

# Trigonometric Identities

## Exercise 10.3 for Class XI

**Question # 1** Find the values of  $\sin 2\alpha$ ,  $\cos 2\alpha$  and  $\tan 2\alpha$  when:

(i)  $\sin \alpha = \frac{12}{13}$                       (ii)  $\cos \alpha = \frac{3}{5}$                       where  $0 < \alpha < \frac{\pi}{2}$

**Question # 2**  $\cot \alpha - \tan \alpha = 2 \cot 2\alpha$

**Question # 3**  $\frac{\sin 2\alpha}{1 + \cos 2\alpha} = \tan \alpha$

**Question # 4**  $\frac{1 - \cos \alpha}{\sin \alpha} = \tan \frac{\alpha}{2}$

**Question # 5**  $\frac{\cos \alpha - \sin \alpha}{\cos \alpha + \sin \alpha} = \sec 2\alpha - \tan 2\alpha$

**Question # 6**  $\sqrt{\frac{1 + \sin \alpha}{1 - \sin \alpha}} = \frac{\sin \frac{\alpha}{2} + \cos \frac{\alpha}{2}}{\sin \frac{\alpha}{2} - \cos \frac{\alpha}{2}}$

**Question # 7**  $\frac{\operatorname{cosec} \theta + 2 \operatorname{cosec} 2\theta}{\sec \theta} = \cot \frac{\theta}{2}$

**Question # 8**  $1 + \tan \alpha \tan 2\alpha = \sec 2\alpha$

**Question # 9**  $\frac{2 \sin \theta \sin 2\theta}{\cos \theta + \cos 3\theta} = \tan 2\theta \tan \theta$

**Question # 10**  $\frac{\sin 3\theta}{\sin \theta} - \frac{\cos 3\theta}{\cos \theta} = 2$

**Question # 11**  $\frac{\cos 3\theta}{\cos \theta} + \frac{\sin 3\theta}{\sin \theta} = 4 \cos 2\theta$

**Question # 12**  $\frac{\tan \frac{\theta}{2} + \cot \frac{\theta}{2}}{\cot \frac{\theta}{2} - \tan \frac{\theta}{2}} = \sec \theta$

**Question # 13**  $\frac{\sin 3\theta}{\cos \theta} + \frac{\cos 3\theta}{\sin \theta} = 2 \cot 2\theta$

**Question # 14** Reduce  $\sin^4 \theta$  to an expression involving only functions of multiples of  $\theta$  raised to the first power.

**Question # 15** Find the values of  $\sin \theta$  and  $\cos \theta$ , without using table or calculator, when  $\theta$

(i)  $18^\circ$                       (ii)  $36^\circ$

(iii)  $54^\circ$                       (iv)  $72^\circ$