

HOTS

1. If $2\cos \theta - \sin\theta = x$ and $\cos\theta - 3\sin\theta = y$, Prove that $2x^2 + y^2 - 2xy = 5$

2. If $(\sec A + \tan A)(\sec B + \tan B)(\sec C + \tan C) = (\sec A - \tan A)$
 $(\sec B - \tan B)(\sec C - \tan C)$

Prove that each is equal to ± 1

3. In an acute angled ΔABC , if $\sin (A + B - C) = \frac{1}{2}$ and $\cos (B + C - A) = \frac{1}{\sqrt{2}}$,

find $\angle A, \angle B, \angle C$

4. If $x = a \cos^3\theta$, $y = b \sin^3\theta$, Prove that $\left\{\frac{x}{a}\right\}^{\frac{2}{3}} + \left\{\frac{y}{b}\right\}^{\frac{2}{3}} = 1$

5. If $\sec\theta = x + \frac{1}{4x}$ Prove that $\sec \theta + \tan \theta = 2x$ or $\frac{1}{2x}$

6. If $\sqrt{3} \cot^2\theta - 4 \cot \theta + \sqrt{3} = 0$ then find the value of $\cot^2\theta + \tan^2\theta$

7. Prove the identity: $-\frac{\sec A - \tan A}{\sec A + \tan A} = 1 - 2 \sec A \cdot \tan A + 2 \tan^2 A$

8. Prove that: $\frac{\sin A}{1 - \cos A} - \frac{\tan A}{1 + \cos A} = \sec A \cdot \operatorname{cosec} A + \cot A$

9. If $A + B = 90$, Prove that $\sqrt{\frac{\tan A \cdot \tan B + \tan A \cdot \cot B}{\sin A \cdot \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$

10. Prove without using trigonometric tables: $\sin^2 5^\circ + \sin^2 10^\circ + \dots + \sin^2 85^\circ + \sin^2 90^\circ = 9 \frac{1}{2}$

11. If $3 \sin\theta + 5 \cos \theta = 5$, Prove that $5 \sin\theta - 3 \cos\theta = \pm 3$

12. Prove that $\frac{\tan^3\theta}{1 + \tan^2\theta} + \frac{\cot^3\theta}{1 + \cot^2\theta} = \sec\theta \operatorname{cosec}\theta - 2 \sin\theta \cdot \cos\theta$

13. If $(a^2 - b^2) \sin \theta + 2ab \cos \theta = a^2 + b^2$, Prove that $\tan \theta = \frac{a^2 - b^2}{2ab}$

14. If $x = r \cos\alpha \cdot \sin\beta$, $y = r \cos\alpha \cdot \cos\beta$, $z = r \sin \alpha$ then Prove that $x^2 + y^2 + z^2 = r^2$