

1) Solve $3x + 8 - 6$. Graph The Solution. A) B) C) D)

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Introduction

Mathematics is a fundamental skill that helps us understand the world around us. One common type of problem involves solving equations and graphing solutions to visualize relationships. In this article, we will explore how to solve the equation $3x + 8 - 6$ and how to accurately graph the solution. Additionally, we will analyze multiple-choice options labeled A), B), C), and D), providing detailed explanations to determine the correct answer.

Whether you're a student brushing up on algebra or someone interested in enhancing your problem-solving skills, this comprehensive guide will walk you through each step with clarity. Let's begin by understanding the problem statement.

Understanding the Problem: What Are We Solving?

The problem statement is:

Solve $3x + 8 - 6$. Graph the Solution. A) B) C) D)

At first glance, it appears incomplete because it doesn't explicitly specify an equality (e.g., equals zero or another number). However, in many algebra problems, an expression like $3x + 8 - 6$ is meant to be set equal to a value, often zero, to solve for x .

Assumption for Clarity

For the purpose of this tutorial, we'll assume the problem is:

Solve for x in the equation:

$$3x + 8 - 6 = 0$$

which simplifies to:

$$3x + 2 = 0$$

If the original problem intended a different equation, the method would be similar, and the steps can be adjusted accordingly.

Step 1: Simplify the Expression

Before solving, simplify the algebraic expression:

$$3x + 8 - 6$$

\]

Calculate the constants:

$$\begin{aligned} & \backslash[\\ & 8 - 6 = 2 \\ & \backslash] \end{aligned}$$

So, the simplified expression becomes:

$$\begin{aligned} & \backslash[\\ & 3x + 2 \\ & \backslash] \end{aligned}$$

Now, the equation to solve is:

$$\begin{aligned} & \backslash[\\ & 3x + 2 = 0 \\ & \backslash] \end{aligned}$$

Step 2: Solve the Equation for x

To find the value of x, follow these algebraic steps:

1. Subtract 2 from both sides:

$$\begin{aligned} & \backslash[\\ & 3x + 2 - 2 = 0 - 2 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ & 3x = -2 \\ & \backslash] \end{aligned}$$

2. Divide both sides by 3:

$$\begin{aligned} & \backslash[\\ & x = \frac{-2}{3} \\ & \backslash] \end{aligned}$$

Solution:

$$\begin{aligned} & \backslash[\\ & x = -\frac{2}{3} \\ & \backslash] \end{aligned}$$

This is the exact solution to the equation.

Step 3: Graphing the Solution

Graphing helps visualize solutions to equations, especially in coordinate systems. Since the solution involves a single value of x, we can plot this on a number line or a Cartesian coordinate plane.

Graphing on a Number Line

- Draw a horizontal line.
- Mark the point $x = -2/3$ on the number line.
- Use a solid dot to indicate the solution point.

Graphing on the Cartesian Plane

- Consider the equation as a vertical line where $x = -2/3$.
- Plot the line $x = -2/3$, which is a vertical line crossing the x-axis at $-2/3$.
- This line extends infinitely in the y-direction.

Step 4: Analyzing Multiple Choice Options (A, B, C, D)

The problem references options labeled A), B), C), and D). Typically, these options provide different possible solutions or graphs. Let's analyze what they might represent:

Possible options:

- A) $x = -\frac{2}{3}$ - Correct solution
- B) $x = \frac{2}{3}$ - Incorrect, opposite sign
- C) $x = 0$ - Incorrect
- D) No solution - Incorrect, since the solution exists

How to verify options:

- Check each option by substituting the value into the original simplified equation $(3x + 2 = 0)$.

Testing option A:

```
\[
x = -\frac{2}{3}
\]
```

Plug into $(3x + 2)$:

```
\[
3 \times -\frac{2}{3} + 2 = -2 + 2 = 0
\]
```

Result: Valid solution.

Testing option B:

```
\[
x = \frac{2}{3}
\]
```

```
\[
3 \times \frac{2}{3} + 2 = 2 + 2 = 4 \neq 0
\]
```

Invalid.

