5.1 Solving trig equations

Warm-up in your notes

Isolate sinx

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

$$-1 \quad -1$$

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

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

5.1 Solving trig equations

eq: How do I solve equations involving trig expressions?

1. $2\sin x - \sqrt{3} = 0$

$+\sqrt{3} \quad +\sqrt{3}$

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

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

$x = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

on unit circle find y-coord. of $+\frac{\sqrt{3}}{2}$

$\boxed{\frac{\pi}{3}, \frac{2\pi}{3}}$

$x \in [0, 2\pi)$

radians

① Isolate trig function

② inverse both sides

③ Find value of angle (use unit circle or draw Δ)

5.1 Solving trig equations

eq: How do I solve equations involving trig expressions?

2. $\tan(\theta + 21°) = -1$ $\theta \in [0, 360°)$

↑ degrees

$\theta + 21° = \tan^{-1}(-1)$

unit circle $\frac{y}{x}$ same x & y coordinate diff. signs

135° & 315°

$\theta + \cancel{21} = 135$
$-\cancel{21}$ -21

$\theta + 21 = 315$
-21 -21

$\boxed{\theta = 114° \qquad \theta = 294°}$

5.1 Solving trig equations

eq: How do I solve equations involving trig expressions?

3. $4\cos^2\theta = 3$ $\theta \in [0, 360°)$

$\frac{4\cos^2\theta}{4} = \frac{3}{4}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{3}{4}}$

$\cos\theta = \pm\frac{\sqrt{3}}{2}$

$\theta = \cos^{-1}\left(\pm\frac{\sqrt{3}}{2}\right)$

* if you take a square root, $\pm$

$\theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ $\theta = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

x-coord 30°, 330° 150°, 210°

$\boxed{30°, 150°, 210°, 330°}$

5.1 Solving trig equations

eq: How do I solve equations involving trig expressions?

4. $\cos x + 2 = 3\cos x$ $\quad x \in [0, 2\pi)$

$-\cos x \qquad -\cos x$

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

$1 = \cos x$

$\cos^{-1}(1) = x$

$\boxed{0}$

U.C.
x-coord = 1

τ radians

$a + 2 = 3a$
$-a \qquad -a$
$2 = 2a$

5.1 Solving Trig Equations (Day 1) Name:_____

Solve each equation in the indicated domain. Use a separate sheet of paper.

1. $\tan\theta + \sqrt{3} = 0$ $\theta \in \left[0^o, 360^o\right)$
2. $2\cos x + \sqrt{3} = 0$ $x \in \left[0, 2\pi\right)$
3. $2\sin\left(\theta + 82^o\right) = -1$ $\theta \in \left[0^o, 360^o\right)$
4. $\sec\left(\theta + 74^o\right) = -2$ $\theta \in \left[0^o, 360^o\right)$
5. $4\cos^2 x = 1$ $x \in \left[0, 2\pi\right)$
6. $4\sin^2 x = 3$ $x \in [0, 2\pi)$
7. $\tan x - \sqrt{3} = 2\tan x$ $x \in [0, 2\pi)$
8. $\cos\theta + 2 = 3\cos\theta$ $\theta \in \left[0^o, 360^o\right)$

5.3 Solving trig equations

eq: How do I solve equations involving trig expressions?

Closing

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

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

$\theta \in [0, 360°)$