27 / 10 / 16

Solving Trigonometric Equations - Lesson 6

Solving Other Trigonometric Equations Using Trigonometric Identities

LI

- Solve other trigonometric equations using trigonometric identities.

SC

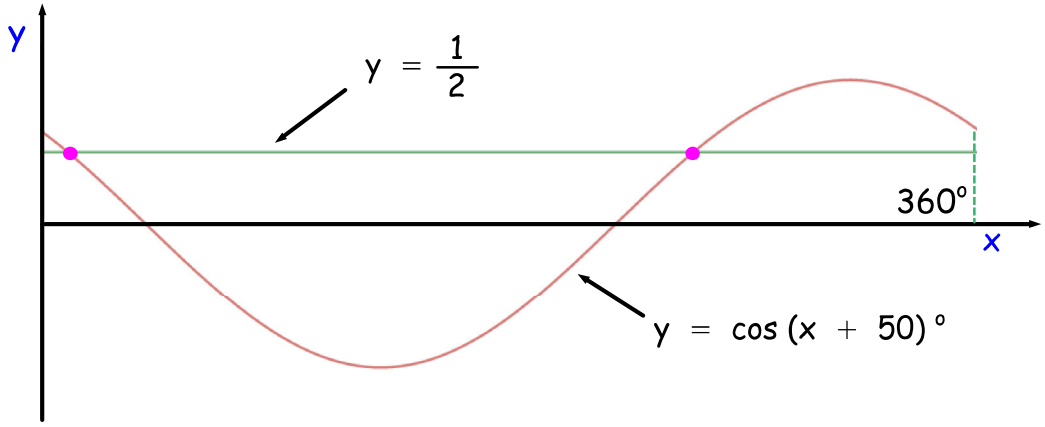
- Addition Formulae.
- Solve linear trig. equations.

Example 1

Solve $\cos x° \cos 50° - \sin x° \sin 50° = 0.5$ $(0 \leq x \leq 360)$.

$$\cos x° \cos 50° - \sin x° \sin 50° = 0.5$$

$$\cos (x + 50)° = 0.5$$



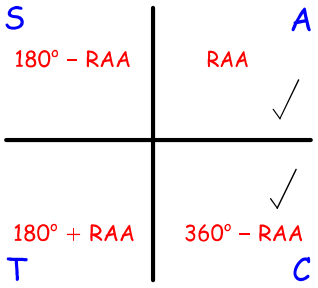
2 solutions expected

$$\cos (x + 50)° = 0.5$$

$$RAA = \cos^{-1}(0.5)$$

$$\Rightarrow \quad RAA = 60°$$

cos is + ve



$$\therefore \quad x° + 50° = 60°, 360° - 60°$$

$$\Rightarrow \quad x° + 50° = 60°, 300°$$

$$\Rightarrow \quad \boxed{x° = 10°, 250°}$$

Oct 27-14:23

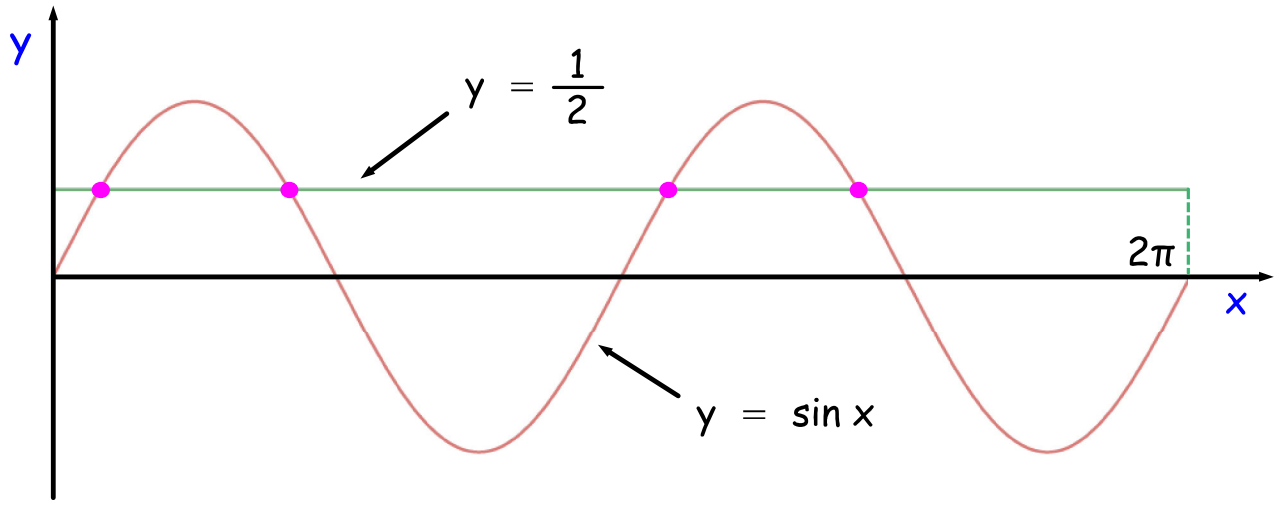
Example 2 (non-calculator)

Show that $(\cos x - \sin x)^2 = 1 - \sin 2x$ and thus solve the equation,

$$(\cos x - \sin x)^2 = 0.5 \quad (0 \le x \le 2\pi)$$

$$\begin{aligned} \text{LHS} &= (\cos x - \sin x)^2 \\ &= \cos^2 x + \sin^2 x - 2 \sin x \cos x \\ &= 1 - 2 \sin x \cos x \\ &= 1 - \sin 2x \\ &= \text{RHS} \end{aligned}$$

$$\therefore \quad \boxed{(\cos x - \sin x)^2 = 1 - \sin 2x}$$



4 solutions expected

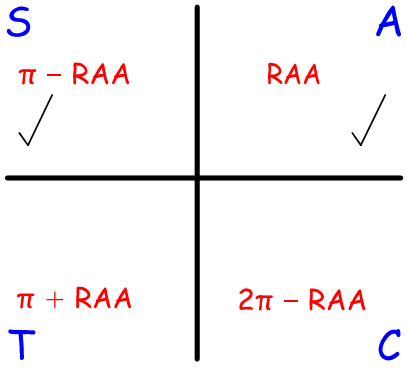
Oct 27-14:23

$$\sin 2x = 0.5$$

$$RAA = \sin^{-1}(0.5)$$

$$\Rightarrow \quad \underline{RAA = \pi/6}$$

sin is + ve



$$\therefore \quad 2x = \pi/6, \pi - \pi/6, 2\pi + \pi/6, 3\pi - \pi/6$$

$$\Rightarrow \quad 2x = \pi/6, 5\pi/6, 13\pi/6, 17\pi/6$$

$$\Rightarrow \quad \boxed{x = \pi/12, 5\pi/12, 13\pi/12, 17\pi/12}$$

CfE Higher Maths

pg. 200 Ex. 8I All Q