ALGEBRA REVIEW SHEET

Factor Formulas

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

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

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

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

Examples

$(x^2-5)^2 = x^4 - 10x^2 + 25$

$(x+3)^2 = x^2 + 6x + 9$

$(x-1)^3 = x^3 - 3x^2 + 3x - 1$

$(x+2)^3 = x^3 + 6x^2 + 12x + 8$

Special Factors

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

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

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

$x^2 - 9 = (x-3)(x+3)$

$x^3 - 27 = (x-3)(x^2 + 3x + 9)$

$x^3 + 8 = (x+2)(x^2 - 2x + 4)$

Quadratic Formula

The quadratic equation of the form $ax^2 + bx + c = 0$ for $a \neq 0$ and a, b, c, numbers may be factorable by the formula:

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

$x^2 + 3x - 1 = 0$ where $a = 1, b = 3, c = -1$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-1)}}{2(1)} = \frac{-3 \pm \sqrt{13}}{2}$$

Exponents and Radicals

Let *n* be a positive integer and $a \neq 0$

$a^0 = 1$

$a^{-x} = \frac{1}{a^x}$

$\frac{a^x}{a^y} = a^{x-y}$

$\left(\frac{b}{a}\right)^x = \frac{b^x}{a^x}$

$(a^x)^y = a^{xy}$

$a^x a^y = a^{x+y}$

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

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

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

$\sqrt[n]{a^m} = a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m$

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

$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, \ b \neq 0$

Equations of the line:

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$	slope of the line given two points (x_1, y_1) and (x_2, y_2)
$y = mx + b$	slope - intercept equation where m = slope and b = y - intercept
$y - y_1 = m(x - x_1)$	point - slope equation given a point (x_1, y_1)
$Ax + By = c$	general linear equation