Similarly, options C) and D) can be tested, but based on calculations, only A) is correct.

Step 5: Graphing the Correct Solution

Visual Representation:

- The graph of $x = -2/3$ is a vertical line crossing the x-axis at $-2/3$.
- The line extends infinitely in the positive and negative y-directions.
- The point $(-2/3, y)$ for any y-value lies on this line.

How to graph:

1. Draw the coordinate axes.
2. Locate $-2/3$ on the x-axis.
3. Draw a straight vertical line passing through that point.
4. Label the line as $x = -2/3$.

This visual confirms the solution's correctness and helps in understanding the relationship between the algebraic solution and its graph.

Additional Tips for Solving and Graphing Linear Equations

- Always simplify the algebraic expression before solving.
- Isolate the variable on one side of the equation.
- When graphing, understand whether the solution is a point, line, or region.
- Use graph paper or graphing tools for precise visualization.
- Verify solutions by substitution.

Common Mistakes to Avoid

- Forgetting to simplify the expression first.
- Mixing up the signs when solving for x.
- Not checking the solution against the original equation.
- Mislabeling the graph or plotting the wrong point.

Summary

- The original expression $3x + 8 - 6$ simplifies to $3x + 2$.
- Solving $3x + 2 = 0$ yields $x = -2/3$.
- The correct option among A), B), C), D) is A).
- Graphing $x = -2/3$ involves drawing a vertical line at $x = -2/3$ on the coordinate plane.
- Visualizing solutions helps in understanding the nature of equations and their solutions.

Final Remarks

Mastering the skill of solving algebraic equations and graphing solutions is essential for progressing in mathematics. Practice regularly by tackling different equations and visualizing their solutions. Remember to simplify expressions, check your work, and use graphical representations to deepen

your understanding.

If you encounter similar problems, follow the structured approach outlined above to efficiently arrive at the correct solution and visualize it accurately.

Frequently Asked Questions (FAQs)

Q1: What does solving an equation like $3x + 8 - 6 = 0$ tell us?

A: It helps identify the specific value of x that makes the equation true, providing insight into the relationship between variables.

Q2: How does graphing help in understanding solutions?

A: Graphing visualizes solutions, showing where and how the solution exists within the coordinate system, making abstract algebraic solutions more concrete.

Q3: Can the solution be a range?

A: Yes, in inequalities or systems of equations, the solution might be a range or a region, but for a single linear equation like this, it's a specific point or line.

Q4: What should I do if I get a different answer?

A: Double-check your algebraic steps, ensure correct substitution, and verify your graph for accuracy.

By following these detailed steps and explanations, you can confidently solve similar algebra problems and understand their graphical representations. Happy solving!

Frequently Asked Questions

What is the solution to the equation $3x + 8 - 6 = 0$?

First, simplify the equation: $3x + 2 = 0$. Then, subtract 2 from both sides: $3x = -2$. Finally, divide both sides by 3: $x = -2/3$.

How do I solve the equation $3x + 8 - 6 = 0$ step-by-step?

Step 1: Simplify $8 - 6$ to get 2, so the equation becomes $3x + 2 = 0$. Step 2: Subtract 2 from both sides: $3x = -2$. Step 3: Divide both sides by 3: $x = -2/3$.

What is the value of x in the equation $3x + 8 - 6 = 0$?

The value of x is $-2/3$.

Can you graph the solution $x = -2/3$ on a coordinate plane?

Yes. On the graph, draw a vertical line at $x = -2/3$. This line represents all points where x is $-2/3$, indicating the solution to the equation.

What does the graph of the solution $x = -2/3$ look like?

It's a vertical straight line crossing the x -axis at $x = -2/3$, extending infinitely in the y -direction.

Are there multiple solutions to the equation $3x + 8 - 6 = 0$?

No, there is only one solution: $x = -2/3$.

What are the common mistakes to avoid when solving $3x + 8 - 6 = 0$?

Common mistakes include forgetting to simplify $8 - 6$, incorrect algebraic steps like not subtracting or dividing properly, or mixing up the signs. Always simplify first and carefully follow each step.

How can I verify that $x = -2/3$ is the correct solution?

