

Trigonometric Identities for Competitive Exams

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

$$\sec A = \frac{1}{\cos A}$$

$$\operatorname{cosec} A = \frac{1}{\sin A}$$

$$\cot A = \frac{\cos A}{\sin A} = \frac{1}{\tan A}$$

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

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

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

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

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

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

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

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

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

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

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

$$\cos 3A = 4 \cos^3 A - 3 \cos A$$

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

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

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

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

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

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

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

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

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

$$a \sin x + b \cos x = R \sin (x + \Phi), \text{ where } R = \sqrt{a^2 + b^2} \text{ and } \cos \Phi = \frac{a}{R}, \sin \Phi = \frac{b}{R}.$$

$$\text{If } t = \tan \frac{1}{2}x \text{ then } \sin x = \frac{2t}{1+t^2}, \cos x = \frac{1-t^2}{1+t^2}.$$

$$\cos x = \frac{1}{2} (e^{ix} + e^{-ix});$$

$$\sin x = \frac{1}{2i} (e^{ix} - e^{-ix})$$

$$e^{ix} = \cos x + i \sin x;$$

$$e^{-ix} = \cos x - i \sin x$$