

8 (a) Given that

$$9 \sin^2 \theta + \sin 2\theta = 8$$

show that

$$8 \cot^2 \theta - 2 \cot \theta - 1 = 0$$

[4 marks]

8 (b) Hence, solve

$$9 \sin^2 \theta + \sin 2\theta = 8$$

in the interval $0 < \theta < 2\pi$

Give your answers to two decimal places.

[3 marks]

8 (c) Solve

$$9 \sin^2 \left(2x - \frac{\pi}{4} \right) + \sin \left(4x - \frac{\pi}{2} \right) = 8$$

in the interval $0 < x < \frac{\pi}{2}$

Give your answers to one decimal place.

[2 marks]