Introduction to Trigonometry

1. Prove the following identities : 1+ sec A/SecA = $\sin^2$ A/1 - cos A

2. Prove that : 1/ secθ − tanθ − 1/ cosθ = 1/cosθ −1/ secθ + tanθ

3. Prove the following identity:

   (sin A + cosec A)^2 + (cos A + sec A)^2 = 7 + $\tan^2$A + $\cot^2$A.

4. If x/a cos = y/bsin and

   ax/cos = by/sin = $a^2 - b^2$ prove that $x^2/a^2 + y^2/b^2$

5. If cotA =4/3 check (1 – $\tan^2$A)/ 1 + $\tan^2$A = $\cot^2$A – $\sin^2$A

6. sin (A – B) = ½, cos(A + B) = ½ find A and B

7. Evaluate tan5° tan25° tan30° tan65° tan85°

8. Verify 4($\sin^4$30° + cos ^{4}60°) – 3($\cos^2$45° – $\sin^2$90°) = 2

9. Show that tan48° tan23° tan 42° tan67° = 1

10. sec4A = cosec(A – 20) find A

11. tan A = cot B prove A + B = 90

12. A, B, and C are the interior angles of ∆ABC show that sin(B + C)/2 = cos A/2

13. In ∆ABC, if sin (A + B – C) = √3/2 and cos(B + C – A) =1/√2, find A, B and C.

14. If cos θ = and θ + φ = 900, find the value of sin φ.

15. If tan 2A = cot (A – 18^0), where 2A is an acute angle, find the value of A.

16. If 2sin (x/2) = 1 , then find the value of x.

17. If tan A = ½ and tan B = 1/3 ,

by using tan (A + B) = (tan A + tan B)/ 1 - tan A. tan B prove that A + B = 45º

18. Express sin 76° + cos 63° in terms of trigonometric ratios of angles between 0° and 45°.
19. Prove that: $2 \sec^2 \theta - \sec^4 \theta - 2 \text{cosec}^2 \theta + \text{cosec}^4 \theta = \cot^4 \theta - \tan^4 \theta$
20. Find the value of θ for which sin θ – cos θ = 0
21. Given that sin2A + cos2A = 1, prove that cot2A = cosec2A – 1
22. If sin (A + B) = 1 and sin (A – B)=1/2 $0^o < A + B \le 90^o$; A > B, find A and B.
23. Show that $\tan 62^0/\cot 28^0 = 1$
24. If $\sin A + \sin^2 A = 1$, prove that $\cos^2 A + \cos^4 A = 1$.
25. If sec 4A = cosec ($A - 20^0$), where 4A is an acute angle, find the value of A.
26. Prove that (cosec θ – sec θ) (cot θ – tan θ) = (cosec θ + sec θ) (sec θ . cosec θ – 2)
27. Given that $A = 60^o$, verify that $1 + \sin A = (\text{Cos } A/2 + \text{Sin } A/2)^2$
28. If sin θ + cos θ = x and sin θ – cos θ = y, show that $x^2 + y^2 = 2$
29. Show that $\sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$
30. If $\theta = 45^o$. Find the value of sec2θ
31. Evaluate: $\cos 60^o \cos 45^o - \sin 60^o \sin 45^o$
32. Find the value of $\tan 15^o.\tan 25^o.\tan 30^o \tan 65^o \tan 85^o$
33. If θ is a positive acute angle such that sec θ = cosec60o, then find the value of 2cos2 θ -1
34. Find the value of sin65-cos25 without using tables.
35. If sec5A=cosec($A-36^o$). Find the value of A.
36. If 2 sin x/2 - 1 =0, find the value of x.
37. If A, B and C are interior angles of ΔABC, then prove that cos (B+C)/2 = sinA/2
38. Find the value of $9\sec^2 A - 9\tan 2A$.

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39. Prove that sin6θ+cos6θ=1-3sin2θcos2θ.

