A Point Is Plotted On The Number Line At 4 3/5 . A Second Point Is Plotted At 3 3/4 .What Is The Length

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Understanding how to determine the distance between two points on a number line is a fundamental concept in mathematics, especially within the realms of fractions and real numbers. This type of problem appears frequently in algebra, geometry, and standardized testing, making it essential for students and learners to grasp the process of calculating lengths between two points accurately. In this detailed guide, we will explore the steps to find the length between the points plotted at 4 3/5 and 3 3/4 on the number line, delve into the concepts of fractions, mixed numbers, and subtraction, and provide practical tips to master similar problems.

Introduction to Number Line and Points

The number line is a visual representation of real numbers, extending infinitely in both directions. Points on the number line are used to represent specific values, and the distance between points indicates the difference in their numerical values. When working with fractions, the key is to convert mixed numbers into improper fractions or decimals for easier calculation.

Understanding the Given Points

Let's analyze the two points provided:

- First point: 4 3/5
- Second point: 3 3/4

These are mixed numbers, consisting of a whole number and a fractional part. To find the length or distance between these points, we need to:

1. Convert the mixed numbers into improper fractions or decimals.
2. Subtract the smaller value from the larger one.
3. Ensure the result is positive, as distance is always non-negative.

Converting Mixed Numbers to Improper Fractions

Mixed numbers can be converted into improper fractions using the following method:

Conversion formula:

$$ \text{Mixed Number} = \frac{\text{Whole Number} \times \text{Denominator} + \text{Numerator}}{\text{Denominator}} $$

Applying this to our points:

For 4 3/5:

- Whole number: 4
- Fraction: 3/5

$$ 4 \frac{3}{5} = \frac{(4 \times 5) + 3}{5} = \frac{20 + 3}{5} = \frac{23}{5} $$

For 3 3/4:

- Whole number: 3
- Fraction: 3/4

$$ 3 \frac{3}{4} = \frac{(3 \times 4) + 3}{4} = \frac{12 + 3}{4} = \frac{15}{4} $$

Converting Improper Fractions to a Common Denominator

To subtract fractions, they should have the same denominator. The least common denominator (LCD) of 5 and 4 is 20.

Convert $\frac{23}{5}$ to denominator 20:

$$ \frac{23}{5} = \frac{23 \times 4}{5 \times 4} = \frac{92}{20} $$

Convert $\frac{15}{4}$ to denominator 20:

$$ \frac{15}{4} = \frac{15 \times 5}{4 \times 5} = \frac{75}{20} $$

Now, the points are:

- 4 3/5 = $\frac{92}{20}$
- 3 3/4 = $\frac{75}{20}$

Calculating the Distance Between the Two Points

The distance (or length) between two points on the number line is the absolute difference of their values:

$$ \text{Distance} = | \text{Point 1} - \text{Point 2} | $$

Applying this:

$$ \text{Distance} = \left| \frac{92}{20} - \frac{75}{20} \right| = \left| \frac{92 - 75}{20} \right| = \left| \frac{17}{20} \right| $$

Since the absolute value is used, the length is positive:

$$ \boxed{\frac{17}{20}} $$

Final Answer: The Length Between the Points

The length between the points plotted at 4 3/5 and 3 3/4 on the number line is 17/20.

This fractional result can also be expressed as a decimal:

$$ \frac{17}{20} = 0.85 $$

Thus, the distance between the two points is 0.85 units.

Practical Tips for Solving Similar Problems

To efficiently handle questions involving distances between points with fractions and mixed numbers, consider the following tips:

1. Always convert mixed numbers to improper fractions or decimals for consistency.
2. Find the least common denominator (LCD) when subtracting fractions.
3. Use absolute value to ensure the distance is non-negative.
4. Double-check conversions to avoid errors in numerator or denominator calculations.
5. Practice with different fractions and mixed numbers to gain confidence.

Additional Practice Problems

To reinforce your understanding, try solving these similar problems:

1. Find the distance between 2 2/3 and 5 1/4.
2. Determine the length between 7 3/8 and 3 5/6.
3. Calculate the distance between 6 1/2 and 4 3/4.

Working through these problems will enhance your skills in converting mixed numbers, finding common denominators, and calculating differences accurately.

Conclusion

Understanding how to find the length between two points on a number line involving fractions and mixed numbers is a vital skill in mathematics. The process involves converting mixed numbers into improper fractions, finding a common denominator, subtracting the fractions, and taking the absolute value to ensure a positive result. In our specific case, the length between 4 3/5 and 3 3/4 is 17/20, or 0.85 units. Mastery of these steps enables students to confidently solve more complex problems involving fractions, decimals, and coordinate systems.

By practicing these methods regularly, learners can improve their numerical fluency and develop a strong foundation in math concepts related to number lines, fractions, and measurement. Whether for academic purposes or real-world applications, understanding how to compute distances on the number line is an

essential mathematical skill.

Frequently Asked Questions

How do you find the distance between two points on a number line at 4 3/5 and 3 3/4?

Convert both mixed numbers to improper fractions, then subtract the smaller from the larger to find the length: 4 3/5 minus 3 3/4.

What is 4 3/5 expressed as an improper fraction?

4 3/5 is equal to 23/5.

