Important Trigonometry Identities

Contangenet and Tangent Identities are

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

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

[OBJ][OBJ]Reciprocal Identities

Reciprocal Identities

$\sin\theta = 1/\csc\theta$

$\csc\theta = 1/\sin\theta$

$\cos\theta = 1/\sec\theta$

$\sec\theta = 1/\cos\theta$

$\tan\theta = 1/\cot\theta$

$\cot\theta = 1/\tan\theta$

Pythagorean Identities

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

$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + \cot^2\theta = \csc^2\theta$$

Even and Odd Angle Formulas

$\sin(-\theta) = -\sin\theta$

$\cos(-\theta) = \cos\theta$

$\tan(-\theta) = -\tan\theta$

$\cot(-\theta) = -\cot\theta$

$\sec(-\theta) = \sec\theta$

$\csc(-\theta) = -\csc\theta$

Co-Functions Formulas

$\sin(90^0-\theta) = \cos\theta$

$\cos(90^0-\theta) = \sin\theta$

$\tan(90^0-\theta) = \cot\theta$

$\cot(90^0-\theta) = \tan\theta$

$\sec(90^0-\theta) = \csc\theta$

$\csc(90^0-\theta) = \sec\theta$

Double Angle Formulas

$\sin2\theta = 2\sin\theta\cos\theta$

$\cos2\theta = 1 - 2\sin^2\theta$

$\tan2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

Half Angle Formulas

$\sin\theta = \pm\sqrt{\dfrac{1-\cos2\theta}{2}}$

$\cos\theta = \pm\sqrt{\dfrac{1+\cos2\theta}{2}}$

$\tan\theta = \pm\sqrt{\dfrac{1-\cos2\theta}{1+\cos2\theta}}$

Thrice Angle Formulas

$\sin3\theta = 3\sin\theta - 4\sin^3\theta$

$\cos3\theta = 4\cos^3\theta - 3\cos\theta$

$\tan3\theta = \dfrac{3\tan\theta-\tan^3\theta}{1-3\tan^2\theta}$

$\cot3\theta = \dfrac{\cot^3\theta-3\cot\theta}{3\cot^2\theta-1}$

Sum and Difference Formulas

Sin (A+B) = Sin A Cos B + Cos A Sin B

Sin (A-B) = Sin A Cos B − Cos A Sin B

Cos (A+B) = Cos A Cos B − Sin A Sin B

Cos (A-B) = Cos A Cos B + Sin A Sin B

Tan (A+B) = $\frac{TanA+TanB}{1-TanATanB}$

Tan (A-B) = $\frac{TanA-TanB}{1+TanATanB}$

Product to Sum Formulas

Sin A Sin B = ½ [Cos (A-B) − Cos (A+B)]

Cos A Cos B = ½ [Cos (A-B) + Cos (A+B)]

Sin A Cos B = ½ [Sin (A+B) + Sin (A-B)]

Cos A Sin B = ½ [Sin (A+B) − Sin (A-B)]

Sum to Product Formulas

Sin A + Sin B = 2 sin $\frac{A+B}{2}$ cos $\frac{A-B}{2}$

Sin A − Sin B = 2 cos $\frac{A+B}{2}$ sin $\frac{A-B}{2}$

Cos A + Cos B = 2 cos $\frac{A+B}{2}$ cos $\frac{A-B}{2}$

Cos A − Cos B = − 2 sin $\frac{A+B}{2}$ sin $\frac{A-B}{2}$

Inverse Trigonometric Functions

If Sin θ = x, then θ = $\sin^{-1} x$ = arcsin(x)

Similarly,

θ = $\cos^{-1}x$ = arccos(x)

θ = $\tan^{-1} x$ = arctan(x)

Also, the inverse properties could be defined as;

$\sin^{-1}(\sin \theta) = \theta$

$\cos^{-1}(\cos \theta) = \theta$

$\tan^{-1}(\tan \theta) = \theta$