

10th CBSE MATHS HOTS QUS ANSWERS

1. In a right triangle ABC, right angled at B, the ratio of AB to AC is $1 : \sqrt{2}$. Find the values of

(i) $\frac{2 \tan A}{1 + \tan^2 A}$ and (ii) $\frac{2 \tan A}{1 - \tan^2 A}$

2. Show that :

(i) $2(\cos^2 45^\circ + \tan^2 60^\circ) - 6(\sin^2 45^\circ - \tan^2 30^\circ) = 6$

(ii) $2(\cos^4 60^\circ + \sin^4 30^\circ) - (\tan^2 60^\circ + \cot^2 45^\circ) + 3 \sec^2 30^\circ = \frac{1}{4}$

3. Find the value of x in each of the following :

(i) $\tan 3x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$

(ii) $\cos x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$

4. If $x = 30^\circ$, verify that

(i) $\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$

(ii) $\sin x = \sqrt{\frac{1 - \cos 2x}{2}}$

5. If $\tan A = \sqrt{2} - 1$, show that $\sin A \cos A = \frac{\sqrt{2}}{4}$.

6. Using the formula,

$\sin(A - B) = \sin A \cos B - \cos A \sin B$, find the value of $\sin 15^\circ$.

7. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; $0^\circ < A + B \leq 90^\circ$; $A > B$, find A and B.

8. Prove the following identities :

(i) $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$

(ii) $(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2 = (1 + \sec \theta \operatorname{cosec} \theta)^2$

(iii) $\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$

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9. Prove the following identities :

(i) $\cos^4 A - \cos^2 A = \sin^4 A - \sin^2 A$

(ii) $\cot^4 A - 1 = \operatorname{cosec}^4 A - 2\operatorname{cosec}^2 A$

(iii) $\sin^6 A + \cos^6 A = 1 - 3\sin^2 A \cos^2 A.$

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

11. If $\cos\theta + \sin\theta = \sqrt{2} \cos\theta$, show that

$$\cos\theta - \sin\theta = \sqrt{2} \sin\theta.$$

12. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, show that $q(p^2 - 1) = 2p$

13. If $\sec\theta + \tan\theta = p$, show that $\frac{p^2 - 1}{p^2 + 1} = \sin\theta$.

14. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, prove that $a^2 + b^2 = m^2 + n^2$.

15. If $\sin\theta + \sin^2\theta = 1$, prove that $\cos^2\theta + \cos^4\theta = 1$.

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