

1 TRIGONOMETRY IDENTITIES

(A) IDENTITIES INVOLVING BASIC DEFINITIONS AND PYTHAGOREAN RELATIONSHIPS

1. $\sin A \cot A = \cos A$
2. $\cos A \tan A = \sin A$
3. $\cot A \sec A = \operatorname{cosec} A$
4. $\sin A \sec A = \tan A$
5. $\cos A \operatorname{cosec} A = \cot A$
6. $\cot A \sec A \sin A = 1$
7. $(1 - \cos^2 A) \operatorname{cosec}^2 A = 1$
8. $(1 - \sin^2 A) \sec^2 A = 1$
9. $\cot^2 \theta (1 - \cos^2 \theta) = \cos^2 \theta$
10. $(1 - \cos^2 \theta) \sec^2 \theta = \tan^2 \theta$
11. $(1 + \tan^2 A) \cos^2 A = 1$
12. $(\sec^2 A - 1) \cot^2 A = 1$
13. $(1 - \cos^2 \theta) (1 + \tan^2 \theta) = \tan^2 \theta$
14. $\sin^2 A (1 + \cot^2 A) = 1$
15. $(\operatorname{cosec}^2 A - 1) \tan^2 A = 1$
16. $\sin^2 \theta \cot^2 \theta + \sin^2 \theta = 1$
17. $(1 - \cos^2 A) (1 + \cot^2 A) = 1$
18. $(1 + \tan^2 \theta) (1 - \sin^2 \theta) = 1$
19. $\sin^2 \theta \sec^2 \theta = \sec^2 \theta - 1$
20. $\operatorname{cosec}^2 \theta \tan^2 \theta - 1 = \tan^2 \theta$
21. $\frac{1}{\sec^2 A} + \frac{1}{\operatorname{cosec}^2 A} = 1$
22. $\frac{1}{\cos^2 A} - \frac{1}{\cot^2 A} = 1$
23. $\frac{\sin A}{\operatorname{cosec} A} + \frac{\cos A}{\sec A} = 1$
24. $\frac{\sec A}{\cos A} - \frac{\tan A}{\cot A} = 1$
25. $\sin^4 \alpha - \cos^4 \alpha = 2 \sin^2 \alpha - 1$
26. $\sec^4 \alpha - 1 = 2 \tan^2 \alpha + \tan^4 \alpha$
27. $\operatorname{cosec}^4 \alpha - 1 = 2 \cot^2 \alpha + \cot^4 \alpha$
28. $(\tan \alpha \operatorname{cosec} \alpha)^2 - (\sin \alpha \sec \alpha)^2 = 1$
29. $(\sec \theta \cot \theta)^2 - (\cos \theta \operatorname{cosec} \theta)^2 = 1$
30. $\tan^2 \theta - \cot^2 \theta = \sec^2 \theta - \operatorname{cosec}^2 \theta$
31. $\frac{\sin \alpha \cot^2 \alpha}{\cos \alpha} = \frac{1}{\tan \alpha}$
32. $\frac{\sec^2 \alpha \cot \alpha}{\operatorname{cosec} \alpha} = \tan \alpha$
33. $\sec \theta - \tan \theta \sin \theta = \cos \theta$
34. $\tan \theta + \cot \theta = \sec \theta \operatorname{cosec} \theta$
35. $(\cos \theta + \sin \theta)^2 + (\cos \theta - \sin \theta)^2 = 2$
36. $(1 + \tan \theta)^2 + (1 - \tan \theta)^2 = 2 \sec^2 \theta$
37. $(\cot \theta - 1)^2 + (\cot \theta + 1)^2 = 2 \operatorname{cosec}^2 \theta$
38. $\sin^2 A (1 - \cot A)^2 + \cos^2 A (1 + \tan A)^2 = 2$
39. $\cos^2 A (\sec^2 A - \tan^2 A) + \sin^2 A (\operatorname{cosec}^2 A - \cot^2 A) = 1$
40. $\cot^2 \alpha + \cot^4 \alpha = \operatorname{cosec}^4 \alpha - \operatorname{cosec}^2 \alpha$
41. $\frac{\tan^2 \alpha}{1 + \tan^2 \alpha} \cdot \frac{1 + \cot^2 \alpha}{\cot^2 \alpha} = \sin^2 \alpha \sec^2 \alpha$
42. $\frac{1}{1 - \sin \alpha} + \frac{1}{1 + \sin \alpha} = 2 \sec^2 \alpha$
43. $\frac{\tan \alpha}{\sec \alpha - 1} + \frac{\tan \alpha}{\sec \alpha + 1} = 2 \operatorname{cosec} \alpha$
44. $\frac{1}{1 + \sin^2 \alpha} + \frac{1}{1 + \operatorname{cosec}^2 \alpha} = 1$
45. $(\sec \theta + \operatorname{cosec} \theta)(\sin \theta + \cos \theta) = \sec \theta \operatorname{cosec} \theta + 2$
46. $(\cos \theta - \sin \theta)(\operatorname{cosec} \theta - \sec \theta) = \sec \theta \operatorname{cosec} \theta - 2$
47. $(1 + \cot \theta + \operatorname{cosec} \theta)(1 + \cot \theta - \operatorname{cosec} \theta) = 2 \cot \theta$
48. $(\sec \theta + \tan \theta - 1)(\sec \theta - \tan \theta + 1) = 2 \tan \theta$
49. $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = \tan^2 A + \cot^2 A + 7$
50. $(\tan \theta + \sec \theta)^2 = \frac{1 + \sin \theta}{1 - \sin \theta}$
51. $\sin^4 A + 2 \cos^2 A - \cos^4 A = 1$
52. $(1 + \tan^2 A)(1 - \tan^2 A) = 2 \sec^2 A - \sec^4 A$
53. $\cos^3 x + \sin^3 x = (\cos x + \sin x)(1 - \sin x \cos x)$
54. $\sin^4 y - 2 \sin^2 y = \cos^4 y - 1$
55. $\frac{\sqrt{1 - \cos^2 \theta}}{\cos \theta} \times \sqrt{\sec^2 \theta - 1} = \tan^2 \theta$
56. $\frac{\cos x}{1 + \sin x} + \frac{1 + \sin x}{\cos x} = 2 \sec x$
57. $\sin^2 A \times \tan A + \cos^2 A \times \cot A + 2 \sin A \times \cos A$
 $= \tan A + \cot A$