VALUES OF TRIGONOMETRIC RATIOS FOR DIFFERENT ANGLES

	15^0	18^0	$\left(22\frac{1}{2}\right)^0$	36^0
Sin	$\frac{\sqrt{3}-1}{2\sqrt{2}}$	$\frac{\sqrt{5}-1}{4}$	$\frac{1}{2}\sqrt{2-\sqrt{2}}$	$\frac{\sqrt{10-2\sqrt{5}}}{4}$
Cos	$\frac{\sqrt{3}+1}{2\sqrt{2}}$	$\frac{\sqrt{10+2\sqrt{5}}}{4}$	$\frac{1}{2}\sqrt{2+2\sqrt{2}}$	$\frac{\sqrt{5}+1}{4}$
tan	$2-\sqrt{3}$	$\frac{\sqrt{25-10\sqrt{5}}}{5}$	$\sqrt{2}-1$	$\sqrt{5-2\sqrt{5}}$

TRIGONOMETRIC IDENTITIES

$$\cot x - \tan x = 2 \cot 2x$$

$$\tan(A+B) = \tan A + \tan B + \tan A \cdot \tan B \cdot \tan(A+B)$$

$$\text{If } A+B = \frac{\pi}{4} \Rightarrow \tan A + \tan B + \tan A \cdot \tan B = 1$$

$$\cos\alpha + \cos\beta + \cos Y + \cos(\alpha+\beta+y) = 4\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\beta+Y}{2}\right)\cos\left(\frac{Y+\alpha}{2}\right)$$

$$\sin\alpha + \sin\beta + \sin Y - \sin(\alpha+\beta+Y) = 4\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\beta+\gamma}{2}\right)\sin\left(\frac{\gamma+\alpha}{2}\right)$$

$$4\sin x \sin(60-x)\sin(60+x) = \sin 3x$$

$$4\cos x \cos(60-x)\cos(60+x) = \cos 3x$$

$$\tan x \tan(60-x)\tan(60+x) = \tan 3x$$

SUM OF SINE & COSINE SERIES

$$\sin\alpha + \sin(\alpha+\beta) + \sin(\alpha+2\beta)+\ldots+\sin\{\alpha+(n-1)\beta\}$$

$$= \frac{\sin\frac{n\beta}{2}}{\sin\frac{\beta}{2}} \sin\left[\frac{\alpha + \{\alpha + (n-1)\beta\}}{2}\right]$$

$$\cos\alpha + \cos(\alpha+\beta)+ \cos(\alpha+2\beta)+\ldots+\cos\{\alpha+(n-1)\beta\}$$

$$= \frac{\sin\frac{n\beta}{2}}{\sin\frac{\beta}{2}} \cos\left[\frac{\alpha + \{\alpha + (n-1)\beta\}}{2}\right]$$

$$\cos\theta \cdot \cos 2\theta \cdot \cos 2^2\theta \ldots \cos 2^{n-1}\theta$$

$$= \prod_{r=1}^{n} \cos\left(2^{r-1}\theta\right) = \prod_{r=0}^{n-1} \cos 2^r\theta$$

$$= \begin{cases} \dfrac{\sin 2^n\theta}{2^n \sin\theta}, & \theta \neq k\pi \\ 1, & \theta = 2k\pi \\ -1, & \theta = (2k+1)\pi \end{cases}$$

CONDITIONAL TRIGONOMETRIC IDENTITIES IN △ABC

$$\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$$

$$\cos 2A + \cos 2B + \cos 2C = -1 - 4 \cos A \cos B \cos C$$

$$\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \cos A \cos B \cos C$$

$$\sin^2\left(\frac{A}{2}\right) + \sin^2\left(\frac{B}{2}\right) + \sin^2\left(\frac{C}{2}\right) = 1 - 2\sin\left(\frac{A}{2}\right)\sin\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$$

$$\tan A + \tan B + \tan C = \tan A \tan B \tan C$$

$$\cot A \cot B + \cot B \cot C + \cot C \cot A = 1$$

$$\tan\frac{A}{2}\tan\frac{B}{2} + \tan\frac{B}{2}\tan\frac{C}{2} + \tan\frac{C}{2}\tan\frac{A}{2} = 1$$

$$\cot\left(\frac{A}{2}\right) + \cot\left(\frac{B}{2}\right) + \cot\left(\frac{C}{2}\right) = \cot\left(\frac{A}{2}\right)\cot\left(\frac{B}{2}\right)\cot\left(\frac{C}{2}\right)$$

$$\sin A + \sin B + \sin C = 4 \cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$$

$$\cos A + \cos B + \cos C = 1 + 4 \sin\left(\frac{A}{2}\right)\sin\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$$

$$\sin^2 A + \sin^2 B + \sin^2 C = 2\,(1 + \cos A \cos B \cos C)$$