



Air maths tuition

Interact, engage and perform

Trig Equations - Double Angle Types (2)

Solve $3\sin \frac{x}{2} + \cos x = 2$ for $0^\circ \leq x \leq 360^\circ$

$$\therefore 3\sin \frac{x}{2} + 1 - 2\sin^2 \frac{x}{2} = 2$$
$$\therefore 2\sin^2 \frac{x}{2} - 3\sin \frac{x}{2} + 1 = 0$$
$$\therefore (2\sin \frac{x}{2} - 1)(\sin \frac{x}{2} - 1) = 0$$
$$\therefore 2\sin \frac{x}{2} - 1 = 0 \text{ or } \sin \frac{x}{2} - 1 = 0$$
$$\therefore \sin \frac{x}{2} = \frac{1}{2} \text{ or } \sin \frac{x}{2} = 1$$

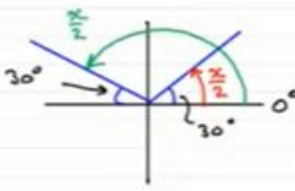
$\cos 2A \equiv \cos^2 A - \sin^2 A$
 $\equiv 2\cos^2 A - 1$
 $\equiv 1 - 2\sin^2 A$

let $2A = x$
 $\therefore A = \frac{x}{2}$

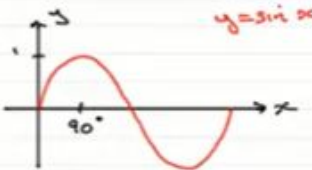
$$\therefore \cos x \equiv 1 - 2\sin^2 \frac{x}{2}$$
$$\sin \frac{x}{2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$\therefore \sin \frac{x}{2} = \frac{1}{2} \text{ or } \sin \frac{x}{2} = 1$

when $\sin \frac{x}{2} = \frac{1}{2}$

$$\therefore \frac{x}{2} = \sin^{-1} \frac{1}{2}$$
$$\therefore \frac{x}{2} = 30^\circ, 150^\circ$$
$$\therefore x = 60^\circ, 300^\circ$$


when $\sin \frac{x}{2} = 1$

$$\therefore \frac{x}{2} = \sin^{-1} 1$$
$$\therefore \frac{x}{2} = 90^\circ$$
$$\therefore x = 180^\circ$$


$\therefore x = 60^\circ, 180^\circ, 300^\circ$

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