

ALGEBRA I

Study Materials: Key Concepts, Practice Questions, Answers

Mathema
Contest

Algebra I -Study guide and Practice Questions



Name: _____

Key Concepts

1. Expressions and Equations

- **Expressions:** Mathematical phrases that can contain numbers, variables, and operations (e.g., $3x + 4$).
- **Equations:** Mathematical statements that assert the equality of two expressions (e.g., $3x + 4 = 10$).

2. Solving Linear Equations

- To solve linear equations, isolate the variable on one side using inverse operations (addition, subtraction, multiplication, division).
 - Example: Solve $2x + 3 = 7$
 - Subtract 3 from both sides: $2x = 4$
 - Divide by 2: $x = 2$

3. Graphing Linear Equations

- The equation of a line in slope-intercept form: $y = mx + b$
 - m is the slope (rise over run)
 - b is the y-intercept (where the line crosses the y-axis)
- Plot the y-intercept, then use the slope to find another point on the line.

4. Systems of Equations

- Consists of two or more equations with the same variables.
- Methods to solve:
 - **Graphing:** Plot both equations and find the intersection point.
 - **Substitution:** Solve one equation for one variable and substitute it into the other equation.
 - **Elimination:** Add or subtract equations to eliminate one variable.

5. Factoring Quadratic Expressions

Algebra I -Study guide and Practice Questions



- A quadratic expression is in the form $ax^2 + bx + c$
- Factoring involves writing it as a product of two binomials.
 - Example: Factor $x^2 + 5x + 6$
 - Find two numbers that multiply to 6 and add to 5: (2 and 3)
 - Write as $(x + 2)(x + 3)$

Practice Questions

1. **Solving Linear Equations:**
 - Solve for x : $4x - 7 = 9$
2. **Graphing Linear Equations:**
 - Graph the equation $y = -2x + 3$
3. **Systems of Equations:**
 - Solve the system of equations:
$$\begin{cases} x + y = 6 \\ 2x - y = 3 \end{cases}$$
4. **Factoring Quadratics:**
 - Factor the quadratic expression: $x^2 - 9x + 20$.
5. **Solving Quadratic Equations by Factoring:**
 - Solve for x : $x^2 - 5x = 14$

Answers

1. $x = 4$
2. Plot the point (0, 3) and use the slope to find another point (1, 1). Draw the line through these points.
3. $(x, y) = (3, 3)$
4. $(x - 4)(x - 5)$

Algebra I -Study guide and Practice Questions



5. $x = 7$ or $x = -2$