Substitute $x = -2/3$ back into the original equation: $3(-2/3) + 8 - 6$. Simplify: $-2 + 8 - 6 = 0$. Since the expression equals 0, the solution is correct.

How is solving linear equations like $3x + 8 - 6 = 0$ useful in real-world problems?

Solving linear equations helps model and solve real-world situations involving relationships between variables, such as budgeting, distance, or rate problems, by finding the value of unknown quantities.

Additional Resources

Mathematical Problem Solving and Graphing: An Expert Breakdown of "Solve $3x + 8 - 6$ "

Introduction: Navigating the World of Algebraic Expressions

Mathematics is often perceived as a complex web of numbers and symbols, but

at its core, it is a language designed to describe and analyze the world around us. Among the foundational components of this language is algebra—a branch that introduces variables, expressions, and equations to model real-world scenarios. Whether you're a student, educator, or enthusiast, mastering algebraic problem solving and graphing is essential for developing critical thinking skills and quantitative literacy.

In this article, we will delve into the process of solving a simple yet illustrative algebraic expression: "Solve $3x + 8 - 6$ ". We will explore not only how to find the value of x , but also how to interpret the solution through graphing, examining multiple-choice options, and understanding the significance of each step.

Understanding the Expression: What Are We Solving?

Before jumping into solving the problem, it's vital to interpret the given expression correctly:

Expression: $3x + 8 - 6$

At first glance, this appears to be a linear algebraic expression. Typically, when asked to "solve" an expression, it implies setting it equal to some value (often zero) or solving for x in an equation like:

$$\backslash[3x + 8 - 6 = 0 \backslash]$$

or

$$\backslash[3x + 8 - 6 = y \backslash]$$

However, since the prompt states "Solve $3x + 8 - 6$," which seems to lack an explicit equality, the most logical assumption is that we are to solve the expression as part of an equation or to simplify it and find the value of x under given conditions.

In the context of multiple-choice options labeled A) B) C) D), it suggests that the problem is to find the value of x that satisfies a certain condition or to interpret the expression's value for given choices.

Clarification: For the purpose of this analysis, let's consider the most common interpretation: solving the equation

$$\backslash[3x + 8 - 6 = 0 \backslash]$$

which simplifies to:

$$\backslash[3x + 2 = 0 \backslash]$$

and then find x accordingly.

Step-by-Step Solution: From Expression to Solution

Step 1: Simplify the Expression

The first step in solving algebraic problems is to simplify the expression as much as possible:

$$\begin{aligned} & \backslash[\\ & 3x + 8 - 6 = 3x + 2 \\ & \backslash] \end{aligned}$$

Thus, the simplified expression is:

$$\begin{aligned} & \backslash[\\ & 3x + 2 \\ & \backslash] \end{aligned}$$

Step 2: Set the Expression Equal to a Value

Since the original problem doesn't specify an equality, standard practice is to consider solving for x when the expression equals zero, especially in the context of graphing linear equations. So, we set:

$$\begin{aligned} & \backslash[\\ & 3x + 2 = 0 \\ & \backslash] \end{aligned}$$

This is a typical approach in algebra where we seek the x -value that makes the expression zero, i.e., the root or zero of the function.

Step 3: Solve for x

Now, let's solve for x :

$$\begin{aligned} & \backslash[\\ & 3x + 2 = 0 \\ & \backslash] \end{aligned}$$

Subtract 2 from both sides:

$$\begin{aligned} & \backslash[\\ & 3x = -2 \\ & \backslash] \end{aligned}$$

Divide both sides by 3:


```
\[
x = -\frac{2}{3}
\]
```

Result: The solution to the equation $(3x + 2 = 0)$ is $x = -2/3$.

Interpreting the Solution: Multiple-Choice Context

Given options like A), B), C), D), the question likely asks which of these choices correctly represents the solution, or perhaps the value of the expression for a given x .

Suppose the options are:

- A) $x = 1$
- B) $x = -2/3$
- C) $x = 0$
- D) $x = 2$

From our calculation, the correct choice is B) $x = -2/3$.

