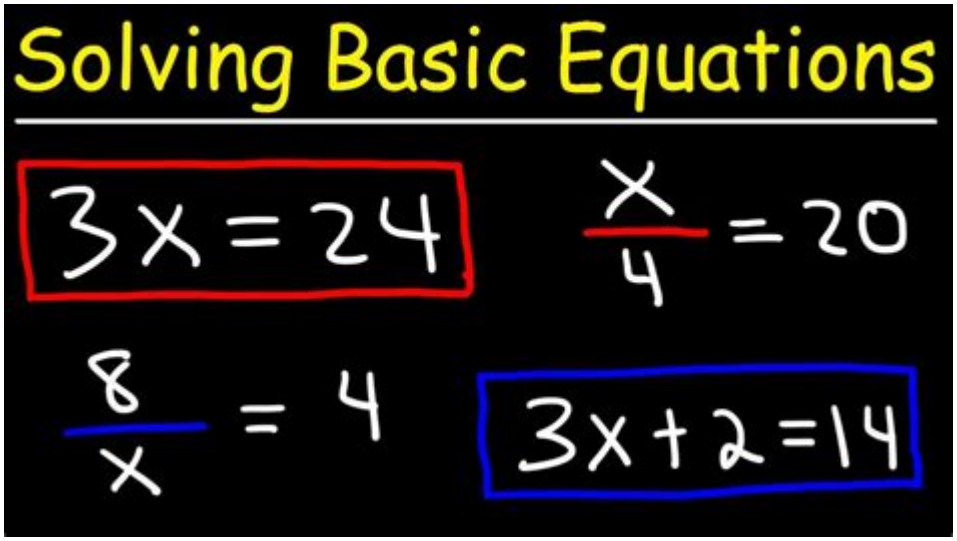
Basic Algebra Problems And Answers



Basic algebra problems and answers serve as the foundation for understanding more complex mathematical concepts. Algebra is an essential branch of mathematics that involves symbols and the rules for manipulating those symbols. This article will explore various basic algebra problems, their solutions, and the underlying concepts that can help learners grasp this essential subject.

Understanding Algebra

Algebra is often referred to as the language of mathematics. It provides a way to represent relationships through equations and inequalities. By using variables, we can express general rules and patterns.

Key Concepts in Algebra

Before diving into specific problems, it's important to understand some fundamental concepts:

1. Variables: Symbols, often letters like x or y, that represent unknown numbers.
2. Constants: Fixed values that do not change, such as numbers like 2, 3, or -5.
3. Expressions: Combinations of variables and constants, such as $2x + 3$.
4. Equations: Statements that two expressions are equal, such as $2x + 3 = 7$.
5. Inequalities: Statements that express a relationship of greater than or less than, such as $x + 3 > 5$.

Solving Basic Algebra Problems

To help solidify understanding, let's look at some basic algebra problems, their solutions, and explanations.

Problem 1: Solving Simple Equations

Problem: Solve for x in the equation:

$$ 2x + 4 = 12 $$

Solution:

1. Subtract 4 from both sides:
$$ 2x + 4 - 4 = 12 - 4 $$
$$ 2x = 8 $$

2. Divide both sides by 2:
$$ x = \frac{8}{2} $$
$$ x = 4 $$

Answer: x = 4

Problem 2: Solving Equations with Variables on Both Sides

Problem: Solve for y in the equation:

$$ 3y + 5 = 2y + 10 $$

Solution:

1. Subtract 2y from both sides:
$$ 3y - 2y + 5 = 10 $$
$$ y + 5 = 10 $$

2. Subtract 5 from both sides:
$$ y = 10 - 5 $$
$$ y = 5 $$

Answer: y = 5

Problem 3: Solving Inequalities

Problem: Solve the inequality:

$$ 4x - 7 < 5 $$

Solution:

1. Add 7 to both sides:
$$ 4x < 5 + 7 $$
$$ 4x < 12 $$

2. Divide both sides by 4:
$$ x < \frac{12}{4} $$
$$ x < 3 $$

Answer: $x < 3$

Working with Algebraic Expressions

Algebraic expressions can be simplified and factored. Understanding how to manipulate these expressions is crucial.

