

SELF ASSESSMENT TEST -6**CLASS 10+1**

T-RATIO OF MULTIPLE ANGLES

1. Find the value of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$, $\tan \frac{x}{2}$, when $\tan x = \frac{4}{5}$ and x lies in 2nd quad.

2. Prove $\operatorname{cosec} 2A + \cot 2A = \cot A$.

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

4. Prove $\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} = \tan \frac{\theta}{2}$.

5. Prove that $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 8\theta}}} = 2 \cos \theta$.

6. Prove $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$.

7. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, find the value of $\tan (2A + B)$.

8. If $\tan \theta = \frac{a}{b}$, prove that $b \cos 2\theta + a \sin 2\theta = b$.

9. If $\tan A = \frac{1}{7}$ and $\tan B = \frac{1}{3}$, show that $\cos 2A = \sin 4B$.

10. If $2 \tan A = 3 \tan B$, prove that $\tan (A - B) = \frac{\sin 2B}{5 - \cos 2B}$.

11. Prove $\cos^2 \frac{\pi}{8} + \cos^2 \frac{3\pi}{8} + \cos^2 \frac{5\pi}{8} + \cos^2 \frac{7\pi}{8} = 2$.

12. Prove that $(1 + \cos \frac{\pi}{8})(1 + \cos 3 \frac{\pi}{8})(1 + \cos 5 \frac{\pi}{8})(1 + \cos 7 \frac{\pi}{8}) = \frac{1}{8}$.

13. Prove $\cos^2 A + \cos^2\left(A + \frac{2\pi}{3}\right) + \cos^2\left(A - \frac{2\pi}{3}\right) = \frac{3}{2}$.

14. Prove $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8} = \frac{3}{2}$.

15. Prove $\cos \frac{\pi}{7} \cos \frac{2\pi}{7} \cos \frac{4\pi}{7} = \frac{-1}{8}$.

16. Prove $\cos \frac{2\pi}{15} \cos \frac{4\pi}{15} \cos \frac{8\pi}{15} \cos \frac{14\pi}{15} = \frac{1}{16}$.

17. Prove $\cos \frac{\pi}{15} \cos \frac{2\pi}{15} \cos \frac{3\pi}{15} \cos \frac{4\pi}{15} \cos \frac{5\pi}{15} \cos \frac{6\pi}{15} \cos \frac{7\pi}{15} = \frac{1}{128}$.

18. If $\theta = \frac{\pi}{2^{n+1}}$ prove that $2^n \cos \theta \cos 2\theta \cos 2^2 \theta \dots \cos 2^{n-1} \theta = 1$

19. Prove $\cos 4X = 1 - 8 \sin^2 x \cos^2 x$.

20. Prove $\tan 4A = \frac{4 \tan A (1 - \tan^2 A)}{1 - 6 \tan^2 A + \tan^4 A}$.

21. Find the value of (a) $\sin 7\frac{1}{2}^\circ$ (b) $\sin 22\frac{1}{2}^\circ$ (c) $\tan 22\frac{1}{2}^\circ$ (d) $\cos \frac{\pi}{24}$

(e) $\tan \frac{\pi}{24}$.

22. Prove $\tan A + \tan (60^\circ + A) + \tan (120^\circ + A) = 3 \tan 3A$.

23. Prove $\cos 5A = 16 \cos^5 A - 20 \cos^3 A + 5 \cos A$.

24. Prove $\cos 6\theta = 32 \cos^6 \theta - 48 \cos^4 \theta + 18 \cos^2 \theta - 1$.

25. If $2 \cos A = x + \frac{1}{x}$, prove that $2 \cos 3A = x^3 + \frac{1}{x^3}$.

