UDAAN 2025

TRIGONOMETRY (Level - 02)

Practice Sheet

Prove the following trigonometric identities:

1. $\dfrac{1+\cos\theta+\sin\theta}{1+\cos\theta-\sin\theta}=\dfrac{1+\sin\theta}{\cos\theta}$

2. $\dfrac{\sin\theta-\cos\theta+1}{\sin\theta+\cos\theta-1}=\dfrac{1}{\sec\theta-\tan\theta}$

   [CBSE 2001, NCERT]

3. $(\sin\theta+\cos\theta)(\tan\theta+\cot\theta)=\sec\theta+\operatorname{cosec}\theta$

   [NCERT Exemplar]

4. $\dfrac{1}{\sec A+\tan A}-\dfrac{1}{\cos A}=\dfrac{1}{\cos A}-\dfrac{1}{\sec A-\tan A}$

   [CBSE 2005]

5. $\dfrac{\tan A}{1+\sec A}-\dfrac{\tan A}{1-\sec A}=2\operatorname{cosec} A$

   [NCERT Exemplar]

6. If $\operatorname{cosec}\theta=2x$ and $\cot\theta=\dfrac{2}{x}$, find the value of

   $2\left(x^2-\dfrac{1}{x^2}\right).$ ` **[CBSE 2010]**

7. If $\operatorname{cosec}\theta+\cot\theta=m$ and $\operatorname{cosec}\theta-\cot\theta=n$, prove that $mn=1$.

8. $\dfrac{\tan^3\theta}{1+\tan^2\theta}+\dfrac{\cot^3\theta}{1+\cot^2\theta}=\sec\theta\,\operatorname{cosec}\theta-2\sin\theta\cos\theta$

9. If $x=a\cos^3\theta,\ y=b\sin^3\theta,$ prove that
   $\left(\dfrac{x}{a}\right)^{2/3}+\left(\dfrac{y}{b}\right)^{2/3}=1.$

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

11. If $\cos A+\cos^2 A=1,$ prove that $\sin^2 A+\sin^4 A=1$

12. $\left(\tan\theta+\dfrac{1}{\cos\theta}\right)^2+\left(\tan\theta-\dfrac{1}{\cos\theta}\right)^2=2\left(\dfrac{1+\sin^2\theta}{1-\sin^2\theta}\right)$

13. $(\sec A+\tan A-1)(\sec A-\tan A+1)=2\tan A$

14. $(1+\cot A-\operatorname{cosec} A)(1+\tan A+\sec A)=2$

15. $\dfrac{\cos A\operatorname{cosec} A-\sin A\sec A}{\cos A+\sin A}=\operatorname{cosec} A-\sec A$

16. $\dfrac{\tan A}{\left(1+\tan^2 A\right)^2}+\dfrac{\cot A}{\left(1+\cot^2 A\right)^2}=\sin A\cos A$

17. $(1+\cot A+\tan A)(\sin A-\cos A)$

    $=\dfrac{\sec A}{\operatorname{cosec}^2 A}-\dfrac{\operatorname{cosec} A}{\sec^2 A}=\sin A\tan A-\cot A\cos A$

    [CBSE 2008]

18. If $\tan\theta+\cot\theta=2,$ find the value of $\tan^2\theta+\cot^2\theta$.

Answer Key

1. **(Prove)**

2. **(Prove)**

3. **(Prove)**

4. **(Prove)**

5. **(Prove)**

6. **(Prove)**

7. **(Prove)**

8. **(Prove)**

9. **(Prove)**

10. **(Prove)**

11. **(Prove)**

12. **(Prove)**

13. **(Prove)**

14. **(Prove)**

15. **(Prove)**

16. **(Prove)**

17. **(Prove)**

18. **(Prove)**