

14.4 Solve Trigonometric Equations

pp. 931–937

EXAMPLE

Solve $2 \cos^2 x = 1$ in the interval $0 \leq x < 2\pi$.

$$2 \cos^2 x = 1 \quad \text{Write original equation.}$$

$$\cos^2 x = \frac{1}{2} \quad \text{Divide each side by 2.}$$

$$\cos x = \pm \frac{\sqrt{2}}{2} \quad \text{Take square roots of each side.}$$

► In the interval $0 \leq x < 2\pi$, the solutions are $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4},$ and $\frac{7\pi}{4}$.

EXAMPLES 1 and 4

on pp. 931–933
for Exs. 21–23

EXERCISES

Solve the equation in the interval $0 \leq x < 2\pi$.

21. $-4 \sin^2 x = -3$

22. $\cos^2 x = \cos x$

23. $\tan^2 4x = 3$

14.5 Write Trigonometric Functions and Models

pp. 941–947

EXAMPLE

Write a function for the sinusoid.

STEP 1 Find the maximum value M and minimum value m . From the graph, $M = 3$ and $m = -1$.

STEP 2 Identify the vertical shift, k .

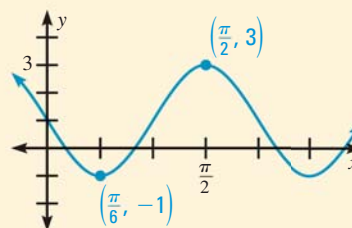
$$k = \frac{M + m}{2} = \frac{3 + (-1)}{2} = \frac{2}{2} = 1$$

STEP 3 Decide whether the graph should be modeled by a sine or cosine function. Because the graph crosses the midline, $y = 1$, on the y -axis and then decreases to its minimum value, the graph is a sine curve with a reflection but no horizontal shift. So, $a < 0$ and $h = 0$.

STEP 4 Find the amplitude and period. The period is $\frac{2\pi}{3} = \frac{2\pi}{b}$. So, $b = 3$.

$$\text{The amplitude is } |a| = \frac{M - m}{2} = \frac{3 - (-1)}{2} = \frac{4}{2} = 2. \text{ So, } a = -2.$$

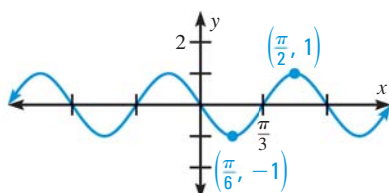
A function for the sinusoid is $y = -2 \sin 3x + 1$.



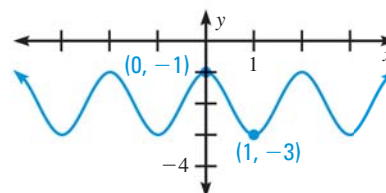
EXERCISES

Write a function for the sinusoid.

24.



25.



EXAMPLE 1

on p. 941
for Exs. 24–25