

Trigonometric Identities & Equations

Date Planned : __ / __ / __	Daily Tutorial Sheet – 1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level – 1	Exact Duration: _____

Note (A) : Questions having asterisk marked against them may have more than one correct answer.

(B) : Questions having  (Symbol) marked against them have a video solution.

- Prove that $\cos^2\theta + \sec^2\theta$ can never be less than 2 for all values of $\theta \in R - \left(2n+1\right)\frac{\pi}{2}, n \in I$.
- If $7(\operatorname{cosec}\theta - 1) = 3 \cot\theta$, show that $3(\operatorname{cosec}\theta + 1) = 7 \cot\theta$.
- Show that : $\frac{1 + \operatorname{cosec}^2\alpha \tan^2\theta}{1 + \operatorname{cosec}^2\beta \tan^2\theta} = \frac{1 + \cot^2\alpha \sin^2\theta}{1 + \cot^2\beta \sin^2\theta}$.
- If $\frac{\cos A}{\cos B} = n, \frac{\sin A}{\sin B} = m$, show that :
 (a) $(m^2 - n^2) \sin^2 B = 1 - n^2$ (b) $(n^2 - m^2) \sin^2 A = m^2 (n^2 - 1)$
- If $\tan\theta = \frac{x \sin\phi}{1 - x \cos\phi}$ and $\tan\phi = \frac{y \sin\theta}{1 - y \cos\theta}$. Show that $x \sin\phi = y \sin\theta$.
- If α, β be two distinct angles satisfying the equation $a \cos\theta + b \sin\theta = c$, show that: $\cos(\alpha + \beta) = \frac{a^2 - b^2}{a^2 + b^2}$. 
- Eliminate θ from the following:
 (i) $a \cot\theta + b \operatorname{cosec}\theta = x^2$ and $b \cot\theta + a \operatorname{cosec}\theta = y^2$
 (ii) $\cos\theta + \sin\theta = m$ and $\sec\theta + \operatorname{cosec}\theta = n$
- If $\sin\alpha \sin\beta - \cos\alpha \cos\beta + 1 = 0$, prove that $1 + \cot\alpha \tan\beta = 0$.
- If an angle α be divided into two parts such that the ratio of tangents of the parts is k . If x be the difference between the two parts, then prove that: $\sin x = \frac{k-1}{k+1} \sin\alpha$. 
- Show that : $\cos A + \cos B + \cos C + \cos(A+B+C) = 4 \cos \frac{B+C}{2} \cos \frac{C+A}{2} \cos \frac{A+B}{2}$.
- Prove : $\frac{\sin 7x + \sin 3x}{\cos 7x + \cos 3x} = \tan 5x$.
- Prove : $\frac{1}{\tan 3\alpha - \tan \alpha} - \frac{1}{\cot 3\alpha - \cot \alpha} = \cot 2\alpha$
- If $\cos(A+B) \sin(C+D) = \cos(A-B) \sin(C-D)$, show that: $\cot A \cot B \cot C = \cot D$.
- If $\tan A \tan B = \sqrt{\frac{a-b}{a+b}}$, show that: $(a-b \cos 2A)(a-b \cos 2B) = a^2 - b^2$. 
- If $\sin x + \sin y = a, \cos x + \cos y = b$, prove that $\sin(x+y) = \frac{2ab}{a^2 + b^2}$. 