

# What Is The Answer For $4x + 1/3 = 20$ ?

## What Is The Answer For $4x + 1/3 = 20$ ?

When faced with the equation  $4x + 1/3 = 20$ , many students and learners wonder how to find the value of  $x$  that makes this equation true. Solving such equations is a fundamental skill in algebra, and understanding the steps involved can help you tackle similar problems with confidence. In this article, we will explore the process of solving this equation in detail, break down each step, and discuss some related concepts that can deepen your understanding of algebraic equations.

## Understanding the Equation $4x + 1/3 = 20$

Before jumping into the solution, it's essential to understand what the equation represents and identify the key components. The equation features a term involving the variable  $x$ , multiplied by 4, and a constant term,  $1/3$ , added to it. The sum equals 20. The goal is to isolate  $x$  and determine its value.

This type of equation is called a linear equation because the variable  $x$  appears to the first power and the highest degree of the variable is 1. Solving linear equations involves performing inverse operations to isolate the variable on one side of the equation.

## Step-by-Step Solution

Let's proceed step-by-step to solve the equation  $4x + 1/3 = 20$ .

### Step 1: Understand the goal

Our objective is to find the value of  $x$  that satisfies the equation. To do this, we need to get  $x$  alone on one side. Currently,  $x$  is multiplied by 4 and then increased by  $1/3$ .

### Step 2: Eliminate the constant term ( $1/3$ )

To isolate the term with  $x$ , subtract  $1/3$  from both sides of the equation:

$$4x + 1/3 - 1/3 = 20 - 1/3$$

Simplifying:

$$4x = 20 - 1/3$$

### Step 3: Simplify the right side

Subtracting a fraction from a whole number requires expressing both in a common denominator.

Express 20 as a fraction with denominator 3:

$$20 = 60/3$$

Now, subtract:

$$60/3 - 1/3 = (60 - 1)/3 = 59/3$$

So, the equation now reads:

$$4x = 59/3$$

### Step 4: Solve for x

Since  $4x$  equals  $59/3$ , divide both sides by 4 to isolate  $x$ :

$$x = (59/3) \div 4$$

Dividing by 4 is equivalent to multiplying by  $1/4$ :

$$x = (59/3) \times (1/4)$$

Multiply numerators and denominators:

$$x = (59 \times 1) / (3 \times 4) = 59 / 12$$

### Final Answer

The solution to the equation  $4x + 1/3 = 20$  is:

$$= \frac{59}{12}$$

Alternatively, as a decimal:

$$\approx 4.9167$$

This is the value of  $x$  that makes the original equation true.

# Understanding the Solution Process

Now that we've arrived at the answer, it's helpful to understand the reasoning behind each step.

## Why subtract $\frac{1}{3}$ first?

In algebra, the goal is to get the variable term by itself. Since  $\frac{1}{3}$  is added to  $4x$ , subtracting  $\frac{1}{3}$  from both sides removes it, simplifying the equation.

## Why express 20 as a fraction?

Expressing whole numbers as fractions with common denominators simplifies calculations, especially when dealing with fractions. It allows for straightforward addition or subtraction of fractions.

## Why divide by 4?

Since  $4x$  indicates that  $x$  is multiplied by 4, dividing both sides by 4 reverses this operation, isolating  $x$ .

## Common Mistakes to Avoid

When solving equations like this, learners often encounter some pitfalls. Here are a few common mistakes and tips to avoid them:

- **Not applying the same operation to both sides:** Always remember to perform inverse operations equally on both sides of the equation to maintain equality.
- **Incorrect fraction arithmetic:** When subtracting or adding fractions, find a common denominator to avoid errors.
- **Forgetting to convert whole numbers to fractions:** To perform operations between fractions and whole numbers, convert the whole number to a fraction with the same denominator.
- **Dividing improperly:** When dividing by a number, remember to multiply by its reciprocal to keep calculations consistent.

## Additional Practice Problems

To reinforce your understanding, try solving similar equations:

1. Solve for  $x$ :  $3x - \frac{2}{5} = 7$
2. Solve for  $x$ :  $5x + 4 = 29$
3. Solve for  $x$ :  $2x/3 = 8$
4. Find  $x$ :  $7 + x/2 = 10$

Working through these problems will help you become more comfortable with algebraic manipulations involving fractions and linear equations.

## Real-Life Applications of Solving Equations

Understanding how to solve equations like  $4x + \frac{1}{3} = 20$  is not just an academic exercise; it has practical applications in various fields:

- **Finance:** Calculating loan payments or investments often involves solving equations with variables.
- **Science:** Determining unknown quantities in experiments or calculations often requires algebraic solutions.
- **Engineering:** Designing systems and solving for specific parameters involves solving linear equations.
- **Statistics:** Data analysis sometimes requires solving equations to find unknown variables.

Mastering these skills enhances your problem-solving ability and prepares you for more advanced mathematical concepts.

