

## 7.4) Solving trigonometric equations

## Worked example

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$8 \sin(\theta + 60^\circ) = 4\sqrt{2} \cos \theta$$

## Your turn

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$4 \sin(\theta + 30^\circ) = 8\sqrt{2} \cos \theta$$

$$\theta = 69.6^\circ, 249.6^\circ (1 \text{ dp})$$

## Worked example

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$8 \cos(\theta - 60^\circ) = 4\sqrt{2} \sin \theta$$

## Your turn

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$4 \cos(\theta - 30^\circ) = 8\sqrt{2} \sin \theta$$

$$\theta = 20.4^\circ, 200.4^\circ \text{ (1 dp)}$$

## Worked example

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$3 \cos 2x + \cos x + 2 = 0$$

## Your turn

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$3 \cos 2x - \cos x + 2 = 0$$

$$x = 60.0^\circ, 109.5^\circ, 250.5^\circ, 300.0^\circ \text{ (1 dp)}$$

## Worked example

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$3 \cos 2x - \sin x - 2 = 0$$

## Your turn

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$3 \cos 2x + \sin x - 2 = 0$$

$$x = 30.0^\circ, 150.0^\circ, 199.5^\circ, 340.5^\circ \text{ (1 dp)}$$

## Worked example

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$5 \sin 2x + 4 \sin x = 0$$

$$4 \sin 2x - 5 \cos x = 0$$

## Your turn

Solve in the interval  $0 \leq x \leq 360^\circ$ :

$$5 \sin 2x - 4 \sin x = 0$$

$$x = 0.0^\circ, 66.4^\circ, 180.0^\circ, 199.5^\circ, 293.6^\circ, 360.0^\circ \text{ (1 dp)}$$

## Worked example

Solve in the interval  $0 \leq y \leq 2\pi$ :  
 $3 \tan 2y \tan y = 2$

## Your turn

Solve in the interval  $0 \leq y \leq 2\pi$ :  
 $2 \tan 2y \tan y = 3$

$$y = 0.58, 2.56, 3.72, 5.70 \text{ (2 dp)}$$

## Worked example

- a) Show that  $\cos(3A) = 4 \cos^3 A - 3 \cos A$ .
- b) Hence or otherwise, solve, for  $0 < \theta < 2\pi$ , the equation  $12 \cos \theta - 16 \cos^3 \theta - 2\sqrt{3} = 0$

## Your turn

- a) Show that  $\sin(3A) = 3 \sin A - 4 \sin^3 A$ .
- b) Hence or otherwise, solve, for  $0 < \theta < 2\pi$ , the equation  $16 \sin^3 \theta - 12 \sin \theta - 2\sqrt{3} = 0$

a) Shown

b)  $\theta = \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{10\pi}{9}, \frac{11\pi}{9}, \frac{16\pi}{9}, \frac{17\pi}{9}$