2}
$$

Calculating step-by-step:

1. Difference in x-coordinates:

$$
-3 - 6 = -9
$$

2. Difference in y-coordinates:

$$
-4 - 5 = -9
$$

3. Square the differences:

$$
(-9)^2 = 81
$$
$$
(-9)^2 = 81
$$

4. Sum the squares:

$$
81 + 81 = 162
$$

5. Take the square root:

$$
d = \sqrt{162}
$$

6. Simplify the square root:

$$
\sqrt{162} = \sqrt{81 \times 2} = \sqrt{81} \times \sqrt{2} = 9 \times \sqrt{2}
$$

7. Approximate $\sqrt{2}$:

$$
\sqrt{2} \approx 1.4142
$$

8. Final calculation:

$$
d \approx 9 \times 1.4142 = 12.7278
$$

Rounding to the nearest tenth:

$$
d \approx 12.7
$$

Therefore, the distance between the points (6, 5) and (-3, -4) is approximately 12.7 units.

Understanding the Significance of the Result

Knowing the distance to the nearest tenth provides a precise measure that's useful in various real-world and academic contexts.

Practical Applications

- Navigation and Mapping: Determining how far apart two locations are.
- Design and Engineering: Calculating lengths or distances between components.
- Data Analysis: Measuring the similarity or difference between data points in a plane.
- Educational Purposes: Reinforcing concepts of coordinate geometry and the Pythagorean theorem.

Why Round to the Tenth?

Rounding to the nearest tenth strikes a balance between precision and simplicity, making the measurement easy to interpret and communicate without losing significant detail.

Additional Tips for Calculating Distances

To become proficient in calculating distances between points, consider these tips:

- **Always double-check your coordinate differences:** Ensure you subtract the correct coordinates and pay attention to signs.
- **Use a calculator for square roots:** Especially when dealing with non-perfect squares, calculators help obtain accurate approximations.
- **Practice with various points:** Work on different coordinate pairs to build confidence and understanding.
- **Visualize the points:** Sketching points on graph paper can help in understanding their relative positions and the nature of the distance.

Conclusion

Finding the distance between two points in the coordinate plane is a fundamental yet vital skill in mathematics. By applying the distance formula carefully, substituting the given coordinates, and performing accurate calculations, you can determine the straight-line distance between any two points. In our example, the distance between (6, 5) and (-3, -4) is approximately 12.7 units when rounded to the nearest tenth. Mastering this process enhances your understanding of geometry, spatial reasoning, and practical problem-solving in various fields.

Whether you're tackling classroom assignments, designing layouts, or navigating real-world scenarios, knowing how to find and interpret these distances empowers you with essential analytical tools. Keep practicing with different coordinate pairs to strengthen your skills, and remember that visualization and double-checking your work are key to accuracy.

Frequently Asked Questions

How do I find the distance between the points (6, 5) and (-3, -4)?

Use the distance formula: $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$.

What is the distance between the points (6, 5) and (-3, -4) rounded to the nearest tenth?

The distance is approximately 11.4 units.

Can you show the step-by-step calculation for the distance between (6, 5) and (-3, -4)?

Yes. Calculate differences: (–3 – 6) = –9 and (–4 – 5) = –9. Then, square them: 81 and 81. Sum: 162. Take the square root: √162 ≈ 12.7279. Rounded to the nearest tenth: 12.7.

Why do we use the distance formula in coordinate geometry?

Because it provides the straight-line distance between two points based on their coordinates.

What is the exact distance between (6, 5) and (-3, -4)?

The exact distance is √162, which simplifies to approximately 12.7279 units.

Is the distance between (6, 5) and (-3, -4) greater than 10 units?

Yes, since the distance is approximately 12.7 units, which is greater than 10.

How does changing the coordinates affect the calculated distance?

Changing the coordinates alters the differences in x and y, thus changing the computed distance accordingly.

Can I use a graph to visually estimate the distance between these two points?

Yes, plotting the points on a graph can help you visually estimate the distance, but for accuracy, use the distance formula.

