

solve the equation  $2 \sin^2 \theta = 1 - \cos \theta$

for  $\theta$  where  $0 \leq \theta < 360^\circ$

$$2 \sin^2 \theta = 1 - \cos \theta \quad (i)$$

using  $\cos^2 \theta + \sin^2 \theta = 1$

$$\Rightarrow \sin^2 \theta = 1 - \cos^2 \theta$$

substituting for  $\sin^2 \theta$  into (i)

$$2(1 - \cos^2 \theta) = 1 - \cos \theta$$

$$2 - 2 \cos^2 \theta = 1 - \cos \theta$$

$$0 = 1 - \cos \theta - 2 + 2 \cos^2 \theta$$

$$0 = 2 \cos^2 \theta - \cos \theta - 1$$

$$2 \cos^2 \theta - \cos \theta - 1 = 0$$

$$(2 \cos \theta + 1)(\cos \theta - 1) = 0$$

$$\therefore \cos \theta = -\frac{1}{2} \quad \text{or} \quad \cos \theta = 1$$

$$\Rightarrow \underline{\theta = 60^\circ, 120^\circ, 240^\circ \quad \text{or} \quad \theta = 0^\circ}$$