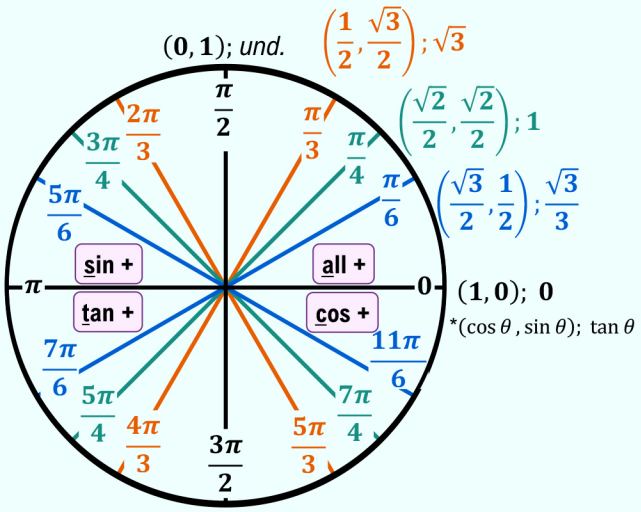
## TOPIC: LINEAR TRIGONOMETRIC EQUATIONS

### Introduction to Trig Equations

◆ Trig equations have _____ solutions.

**EXAMPLE** Find all solutions to the equation within the interval $[0, 2\pi]$.

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




◆ To find *all* sol'ns to a trig eqn, first find all sol'ns on the unit circle, then add _____ to each, where $n$ is an integer.

**EXAMPLE** Find all solutions to the equation.

$(A)$ $\sin\theta = \frac{1}{2}$

$(B)$ $\cos x = -1$

**EXAMPLE** Find all solutions to the equation.

$\tan\theta = \sqrt{3}$

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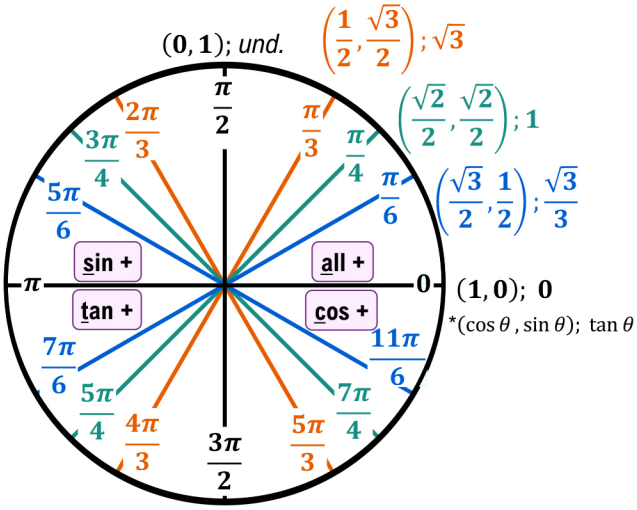



**PRACTICE** Find all solutions to the equation.

**(A)** $\cos x = 1$

**(B)** $\tan\theta = 1$

**(C)** $\sin\theta = -\frac{\sqrt{3}}{2}$

**EXAMPLE** Find all solutions to the equation in degrees.

**Recall**

$$\theta_d = \frac{180^\circ}{\pi} \cdot \theta_r$$

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

## TOPIC: LINEAR TRIGONOMETRIC EQUATIONS

### How to Solve Linear Trigonometric Equations

- To solve linear trig equations, isolate the trig function, just like a _____.

| Recall Linear Equations | New Linear TRIG Equations |
|---|---|
| $4x - 3 = 1$ | $4\sin\theta - 3 = 1$ |
| $4x = 4$ | |
| $x = 1$ | $\sin\theta = 1$ |

