

Solving Trigonometric Equations using Identities

Name Master E
Date _____ Block _____

Solve for all values of x : $0^\circ \leq x \leq 360^\circ$

1. $4\cos^2 x = 1$
 $\cos^2 x = \frac{1}{4}$
 $\cos x = \pm \frac{1}{2}$

$x = 60^\circ, 120^\circ, 240^\circ, 300^\circ$

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

$\cos x \cdot \frac{\sin x}{\cos x} - \sin^2 x = 0$

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

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

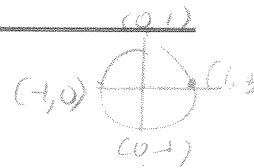
$\sin x = 0$ $1 - \sin x = 0$

$1 = \sin x$

$x = 0, 180, 360$

$x = 90^\circ$

$x = 0, 90, 180, 360$



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

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

$\sin x = 0$ $\sin x = 1$

Same as #2

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

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

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

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

$x = 210, 330$

$x = 90$

$x = 90, 210, 330$

5. $\cot^2 x = 1$

$\cot x = \pm 1$

$\tan x = \pm 1$

$x = 45, 135, 225, \& 315$

6. $\tan^2 x + \sec x = 1$

$\sec^2 x - 1 + \sec x = 1$

$\sec^2 x + \sec x - 2 = 0$

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

$\sec x + 2 = 0$ $\sec x - 1 = 0$

$\sec x = -2$

$\sec x = 1$

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

$\cos x = 1$

$x = 120^\circ, 240$

$0^\circ, 360^\circ$

$x = 0, 120, 240, 360$

Solve for all values of θ : $0^\circ \leq \theta \leq 2\pi$

7. $\sin^2 \theta \cos \theta = \cos \theta$ ^{typo}

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

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

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

$$\sin^2 \theta = 1$$

$$\sin \theta = \pm 1$$

$$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$$

8. $\csc^2 \theta - 3\csc \theta + 2 = 0$

$$(\csc \theta - 2)(\csc \theta - 1) = 0$$

$$\csc \theta = 2 \quad \csc \theta = 1$$

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

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

$$\theta = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$$

9. $\cot \theta = \cot^3 \theta$

$$0 = \cot^3 \theta - \cot \theta$$

$$0 = \cot \theta (\cot^2 \theta - 1)$$

$$\cot \theta = 0 \quad \cot^2 \theta = 1$$

$$\tan \theta = \infty \quad \cot \theta = \pm 1$$

$$\frac{\pi}{2}, \frac{3\pi}{2} \quad \tan \theta = \pm 1$$

$$\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

$$\theta = \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{3\pi}{2}, \frac{7\pi}{4}$$

11. $4\sin^2 \theta - 1 = 0$

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

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

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

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

10. $\sqrt{2} \sin^3 \theta = \sin^2 \theta$

$$\sqrt{2} \sin^3 \theta - \sin^2 \theta = 0$$

$$\sin^2 \theta (\sqrt{2} \sin \theta - 1) = 0$$

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

$$\sin \theta = 0$$

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

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

12. $\tan \theta = \sin \theta$

$$\frac{\sin \theta}{\cos \theta} - \sin \theta = 0$$

$$\sin \theta - \sin \theta \cos \theta = 0$$

$$\sin \theta (1 - \cos \theta) = 0$$

$$\sin \theta = 0 \quad 1 = \cos \theta$$

$$\theta = 0, \pi, 2\pi \quad \theta = 0, 2\pi$$

$$\theta = 0, \pi, 2\pi$$