TRIGONOMETRY

Right Triangle Trig

$\sin\theta = \frac{\text{opp}}{\text{hyp}}$ $\cos\theta = \frac{\text{adj}}{\text{hyp}}$ $\tan\theta = \frac{\text{opp}}{\text{adj}}$

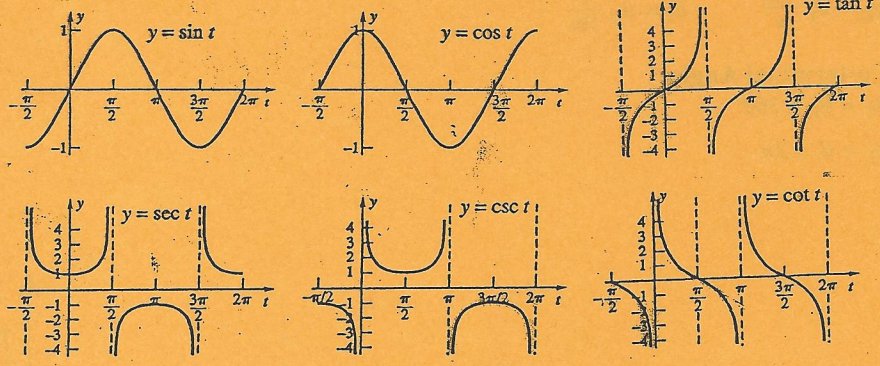
$\csc\theta = \frac{\text{hyp}}{\text{opp}}$ $\sec\theta = \frac{\text{hyp}}{\text{adj}}$ $\cot\theta = \frac{\text{adj}}{\text{opp}}$

Circular Trig

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

$\csc\theta = \frac{r}{y}$ $\sec\theta = \frac{r}{x}$ $\cot\theta = \frac{x}{r}$

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



Reciprocal Identities

$\sin x = \frac{1}{\csc x}$ $\cos x = \frac{1}{\sec x}$ $\tan x = \frac{1}{\cot x}$

$\csc x = \frac{1}{\sin x}$ $\sec x = \frac{1}{\cos x}$ $\cot x = \frac{1}{\tan x}$

Tangent and CoTangent Identities

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

Pythagorean Identities

$\sin^2 x + \cos^2 x = 1$ $1 + \tan^2 x = \sec^2 x$ $1 + \cot^2 x = \csc^2 x$

$\sin^2 x = 1 - \cos^2 x$ $\tan^2 x = \sec^2 x - 1$ $\cot^2 x = \csc^2 x - 1$

$\cos^2 x = 1 - \sin^2 x$ $\sec^2 x - \tan^2 x = 1$ $\csc^2 x - \cot^2 x = 1$

Law of Sines (Pick a Pear)

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \; ; \; A = \sin^{-1}\left(\frac{a\sin B}{b}\right)$$

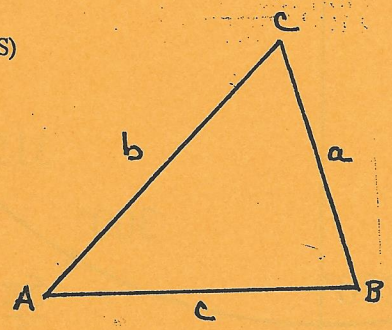
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \; ; \; a = \frac{b\sin A}{\sin B}$$

Law of Sines (Pick a Pear)

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

$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$ (SSS)

$A = \cos^{-1}\left(\frac{(b^2 + c^2 - a^2)}{(2bc)}\right)$



Area of a Triangle

Area $= \frac{1}{2}ab(\sin C)$ (SAS)

Area $= \sqrt{s(s-a)(s-b)(s-c)}$ (Heron's – SSS)

where $s = \frac{1}{2}(a+b+c)$

Arc Length and Sector Area

Arc Length: $s = r\theta$ (radians), $s = \frac{\theta}{360}2\pi r$ (deg)

Sector Area: $A = \frac{1}{2}r^2\theta$ (radians), $A = \frac{\theta}{360}\pi r^2$ (deg)

Sum and Difference Formulas

$\sin(u \pm v) = \sin u\cos v \pm \cos u\sin v$

$\cos(u \pm v) = \cos u\cos v \mp \sin u\sin v$

$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u\tan v}$

Double Angle Formulas

$\sin 2u = 2\sin u\cos u$

$\cos 2u = \cos^2 u - \sin^2 u = 2\cos^2 u - 1 = 1 - 2\sin^2 u$

$\tan 2u = \frac{2\tan u}{1 - \tan^2 u}$

Half Angle Formulas

$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$ $\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$

$\tan\frac{u}{2} = \frac{1-\cos u}{\sin u} = \frac{\sin u}{1+\cos u}$

Cofunction Identities

$\sin(\frac{\pi}{2} - x) = \cos x$ $\cos(\frac{\pi}{2} - x) = \sin x$ $\tan(\frac{\pi}{2} - x) = \cot x$

$\csc(\frac{\pi}{2} - x) = \sec x$ $\sec(\frac{\pi}{2} - x) = \csc x$ $\cot(\frac{\pi}{2} - x) = \tan x$

Reduction Formulas

$\sin(-x) = -\sin x$ $\cos(-x) = \cos x$ $\tan(-x) = -\tan x$

$\csc(-x) = -\csc x$ $\sec(-x) = \sec x$ $\cot(-x) = -\cot x$

Power-Reducing Formulas

$\sin^2 u = \frac{1-\cos 2u}{2}$ $\cos^2 u = \frac{1+\cos 2u}{2}$ $\tan^2 u = \frac{1-\cos 2u}{1+\cos 2u}$