Problem 4: Simplifying Expressions

Problem: Simplify the expression:

$$ 3(2x + 4) - 5x $$

Solution:

1. Distribute 3:
$$ 6x + 12 - 5x $$

2. Combine like terms:
$$ (6x - 5x) + 12 $$
$$ x + 12 $$

Answer: $x + 12$

Problem 5: Factoring Expressions

Problem: Factor the expression:

$$ x^2 + 5x + 6 $$

Solution:

1. Look for two numbers that multiply to 6 and add to 5. These numbers are 2 and 3.
2. Rewrite the expression:
$$ (x + 2)(x + 3) $$

Answer: (x + 2)(x + 3)

Working with Functions

Functions are an important aspect of algebra. They describe relationships between variables.

Problem 6: Evaluating Functions

Problem: If $f(x) = 2x + 3$, find f(4).

Solution:

1. Substitute 4 for x:
$$ f(4) = 2(4) + 3 $$
$$ f(4) = 8 + 3 $$
$$ f(4) = 11 $$

Answer: f(4) = 11

Problem 7: Finding the Slope of a Linear Function

Problem: Determine the slope of the line given by the function $y = 3x + 2$.

Solution:

The slope-intercept form of a line is given by $y = mx + b$, where m is the slope and b is the y-intercept. Here:

- Slope (m) = 3
- Y-intercept (b) = 2

Answer: The slope is 3.

Solving Systems of Equations

Systems of equations involve solving for multiple variables simultaneously.

Problem 8: Solving by Substitution

Problem: Solve the system of equations:

1. $x + y = 10$
2. $2x - y = 3$

Solution:

1. From the first equation, express y in terms of x:
$$y = 10 - x$$

2. Substitute into the second equation:
$$2x - (10 - x) = 3$$
$$2x - 10 + x = 3$$
$$3x - 10 = 3$$
$$3x = 13$$
$$x = \frac{13}{3}$$

3. Substitute x back into the first equation to find y:
$$y = 10 - \frac{13}{3} = \frac{30 - 13}{3} = \frac{17}{3}$$

Answer: $x = \frac{13}{3}, y = \frac{17}{3}$

Problem 9: Solving by Elimination

Problem: Solve the system of equations:

1. $3x + 2y = 16$
2. $5x + 4y = 32$

Solution:

1. Multiply the first equation by 2 to align coefficients of y:
$$6x + 4y = 32$$

2. Now, subtract the second equation:
$$(6x + 4y) - (5x + 4y) = 32 - 32$$
$$x = 0$$

3. Substitute $x = 0$ back into the first equation:
$$3(0) + 2y = 16$$

$$ 2y = 16 $$
$$ y = 8 $$

Answer: $x = 0, y = 8$

Conclusion

Mastering **basic algebra problems and answers** is essential for building a solid foundation in mathematics. Through practice and understanding of concepts like variables, expressions, equations, and functions, learners can develop the skills necessary to tackle more complicated mathematical challenges.

To continue improving your algebra skills, consider engaging with various practice problems, using educational resources, and seeking help when needed. The key to success in algebra lies in consistent practice and a willingness to learn from mistakes.

Frequently Asked Questions

What is the solution to the equation 2x + 3 = 11?

x = 4

How do you solve the equation x/4 - 2 = 1?

x = 12

What is the value of x in the equation 5x - 7 = 3?

x = 2

If 3(x - 2) = 12, what is the value of x?

x = 6

Solve for y in the equation 4y + 8 = 24.

y = 4

What is the solution to the equation 7 - 2x = 1?

x = 3

How do you solve the equation 9x + 1 = 28?

x = 3

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