

Trigonometry for Life

Basic Identities

$$\tan A = \sin A / \cos A$$

$$\sec A = 1 / \cos A$$

$$\cot A = \cos A / \sin A$$

$$\csc A = 1 / \sin A$$

$$\cot A = 1 / \tan A$$

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

Cofunction Identities

$$\sin\left(\frac{\pi}{2} - A\right) = \cos A$$

$$\cos\left(\frac{\pi}{2} - A\right) = \sin A$$

$$\tan\left(\frac{\pi}{2} - A\right) = \cot A$$

Odd-Even Identities

$$\sin(-A) = -\sin A$$

$$\cos(-A) = \cos A$$

$$\tan(-A) = -\tan A$$

Addition Formulas

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

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

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

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

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

Double Angle Formulas

$$\sin 2A = 2 \sin A \cos A$$

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

$$\tan 2A = 2 \tan A / (1 - \tan^2 A)$$

Half Angle Formulas

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

$$\cos \frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}}$$

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

Product Formulas

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

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

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

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

Factoring Formulas

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

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

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

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