Product-to-Sum Formulas

$\sin u\sin v = \frac{1}{2}[\cos(u-v) - \cos(u+v)]$

$\cos u\cos v = \frac{1}{2}[\cos(u-v) + \cos(u+v)]$

$\sin u\cos v = \frac{1}{2}[\sin(u+v) + \sin(u-v)]$

$\cos u\sin v = \frac{1}{2}[\sin(u+v) - \sin(u-v)]$

Sum-to-Product Formulas

$\sin u + \sin v = 2\sin(\frac{u+v}{2})\cos(\frac{u-v}{2})$

$\sin u - \sin v = 2\cos(\frac{u+v}{2})\sin(\frac{u-v}{2})$

$\cos u + \cos v = 2\cos(\frac{u+v}{2})\cos(\frac{u-v}{2})$

$\cos u - \cos v = -2\sin(\frac{u+v}{2})\sin(\frac{u-v}{2})$

Deg-Rad

$\theta_D = \theta_r \frac{180}{\pi}$

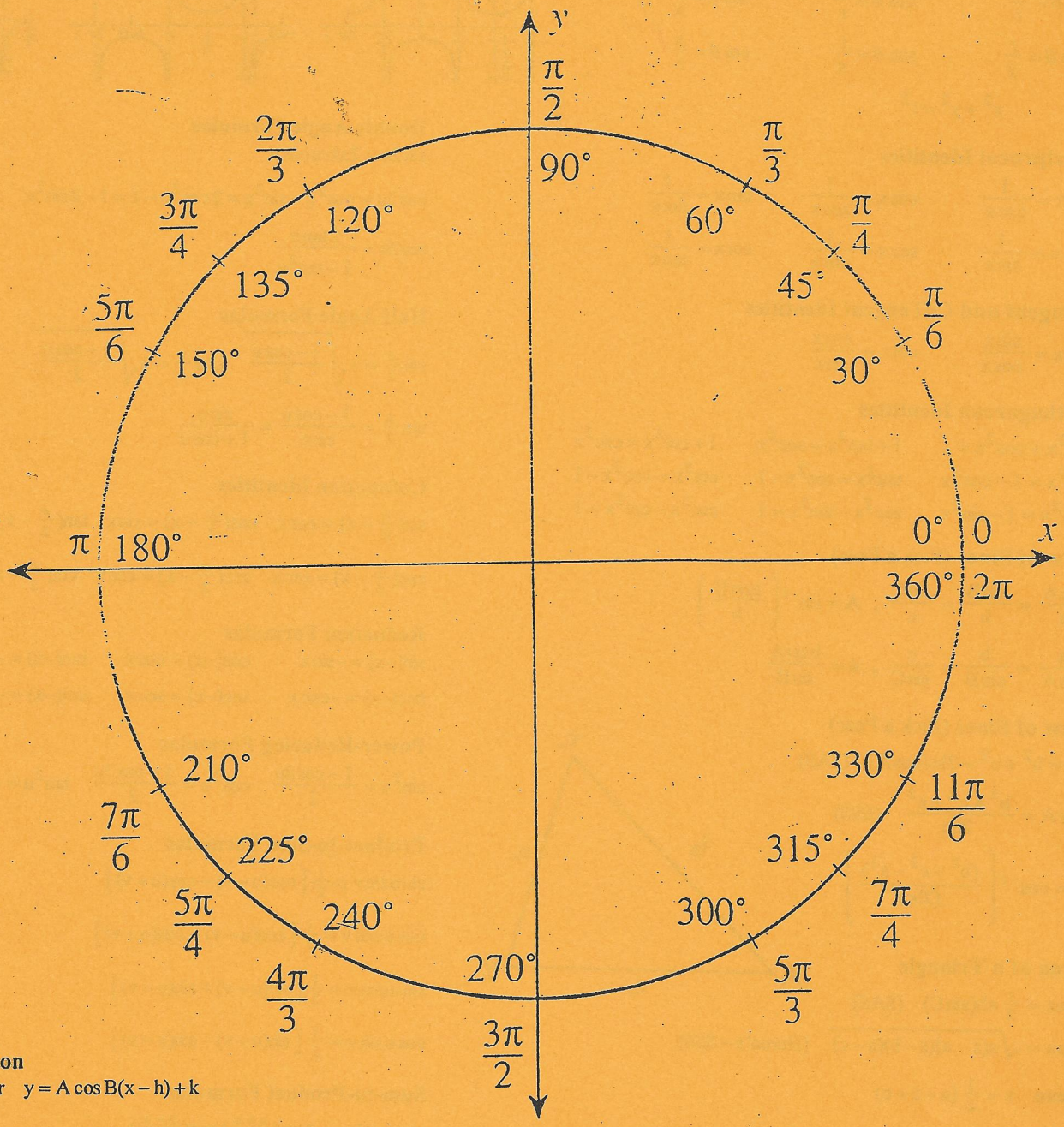
Rad-Deg

$\theta_r = \theta_D \frac{\pi}{180}$

Co-terminal Angles

$\theta_T = \theta_D \pm 360°$

$\theta_T = \theta_r \pm 2\pi$



General Trig Equation

$y = A\sin B(x-h)+k$ or $y = A\cos B(x-h)+k$

Domain:
Range:
x-int::
y-int:
Symmetry:
Continuity:
Left End:
Right End:
Increasing:
Decreasing:
Max:
Min:

A:

P:

h:

k: