

Algebra Formula Sheet

”Story Problem Formulas”

Formula	Use
$A = lw$	Area of Rectangle
$A = \frac{1}{2}bh$	Area of a triangle
$A = \pi r^2$	Area of a Circle
$A = \frac{1}{2}(b_1 + b_2)h$	Area of a Trapezoid
$I = PRT$	Simple Interest
$d = rt$	Distance traveled
$V = lwh$	Volume of rectangular solid
$F = (\frac{9}{5})C + 32$	Temperature conversion

Slope Equation: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Point-Slope Form of a Linear Equation:

$$y - y_1 = m(x - x_1)$$

Slope Intercept Form of a Linear Equation:

$$y = mx + b$$

Standard Form of Linear Equation:

$$Ax + By = C, A > 0 \text{ and no fractions}$$

Horizontal Line: $y = c$

Vertical Line: $x = c$

Exponent Rules:

Product Rule: $a^m \cdot a^n = a^{m+n}$

Quotient Rule: $\frac{a^m}{a^n} = a^{m-n}$

Power Rule: $(a^m)^n = a^{mn}$

Power of a Product: $(ab)^n = a^n b^n$

Power of a Quotient: $(\frac{a}{c})^n = \frac{a^n}{c^n}$

Zero Exponent: $a^0 = 1$

Negative Exponent: $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-n}} = a^n$

Dividing a Polynomial by a Monomial:

$$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$$

Perfect Square Trinomials:

$$a^2 + 2ab + b^2 = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)^2$$

Difference of Squares: $a^2 - b^2 = (a + b)(a - b)$

Difference of Cubes:

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Sum of Cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Zero Factor Property: $ab = 0 \Rightarrow a = 0 \text{ or } b = 0$

Pythagorean Theorem: $a^2 + b^2 = c^2$

Direct Variation: $y = kx$

Inverse Variation: $y = \frac{k}{x}$

Joint Variation: $y = kxz$

Radical Rules:

Definition: $a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$

Product Rule: $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$

Quotient Rule: $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

Square Root Property: $a^2 = b \Rightarrow a = \pm\sqrt{b}$

Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint Formula: $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

Imaginary Numbers:

$$i = \sqrt{-1}$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Algebra of Functions:

Sum: $(f + g)(x) = f(x) + g(x)$

Difference: $(f - g)(x) = f(x) - g(x)$

Product: $(f \cdot g)(x) = f(x) \cdot g(x)$

Quotient: $(\frac{f}{g})(x) = \frac{f(x)}{g(x)}$

Composition: $(f \circ g)(x) = f(g(x))$

Logarithmic Definition:

$$y = \log_b(x) \text{ means } x = b^y$$

Properties of Logarithms:

Product: $\log_b(xy) = \log_b(x) + \log_b(y)$

Quotient: $\log_b(\frac{x}{y}) = \log_b(x) - \log_b(y)$

Power: $\log_b(x^r) = r \log_b(x)$

Change of Base: $\log_b(a) = \frac{\log_c(a)}{\log_c(b)}$

$$\log_b(1) = 0$$

$$\log_b(b^x) = x$$

$$b^{\log_b(x)} = x$$