Solve The Equations. Simplify Your Answers Completely.A) -1/3p=7b) 48 = 4/5x

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Understanding how to solve equations is a fundamental skill in mathematics that empowers students and professionals alike to find unknown values efficiently. Whether you're tackling algebraic problems in school or applying these skills in real-world scenarios, mastering the process of solving equations and simplifying answers completely is essential. In this article, we'll explore step-by-step methods to solve the following equations:

- Equation A: $-\frac{1}{3} p = 7b$
- Equation B: $48 = \frac{4}{5} x$

By learning how to manipulate these equations, you'll be able to confidently find the values of variables and present simplified solutions that are easy to interpret.

Understanding the Basics of Solving Equations

Before diving into specific examples, it’s important to grasp some foundational concepts:

What Is an Equation?

An equation is a mathematical statement that asserts the equality of two expressions, often containing variables. The goal is to find the value(s) of the variable(s) that make the equation true.

Key Principles in Solving Equations

- Inverse Operations: To isolate the variable, use opposite operations (addition vs. subtraction, multiplication vs. division).
- Maintaining Balance: Whatever operation you perform on one side of the equation, perform on the other to keep the balance.
- Simplification: Combine like terms and reduce fractions to their simplest form before concluding.

Step-by-Step Solution for Equation A: $-\frac{1}{3} p = 7b$

This equation involves two variables, p and b, which suggests that solving for one variable in terms of the other is the goal.

Rearranging the Equation

Given:
$$
-\frac{1}{3} p = 7b
$$

To solve for p:
1. Multiply both sides of the equation by -3 (the reciprocal of $-\frac{1}{3}$) to eliminate the fraction:
$$
p = -3 \times 7b
$$
2. Simplify:
$$
p = -21b
$$

Result:
$$
\boxed{
p = -21b
}
$$

Interpretation:
The solution expresses p in terms of b. If you know the value of b, you can find p by multiplying by -21.

Special Notes:

- The solution is completely simplified because it is expressed in terms of the variable b, with no fractions remaining.
- If a numerical value for b is given, substitute to find p.

Step-by-Step Solution for Equation B: $48 = \frac{4}{5} x$

This is a straightforward linear equation where the goal is to solve for x.

Isolating x

Given:
$$
48 = \frac{4}{5} x
$$

1. To eliminate the fraction, multiply both sides by the reciprocal of $\frac{4}{5}$, which is $\frac{5}{4}$:
$$
48 \times \frac{5}{4} = x
$$

2. Simplify the multiplication:
$$
x = 48 \times \frac{5}{4}
$$
$$
x = \left(48 \div 4\right) \times 5
$$
$$
x = 12 \times 5
$$

3. Final calculation:
$$
x = 60
$$

Result:
$$
\boxed{
x = 60
}
$$

Interpretation:
The solution is a complete and simplified value for x, with no fractions remaining.

Additional Tips for Solving Equations

To master solving equations and simplifying answers completely, keep these tips in mind:

1. Always Perform Inverse Operations

- Addition ↔ Subtraction
- Multiplication ↔ Division

2. Clear Fractions First

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

3. Simplify Before Solving

- Combine like terms and reduce fractions to their simplest form to make calculations easier.

4. Check Your Solutions

- Substitute the solutions back into the original equations to verify correctness.

5. Practice with Different Types of Equations

- Linear equations, equations with fractions, variables on both sides, and more complex algebraic expressions.

Practice Problems to Reinforce Learning

Try solving these equations to become more confident:

1. Solve for p: $-\frac{1}{3} p = 14$
2. Solve for b: $3b + 5 = 20$
3. Solve for x: $\frac{2}{3} x = 9$
4. Solve for p: $4p - 7 = 13$
5. Solve for x: $\frac{5}{8} x = 15$

Conclusion: Simplify Your Answers Completely

Mastering the art of solving equations involves understanding how to manipulate algebraic expressions to isolate variables, and then simplifying the results to their most straightforward form. The equations $-\frac{1}{3} p = 7b$ and $48 = \frac{4}{5} x$ serve as excellent examples of how to systematically approach such problems.

Remember to always perform inverse operations, clear fractions early, and double-check your solutions. With consistent practice, you'll be able to solve even complex equations confidently and present your answers in the simplest, most understandable form. Whether you're a student preparing for exams or a professional handling data analysis, these skills are invaluable tools in your mathematical toolkit.

Frequently Asked Questions

How do you solve the equation -1/3 p = 7 for p?

Multiply both sides by -3 to isolate p: p = 7 (-3) = -21.

What is the solution to the equation 48 = (4/5) x?

Multiply both sides by 5/4 to solve for x: x = 48 (5/4) = 48 1.25 = 60.

How do you simplify the solution for p in -1/3 p = 7?

Simplify p = -21; since it is already in its simplest form.

What is the step-by-step process to solve 48 = (4/5) x?

Multiply both sides by 5/4: x = 48 (5/4) = 60; then simplify if needed.

Are the solutions to these equations in simplest form?

Yes, p = -21 and x = 60 are both simplified answers.

Additional Resources

Solve The Equations. Simplify Your Answers Completely.

