

The Fraction $N/16$ Is Between $1/2$ And $3/4$. Write Down All The Possible Values Of N . Optional Working N

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Optional Working N**

Understanding how to determine all possible integer values of N such that the fraction $N/16$ lies strictly between $1/2$ and $3/4$ is an essential skill in mathematics, especially when dealing with inequalities, fractions, and number ranges. This article offers a comprehensive guide to solving this problem, breaking down the process step-by-step, and providing detailed explanations to ensure clarity. Whether you're a student, educator, or anyone interested in mathematical logic, this guide aims to enhance your understanding of inequalities involving fractions and how to find valid integer solutions systematically.

Introduction to the Problem

At the core of this problem lies the task of identifying all integers N that satisfy the inequality:

$$\frac{1}{2} < \frac{N}{16} < \frac{3}{4}$$

This involves understanding how fractions relate to each other and manipulating inequalities to isolate N . The problem is a classic example of how to handle fractional inequalities, which are common in algebra and number theory.

Understanding the Inequality

Before solving the inequality, let's interpret what it means:

- The fraction $N/16$ must be strictly greater than $1/2$.
- The same fraction must also be strictly less than $3/4$.

Expressed mathematically:

$$\frac{1}{2} < \frac{N}{16} < \frac{3}{4}$$

This double inequality indicates $N/16$ is within an open interval between $1/2$ and $3/4$.

Step-by-Step Solution Approach

To find all suitable values of N, follow these steps:

Step 1: Eliminate the denominator

Multiply each part of the inequality by 16 to clear the denominator:

$$\lfloor 16 \times \frac{1}{2} < N < 16 \times \frac{3}{4} \rfloor$$

Calculating the products:

$$\lfloor 8 < N < 12 \rfloor$$

Step 2: Identify the integer values

Since N is an integer, the inequality simplifies to:

$$\lfloor 8 < N < 12 \rfloor$$

The integers strictly between 8 and 12 are:

- 9
- 10
- 11

Step 3: Verify the solutions

To ensure these values satisfy the original inequality, substitute each N back into the original expression:

- For N = 9:

$$\lfloor \frac{9}{16} = 0.5625 \rfloor$$

Check if:

$$\lfloor \frac{1}{2} < 0.5625 < \frac{3}{4} \rfloor$$

which simplifies to:

$$\lfloor 0.5 < 0.5625 < 0.75 \rfloor$$

True.

- For N = 10:

$$\lfloor \frac{10}{16} = 0.625 \rfloor$$

Check:

$$\lfloor 0.5 < 0.625 < 0.75 \rfloor$$

True.

- For $N = 11$:

$$\lfloor \frac{11}{16} = 0.6875 \rfloor$$

Check:

$$\lfloor 0.5 < 0.6875 < 0.75 \rfloor$$

True.

Thus, all three values satisfy the inequality.

Summary of Possible Values of N

Based on the calculations, the possible integer values of N are:

- $N = 9$
- $N = 10$
- $N = 11$

Optional Working N: Exploring Other Values of N

While the main solution involves integers strictly between 8 and 12, it's instructive to understand why values outside this range do not qualify.

- For $N = 8$:

$$\lfloor \frac{8}{16} = 0.5 \rfloor$$

which is equal to $1/2$, not strictly greater, so $N=8$ does not satisfy the inequality.

- For $N = 12$:

$$\lfloor \frac{12}{16} = 0.75 \rfloor$$

which equals $3/4$, not strictly less, so $N=12$ does not satisfy the inequality.

- For $N = 7$:

$$\lfloor \frac{7}{16} \rfloor = 0.4375 \rfloor$$

which is less than 0.5, so it does not satisfy the inequality.

- For $N = 13$:

$$\lfloor \frac{13}{16} \rfloor = 0.8125 \rfloor$$

which exceeds 0.75, so it is invalid.

This exploration confirms that only $N = 9, 10$, and 11 satisfy the inequality.

Additional Insights and Variations

1. Generalizing the Problem

The problem can be generalized for any denominator D , where N/D is between two fractions A/B and C/E :

$$\lfloor \frac{A}{B} \rfloor < \frac{N}{D} < \lfloor \frac{C}{E} \rfloor$$

The steps involve:

- Cross-multiplication to eliminate denominators.
- Solving the resulting inequalities.
- Ensuring N is an integer within the bounds.