What is 3 3/4 expressed as an improper fraction?

3 3/4 is equal to 15/4.

How do you subtract fractions with different denominators when finding the length?

Find a common denominator, convert both fractions, then subtract the numerators to get the difference.

What is the length between the points 4 3/5 and 3 3/4 on the number line?

The length is 1 2/5 units.

Can the length between two points on a number line be negative?

No, the length or distance is always a non-negative value; it is the absolute difference between the two points.

Additional Resources

A Point Is Plotted On The Number Line At 4 3/5. A Second Point Is Plotted At 3 3/4. What Is The Length?

Understanding the distance between two points on a number line is a fundamental concept in mathematics,

especially in the study of real numbers and their applications. The problem of finding the length between two points given in mixed number form provides an excellent opportunity to explore the processes of converting mixed numbers to improper fractions, subtracting fractions, and understanding the significance of number line representations. This article takes a detailed, reader-friendly approach to solving this problem, focusing on clarity and mathematical accuracy.

Interpreting the Problem: Points on the Number Line

The problem states:
A Point Is Plotted On The Number Line At 4 3/5. A Second Point Is Plotted At 3 3/4. What Is The Length?

This scenario involves two points located at specific positions on a number line. The number line is a visual representation of real numbers, extending infinitely in both directions, with each point corresponding to a real number.

- The first point is at 4 3/5.
- The second point is at 3 3/4.

The goal is to determine the length of the segment connecting these two points, which is essentially the absolute difference between the two numbers.

Converting Mixed Numbers to Improper Fractions

To perform arithmetic operations such as subtraction, it is often easiest to convert mixed numbers into improper fractions. This process simplifies calculations and ensures accuracy.

Why Convert?

Mixed numbers combine whole numbers and fractions, which can complicate direct subtraction. Converting to improper fractions transforms the mixed number into a single fraction, making subtraction straightforward.

Conversion Process

Let's convert both mixed numbers:

1. Convert 4 3/5

- Whole number: 4
- Fraction: 3/5

Step-by-step:

- Multiply the whole number by the denominator: 4 × 5 = 20
- Add the numerator: 20 + 3 = 23
- Write as an improper fraction: 23/5

2. Convert 3 3/4

- Whole number: 3
- Fraction: 3/4

Step-by-step:

- Multiply the whole number by the denominator: 3 × 4 = 12
- Add the numerator: 12 + 3 = 15
- Write as an improper fraction: 15/4

Finding a Common Denominator

To subtract these improper fractions, they must have a common denominator.

Least Common Denominator (LCD)

- Denominators are 5 and 4.
- The least common denominator (LCD) of 5 and 4 is 20, since:
- 20 ÷ 5 = 4
- 20 ÷ 4 = 5

Converting to Equivalent Fractions

- Convert 23/5 to denominator 20:
- Multiply numerator and denominator by 4:

23 × 4 = 92
So, 23/5 = 92/20

- Convert 15/4 to denominator 20:
- Multiply numerator and denominator by 5:
15 × 5 = 75
So, 15/4 = 75/20

Now, the points are represented as:

- First point: 92/20
- Second point: 75/20

Calculating the Distance

The length of the segment between the two points is the absolute difference of their positions.

Subtracting the Fractions

- Difference: |92/20 - 75/20| = |(92 - 75)/20| = |17/20|

Absolute Value

Since the order doesn't matter for length, take the absolute value:

- Length = 17/20

Converting Back to Mixed Number (Optional)

While the fractional form is precise, expressing the length as a mixed number can be more intuitive:

- 17/20 is already a proper fraction (less than 1), so it remains as is.

Final Answer and Interpretation

The length of the segment between the points plotted at 4 3/5 and 3 3/4 on the number line is 17/20.

Understanding the Significance of the Result

This calculation demonstrates several key principles in mathematics:

- Converting mixed numbers to improper fractions simplifies complex calculations.
- Finding common denominators is essential when subtracting fractions.
- Absolute difference ensures the length is always positive, regardless of the order of subtraction.
- Fractional representation provides exact measurements, crucial in precise applications.

Furthermore, the length being less than 1 indicates that the two points are less than one unit apart on the number line, despite their mixed number representations suggesting larger values.

Extensions and Practical Applications

Understanding how to compute distances between points on a number line has practical applications across various fields:

- Geometry: Measuring segments in coordinate systems.
- Physics: Calculating distances in one-dimensional motion.
- Engineering: Precision measurement between points or features.
- Data Analysis: Determining differences between data points.

The process outlined here can be extended to more complex problems involving multiple points, different units, or higher-dimensional spaces.

Summary

In conclusion, determining the length between two points given as mixed numbers involves a systematic approach:

1. Convert mixed numbers to improper fractions.
2. Find a common denominator.
3. Subtract the fractions to find the difference.
4. Take the absolute value to determine the length.
5. (Optional) Convert back to mixed number form for clarity.

Applying these steps to the specific problem yields a length of 17/20 units, an elegant demonstration of fractional arithmetic and number line concepts. This foundational skill supports a deeper understanding of real numbers and their spatial representations, forming a cornerstone of mathematical literacy.

In essence, mastering the conversion and subtraction of fractions enhances one's ability to interpret and analyze real-world measurements with confidence and precision.

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