

Answer on Question #45769 – Math – Trigonometry

Question.

If $4 \sin^2 x = 1$, where $0 < x < 360^\circ$, how many values does x take?

Solution.

$$4 \sin^2 x = 1$$

$$\sin^2 x = \frac{1}{4}$$

$$1) \sin x = \frac{1}{2} \text{ or } 2) \sin x = -\frac{1}{2}$$

$$1) \sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6} + 2\pi n; \frac{5\pi}{6} + 2\pi n; n \in \mathbb{Z}$$

$$2) \sin x = -\frac{1}{2}$$

$$x = -\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k; k \in \mathbb{Z}$$

We have the solutions in the interval $0 < x < 2\pi$. Therefore, we use the following values:

$$1) x = \frac{\pi}{6}; \frac{5\pi}{6}$$

$$2) x = \frac{7\pi}{6}; \frac{11\pi}{6}$$

See the unit circle to verify (Fig.1):

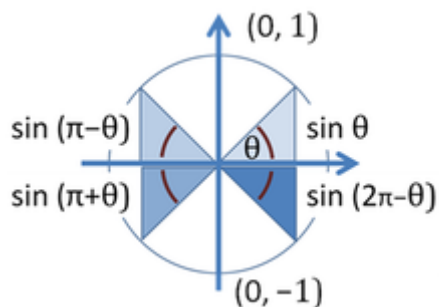


Fig.1. The unit circle for $\sin \theta$.

So, the equation $4 \sin^2 x = 1$ has 4 values:

$$x = \frac{\pi}{6}; \frac{5\pi}{6}; \frac{7\pi}{6}; \frac{11\pi}{6}$$

Answer.

The equation $4 \sin^2 x = 1$ has **4 values**:

$$x = \frac{\pi}{6}; \frac{5\pi}{6}; \frac{7\pi}{6}; \frac{11\pi}{6} \text{ (i.e. } 30^\circ; 150^\circ; 210^\circ; 330^\circ \text{)}.$$