Additional Resources

Find The Distance, To The Nearest Tenth, Between (6, 5) And (-3, -4)

When working with coordinate geometry, one of the fundamental skills is calculating the distance between two points on a Cartesian plane. Whether you're a student studying for an exam, a teacher preparing lesson plans, or a professional analyzing spatial data, understanding how to find the distance between two points is essential. In this guide, we'll walk through the process of finding the distance, to the nearest tenth, between (6, 5) and (-3, -4), providing a clear, step-by-step explanation suitable for learners at various levels.

Understanding the Distance Formula

Before diving into the calculations, it's important to understand the core concept: the distance formula. Derived from the Pythagorean theorem, the distance d between two points (x_1, y_1) and (x_2, y_2) is given by:

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

This formula calculates the straight-line distance between the two points by finding the hypotenuse of a right triangle formed by the differences in their x and y coordinates.

Step-by-Step Breakdown

Let's apply this formula to our specific points:

- Point A: $(6, 5)$
- Point B: $(-3, -4)$

1. Identify the Coordinates

- $x_1 = 6$
- $y_1 = 5$
- $x_2 = -3$
- $y_2 = -4$

2. Calculate the Differences in Coordinates

- Difference in x-coordinates: $\Delta x = x_2 - x_1 = -3 - 6 = -9$
- Difference in y-coordinates: $\Delta y = y_2 - y_1 = -4 - 5 = -9$

Note: The negative signs indicate direction, but since we're squaring these differences, the signs will become positive in the calculation.

3. Square the Differences

- $(\Delta x)^2 = (-9)^2 = 81$
- $(\Delta y)^2 = (-9)^2 = 81$

4. Sum the Squares

$$
81 + 81 = 162
$$

5. Take the Square Root

$$
d = \sqrt{162} \approx 12.7279
$$

Rounding to the Nearest Tenth

To express the distance to the nearest tenth, we round 12.7279:

- The digit in the tenths place is 7.
- The next digit (hundreds place) is 2, which is less than 5.
- Therefore, the rounded value is 12.7.

Final Answer: The distance between the points \((6, 5)\) and \((-3, -4)\) is approximately 12.7 units.

Visualizing the Problem

Visual aids can significantly enhance understanding. Imagine plotting the two points on a graph:

- Point A at (6, 5) is located in the first quadrant, somewhat to the right and above the origin.
- Point B at (-3, -4) lies in the third quadrant, to the left and below the origin.

Connecting these points creates a straight line. The differences in x and y (both -9) indicate that the line is inclined at an angle, and the length of this line segment is what we've calculated as approximately 12.7 units.

Practical Applications

Knowing how to compute distances between points has numerous real-world applications:

- Navigation and GPS: Calculating the straight-line distance between two locations.
- Engineering: Designing structures where precise measurements are crucial.
- Data Analysis: Measuring the similarity or difference between data points in multi-dimensional space.
- Gaming and Animation: Determining distances between objects for collision detection or movement.

Additional Tips for Accurate Calculation

- Always double-check coordinate differences: Small errors here can significantly affect the final distance.
- Use a calculator for square roots: Especially for non-perfect squares, to ensure precision.
- Round carefully: Follow standard rounding rules to avoid inaccuracies.

Summary of Key Steps

| Step | Description | Calculation / Result |

1	Identify coordinates	$(6, 5)$ and $(-3, -4)$
2	Find differences in x and y	$\Delta x = -9$, $\Delta y = -9$
3	Square the differences	81 and 81
4	Sum the squares	162
5	Take the square root	$\sqrt{162} \approx 12.7279$
6	Round to nearest tenth	12.7

Final Thoughts

Mastering the process of finding the distance, to the nearest tenth, between (6, 5) and (-3, -4) is a foundational skill in coordinate geometry. This method can be extended to points in three dimensions or higher by adding more differences and applying the same principles. With practice, calculating distances becomes quick and intuitive, empowering you to analyze spatial relationships confidently.

Whether tackling homework problems, designing maps, or working on technical projects, understanding this process equips you with a vital tool for spatial reasoning and analytical problem-solving.

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