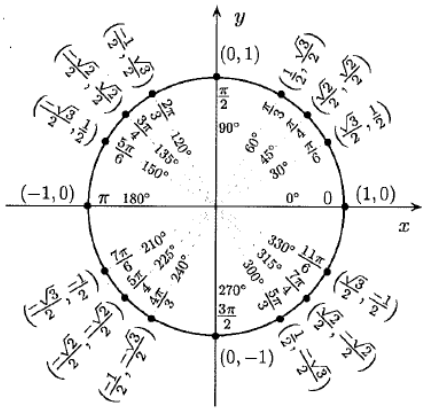
Trigonometric Equations

Practice Worksheet: Trigonometric Equations

Solve each equation over $[0, 2\pi]$ by combining like terms. All answers must be exact in terms of pi.



1] $\sin x + 2 = 3$ $\sin x = 1$ $x = \pi/2$	4] $\sqrt{3}\tan x + 1 = 0$ $\tan x = \frac{-1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$ $x = \frac{5\pi}{6}, \frac{11\pi}{6}$
2] $4\sec x + 8 = 0$ $\sec x = -2$ $\cos x = -\frac{1}{2}$ $x = \frac{2\pi}{3}, \frac{4\pi}{3}$	5] $\cot x - \sqrt{3} = 0$ $\cot x = \sqrt{3}$ $\tan x = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ $x = \frac{\pi}{6}, \frac{7\pi}{6}$
3] $18\cos x - 9\sqrt{3} = 0$ $\cos x = \frac{9\sqrt{3}}{18} = \frac{\sqrt{3}}{2}$ $x = \frac{\pi}{6}, \frac{11\pi}{6}$	6] $8\cos x - 4\sqrt{2} = 0$ $\cos x = \frac{4\sqrt{2}}{8} = \frac{\sqrt{2}}{2}$ $x = \frac{\pi}{4}, \frac{7\pi}{4}$

Solve each equation over $[0, 2\pi]$ with the square root method. All answers must be exact in terms of pi.

7] $\sec^2 x - 1 = 0$ $\sec^2 x = 1$ $\sec x = \pm 1$ $\cos x = \pm 1$ $x = 0, \pi, 2\pi$	10] $4\cos^2 x - 1 = 0$ $\cos^2 x = \frac{1}{4}$ $\cos x = \pm\sqrt{\frac{1}{4}}$ $\cos x = \pm\frac{1}{2}$ $x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
8] $2\cos^2 x = 1$ $\cos^2 x = \frac{1}{2}$ $\cos x = \pm\sqrt{\frac{1}{2}}$ $= \pm\frac{1}{\sqrt{2}}$ $= \pm\frac{\sqrt{2}}{2}$ $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$	11] $4\sin^2 x + 5 = 6$ $\sin^2 x = \frac{1}{4}$ $\sin x = \pm\sqrt{\frac{1}{4}}$ $\sin x = \pm\frac{1}{2}$ $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$
9] $3\tan^2 x - 9 = 0$ $\tan^2 x = 3$ $\tan x = \pm\sqrt{3}$ $x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$	12] $3\sec^2 x - 4 = 0$ $\sec^2 x = \frac{4}{3}$ $\sec x = \pm\sqrt{\frac{4}{3}}$ $\sec x = \pm\frac{2}{\sqrt{3}}$ $\cos x = \pm\frac{\sqrt{3}}{2}$ $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Trigonometric Equations

Solve each equation over $[0, 2\pi]$ by factoring. All answers must be exact in terms of pi.

13] $\sin^2 x - 3\sin x + 2 = 0$

$(\sin x - 2)(\sin x - 1) = 0$

$\sin x - 2 = 0$ $\quad \sin x - 1 = 0$

$\sin x = 2$ $\quad \sin x = 1$

NEVER $\quad x = \pi/2$

14] $\sin^2 x \cos x = \cos x$

$\sin^2 x \cos x - \cos x = 0$

$\cos x (\sin^2 x - 1) = 0$

$\cos x = 0$ $\quad \sin^2 x - 1 = 0$

$x = \pi/2, \frac{3\pi}{2}$ $\quad \sin^2 x = 1$

$\sin x = \pm 1$

SAME $\quad x = \frac{\pi}{2}, \frac{3\pi}{2}$

15] $2\cos^2 x - \sqrt{3}\cos x = 0$

$\cos x (2\cos x - \sqrt{3}) = 0$

$\cos x = 0$ $\quad 2\cos x - \sqrt{3} = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad \cos x = \frac{\sqrt{3}}{2}$

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

16] $2\sin^2 x + \sin x = 1$

$2\sin^2 x + \sin x - 1 = 0$

$(2\sin x - 1)(\sin x + 1) = 0$

$2\sin x - 1 = 0$ $\quad \sin x + 1 = 0$

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

$x = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad x = \frac{3\pi}{2}$

17] $\cot^2 x = -2\cot x - 1$

$\cot^2 x + 2\cot x + 1 = 0$

$(\cot x + 1)(\cot x + 1) = 0$

$\cot x + 1 = 0$

$\cot x = -1$

$\tan x = -1$

$x = \frac{3\pi}{4}, \frac{7\pi}{4}$

18] $\sin x - 2\sin x \cos x = 0$

$\sin x (1 - 2\cos x) = 0$

$\sin x = 0$ $\quad 1 - 2\cos x = 0$

$x = 0, \pi, 2\pi$ $\quad \cos x = \frac{1}{2}$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

19] $\sec x \csc x = 2\csc x$

$\sec x \csc x - 2\csc x = 0$

$\csc x (\sec x - 2) = 0$

$\csc x = 0$ $\quad \sec x - 2 = 0$

Never $\quad \sec x = 2$

$\cos x = \frac{1}{2}$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

20] $\tan x \csc x - 2\tan x = 0$

$\tan x (\csc x - 2) = 0$

$\tan x = 0$ $\quad \csc x - 2 = 0$

$x = 0, \pi, 2\pi$ $\quad \csc x = 2$

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

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