Mathematics is an essential part of education and everyday problem-solving, and mastering how to solve equations is fundamental for students and professionals alike. The ability to manipulate algebraic expressions, isolate variables, and simplify answers is a skill that underpins more advanced topics in mathematics, science, engineering, and economics. In this article, we will explore the process of solving specific equations—namely, $-\frac{1}{3}p = 7$ and $48 = \frac{4}{5}x$—and demonstrate

how to simplify answers completely. These examples serve as a practical guide to understanding the core principles of algebraic manipulation and solution verification.

Understanding the Importance of Solving Equations

Before diving into specific problems, it’s worth emphasizing why solving equations efficiently and accurately matters. Equations are at the heart of mathematical reasoning, representing relationships between variables and constants. Whether calculating financial interests, predicting scientific phenomena, or programming algorithms, solving equations allows us to find unknown quantities and make informed decisions.

Features of solving equations:
- Enables the determination of unknown values.
- Facilitates the modeling of real-world scenarios.
- Builds foundational skills for higher mathematics.

Pros:
- Enhances problem-solving skills.
- Develops logical thinking.
- Applicable across various disciplines.

Cons:
- Can become complex with advanced equations.
- Requires careful attention to detail to avoid errors.

Solving Simple Linear Equations

Linear equations are the most basic type, involving variables raised to the first power. They typically take the form $ax + b = c$, where a, b, and c are constants, and x is the variable.

The goal is to isolate the variable on one side of the equation, which often involves inverse operations such as addition, subtraction, multiplication, and division.

Equation 1: $-\frac{1}{3}p = 7$

Let's analyze how to solve this equation step by step.

Step 1: Understand the structure

The equation involves a fractional coefficient multiplying p:

$$
-\frac{1}{3}p = 7
$$

Our goal is to solve for p.

Step 2: Isolate p

Since p is multiplied by $-\frac{1}{3}$, to isolate p, we need to perform the inverse operation: multiply both sides of the equation by the reciprocal of $-\frac{1}{3}$.

The reciprocal of $-\frac{1}{3}$ is -3.

Step 3: Multiply both sides by -3:

$$
-\frac{1}{3}p \times (-3) = 7 \times (-3)
$$

Simplify each side:

$$
p = -21
$$

Step 4: Verify the solution

Substitute $p = -21$ back into the original equation:

$$
-\frac{1}{3} \times (-21) = 7
$$

Calculate:

$$
\frac{1}{3} \times 21 = 7
$$

which confirms the solution is correct.

Final answer:

$$
\boxed{p = -21}
$$

Features and Tips for Solving Equations Like $-\frac{1}{3}p=7$

- Always identify the coefficient of the variable.
- Use reciprocal multiplication to isolate the variable.
- Double-check your work by substituting the solution back into the original equation.

Equation 2: $48 = \frac{4}{5}x$

This equation involves a fractional coefficient multiplying x. The process to solve it is similar but involves different steps due to the constants involved.

Step 1: Recognize the structure

$$
48 = \frac{4}{5}x
$$

Our goal is to solve for x.

Step 2: Isolate x

Since x is multiplied by $\frac{4}{5}$, we can isolate x by multiplying both sides of the equation by the reciprocal of $\frac{4}{5}$.

The reciprocal of $\frac{4}{5}$ is $\frac{5}{4}$.

Step 3: Multiply both sides by $\frac{5}{4}$:

$$
48 \times \frac{5}{4} = \frac{4}{5}x \times \frac{5}{4}
$$

Simplify the right side:

$$
x = 48 \times \frac{5}{4}
$$

Calculations:

$$
\[

$$
x = 48 \times \frac{5}{4}
$$

Since $48 \div 4 = 12$, then:

$$
x = 12 \times 5 = 60
$$

Step 4: Verify the solution

Substitute $x=60$ into the original equation:

$$
48 = \frac{4}{5} \times 60
$$

Calculate:

$$
\frac{4}{5} \times 60 = 4 \times \frac{60}{5} = 4 \times 12 = 48
$$

which confirms the solution is correct.

Final answer:

$$
\boxed{x=60}
$$

Features and Tips for Solving Fractions in Equations

- Always identify the fractional coefficient.
- Multiply both sides by the reciprocal to clear the fraction.
- Simplify before multiplying to save time.
- Confirm solutions by substitution.

Additional Tips for Simplifying Answers Completely

Achieving fully simplified answers involves expressing solutions in their simplest form,

which may include:

- Reducing fractions to lowest terms.
- Combining like terms if necessary.
- Checking for extraneous solutions, especially in more complex equations.
- Ensuring variables are isolated with positive coefficients where possible.

For the equations discussed:

- The solution $p = -21$ is already in simplest form.
- The solution $x = 60$ is a whole number, thus fully simplified.

Conclusion

The process of solving equations such as $-\frac{1}{3}p=7$ and $48=\frac{4}{5}x$ underscores the importance of understanding inverse operations, fractional manipulation, and verification. These examples highlight key skills: recognizing coefficients, multiplying by reciprocals to isolate variables, and simplifying answers completely. Mastering these techniques not only boosts mathematical confidence but also lays a strong foundation for tackling more complex algebraic problems. Whether you're a student preparing for exams or a professional applying these skills in real-world contexts, a thorough grasp of solving equations is an invaluable asset. Practice regularly, check your work, and always aim for the simplest, most accurate solutions.

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