Algebra Formulas

Factoring

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

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

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

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

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

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

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

Exponents and Radicals

$a^0 = 1, a \neq 0$

$(a^m)^n = a^{mn}$

$a^m a^n = a^{m+n}$

$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

$(ab)^m = a^m b^m$

$\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$

$\dfrac{a^m}{a^n} = a^{m-n}$

$\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

$\sqrt{a} = a^{\frac{1}{2}}$

$a^{-m} = \dfrac{1}{a^m}$

$\sqrt[n]{a} = a^{\frac{1}{n}}$

$\left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n$

Important Formulas

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

Change of Base: $\log_b M = \dfrac{\log M}{\log b}$

Midpoint Formula: $(x_m, y_m) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

Logarithm: If $y = b^x$ then, $\log_b y = x$

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

Natural Log: If $y = e^x$, then $\log_e y = x$, which is commonly written as $\ln y = x$

Parabola Axis of Symmetry: $x = \dfrac{-b}{2a}$