

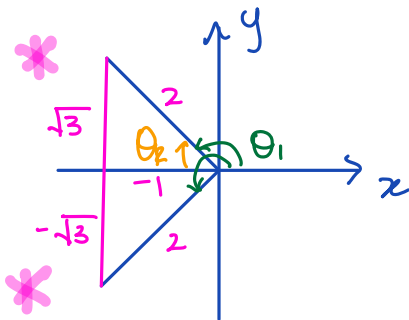
Name: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Learning Goal 4.2</b>	Solving first- and second-degree equations over restricted domains and all real numbers.
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When solving a <sup>trig</sup> equation, isolate the trig function before solving.

**Example** Solve the following trigonometric equation for the exact value(s) of  $\theta$ .



$$\cos \theta = -\frac{1}{2}, \quad 0 \leq \theta < 2\pi \quad \text{answer in radians}$$

$$\theta_r = \frac{\pi}{3}$$

$$\theta_1 = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$$

$$\theta_2 = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$$

**Example** Solve the following trigonometric equation for the exact value(s) of  $\theta$ .

$$2 \cos \theta + 1 = 0, \quad 0 \leq \theta < 2\pi$$

B  
E  
D  
M  
A  
S  
Remove trig function.

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

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

answers are the same as above.

How would the answer change if the domain given was  $0^\circ \leq \theta < 360^\circ$ ?

$$\theta_r = 60^\circ$$

$$\theta_1 = 180 - 60 = 120^\circ$$

$$\theta_2 = 180 + 60 = 240^\circ$$

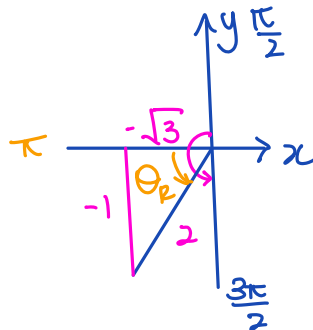
**Example** Solve the following first-degree trigonometric equations on the specified domain.

a.  $5 \sin \theta + 2 = 1 + 3 \sin \theta, \quad \frac{\pi}{2} \leq \theta < \frac{3\pi}{2}$   
 $-3 \sin \theta \quad -3 \sin \theta$  half circle, so probably only one answer.

$$2 \sin \theta + 2 = 1$$

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

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



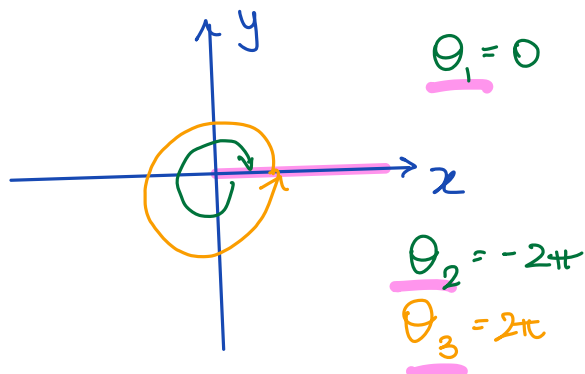
$$\theta_r = \frac{\pi}{6}$$

$$\theta = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$$

Day 1

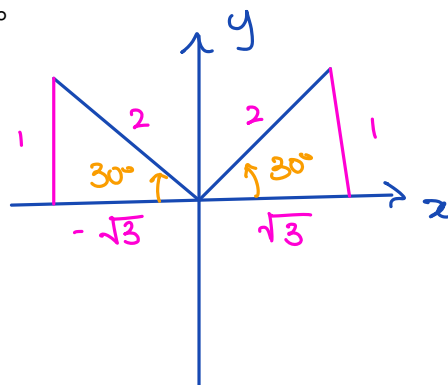
b.  $3 \cos \theta - 1 = \cos \theta + 1, -2\pi \leq \theta \leq 2\pi$  up to 4 solutions.

$$\begin{aligned} 3 \cos \theta - 1 &= \cos \theta + 1 \\ -\cos \theta & \quad -\cos \theta \\ +1 & \quad +1 \\ \hline 2 \cos \theta - 1 &= 1 \\ 2 \cos \theta &= 2 \\ \hline \frac{2 \cos \theta}{2} &= \frac{2}{2} \\ \cos \theta &= 1 = \frac{x}{r} \\ x &= r \end{aligned}$$



c.  $3 \csc x - 6 = 0, 0^\circ \leq x < 360^\circ$

$$\begin{aligned} 3 \csc x - 6 &= 0 \\ +6 & \quad +6 \\ \hline 3 \csc x &= 6 \\ \frac{3 \csc x}{3} &= \frac{6}{3} \\ \csc x &= 2 \\ \sin x &= \frac{1}{2} = \frac{y}{r} \end{aligned}$$



$$\theta_1 = \theta_2 = 30^\circ$$

$$\theta_2 = 180 - 30 = 150^\circ$$