

Trigonometric Identities & Equations

Date Planned : __ / __ / __	Daily Tutorial Sheet – 1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration: _____

- A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides having fence are of same length x . The maximum area enclosed by the park is:
 (A) $\sqrt{\frac{x^3}{8}}$ (B) $\frac{1}{2}x^2$ (C) πx^2 (D) $\frac{3}{2}x^2$
- If $0 < x < \pi$ and $\cos x + \sin x = \frac{1}{2}$, then $\tan x$ is:
 (A) $\frac{(4-\sqrt{7})}{3}$ (B) $-\frac{(4+\sqrt{7})}{3}$ (C) $\frac{(1+\sqrt{7})}{4}$ (D) $\frac{(1-\sqrt{7})}{4}$
- In a ΔPQR , $\angle R = \frac{\pi}{2}$. If $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of $ax^2 + bx + c = 0$, $a \neq 0$, then:
 (A) $b = a + c$ (B) $b = c$ (C) $c = a + b$ (D) $a = b + c$
- Let $S = \left\{x \in (-\pi, \pi) : x \neq 0, \pm \frac{\pi}{2}\right\}$. The sum of all distinct solutions of the equation $\sqrt{3} \sec x + \csc x + 2(\tan x - \cot x) = 0$ in the set S is equal to:
 (A) $-7\pi/9$ (B) $-2\pi/9$ (C) 0 (D) $5\pi/9$
- For $x \in (0, \pi)$, the equation $\sin x + 2 \sin 2x - \sin 3x = 3$ has: ▶
 (A) infinitely many solutions (B) three solutions
 (C) one solution (D) no solution
- If $P = \{\theta : \sin \theta - \cos \theta = \sqrt{2} \cos \theta\}$ and $Q = \{\theta : \sin \theta + \cos \theta = \sqrt{2} \sin \theta\}$ be two sets. Then:
 (A) $P \subset Q$ & $Q - P \neq \phi$ (B) $Q \subset P$ (C) $P \subset Q$ (D) $P = Q$
- The number of solutions of the pair of equations $2 \sin^2 \theta - \cos 2\theta = 0$ and $2 \cos^2 \theta - 3 \sin \theta = 0$ in the interval $[0, 2\pi]$ is:
 (A) 0 (B) 1 (C) 2 (D) 4
- The set of values of θ satisfying the inequation $2 \sin^2 \theta - 5 \sin \theta + 2 > 0$, where $0 < \theta < 2\pi$, is:
 (A) $\left(0, \frac{\pi}{6}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$ (B) $\left(0, \frac{\pi}{4}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$ (C) $\left(0, \frac{\pi}{3}\right) \cup \left(\frac{2\pi}{3}, 2\pi\right)$ (D) None of these
- If $0 \leq x < 2\pi$, then the number of real values of x , which satisfy the equation $\cos x + \cos 2x + \cos 3x + \cos 4x = 0$, is:
 (A) 3 (B) 5 (C) 7 (D) 9
- The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are: ▶
 (A) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$ (B) $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$
 (C) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$ (D) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$
- The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2 \sin^2 x + 5 \sin x - 3 = 0$, is:
 (A) 6 (B) 1 (C) 2 (D) 4