

10th Trigonometry Identities

1. Simplify:  $(1 + \tan^2 \theta)(1 - \sin \theta)(1 + \cos \theta)$

2. Evaluate:  $(\sec^2 \theta - 1)(1 - \operatorname{cosec}^2 \theta)$

3. Evaluate:  $4(\sin^4 30^\circ + \cos^4 60^\circ) - \frac{2}{3}(\sin^2 60^\circ - \cos^2 45^\circ) + \frac{1}{2} \sin^2 60^\circ$

4. Evaluate:  $\frac{2}{3}(\cos^4 30^\circ - \sin^4 45^\circ) - 3(\sin^2 60^\circ - \sec^2 45^\circ) + \frac{1}{4} \cot^2 30^\circ$

**Prove the following identities**

5.  $\frac{\sin \theta}{1 - \cos \theta} = \operatorname{cosec} \theta + \cot \theta$

6.  $\frac{\tan \theta + \sin \theta}{\tan \theta - \sin \theta} = \frac{\sec \theta + 1}{\sec \theta - 1} = \frac{1 + \cos \theta}{1 - \cos \theta}$

7.  $\frac{1 - \cos \theta}{1 + \cos \theta} = (\operatorname{cosec} \theta - \cot \theta)^2$

8.  $\left(1 + \frac{1}{\tan^2 \theta}\right)\left(1 + \frac{1}{\cot^2 \theta}\right) = \frac{1}{\sin^2 \theta - \sin^4 \theta}$

9.  $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$

10.  $\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta = \sec^2 \theta \cdot \tan^2 \theta$

11.  $\cot \theta - \tan \theta = \frac{2 \cos^2 \theta - 1}{\sin \theta \cos \theta}$

12.  $\frac{1 - \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 - \sin \theta} = 2 \sec \theta$

13.  $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \cdot \operatorname{cosec}^2 \theta$

14.  $\frac{1 + \cos \theta}{1 - \cos \theta} = (\operatorname{cosec} \theta + \cot \theta)^2$

15.  $\frac{1 + \sin \theta}{1 - \sin \theta} = (\sec \theta + \tan \theta)^2$

16.  $(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta) = \frac{1}{\tan \theta + \cot \theta}$

17.  $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$

18.  $2 \sec^2 \theta - \sec^4 \theta - 2 \operatorname{cosec}^2 \theta + \operatorname{cosec}^4 \theta = \cot^4 \theta - \tan^4 \theta$

## 10th Trigonometry Identities

$$19. \frac{\cos \theta}{1 - \tan \theta} + \frac{\sin \theta}{1 - \cot \theta} = \sin \theta + \cos \theta$$

$$20. \frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$$

$$21. \frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta$$

$$22. (\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2 = (1 + \sec \theta \operatorname{cosec} \theta)^2$$

$$23. \frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^3 \theta}{\sin \theta - \cos \theta} = 1 + \sin \theta \cos \theta$$

$$24. \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} + \frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} = \frac{2}{2 \sin^2 \theta - 1}$$

$$25. \frac{\sin \theta + 1 - \cos \theta}{\cos \theta - 1 + \sin \theta} = \frac{1 - \sin \theta}{\cos \theta}$$

$$26. (1 - \sin \theta + \cos \theta)^2 = 2(1 + \cos \theta)(1 - \sin \theta)$$

$$27. \sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} + \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = 2 \operatorname{cosec} \theta$$

$$28. \sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} + \sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = 2 \sec \theta$$

$$29. \sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} + \sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = 2 \operatorname{cosec} \theta$$

$$30. \frac{1}{\operatorname{cosec} \theta + \cot \theta} - \frac{1}{\sin \theta} = \frac{1}{\sin \theta} - \frac{1}{\operatorname{cosec} \theta - \cot \theta}$$

$$31. \frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cot \theta$$

$$32. \frac{\cos A}{1 - \tan A} - \frac{\sin^2 A}{\cos A - \sin A} = \sin A + \cos A$$

$$33. \frac{1 + \cos \theta - \sin^2 \theta}{\sin \theta(1 + \cos \theta)} = \cot \theta$$

$$34. \frac{\operatorname{cosec} A}{\operatorname{cosec} A - 1} + \frac{\operatorname{cosec} A}{\operatorname{cosec} A + 1} = 2 + 2 \tan^2 A$$

$$35. \text{ If } \sin \theta + \cos \theta = \sqrt{2} \cos(90^\circ - \theta), \text{ determine } \cot \theta$$

## 10th Trigonometry Identities

36. If  $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$ , Show that  $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$
37. If  $\tan \theta + \sin \theta = m$  and  $\tan \theta - \sin \theta = n$ , Show that  $m^2 - n^2 = 4\sqrt{mn}$
38. If  $\sin \theta + \cos \theta = p$  and  $\sec \theta + \operatorname{cosec} \theta = q$  Show that  $q(p^2 - 1) = 2p$
39. If  $3 \tan \theta = 4$ , find the value of  $\frac{5 \sin \theta - 3 \cos \theta}{5 \sin \theta + 2 \cos \theta}$
40. If  $3 \cot \theta = 4$ , find the value of  $\frac{5 \cos \theta - 2 \sin \theta}{5 \cos \theta + 3 \sin \theta}$
41. If  $\frac{\cos \alpha}{\cos \beta} = m$  and  $\frac{\cos \alpha}{\sin \beta} = n$ , show that  $(m^2 + n^2) \cos^2 \beta = n^2$
42.  $a \cos \theta - b \sin \theta = x$  and  $a \sin \theta + b \cos \theta = y$ , prove that  $a^2 + b^2 = x^2 + y^2$
43. If  $\sec \theta = x + \frac{1}{4x}$ , prove that  $\sec \theta + \tan \theta = 2x$  or  $\frac{1}{2x}$
44. If  $x = p \sec \theta + q \tan \theta$  and  $y = p \tan \theta + q \sec \theta$ , prove that  $x^2 - y^2 = p^2 - q^2$
45. If  $\sin \theta + \sin^2 \theta = 1$  prove that  $\cos^2 \theta + \cos^4 \theta = 1$