## Conclusion

In summary, the answer for  $4x + \frac{1}{3} = 20$  is  $x = \frac{59}{12}$ . Solving it involves understanding the structure of

the equation, performing inverse operations systematically, and simplifying fractions carefully. With practice, solving similar equations becomes an intuitive process that can be applied across various mathematical and real-world scenarios. Whether you're a student aiming to improve your algebra skills or someone seeking to understand the basics of equations, grasping these fundamental techniques is essential for progressing in mathematics.

## Frequently Asked Questions

### What is the solution to the equation $4x + 1/3 = 20$ ?

First, subtract  $1/3$  from both sides:  $4x = 20 - 1/3$ . Convert 20 to a fraction:  $20 = 60/3$ . So,  $4x = (60/3) - (1/3) = 59/3$ . Then, divide both sides by 4:  $x = (59/3) \div 4 = (59/3) \times (1/4) = 59/12$ . Therefore, the solution is  $x = 59/12$ .

### How do I solve for $x$ in the equation $4x + 1/3 = 20$ ?

Subtract  $1/3$  from both sides to get  $4x = 20 - 1/3$ . Convert 20 to  $60/3$  to combine:  $4x = 60/3 - 1/3 = 59/3$ . Then, divide both sides by 4:  $x = (59/3) \div 4 = 59/12$ .

### What is the value of $x$ in $4x + 1/3 = 20$ ?

$x$  equals  $59/12$ , which simplifies to approximately 4.92.

### Can you show step-by-step how to solve $4x + 1/3 = 20$ ?

Yes. Step 1: Subtract  $1/3$  from both sides:  $4x = 20 - 1/3$ . Step 2: Convert 20 to  $60/3$ :  $4x = 60/3 - 1/3 = 59/3$ . Step 3: Divide both sides by 4:  $x = (59/3) \div 4 = 59/12$ .

### Is the solution to $4x + 1/3 = 20$ a rational number?

Yes, the solution  $x = 59/12$  is a rational number.

### What operations are involved in solving $4x + 1/3 = 20$ ?

The operations include subtraction and division. First, subtract  $1/3$  from both sides, then divide both sides by 4.

### How do fractions play a role in solving $4x + 1/3 = 20$ ?

Fractions are involved when subtracting  $1/3$  from 20 (which is converted to a fraction), and when dividing by 4, which involves fractional division to find  $x$ .

## What is the approximate decimal value of the solution to $4x + 1/3 = 20$ ?

The approximate decimal value of  $x$  is approximately 4.92.

## Can the equation $4x + 1/3 = 20$ be solved using a calculator?

Yes, you can input the steps into a calculator: subtract  $1/3$  from 20, then divide the result by 4 to find  $x$ .

## What is the importance of converting numbers to fractions when solving equations like $4x + 1/3 = 20$ ?

Converting to fractions ensures accuracy in calculations involving fractional parts and makes it easier to perform algebraic operations precisely.

## Additional Resources

Understanding the Equation: What Is The Answer For  $4x + 1/3 = 20$ ?

When it comes to solving algebraic equations, clarity and methodical approach are essential. The question "What is the answer for  $4x + 1/3 = 20$ ?" is a classic example of a linear equation that students often encounter in middle school or high school mathematics. This detailed review will explore every aspect of this problem, from understanding the components of the equation to step-by-step solving techniques, common pitfalls, and real-world applications. Whether you're a beginner trying to grasp the basics or someone seeking a comprehensive refresher, this guide aims to provide valuable insights.

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## Breaking Down the Equation

Before diving into the solution, it's crucial to understand what each part of the equation represents:

Equation:  $4x + 1/3 = 20$

- $4x$ : This term indicates four times an unknown variable  $x$ . It's a linear term that depends on the value of  $x$ .
- $1/3$ : A constant fractional term added to  $4x$ .
- $= 20$ : The equation states that the sum of  $4x$  and  $1/3$  equals 20.

This is a linear equation because  $x$  is to the first power, and the highest degree of the variable is 1.

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## Fundamentals of Solving Linear Equations

To solve for  $x$  in the equation, the goal is to isolate the variable on one side of the equation. The process involves:

1. Eliminating constant terms from the side with the variable.
2. Isolating the variable by dividing or multiplying to get  $x$  by itself.

Key principles:

- Whatever operation you perform on one side of the equation, you must perform on the other side.
  - Maintain the balance of the equation throughout the process.
  - Simplify fractions or terms when possible to make calculations easier.
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## Step-by-Step Solution of $4x + 1/3 = 20$

Let's walk through the process carefully.

### Step 1: Eliminate the Fractional Constant

The term  $1/3$  is added to  $4x$ . To isolate  $4x$ , subtract  $1/3$  from both sides:

$$\left[ 4x + \frac{1}{3} - \frac{1}{3} = 20 - \frac{1}{3} \right]$$

This simplifies to:

$$\left[ 4x = 20 - \frac{1}{3} \right]$$

Note: Subtracting fractions requires a common denominator.

