College Algebra Formulas and Rules

Standard Form (Linear)

$$Ax + By = C$$

Point-Slope Formula

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

Slope-Intercept Form

$$y = mx + b$$

Slope Formula

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

Distance Formula

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

Midpoint Formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

General Form (Quadratic)

$$ax^2 + bx + c = y \text{ or } f(x) = ax^2 + bx + c;\ f(x) \equiv y$$

Standard (Vertex) Form

$$f(x) = a(x - h)^2 + k$$

Quadratic Formula

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

Vertex of a Parabola

$$(h, k) = \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right) \text{ or } \left(\frac{-b}{2a}, c - \frac{b^2}{4a}\right)$$

Equation of a Circle

$$r^2 = (x - h)^2 + (y - k)^2$$

$$r = \sqrt{(x - h)^2 + (y - k)^2}$$

r = radius, (h, k) = center of circle

Difference of Squares

$$(x^2 - y^2) = (x - y)(x + y)$$

Sum of Squares

$$x^2 + y^2; prime$$

Perfect Square Trinomial

$$x^2 + 2xy + y^2 = (x + y)^2$$
$$x^2 - 2xy + y^2 = (x - y)^2$$

Difference of Cubes

$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

Sum of Cubes

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$

▲ *Tip:* Use **S.O.A.P.** to remember the signs in the Diff. and Sum of Cubes formulas—**Same**, **Opposite**, **Always Positive**.

Exponent Properties

$$x^0 = 1$$
$$0^0 = undef.$$

$$x^{-n} = \frac{1}{x^n}$$
$$x \neq 0$$

$$\left(\frac{x^z}{y^z}\right)^n = \frac{x^{zn}}{y^{zn}}$$
$$y \neq 0$$
$$(x^z)^n = x^{zn}$$
$$(xy)^z = x^z y^z$$

$$\frac{x^n}{x^z} = x^{n-z}$$
$$x \neq 0$$
$$x^z x^n = x^{z+n}$$

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http://www.lsco.edu/learningcenter/math.asp

$$\sqrt[n]{x} = x^{1/n};\ n \neq 0$$
$$\left(\sqrt[n]{x}\right)^z = \sqrt[n]{x^z} = x^{z/n}$$

$$x^n + x^n = 2x^n$$
$$2x^n - x^n = x^n$$

$$\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}};\ y \neq 0$$

Log Properties

$$\log_b b = 1$$
$$b^{\log_b x} = x$$

$$y = \log_b x \Leftrightarrow b^y = x$$

$$\log_b 1 = 0;\ \log_b 0 = undef.$$
$$\log_b b^x = x$$

$$\log_b M^p = P \log_b M$$
$$\log_b x = \log_b y \rightarrow x = y$$

$$\log_b y = \frac{\log_a y}{\log_a b}$$

◀*Tip:* Use the **change of base formula** to convert to base *10* (*log*) or base *e* (*ln*). Some calculators handle only these bases.

$$\log_b MN = \log_b M + \log_b N$$
$$\log_b \frac{M}{N} = \log_b M - \log_b N$$

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