

**Exercise 158**

For the following exercises, solve the trigonometric equations on the interval  $0 \leq \theta < 2\pi$ .

$$4 \sin^2 \theta - 2 = 0$$

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**Solution**

$$4 \sin^2 \theta - 2 = 0$$

$$4 \sin^2 \theta = 2$$

$$\sin^2 \theta = \frac{1}{2}$$

$$\sin^2 \theta - \frac{1}{2} = 0$$

$$\left( \sin \theta + \frac{1}{\sqrt{2}} \right) \left( \sin \theta - \frac{1}{\sqrt{2}} \right) = 0$$

$$\sin \theta + \frac{1}{\sqrt{2}} = 0 \quad \text{or} \quad \sin \theta - \frac{1}{\sqrt{2}} = 0$$

$$\sin \theta = -\frac{1}{\sqrt{2}} \quad \text{or} \quad \sin \theta = \frac{1}{\sqrt{2}}$$

Therefore,

$$\theta = \left\{ \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}.$$