Mathematics 20-1

Sturgeon Composite High School

Sequences & Series

Arithmetic Progressions

$$d = t_n - t_{n-1}$$

$$t_n = t_1 + (n-1)d$$

$$S_n = \frac{n}{2}\left[t_1 + t_n\right]$$

$$S_n = \frac{n}{2}\left[2t_1 + (n-1)d\right]$$

Geometric Progressions

$$r = \frac{t_n}{t_{n-1}}$$

$$t_n = t_1 \bullet r^{n-1}$$

$$S_n = \frac{t_1\left(r^n - 1\right)}{r-1}, \quad r \neq 1$$

$$S_n = \frac{rt_n - t_1}{r-1}, \quad r \neq 1$$

$$S_n = n \bullet t_1, \quad r = 1$$

Infinite Geometric Progressions

$$S_\infty = \frac{t_1}{1-r}, \quad |r| < 1$$

Quadratics

Quadratic Functions

$$y = ax^2 + bx + c$$

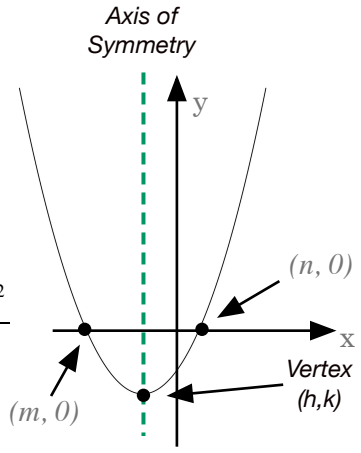
$$y = a(x-m)(x-n)$$

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

$$y = a\left(x + \frac{b}{2a}\right)^2 + \frac{4ac - b^2}{4a}$$

Quadratic Equation

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



Systems of Equations

Linear Relation Equations

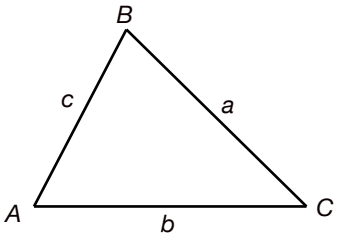
$$y = mx + b$$

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

$$Ax + By + C = 0$$

Trigonometry

Oblique Triangles



Sine Law

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Cosine Law

$$a^2 = b^2 + c^2 - 2bc \bullet \cos(A)$$

$$b^2 = a^2 + c^2 - 2ac \bullet \cos(B)$$

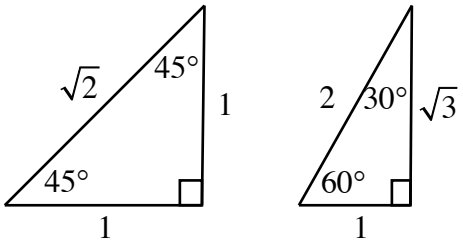
$$c^2 = a^2 + b^2 - 2ab \bullet \cos(C)$$

$$A = Cos^{-1}\left[\frac{b^2 + c^2 - a^2}{2bc}\right]$$

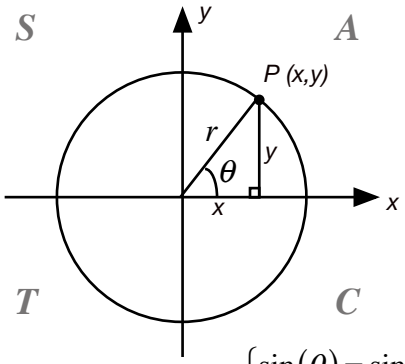
$$B = Cos^{-1}\left[\frac{a^2 + c^2 - b^2}{2ac}\right]$$

$$C = Cos^{-1}\left[\frac{a^2 + b^2 - c^2}{2ab}\right]$$

Special Angle Triangles



Angles on the Cartesian Plane



$$x^2 + y^2 = r^2$$

$$\sin(\theta) = \frac{y}{r}$$

$$\cos(\theta) = \frac{x}{r}$$

$$\tan(\theta) = \frac{y}{x}$$

"CAST" Rule

$$\begin{cases} \sin(\theta) = \sin(180° - \theta) \\ \cos(\theta) = \cos(360° - \theta) \\ \tan(\theta) = \tan(180° + \theta) \end{cases}$$

