46. If $\sin 3\theta = \cos(\theta - 6°)$, where 3θ and $(\theta - 6°)$ are acute angles, find the value of θ.
47. If $\sin 5\theta = \cos 4\theta$, where 5θ and 4θ are acute angles, find the value of θ.
48. If A and B are acute angles and $\sin A = \cos B$, prove that $A + B = 90°$.
49. If A, B and C are the interior angles of a triangle ABC, show that: $\sin\frac{B+C}{2} = \cos\frac{A}{2}$
50. If $A + B = 90°$, prove that:

$$\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$$

----- x -----

Er Manish Bhadoria's Interactions Study Circle
Strong Foundation for a bright future
Nimbalkar's Goth – 2, Kampoo, Lashkar, Gwl
Ph: 6450282, 2424758 Mob: 92294 97622
Website: http://manishbhadoria.blogspot.com

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08 Trigonometry

(Work Sheet – 3)

Express each of the following in terms of trigonometric ratios of angles between 0° and 45°.

1. $\cos 75° + \cot 75°$
2. $\sin 85° + \sec 68°$
3. $\tan 68° + \sec 68°$
4. $\text{cosec } 69° + \cot 69°$
5. $\sin 81° + \tan 81°$

Without using trigonometric tables, evaluate the following:

6. $\sec 50° \sin 40° + \cos 40° \text{ cosec } 50°$
7. $\sin^2 20° + \sin^2 70°$
8. $\frac{\cos^2 20° + \cos^2 70°}{\sin^2 59° + \sin^2 31°}$
9. $\text{cosec}^2 67° - \tan^2 23°$
10. $\frac{3\sin 62°}{\cos 28°} - \frac{\sec 42°}{\text{cosec } 48°}$
11. $\frac{\cot 54°}{\tan 36°} + \frac{\tan 20°}{\cot 70°} - 2$
12. $\frac{2\tan 53°}{\cot 37°} - \frac{\cot 80°}{\tan 10°}$
13. $\left(\frac{\sin 35°}{\cos 55°}\right)^2 + \left(\frac{\cos 55°}{\sin 35°}\right)^2 - 2\cos 60°$
14. $\frac{2\cos 67°}{\sin 23°} - \frac{\tan 40°}{\cot 50°} - \cos 0°$

15. $\left(\frac{\sin 47°}{\cos 43°}\right)^2 + \left(\frac{\cos 43°}{\sin 47°}\right)^2 - 4\cos^2 45°$

16. $\frac{\cos^2 20° + \cos^2 70°}{\sin^2 59° + \sin^2 31°}$

17. $\frac{\sin^2 20° + \sin^2 70°}{\cos^2 20° + \cos^2 70°} + \frac{\sin(90° - \theta)\sin\theta}{\tan\theta} + \frac{\cos(90° - \theta)\cos\theta}{\cot\theta}$

18. $\cos(40° + \theta) - \sin(50° - \theta) + \frac{\cos^2 40° + \cos^2 50°}{\sin^2 40° + \sin^2 50°}$

19. $\frac{\cos 70°}{\sin 20°} + \frac{\cos 55° \operatorname{cosec} 35°}{\tan 5° \tan 25° \tan 45° \tan 65° \tan 85°}$

20. $\cot 12° \cot 38° \cot 52° \cot 60° \cot 78°$

21. $\tan 5° \tan 25° \tan 30° \tan 65° \tan 85°$

22. $\sec^2 10° - \cot^2 80° + \frac{\sin 15° \cos 75° + \cos 15° \sin 75°}{\cos\theta \sin(90° - \theta) + \sin\theta \cos(90° - \theta)}$

23. $\sin(50° + \theta) - \cos(40° - \theta) + \tan 1° \tan 10° \tan 20° \tan 70° \tan 80° \tan 89°$

24. $\cot\theta \tan(90° - \theta) - \sec(90° - \theta) \operatorname{cosec}\theta + \sin^2 25° + \sin^2 65° + \sqrt{3}(\tan 5° \tan 45° \tan 85°)$

25. $\frac{-\tan\theta \cot(90° - \theta) + \sec\theta \operatorname{cosec}(90° - \theta) + \sin^2 35° + \sin^2 55°}{\tan 10° \tan 20° \tan 45° \tan 70° \tan 80°}$

Prove that:

26. $\frac{\cos(90° - \theta)}{\sin\theta} + \frac{\sin\theta}{\cos(90° - \theta)} = 2, \theta \neq 0°$

27. $\sec^2\theta - \cot^2(90° - \theta) = \cos^2(90° - \theta) + \cos^2\theta$

28. $\frac{\cos(90° - \theta)\cos\theta}{\tan\theta} + \cos^2(90° - \theta) = 1$

29. $\cos(81° + \theta) = \sin(9° - \theta)$

30. $\frac{\cos 20°}{\sin 70°} + \frac{\cos\theta}{\sin(90° - \theta)} = 2$

31. $\sin\theta \cos(90° - \theta) + \cos\theta \sin(90° - \theta) = 1$

32. $\cot(90° - \theta) \sin(90° - \theta) = \sin\theta$

33. $\tan 15° \tan 20° \tan 70° \tan 75° = 1$

34. $\frac{\sin(90° - \theta)\sin\theta}{\tan\theta} - 1 = -\sin^2\theta$.

35. $\frac{\sin(90° - \theta)\cos(90° - \theta)}{\tan\theta} = 1 - \sin^2\theta$.

36. $\operatorname{cosec}^2(90° - \theta) - \tan^2\theta = \cos^2(90° - \theta) + \cos^2\theta$.

37. $\tan 1° \tan 2° \tan 3° \ldots \tan 89° = 1$

38. $\sin 35° \sin 55° - \cos 35° \cos 55° = 0$

39. $\frac{\cos 70°}{\sin 20°} + \frac{\cos 59°}{\sin 31°} - 8\sin^2 30° = 0$

40. $\frac{\sin\theta}{\sin(90° - \theta)} + \frac{\cos\theta}{\cos(90° - \theta)} = \sec\theta \operatorname{cosec}\theta$

41. $\sin(90° - \theta)\cos(90° - \theta) = \frac{\tan\theta}{1 + \cot^2(90° - \theta)}$

42. $\frac{\cos(90° - \theta)}{1 + \sin(90° - \theta)} + \frac{1 + \sin(90° - \theta)}{\cos(90° - \theta)} = 2\operatorname{cosec}\theta$

43. $\frac{1}{1 + \cos(90° - \theta)} + \frac{1}{1 - \cos(90° - \theta)} = 2\operatorname{cosec}^2(90° - \theta)$

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44. Find θ if $\sin(\theta + 36°) = \cos\theta$, where $(\theta + 36°)$ is and acute angle.

45. If $\tan 2\theta = \cot(\theta + 6°)$, where 2θ and $(\theta + 6°)$ are acute angles, find the value of θ.

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Mob: 92294 97622 Website: http://manishbhadoria.blogspot.com