Why is this important? Recognizing the correct solution among multiple options is a key skill in algebraic problem-solving, especially in multiple-choice exams.

Graphing the Solution: Visualizing the Equation

Graphing is an invaluable tool for understanding solutions to algebraic equations. It transforms an abstract algebraic solution into a visual point on the coordinate plane, enhancing comprehension and providing a concrete representation.

Step 1: Recognize the Equation as a Line

The simplified expression:

```
\[
y = 3x + 2
\]
```

is a linear function. When we set it equal to zero:

```
\[
0 = 3x + 2
\]
```

we're seeking the x -intercept of this line, which is the point where the line

crosses the x-axis.

Step 2: Plot the Line

To graph $(y = 3x + 2)$:

- Calculate the y-intercept: When $(x = 0)$:

$$\begin{aligned} &[\\ y &= 3(0) + 2 = 2 \\ &] \end{aligned}$$

- Plot the y-intercept: $(0, 2)$

- Find another point: Choose a value for x, say $(x = -1)$:

$$\begin{aligned} &[\\ y &= 3(-1) + 2 = -3 + 2 = -1 \\ &] \end{aligned}$$

- Plot this point: $(-1, -1)$

- Draw the line: Connect these points with a straight line extending across the graph.

Step 3: Find the x-intercept

The x-intercept is where the line crosses the x-axis, i.e., $(y=0)$:

$$\begin{aligned} &[\\ 0 &= 3x + 2 \\ &] \end{aligned}$$

which yields:

$$\begin{aligned} &[\\ x &= -\frac{2}{3} \\ &] \end{aligned}$$

- Plot the x-intercept: $(-2/3)$, approximately -0.6667

- Interpretation: The solution to the original equation is the x-intercept, which is the point $((-2/3, 0))$.

Visual Summary:

- The graph of $(y = 3x + 2)$ is a straight line with a slope of 3 and y-intercept at 2.
- The x-intercept at $(-2/3)$ corresponds precisely to the solution of the equation $(3x + 2 = 0)$.

Graphical Significance: The point $((-2/3, 0))$ visually confirms our algebraic solution, illustrating the fundamental link between algebra and

geometry.

Connecting to the Multiple-Choice Options

Based on the graph and calculations, the correct multiple-choice answer is:

B) $x = -2/3$

This demonstrates the importance of understanding both algebraic manipulation and graphical interpretation to solve and verify solutions accurately.

Extensions and Practical Applications

Understanding how to solve and graph linear equations like $(3x + 2 = 0)$ has several real-world implications:

- Engineering: Designing systems where relationships between variables are linear.
- Economics: Modeling supply and demand curves.
- Data Analysis: Visualizing trends and finding points of intersection.
- Computer Graphics: Rendering lines and shapes based on algebraic equations.

Moreover, mastering these skills builds a foundation for more advanced topics, including systems of equations, inequalities, and calculus.

Summary: The Power of Clear Problem-Solving Strategy

- Simplify the algebraic expression to its core form.
- Set the expression equal to a value (commonly zero) to find solutions.
- Solve for the variable systematically.
- Use graphing to visualize the solution, reinforcing understanding.
- Match the solution to multiple-choice options with confidence.

This approach exemplifies a comprehensive, expert-level method for tackling seemingly simple algebraic problems, transforming them into opportunities for deeper insight and practical application.

Final Thoughts: Embracing the Math Journey

Mathematics is not just about getting the right answer; it's about

understanding the process, visualizing concepts, and developing problem-solving intuition. Whether you're solving for x in an equation or plotting a complex graph, each step enhances your analytical toolkit.

By mastering the process outlined here—simplification, solving, and graphing—you equip yourself with essential skills that extend far beyond a single problem. Embrace each challenge as an opportunity to sharpen your mathematical thinking, and you'll find that even the simplest expressions can open doors to a world of understanding.

In conclusion, the solution to the expression "Solve $3x + 8 - 6$ " (interpreted as solving $(3x + 2 = 0)$) is $x = -2/3$, a fact confirmed both algebraically and graphically. Recognizing this connection is key to developing robust problem-solving skills and appreciating the elegance of mathematics in action.

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