Unit Circle $(r = 1)$

$$x^2 + y^2 = 1$$

$$\sin(\theta) = y$$

$$\cos(\theta) = x$$

Pythagorean Identity

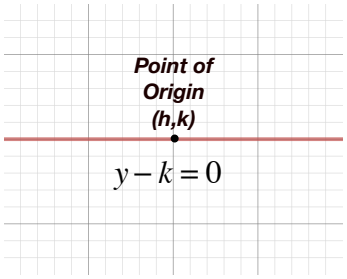
$$\sin^2(\theta) + \cos^2(\theta) = 1$$

$$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$$

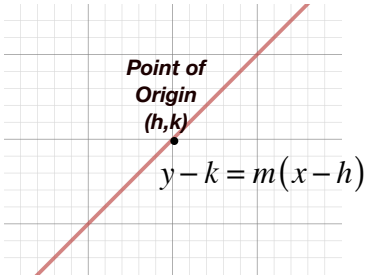
Common Relations and Functions

$y = a \bullet f(x-h)+k \qquad or \qquad (y-k) = a \bullet f(x-h)$

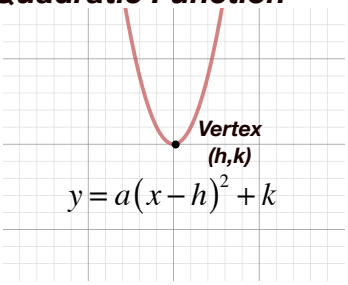
Constant Function



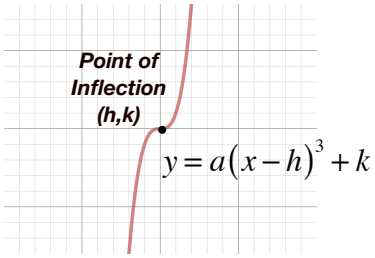
Linear Function



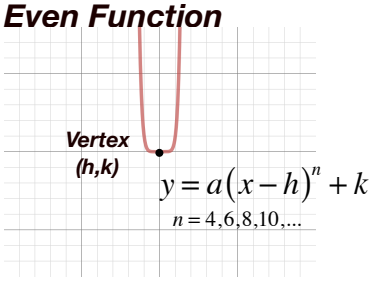
Quadratic Function



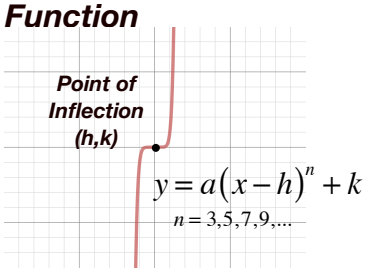
Cubic Function



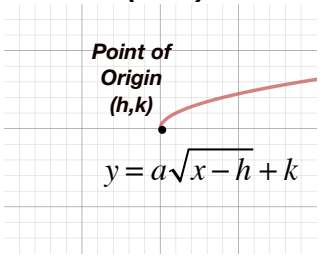
High Order Even Function



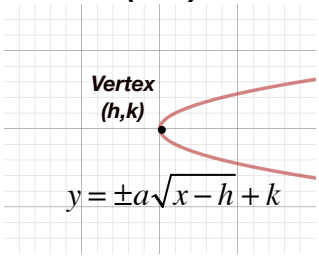
High Order Odd Function



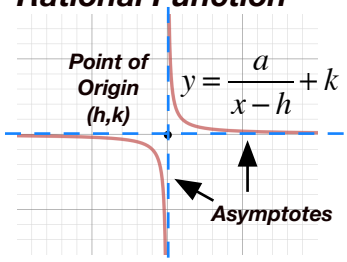
Radical (Half) Function



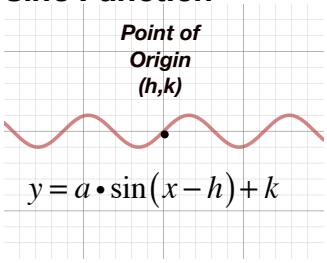
Radical (Full) Relation



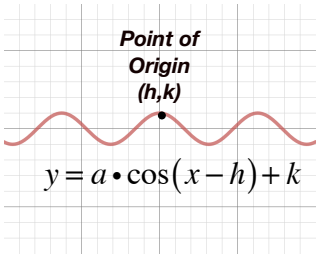
Rational Function



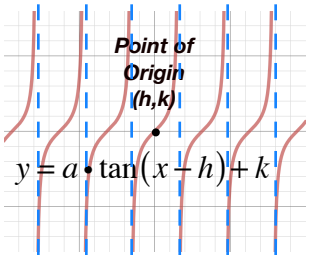
Sine Function



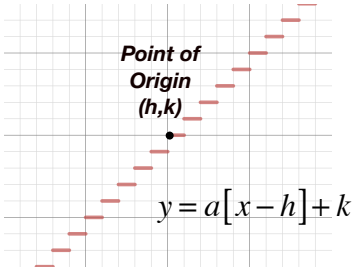
Cosine Function



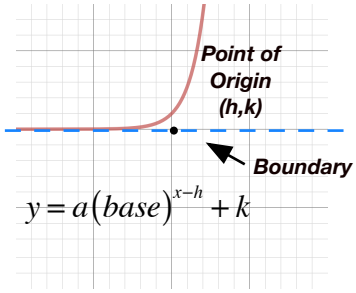
Tangent Function



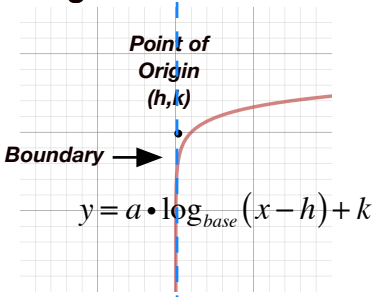
Greatest Integer Function



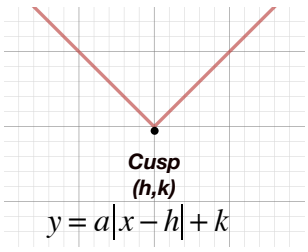
Exponential Function



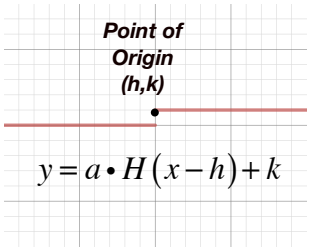
Logarithmic Function



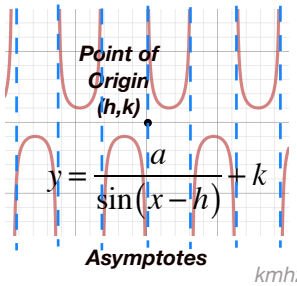
Absolute Value Function



Heavyside Function



Cosecant Function



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