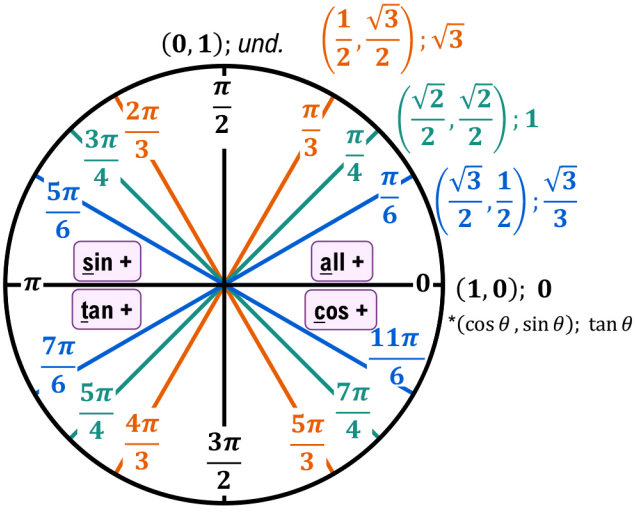
- Remember, trig equations have ***multiple*** solutions.

**EXAMPLE** Find all solutions to the equation within $[0, 2\pi]$.

$-2\cos\theta + \sqrt{3} = 0$

**HOW TO: Solve Linear Trig Eqns**

1) Isolate trig function using $+|-|\times|\div$
2) Find all solutions on the unit circle
3) If domain is *not* restricted: Add $2\pi n$ to each solution
4) Isolate $\theta$



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### HOW TO: Solve Linear Trig Eqns

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**2)** Find all solutions on the unit circle

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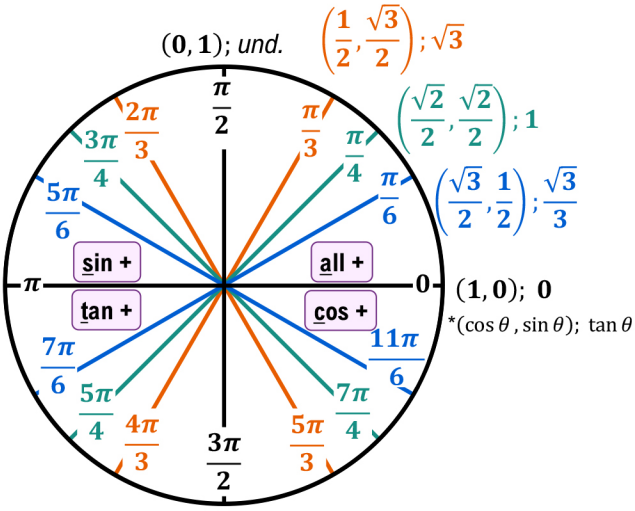


**PRACTICE** Find all solutions to the equation.

**(A)** $3\sin\theta - 6 = -9$

**(B)** $\sqrt{2}\cdot\cos\theta + 4 = 5$

**(C)** $\sqrt{3}\cdot\tan\theta - 7 = -6$

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**HOW TO: Solve Linear Trig Eqns**

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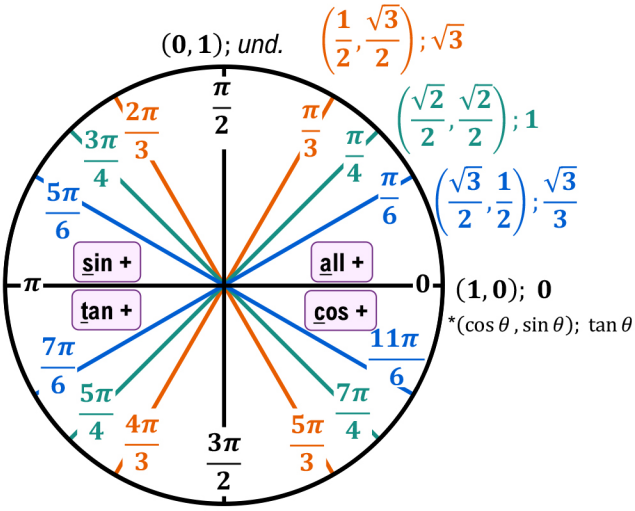
**2)** Find all solutions on the unit circle

**3)** If domain is *not* restricted: Add $2\pi n$ to each solution

**4)** Isolate $\theta$




**EXAMPLE** Find all solutions to the equation.

$4\cos(2\theta + \pi) + 8 = 12$