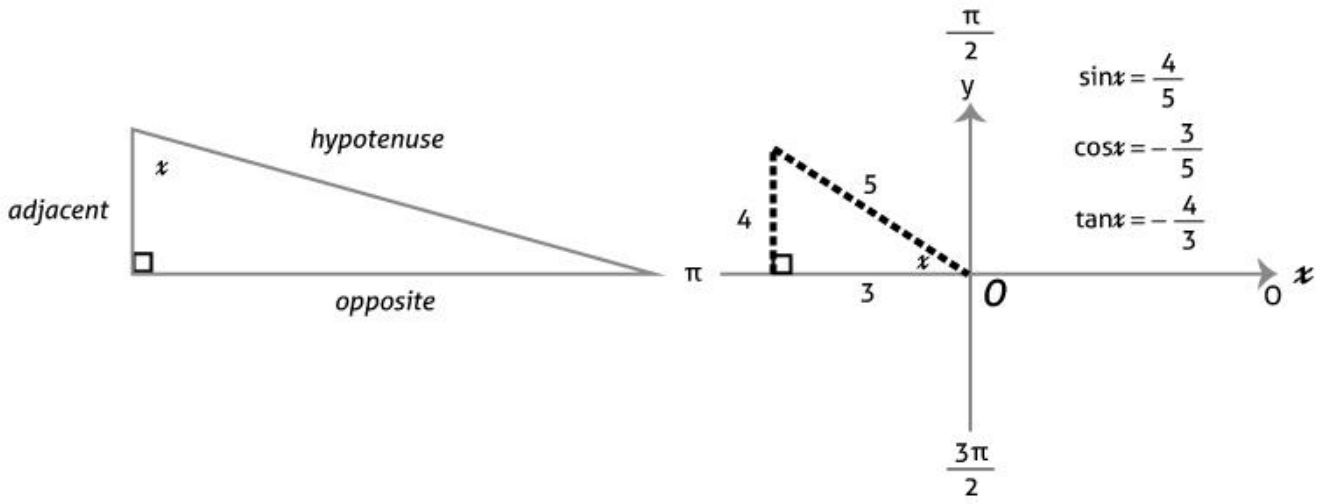
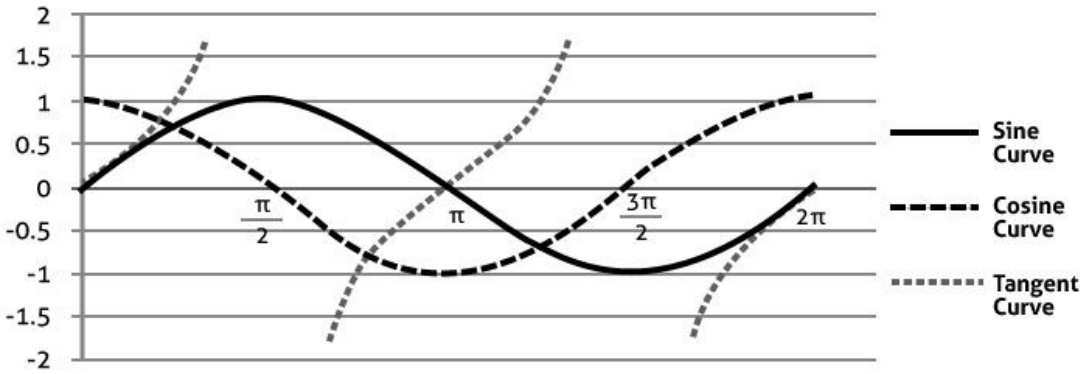
Trigonometry Formulas

SOHCAHTOA

$$\sin x = \frac{opposite}{hypotenuse} \qquad \cos x = \frac{adjacent}{hypotenuse} \qquad \tan x = \frac{opposite}{adjacent}$$



