Hitesh sir classes (maths)

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TRIGONOMETRY ABHYAS 02

Class 11 - Mathematics

1. If cos x = $\frac{-3}{5}$ and $\frac{\pi}{2} < x < \pi$, then sin $\frac{x}{2}$ = ? **[1]**

   a) $\frac{2}{\sqrt{5}}$
   b) $\frac{-1}{\sqrt{5}}$
   c) $\frac{-2}{\sqrt{5}}$
   d) $\frac{1}{\sqrt{5}}$

2. $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ = ? **[1]**

   a) 2 sin θ
   b) 2 cos θ
   c) sin 2θ
   d) cos 2θ

3. If $\pi < x < 2\pi$, then $\sqrt{\frac{1+\cos x}{1-\cos x}}$ is equal to **[1]**

   a) - cosec x + cot x
   b) - cosec x - cot x
   c) cosec x + cot x
   d) cosec x - cot x

4. If cos θ = $\frac{-1}{2}$ and θ lies in quadrant II, then (2sin θ + tan θ) = ? **[1]**

   a) 0
   b) $\frac{3\sqrt{3}}{2}$
   c) $\frac{-\sqrt{3}}{2}$
   d) None of these

5. The angle between the hour hand and the minute hand of a clock at half past three is **[1]**

   a) 54°
   b) 72°
   c) 75°
   d) 63°

6. Prove that sin $\frac{\pi}{5}$sin $\frac{2\pi}{5}$ sin $\frac{3\pi}{5}$sin $\frac{4\pi}{5} = \frac{5}{16}$. **[2]**
7. If A + B + C = π, prove that tan A + tan B + tan C = tan A tan B tan C **[2]**
8. Prove that: $\sin^2\frac{\pi}{18} + \sin^2\frac{\pi}{9} + \sin^2\frac{7\pi}{18} + \sin^2\frac{4\pi}{9} = 2.$ **[2]**
9. Prove that: $\sin^2$ B = $\sin^2$ A + $\sin^2$ (A - B) - 2 sin A cos B sin (A - B). **[2]**
10. Prove that tan 6° tan 42° tan 66° tan 78° = 1. **[2]**
11. If tan A - tan B = x and, cot B - cot A = y, move that cot (A - B) $= \frac{1}{x} + \frac{1}{y}$. **[2]**
12. If $\cos\theta = \frac{-\sqrt{3}}{2}$ and θ lies in Quadrant III, find the value s of all the other five trigonometric functions. **[2]**
13. Prove that $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}$ = 2 cosθ **[2]**
14. Prove that: tan x + tan$\left(\frac{\pi}{3}+x\right)$ - tan$\left(\frac{\pi}{3}-x\right)$ = 3 tan 3x. **[2]**
15. If A + B + C = π, prove that $\sin^2$A + $\sin^2$B + $\sin^2$C = 2(1 + cos A cos B cos C). **[2]**
16. Prove that $\sqrt{\frac{1+\sin x}{1-\sin x}} = \tan\left(\frac{\pi}{4}+\frac{x}{2}\right)$. **[2]**
17. If 2 $\sin^2\theta$ = 3 cos θ, where $0 \leq \theta \leq 2\pi$, then find the value of θ. **[2]**
18. Prove that: cos 20° + cos 100^o + cos 140° = 0. **[2]**

19. If A + B + C = π, prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2 \sin A \sin B \cos C$ **[2]**

20. If sin x = n sin (x + 2α), prove that tan (x + α) = $\frac{1+n}{1-n}\tan\alpha$. **[2]**

21. Prove that $\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)$ = tan x + sec x. **[2]**

22. If sin A = $\frac{3}{5}$ and A is in I quadrant, then find sin 2 A, cos 2 A and tan 2 A. **[2]**

23. Find the degree measure of the angle subtended at the centre of a circle of diameter 60 cm by an arc of length 16.5 cm. **[2]**

24. If tan (A + B) = p, tan (A - B) = q, then show that tan 2A = $\frac{p+q}{1-pq}$ **[2]**

[Hint: Use 2A = (A + B) + (A - B)]

25. If A + B = $\frac{\pi}{3}$ and cos A + cos B = 1, then find the value of cos $\frac{A-B}{2}$. **[2]**

26. Prove that: $\left(1+\cos\frac{\pi}{10}\right)\left(1+\cos\frac{3\pi}{10}\right)\left(1+\cos\frac{7\pi}{10}\right)\left(1+\cos\frac{9\pi}{10}\right) = \frac{1}{16}$. **[3]**

27. If sin x = $\frac{4}{5}$ and 0 < x < $\frac{\pi}{2}$, find the value of sin 4x. **[3]**

28. If $\cos\theta = \frac{\cos\alpha-\cos\beta}{1-\cos\alpha\cos\beta}$, prove that $\tan\frac{\theta}{2} = \pm\tan\frac{\alpha}{2}\cot\frac{\beta}{2}$. **[3]**

29. Prove that cos x cos 2x cos 4x cos 8x $= \frac{\sin 16x}{16\sin x}$. **[3]**

30. If $\cos x = \frac{-3}{5}$ and $\frac{\pi}{2} < x < \pi$, find the values of **[3]**

   i. $\sin\frac{x}{2}$
   ii. $\cos\frac{x}{2}$
   iii. $\tan\frac{x}{2}$

31. Prove that sin 4A = 4sin A $\cos^3$ A - 4 cos A $\sin^3$ A. **[3]**

32. Prove that: $\cos^3 x + \cos^3\left(\frac{2\pi}{3}+x\right) + \cos^3\left(\frac{4\pi}{3}+x\right) = \frac{3}{4}\cos 3x$. **[3]**

33. Prove that: sin (n + 1) x sin (n + 2) x + cos (n +1) x cos (n + 2) x = cos x **[3]**

34. If A + B = $\frac{\pi}{4}$, prove that **[3]**

   i. (1 + tan A) (1 + tan B) = 2
   ii. (cot A - 1) (cot B - 1) = 2

35. Prove that: $\tan\frac{\pi}{16} = \sqrt{4+2\sqrt{2}} - (\sqrt{2}+1)$. **[3]**

36. If sec (x + α) + sec(x - α) = 2 sec x, prove that cos x = $\pm\sqrt{2}\cos\frac{\alpha}{2}$. **[5]**

37. Prove that: 4 sin A sin (60^o - A) sin (60^o + A) = sin 3A. **[5]**

Hence deduce that: sin $20^o \times$ sin $40^o \times$ sin $60^o \times$ sin 80^o = $\frac{3}{16}$

38. If cos x = $-\frac{3}{5}$ and x lies in the IIIrd quadrant, find the values of $\cos\frac{x}{2}$, $\sin\frac{x}{2}$ and sin 2x. **[5]**

39. Prove that: sin 5x = 5 sin x - 20 $\sin^3$ x + 16 $\sin^5$ x. **[5]**

40. If cos x = $\frac{\cos\alpha+\cos\beta}{1+\cos\alpha\cos\beta}$, prove that $\tan\frac{x}{2} = \pm\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$. **[5]**