## Step 2: Subtract the Fractions

Express 20 as a fraction with denominator 3:

$$\left[ 20 = \frac{20 \times 3}{3} = \frac{60}{3} \right]$$

Now, subtract:

$$\left[ \frac{60}{3} - \frac{1}{3} = \frac{59}{3} \right]$$

Thus,

$$\left[ 4x = \frac{59}{3} \right]$$

## Step 3: Isolate x

Since 4 is multiplied by x, divide both sides by 4:

$$\left[ x = \frac{\frac{59}{3}}{4} \right]$$

Dividing a fraction by a whole number is the same as multiplying by its reciprocal:

$$\left[ x = \frac{59}{3} \times \frac{1}{4} \right]$$

Multiply numerators and denominators:

$$\left[ x = \frac{59 \times 1}{3 \times 4} = \frac{59}{12} \right]$$

Answer:

$$\left[ \boxed{x = \frac{59}{12}} \right]$$

Alternatively, as a mixed number:

$$\left[ \frac{59}{12} = 4 \frac{11}{12} \right]$$

This is the precise solution for x.

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# Understanding the Solution and Its Significance

Having obtained the solution, it's important to interpret its meaning and verify correctness.

Key points:

- The answer is a fractional value, indicating that  $x$  is not an integer but a rational number.
- The solution maintains the balance of the original equation, confirming its correctness.
- Recognizing that equations with fractions can often be simplified by clearing denominators, as shown above.

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## Alternative Approaches to Solve the Equation

While the step-by-step method described is standard, there are alternative techniques:

### Method 1: Clearing Denominators Early

- Multiply both sides of the entire equation by the least common denominator (LCD) to eliminate fractions upfront.

In this case:

- The denominator is 3.

Multiply both sides by 3:

$$\left[ 3 \times \left( 4x + \frac{1}{3} \right) = 3 \times 20 \right]$$

Simplify:

$$\left[ 3 \times 4x + 3 \times \frac{1}{3} = 60 \right]$$

$$\left[ 12x + 1 = 60 \right]$$

Now, solve for  $x$ :

$$\left[ 12x = 60 - 1 = 59 \right]$$

$$\left[ x = \frac{59}{12} \right]$$

This method simplifies calculations and reduces chances of errors with fractions.

## Method 2: Use of Decimals

Alternatively, convert fractions to decimals:

$$- \left( \frac{1}{3} \approx 0.3333 \right)$$

Rewrite the equation:

$$\left[ 4x + 0.3333 = 20 \right]$$

Subtract:

$$\left[ 4x = 19.6667 \right]$$

Divide:

$$\left[ x \approx \frac{19.6667}{4} \approx 4.9167 \right]$$

Expressed as a fraction, this is approximately  $\left( \frac{59}{12} \right)$ , matching the exact solution.

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## Common Pitfalls and Tips for Solving Similar Equations

When tackling equations like  $4x + \frac{1}{3} = 20$ , students often encounter issues. Here are some common pitfalls and how to avoid them:

- Ignoring the fraction: Always handle fractions carefully, whether by converting to decimals or clearing denominators.
- Mismanaging signs: Be vigilant with negative signs or subtraction steps.
- Forgetting to perform the same operation on both sides: This is fundamental to maintaining equality.
- Simplifying fractions incorrectly: Use proper fraction arithmetic or tools to avoid errors.
- Overcomplicating the problem: Use methods like clearing denominators early to simplify calculations.

Tips:

- Always identify the least common denominator (LCD) to clear fractions at the start.
- Double-check each step for accuracy.
- Use a calculator for decimal conversions, but verify with fraction calculations if exactness is required.
- Practice solving similar equations to build confidence.

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## Real-World Applications of Solving Linear Equations

Understanding how to solve equations like  $4x + \frac{1}{3} = 20$  has practical significance beyond academics:

- Financial calculations: Determining the value of investments, loans, or payments over time.
- Engineering: Calculating dimensions, forces, or velocities where relationships are linear.
- Science: Solving for unknown quantities in formulas involving proportional relationships.
- Data Analysis: Fitting linear models to data points.

In each case, the ability to manipulate and solve equations accurately is crucial for making informed decisions.

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## Practice Problems for Mastery

To solidify understanding, try solving these similar equations:

1.  $3x + \frac{2}{5} = 11$
2.  $5x - \frac{4}{7} = 23$
3.  $2x + \frac{1}{4} = 7$
4.  $6x + \frac{3}{2} = 15$

Solutions:

- For each, follow the same steps: eliminate fractions, isolate  $x$ , and simplify.

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# Summary and Final Thoughts

The question "What is the answer for  $4x + 1/3 = 20$ ?" serves as a fundamental example of solving linear equations involving fractions. The key takeaways include:

- Methodical approach: Clear steps ensure accuracy.
- Handling fractions: Use techniques like clearing denominators or converting to decimals.
- Verification: Always check your solution by substituting back into the original equation.
- Practical relevance: These skills are widely applicable in various fields.

By mastering these techniques, students can confidently approach more complex equations, develop problem-solving skills, and better understand the algebraic relationships that underpin many scientific and real-world phenomena.

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In conclusion, the solution to  $4x + 1/3 = 20$  is:

$$\boxed{x = \frac{59}{12} \quad \text{or approximately} \quad 4.9167}$$

This comprehensive exploration emphasizes the importance of understanding each component of the equation, employing suitable solving techniques, and recognizing the value of algebraic skills in everyday life.

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