40. If 5tanθ-4=0, then find the value of (5sinθ - 4cosθ) (5sinθ + 4cosθ)

41. In ABC, <c=90^o, tan A= and tan B=<3.Prove that sin A. cos B+ cos A .sin B=1.

42. In Δ ABC, right angled at B, if tan a =1/√3 find the value of Sin A cos C + cos A sin C.

43. Show that 2($\cos^4$ 60 + $\sin^4$ 30)- ($\tan^2$ 60 + $\cot^2$ 45) + 3$\sec^2$ 30 =1/4

44. sin(50 +q) - cos(40 -q) + tan1 tan10 tan 20 tan 70 tan80 tan89 =1

45. Given tan A =4/3, find the other trigonometric ratios of the angle A.

46. In a right triangle ABC, right-angled at B, if tan A = 1, then verify that 2 sin A cos A = 1.

47. In D OPQ, right-angled at P, OP = 7 cm and OQ – PQ = 1 cm. Determine the values of sin Q and cos Q.

48. In Δ ABC, right-angled at B, AB = 24 cm, BC = 7 cm. Determine:(i) sin A , cos A(ii) sin C, cos C

49. If ∠A and ∠B are acute angles such that cos A = cos B, then show that ∠ A = ∠B.

50. If cot A= 7/8 evaluate: {(1 + sinA)(1 – sinA)} / {(1+ cosA)(1-cosA)

51. In triangle ABC, right-angled at B, if tan A = 1/√3

find the value of :(i) sin A cos C + cos A sin C (ii) Cos A cos C – sin A sin C

52. In D ABC, right angled at B, AB = 5 cm and ÐACB = 300 Determine the lengths of the sides BC and AC.

53. In Δ PQR, right – angled at Q, PQ = 3 cm and PR = 6 cm. Determine ∠QPR and ∠PRQ

54. If sin (A-B) = ½ ,cos(A+B) = ½ $A+ B = o < A+ B \le 90$, $A > B$ find A and B

55. Evaluate the following: (5$\cos^2$60 + 4$\sec^2$30 - $\tan^2$ 45)/ ($\sin^2$ 30 + $\cos^2$ 30)

56. If sin 3 A = cos (A – 26), where 3 A is an acute angle, find the value of A.

57. Prove the trigonometric identities (1 - cos A)/(1 – cos A) = (cosec A – cot A)^2

58. Prove the trigonometric identities (1+ 1/$\tan^2$A) (1 + 1/$\cot^2$A) = 1/($\sin^2$A- $\cos^4$A)

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59. Prove the trigonometric identities $(\sec^4A - \sec^2A) = \tan^4A + \tan^2A = \sec^2 A \tan^2 A$

60. Prove the trigonometric identities $\cot A - \tan A = (2\cos^2A - 1)/(\sin A.\cos A)$

61. Prove the trigonometric identities. $(1 - \sin A + \cos A)^2 = 2(1 + \cos A)(1 - \sin A)$

62. If $\tan A + \sin A = m$ and $\tan A - \sin A = n$ show that $m^2 - n^2 = 4\sqrt{mn}$

63. If $x = p\sec A + q\tan A$ and $y = p\tan A + q\sec A$ prove that $x^2 - y^2 = p^2 - q^2$

64. If $\sin A + \sin^2A = 1$ prove that $\cos^2 A + \cos^4 A = 1$

65. Express the following in terms of t-ratios of angles between 0° and 45°.

1) sin 85° +cosec 85°
2) cosec 69° +cot 69°
3) sin 81° +tan 81°
4) cos 56° +cot 56°

66. [sin (90 -A) sin A]/tan A-1 = - sin² A
67. cos cos(90° -) -sin sin (90° -) = 0
68. sin (90° -) cos (90° -) = tan /(1 +tan²)
69. cosec² (90° -) -tan²   = cos²(90° -) +cot²
70. If cos /cos = m and cos /sin = n, show that (m² +n²) cos² = n².If x = r cos sin ,
y = r cos cos and z = r sin , show that x² +y² +z² = r².