2. Visual Representation

Plotting $N/16$ on a number line between 0 and 1 helps visualize where N must lie:

- $N/16 > 1/2 \rightarrow N > 8$
- $N/16 < 3/4 \rightarrow N < 12$

The integer points between 8 and 12 are 9, 10, 11, matching earlier calculations.

3. Real-World Applications

Understanding such inequalities applies to:

- Probability calculations.
- Ratios in data analysis.
- Engineering measurements where proportions are important.

Conclusion

Determining the values of N such that the fraction $N/16$ lies between $1/2$ and $3/4$ involves straightforward algebraic manipulation and understanding of inequalities. The key steps are multiplying through to clear denominators, identifying the range of N , and verifying the solutions. The integer solutions to this problem are $N = 9, 10$, and 11 .

This problem exemplifies the importance of inequality reasoning in mathematics and highlights systematic approaches to solving fractional inequalities. Mastering such techniques enhances problem-solving skills and deepens understanding of the relationships between fractions and inequalities.

SEO Keywords & Phrases

- Fraction $N/16$ between $1/2$ and $3/4$
- Possible values of N for $N/16$ between $1/2$ and $3/4$
- Solving fractional inequalities
- Find all integers N where $N/16$ is between $1/2$ and $3/4$
- Inequalities involving fractions
- How to determine values of N in fractional inequalities
- Step-by-step solution for $N/16$ between $1/2$ and $3/4$
- Mathematical inequalities involving fractions
- Number line representation of fractional inequalities
- General methods for solving inequalities with fractions

This comprehensive guide aims to clarify the process of finding all possible integer values of N in the inequality $(1/2 < N/16 < 3/4)$, ensuring a clear understanding and practical application of inequality solving techniques.

Frequently Asked Questions

How do I determine the possible integer values of N for the fraction $N/16$ when it lies between $1/2$ and $3/4$?

To find N , set up the inequality $1/2 < N/16 < 3/4$. Multiply all parts by 16 to get $8 < N < 12$. Since N is an integer, N can be 9, 10, or 11.

What are the possible values of N such that $N/16$ is between

1/2 and 3/4?

The possible values of N are 9, 10, and 11 because these satisfy the inequality $8 < N < 12$.

Why are $N = 8$ or $N = 12$ not included as solutions for the fraction $N/16$?

Because $N=8$ gives $N/16 = 8/16 = 1/2$, which is not strictly greater than $1/2$, and $N=12$ gives $12/16 = 3/4$, which is not strictly less than $3/4$. The inequality is strict, so these are excluded.

Can you explain the step-by-step process to find all N such that $N/16$ is between $1/2$ and $3/4$?

Yes. First, write the inequality: $1/2 < N/16 < 3/4$. Multiply all parts by 16: $8 < N < 12$. Since N is an integer, N can be 9, 10, or 11.

Is $N=9$ a valid solution for the inequality $1/2 < N/16 < 3/4$?

Yes, because $9/16 = 0.5625$, which is between 0.5 and 0.75, satisfying the inequality.

What is the significance of the inequality $1/2 < N/16 < 3/4$ in determining N ?

It restricts N to values where the fraction $N/16$ is strictly between $1/2$ and $3/4$, helping us identify the possible integer values of N based on this range.

Additional Resources

Understanding the Fraction $N/16$: Exploring Values Between $1/2$ and $3/4$

When delving into the world of fractions, one common challenge is determining which specific values satisfy particular inequalities. In this case, we are examining the fraction $N/16$, where N is an integer, positioned between $1/2$ and $3/4$. This inquiry is not only fundamental for students learning about inequalities and fractions but also has practical implications in fields like engineering, mathematics, and data analysis. This article provides an in-depth exploration of this problem, clarifies the possible values of N , and offers a comprehensive understanding of the concepts involved.

Understanding the Problem

The core question is: For which integer values of N does the fraction $N/16$ fall between $1/2$ and $3/4$? Formally, we are looking to solve the compound inequality:

$$\lfloor \frac{1}{2} < \frac{N}{16} < \frac{3}{4} \rfloor$$

This inequality frames the problem as a search for all integers N satisfying these bounds.

