

5.3 More Practice Solving Trig Equations

Name Key

Decide if each  $x$ -value is a solution of the trigonometric equation. Answer *True* or *False*.

1.  $2 \cos x - 1 = 0; x = \frac{4\pi}{3}$

False

2.  $3 \cos x + 5 \sin x = 8; x = \pi$

False

Solve each equation. Give ALL the solutions using  $n$  as any integer.

3.  $2 \sin x + \sqrt{3} = 0$

$x = \frac{4\pi}{3} + 2\pi n; \frac{5\pi}{3} + 2\pi n$

4.  $\cos^2 x - 1 = 0$

$x = 0 + \pi n$

5.  $3 \tan^2 x - 1 = 0$

$x = \frac{\pi}{6} + \pi n; \frac{5\pi}{6} + \pi n$

6.  $\csc x - 2 = 0$

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

$\frac{5\pi}{12} + \pi n$   
 $\frac{7\pi}{12} + \pi n$

7.  $\cos 2x = -\frac{\sqrt{3}}{2}$

$2x = \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{17\pi}{6}, \frac{19\pi}{6}$

$x = \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}$



8.  $3 \sec 4x = -6$

$4x = \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{8\pi}{3}, \frac{10\pi}{3}, \frac{14\pi}{3}, \frac{16\pi}{3}, \frac{20\pi}{3}, \frac{22\pi}{3}$

$\sec 4x = -2$

$\cos(4x) = -\frac{1}{2}$

$x = \frac{\pi}{6}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{11\pi}{6}$

ALL

$\frac{\pi}{6} + \pi n$   
 $\frac{\pi}{3} + \pi n$   
 $\frac{5\pi}{6} + \pi n$   
 $\frac{2\pi}{3} + \pi n$

Solve each equation over the interval  $[0, 2\pi)$ .

9.  $\sin^2 x - \sin x = 0$

$$x = 0, \pi, \frac{\pi}{2}$$

10.  $4 \cos^2 x = 3$

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

11.  $2 \cos^2 x - \cos x - 1 = 0$

$$x = 0, \frac{2\pi}{3}, \frac{4\pi}{3}$$

12.  $\sin \frac{x}{3} = \frac{\sqrt{3}}{2}$

$$x = \pi$$

13.  $4 \tan(3x) - 2 = 2$

$$x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{3\pi}{4}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{7\pi}{4}$$

**STOP** Use your calculator to approximate the solutions (to two decimal places) of the equation in the interval  $[0, 2\pi)$ .

14.  $3 \tan^2 x - \tan x - 2 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

15.  $3 \cos 2x - 1 = 0$