

Solving trig equations

Key.

Name: _____ Date: _____ Period: _____

Section 8.3: Solving Trig Equations Practice

Directions: Solve for x algebraically, given the domain. Show all work.

1) $4 \sin x + 2 = 0, 0 \leq x < 2\pi$

$$\frac{4 \sin x}{4} = -\frac{2}{4}$$

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

$$x = \frac{7\pi}{6}$$

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

3) $\cot x - \sqrt{3} = 0, 0 \leq x < 2\pi$

$$\cot x = \sqrt{3}$$

$$\frac{1}{\tan} = \sqrt{3}$$

$$\tan = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

5) $2 \sin^2 x + 5 \sin x = 3, 0 \leq x < 2\pi$

$$2 \sin^2 x + 5 \sin x - 3 = 0$$

$$\text{let } \sin x = u$$

$$2u^2 + 5u - 3 = 0$$

$$(u-1)(u+6) = 0$$

$$(2u-1)(u+3) = 0$$

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

$$2 \sin x = 1$$

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

2) $4 \sec x + 8 = 0, 0 \leq x < 2\pi$

$$\frac{4 \sec x}{4} = -\frac{8}{4}$$

$$\sec x = -2$$

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

$$x = \frac{2\pi}{3}$$

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

4) $3 \cot^2 x - 1 = 0, 0 \leq x < 2\pi$

$$\frac{3 \cot^2 x}{3} = \frac{1}{3}$$

$$\cot^2 x = \frac{1}{3}, \cot = \pm \frac{1}{\sqrt{3}}$$

$$\cot = \frac{\cos}{\sin}$$

$$\sin = \frac{\cos}{\cot}$$

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

6) $2 \tan^2 x - \tan x - 6 = 0, 0 \leq x < 2\pi$

$$2u^2 - u - 6 = 0$$

$$3 \times \frac{12}{4}$$

$$(u+3)(u-2)$$

$$(2u+3)(u-2)$$

$$2u = -3$$

$$\tan x = -\frac{3}{2}$$

$$\tan x = 2$$

$$\tan x = -\frac{3}{2}$$

$$\sin x + 3 = 0$$

$$\sin x = -3$$

$$x = -0.98$$

$$x = 1.10$$

7) $\sec x \sin x - 3 \sin x = 0, 0 \leq x < 2\pi$

$$\sin x (\sec x - 3) = 0$$

$$\sin x = 0$$

$$\sec x = 3$$

$$\cos x = \frac{1}{3}$$

$$x = 1.1073$$

$$x = 2\pi - 1.1073$$

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

$$x = \frac{2\pi}{3}$$

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

$$x = \frac{3\pi}{2}$$

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$$x = \frac{3\pi}{2}$$

8) $\cos 3x = 0, 0 \leq x < 2\pi$

$$\cos u = 0$$

$$u = \frac{\pi}{2}$$

$$3x = \frac{\pi}{2}$$

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

$$\text{if the domain is } -\pi \leq x < \pi$$

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

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

$$x = \frac{3\pi}{2}$$

$$x = \frac{7\pi}{6}$$

$$x = \frac{5\pi}{2}$$

$$x = \frac{3\pi}{2}$$

$$x = \frac{3\pi}{2}$$

$$x = \frac{3\pi}{2}$$

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$$x = \frac{3\pi}{2}$$

b) if the domain is $-\frac{\pi}{2} < x < \frac{\pi}{2}$

No solution.

$$x = -\pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$

$$x = \pi$$