

Algebra Study Guide

This study guide covers fundamental algebra concepts, formulas, and practice problems.

Basic Formulas

- Linear Equation: $y = mx + b$
- Slope Formula: $m = (y_1 - y_2) / (x_1 - x_2)$
- Quadratic Formula: $x = \frac{(-b \pm \sqrt{(b^2 - 4ac)})}{2a}$
- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- Midpoint Formula: $M = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

Worked Examples

Example 1: Solve for x in $2x + 5 = 13$

Solution: $2x = 13 - 5 = 8$, therefore $x = 4$

Example 2: Factor $x^2 + 5x + 6$

Solution: $(x + 2)(x + 3) = x^2 + 5x + 6$

Practice Problems

1. Solve: $3x - 7 = 14$
2. Simplify: $2x + 3x - 5x$
3. Solve: $x^2 - 9 = 0$
4. Find the slope: $(2, 3)$ and $(5, 9)$
5. Solve the system: $x + y = 5$, $2x - y = 1$

Answer Key: 1) $x = 7$, 2) 0 , 3) $x = 3$ or -3 , 4) $m = 2$, 5) $x = 2, y = 3$