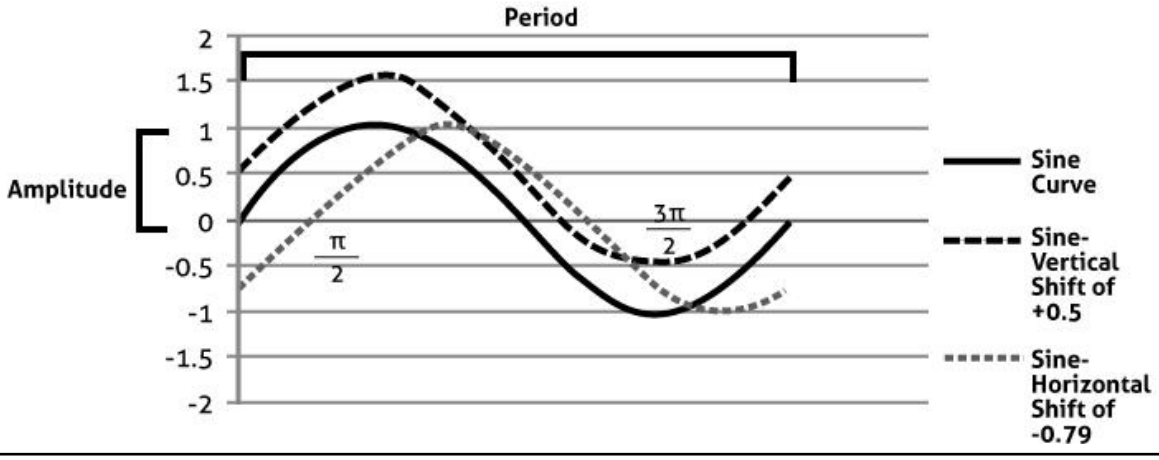
Trigonometric Curves



Graphing Trigonometric Functions

f(x) = (*a*) sin (*b x* – *c*) + *d*

a - amplitude, or the magnitude (height) of the oscillation (wave) of the function.
b - period, or horizontal length of one complete repetition of the pattern (or cycle)
c - phase shift, or horizontal shift
d - vertical shift



Trigonometric Reciprocal Identities

$$\csc x = \frac{1}{\sin x}$$

$$\sec x = \frac{1}{\cos x}$$

$$\cot x = \frac{1}{\tan x}$$

Trigonometric Quotient Identities

$$\tan x = \frac{\sin x}{\cos x}$$

$$\cot x = \frac{\cos x}{\sin x}$$

Logarithm Rules

$\log_b n = x$ is equivalent to $b^x=n$

Ex: $\log_2 8 = 3$ is equivalent to $2^3=8$

Product Rule

$\log_b(xy) = \log_b(x) + \log_b(y)$

Ex: $\log_{10}(2(3)) = \log_{10}(2) + \log_{10}(3)$

Quotient Rule

$$\log_b\left(\frac{x}{y}\right) = \log_b(x) - \log_b(y)$$

Ex: $\log_{10}\left(\frac{3}{2}\right) = \log_{10}(3) - \log_{10}(2)$

Power Rule

$\log_b(x^r) = \mathrm{r} \cdot \log_b(x)$

Ex: $\log_{10}(2^3) = 3 \cdot \log_{10}(2)$

Complex Numbers

$$i^1 = i$$
$$i^2 = -1$$
$$i^3 = -i$$
$$i^4 = 1$$

Quadratic Formula

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

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

Matrix Addition & Subtraction

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \pm \begin{bmatrix} e & f \\ g & \mathrm{h} \end{bmatrix} = \begin{bmatrix} (a \pm e) & (b \pm f) \\ (c \pm g) & (d \pm \mathrm{h}) \end{bmatrix}$$

Matrix Scalar

$$k\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} ak & bk \\ ck & \mathrm{dk} \end{bmatrix}$$

Determinant of a 2x2 Matrix

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

Matrix Multiplication (rows by columns)

Product of one row and one column:

$$[c_1 c_2 \ldots c_n]\begin{bmatrix} d_1 \\ d_2 \\ \vdots \\ d_3 \end{bmatrix} = [c_1 d_1 + c_2 d_2 + \ldots c_n d_n]$$

In the product of two matrices *CD*, the number of columns in *C* must match number of rows in *D*, or else undefined.

Ex: 1x2 matrix by 2x2 matrix

$$[-1 \quad 2]\begin{bmatrix} 1 & 3 \\ 2 & 0 \end{bmatrix}$$

$$= [(-1)(1) + (2)(2) \quad (-1)(3) + (2)(0)]$$

$$= [(-1 + 4) \quad (-3 + 0)]$$

$$= [3 \quad -3]$$

Graphing Parabolas

Standard form: $y = a(x-h)^2 + k$ with vertex (h,k)

If $a>0$, parabola opens up
If $a<0$, parabola opens down
If $h>0$, parabola shifts to the right
If $h<0$, parabola shifts to the left
If $k>0$, parabola shifts up
If $k<0$, parabola shifts down