Trigonometry

Important Formulas & Results

VERBAL MATH BY ABHAS SAINI



TRIGONOMETRY

$$din^{2}x + cos^{2}x = 1$$

$$dic^{2}x - tan^{2}x = 1$$

$$case^{2}x - cot^{2}x = 1$$

6)
$$\tan (A-B) = \frac{\tan A - \tan B}{1 + \tan A + \tan B}$$

7.)
$$\cot (A+B) = \cot A \cot B - 1$$
 $\cot A + \cot B$

8)
$$\cot (A-B) = \cot A \cot B + 1$$
 $\cot A - \cot B$

9)
$$\sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$$

10)
$$\cos^2 A - \sin^2 B = \cos (A+B) \cos (A-B)$$

11.)
$$\cot \theta - \tan \theta = 2 \cot 2\theta$$

BASIC

IDENTITIES

13)
$$\sin 3A = 3 \sin 4 - 4 \sin^3 A$$

14)
$$\cos 3A = 4 \cos^2 A - 3 \cos A$$

TRIPLE ANGLE

(15)
$$\tan 3A = \frac{3 \tan A - \tan^3 A}{1 - 3 \tan^2 A}$$

DOUBLE ANGLE PORMULAS

1.)
$$\sin 20 = 2 \sin 0 \cos 0 = \frac{2 \tan 0}{1 + \tan^2 0}$$

2)
$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1 = 1 - 2 \sin^2 \theta$$

$$= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$$

3.)
$$1 + \cos 2\theta = 2 \cos^2 \theta$$

4.)
$$1 - \cos 20 = 2 \sin^2 0$$

s)
$$tan20 = sin20 = 2 tan 0$$

 $cos 20 = 1 - tan^2 0$

6)
$$\tan \theta = \frac{\sin 2\theta}{1 + \cos 2\theta} = \frac{1 - \cos 2\theta}{\sin 2\theta}$$

$$\sin C + \sin D = 2 \sin \left(\frac{C+D}{2}\right) \cos \left(\frac{C-D}{2}\right)$$

$$\sin C - \sin D = 2 \cos \left(\frac{C+D}{2}\right) \sin \left(\frac{C-D}{2}\right)$$

$$\cos C + \cos D = 2 \cos \left(\frac{C+D}{2}\right) \cos \left(\frac{C-D}{2}\right)$$

$$\cos C - \cos D = -2 \sin \left(\frac{C+D}{2}\right) \sin \left(\frac{C-D}{2}\right)$$

$$= 2 \sin \left(\frac{C+D}{2}\right) \sin \left(\frac{D-C}{2}\right)$$

$$sin(A+B) + sin(A-B) = 2 sin A cos B$$

$$los (A+B) - los (A-B) = -2 sin A sin B$$

win
$$\theta$$
 sin $(60-\theta)$ sin $(60+\theta) = \frac{1}{4} \sin 3\theta$
(a) θ cos $(60-\theta)$ cos $(60+\theta) = \frac{1}{4} \cos 3\theta$
tan θ tan $(60-\theta)$ tan $(60+\theta) = \tan 3\theta$
tan θ tan $(60-\theta)$ tan $(60+\theta) = \tan 3\theta$
tan θ + tan $(60+\theta)$ + tan $(120+\theta) = 3 \tan 3\theta$
cos θ + cos $(120-\theta)$ + cos $(120+\theta) = 0$
cos θ + cos $(120-\theta)$ + cos $(120+\theta) = \frac{3}{2}$
cos θ + cos $(120-\theta)$ + cos $(120-\theta)$ = $\frac{3}{4}$ cos 3θ

 $\cot \alpha + \cot (60 + \alpha) - \cot (60 - \alpha) = 3 \cot 3\alpha$

$$\frac{3f}{(\cos^2 A + \cos^2 B - \cos A)} = \frac{3}{4}$$

$$\sin^2 A + \sin^2 B + \sin A \sin B = \frac{3}{4}$$

$$\frac{11}{14} A - B = 60^{\circ}$$

$$\cos^{2} A + \cos^{2} B + \cos A \cos B = 3/4$$

$$\sin^{2} A + \sin^{2} B - \sin A \sin B = 3/4$$

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

1/ A+B+C = 180°

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 $\sin A + \sin B + \sin C = 4 \cos A \cos B \cos C$ sin A + sin B - sin C = 4 sin A sin B sin C cos A + cos B + cos C = 1 + 4 sin A sin B sin & sin 2A + in 2B - sin 2C = 4 cos A cos B sin C sin 2A + sin 2B + sin 2C = 4 sin A sin B sin C con 2A + con 2B + con 2C = 1 - 4 con A con B con C Cos 2A + cos 2B - cos 2C = 1-4 sin A sin B cos C Ain A + sin B - sin C = 2 sin A sin B cos C $cos^{2}A + cos^{2}B + cos^{2}C = 1-2 cos A cos B$ $\cos^2 A + \cos^2 B - \cos^2 C = 1-2 \sin A \sin B$

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DERIVED RESULTS

$$\cos^4 \theta - \sin^4 \theta = \cos^2 \theta - \sin^2 \theta$$

$$\sin^4 \theta - \cos^4 \theta = \sin^2 \theta - \cos^2 \theta$$

$$\sec^4 \theta - \tan^4 \theta = \sec^2 \theta + \tan^2 \theta$$

$$\csc^4 \theta - \cot^4 \theta = \csc^2 \theta + \cot^2 \theta$$

$$\frac{\sin(A-B)}{\cos A - \cos B} = \frac{\sin A \cos B - \cos A \sin B}{\cos A \cos B} = \tan A - \tan B$$

$$\frac{\cos(A+B)}{\sin A \cos B} = \frac{\cos A \cos B - \sin A \sin B}{\sin A \cos B} = \cot A - \tan B$$

SOME STANDARD ANGLES

1.)
$$\sin 18 = \cos 72 = \frac{\sqrt{5}-1}{4}$$

2)
$$\sin 54 = \cos 36 = \frac{\sqrt{5}+1}{4}$$

3)
$$\lim_{\to} 72 = \cos 8 = \frac{10 + 2\sqrt{5}}{4}$$

4)
$$\sin 36 = \cos 54 = \sqrt{10-255}$$

sin
$$15 = \cos 75 = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

6)
$$\sin 75 = \cos 15 = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

7)
$$\tan 15 = \cot 75 = 2-53$$

$$\frac{1}{2}$$
 tax $\frac{1}{7}$ = cot $\frac{1}{5}$ = $\frac{2}{7}$

9)
$$\tan 22.5 = \cot 67.5 = \sqrt{2}$$

$$f(x)$$
 tan 67.5 = cot 22.5 = $\int_{2}^{2} + \int_{1}^{2}$