Breaking Down the Inequality

To identify the possible values of N , it is useful to analyze each part of the compound inequality separately.

Part 1: $N/16 > 1/2$

This inequality suggests that the fraction $N/16$ exceeds one-half. To find N 's range, multiply both sides by 16:

$$\lfloor N/16 > 1/2 \implies N > 16 \times \frac{1}{2} \implies N > 8 \rfloor$$

Since N is an integer, the smallest integer greater than 8 is 9. Therefore:

$$\lfloor N \geq 9 \rfloor$$

Key Point: N must be strictly greater than 8, so $N \geq 9$.

Part 2: $N/16 < 3/4$

Similarly, this part states that $N/16$ is less than three-quarters. Multiply both sides by 16:

$$\lfloor N/16 < 3/4 \implies N < 16 \times \frac{3}{4} \implies N < 12 \rfloor$$

Since N is an integer, the largest integer less than 12 is 11. So:

$$\lfloor N \leq 11 \rfloor$$

Key Point: N must be strictly less than 12, so $N \leq 11$.

Consolidating the Results

Combining both parts, the set of integers N satisfying the inequality is:

$$9 \leq N \leq 11$$

which includes $N = 9, 10, 11$.

Verification:

Let's verify each candidate:

- For $N=9$:

$$\frac{9}{16} = 0.5625$$

Check if it's between 0.5 and 0.75:

$$0.5 < 0.5625 < 0.75 \quad \text{Yes}$$

- For $N=10$:

$$\frac{10}{16} = 0.625$$

Check:

$$0.5 < 0.625 < 0.75 \quad \text{Yes}$$

- For $N=11$:

$$\frac{11}{16} = 0.6875$$

Check:

$$0.5 < 0.6875 < 0.75 \quad \text{Yes}$$

All three values satisfy the inequality.

Optional Working with N: A Closer Look

While we have straightforward bounds, understanding the reasoning behind these bounds deepens comprehension.

Why Multiply Both Sides by 16?

Multiplying through by 16 simplifies the inequality, removing fractions and making the bounds easier to interpret:

- The inequality $\frac{N}{16} > \frac{1}{2}$ becomes $N > 8$.
- The inequality $\frac{N}{16} < \frac{3}{4}$ becomes $N < 12$.

This approach is standard when solving inequalities involving fractions, as it simplifies the algebraic manipulation.

Considering the Nature of N

Since N represents an integer, the inequalities translate into simple integer bounds:

- $N > 8 \rightarrow N \geq 9$
- $N < 12 \rightarrow N \leq 11$

Thus, the possible N are the integers from 9 to 11 inclusive.

Summary of All Possible Values of N

N	Fraction N/16	Fraction in decimal	Satisfies inequality?
9	9/16	0.5625	Yes
10	10/16	0.625	Yes
11	11/16	0.6875	Yes

Conclusion: The possible values of N are 9, 10, and 11.

Additional Insights and Practical Applications

Understanding the bounds of N in fractions like $N/16$ is essential in various contexts:

- **Measurement and Calibration:** When working with measurements divided into 16 parts (like in some engineering scales or musical tuning), knowing which integer parts fall within certain ranges is vital.
- **Data Representation:** In digital systems, where data might be segmented into 16 units, knowing which N values produce ratios within specific bounds can influence data encoding or processing.
- **Educational Contexts:** This problem serves as a fundamental exercise in inequalities, fraction comparison, and algebraic manipulation, reinforcing core mathematical skills.

Final Thoughts

The exploration of the fraction $N/16$ between $1/2$ and $3/4$ demonstrates the importance of careful algebraic manipulation and understanding of inequalities. By transforming fractional inequalities into simple bounds through multiplication, we can efficiently identify the possible integer values of N .

In summary:

- The fraction $N/16$ is between $1/2$ and $3/4$ if and only if N is an integer satisfying $9 \leq N \leq 11$.
- The valid values of N are: 9, 10, and 11.

This example underscores the elegance of algebraic reasoning and the value of systematic problem-solving strategies in mathematics.

Note: Always verify your solutions by substituting back into the original inequality to ensure correctness.

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