

Solving trig equations

Key

Name: _____

Date: _____

Section 8.3: Solving Trig Equations Practice

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

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

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

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

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

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

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

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

$$\sec x = -2$$

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

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

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

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

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

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

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

$$\frac{1}{2} = \frac{1}{2} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{2}$$

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

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

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

$$3 \cot^2 x = 1$$

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

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

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

$$\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

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

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

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

$$u = -3, u = 2$$

$$\tan x = -3$$

$$\tan x = 2$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

$$x = -0.98, x = 1.10$$

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

$$\cos u = 0$$

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

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

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

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

b) if the domain is $-\pi \leq x < \pi$

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

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

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

$$x = -\frac{7\pi}{2}, x = \frac{7\pi}{2}$$

$$x = -\frac{9\pi}{2}, x = \frac{9\pi}{2}$$

$$x = -\frac{11\pi}{2}, x = \frac{11\pi}{2}$$

$$x = -\frac{13\pi}{2}, x = \frac{13\pi}{2}$$

$$x = -\frac{15\pi}{2}, x = \frac{15\pi}{2}$$

$$x = -\frac{17\pi}{2}, x = \frac{17\pi}{2}$$

$$x = -\frac{19\pi}{2}, x = \frac{19\pi}{2}$$

$$x = -\frac{21\pi}{2}, x = \frac{21\pi}{2}$$

$$x = -\frac{23\pi}{2}, x = \frac{23\pi}{2}$$

$$x = -\frac{25\pi}{2}, x = \frac{25\pi}{2}$$

$$x = -\frac{27\pi}{2}, x = \frac{27\pi}{2}$$

$$x = -\frac{29\pi}{2}, x = \frac{29\pi}{2}$$

$$x = -\frac{31\pi}{2}, x = \frac{31\pi}{2}$$

$$x = -\frac{33\pi}{2}, x = \frac{33\pi}{2}$$

$$x = -\frac{35\pi}{2}, x = \frac{35\pi}{2}$$

$$x = -\frac{37\pi}{2}, x = \frac{37\pi}{2}$$

$$x = -\frac{39\pi}{2}, x = \frac{39\pi}{2}$$

$$x = -\frac{41\pi}{2}, x = \frac{41\pi}{2}$$

$$x = -\frac{43\pi}{2}, x = \frac{43\pi}{2}$$

$$x = -\frac{45\pi}{2}, x = \frac{45\pi}{2}$$

$$x = -\frac{47\pi}{2}, x = \frac{47\pi}{2}$$

$$x = -\frac{49\pi}{2}, x = \frac{49\pi}{2}$$

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

$$x = -\frac{\pi}{4}, x = \frac{\pi}{4}$$

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

$$x = -\frac{5\pi}{4}, x = \frac{5\pi}{4}$$

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

$$x = -\frac{9\pi}{4}, x = \frac{9\pi}{4}$$

$$x = -\frac{11\pi}{4}, x = \frac{11\pi}{4}$$

$$x = -\frac{13\pi}{4}, x = \frac{13\pi}{4}$$

$$x = -\frac{15\pi}{4}, x = \frac{15\pi}{4}$$

$$x = -\frac{17\pi}{4}, x = \frac{17\pi}{4}$$

$$x = -\frac{19\pi}{4}, x = \frac{19\pi}{4}$$

$$x = -\frac{21\pi}{4}, x = \frac{21\pi}{4}$$

$$x = -\frac{23\pi}{4}, x = \frac{23\pi}{4}$$

$$x = -\frac{25\pi}{4}, x = \frac{25\pi}{4}$$

$$x = -\frac{27\pi}{4}, x = \frac{27\pi}{4}$$

$$x = -\frac{29\pi}{4}, x = \frac{29\pi}{4}$$

$$x = -\frac{31\pi}{4}, x = \frac{31\pi}{4}$$

No solution.

if $-\pi \leq x < \pi$
without or equal
No solution

$-\pi \leq x \leq \pi$ with or equal $x = \pi$