Sheet#650: Trigonometry Formulas:
Radians, Circular Functions, Master Formula

Radians and Degrees

$$\theta_{\text{deg}} = \frac{180^\circ}{\pi}\theta_{\text{rad}}$$

$$\theta_{\text{rad}} = \frac{\pi}{180^\circ}\theta_{\text{deg}}$$

Arclength

$$s = r\theta_{\text{rad}}$$

Circular Functions

Polar and Cartesian coordinates

$$\sin\theta = \frac{y}{r} \quad \cos\theta = \frac{x}{r} \quad \tan\theta = \frac{y}{x}$$

$$r = \sqrt{x^2 + y^2}$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right)$$

Master formula

Use either sin(t) or cos(t) as the parent function.

With horizontal shift, h, given:

$$y = \pm A\sin(B(t-h)) + k$$

With phase shift, Bh, given:

$$y = \pm A\sin(Bt - Bh)) + k$$

t = time (or angle θ)

y = height

A = amplitude

B = angular Frequency. $B = \frac{2\pi}{T} = \frac{360^\circ}{T}$

T = period. $T = \frac{2\pi}{B} = \frac{360^\circ}{B}$

h = horizontal Shift

Bh = phase Shift

k = vertical Shift

$y = k$. midline.

f = "regular" frequency (oscillations/second).

$f = 1/T$. $B = 2\pi f$