Introduction to Solving Trig Equations

(This material is covered in the book in section 7.4, but I am introducing the basics here. These basics will be practiced on a worksheet and will be on the test for this unit)

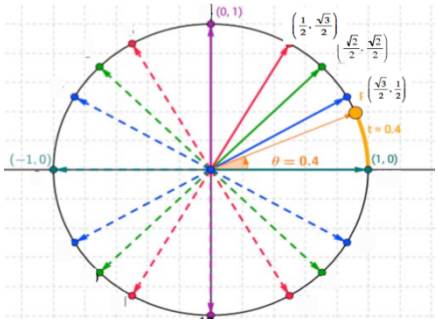
Going "backwards" from finding trig. values

$$\sin\left(\frac{\pi}{3}\right) = \_\_\_\_\_$$

"What is the y value of a point on the unit circle for input π/3?"

$$\sin(\quad) = \frac{\sqrt{3}}{2}$$

"What input(s) have a y value of $\sqrt{3}/2$



Basic Equations: Solving sine and cosine equations for special number inputs

Solve: $\sin(t) = \frac{\sqrt{2}}{2}$

This is saying, find the real number (arc length or corresponding angle, in radians) whose corresponding point on the unit circle has Y value of $\frac{\sqrt{2}}{2}$

Why Y value? _____

How many terminal sides are there corresponding to this_____

How many values of t? (or think in angles) _____

How do we express infinitely many answers?_____

Sometimes we are asked to solve for t on a restricted domain:

Solve: $\sin(t) = \frac{\sqrt{2}}{2}$ for $0 < t < \pi/2$ _____

Solve: $\sin(t) = \frac{\sqrt{2}}{2}$ for $0 \le t < 2\pi$ _____

Solve: $\sin(t) = \frac{\sqrt{2}}{2}$ for $0 \le t < 4\pi$ _____

Solve: $\sin(t) = \frac{\sqrt{2}}{2}$ for $-2\pi \le t < 0$ _____

Examples: While you are learning the process, I highly encourage you to draw the unit circle and find the location of the terminal sides corresponding to the solution.

Solve: $\cos(t) = -1/2$

This is asking us to find the real number (arc length or corresponding angle, in radians) whose corresponding point on the unit circle has_____value of -1/2

Solutions: _____

Solve: $\cos(t) = -1/2$ for $0 < t < \pi$ _____

Solve: $\cos(t) = 1$

This is asking us to find the real number (arc length or corresponding angle, in radians) whose corresponding point on the unit circle has_____value of 1

Solutions: _____

Solve: $\cos(t) = 1$ for $0 \le t < 2\pi$ _____

Solve: $\sin(t) = 0$

This is asking us to find the real number (arc length or corresponding angle, in radians) whose corresponding point on the unit circle has_____value of 0

Solutions: _____

Solve: $\sin(t) = 0$ for $0 < t < \pi/2$ _____

Solve: $\sin(t) = -\frac{\sqrt{2}}{2}$

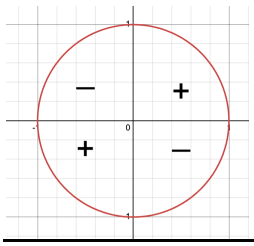
This is asking us to find the real number (arc length or corresponding angle, in radians) whose corresponding point on the unit circle has_____value of $-\frac{\sqrt{2}}{2}$

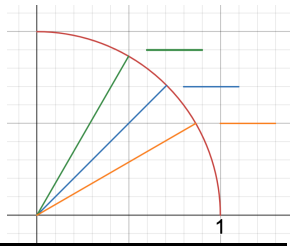
Solutions: _____

Solve: $\sin(t) = -\frac{\sqrt{2}}{2}$ for $-\pi/2 < t < \pi/2$ _____

Basic Equations: Solving tangent equations for special number inputs

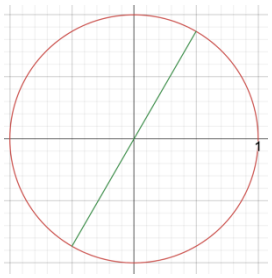
For solving equation with tangent, we need to be familiar with the tangent values in the first quadrant, and the tangent signs as discussed earlier.





Solve: $\tan(t)=\sqrt{3}$

This is asking us to find the real number (arc length or corresponding angle, in radians) whose tangent has value of $\sqrt{3}$



What is the reference angle? _____.

What quadrants have positive tangent values? _____

Solve: $\tan(t)=\sqrt{3}$ for $0<t<2\pi$ _____

All Solutions: _____

Solve: $\tan(t)=-1$

This is asking us to find the real number (arc length or corresponding angle, in radians) whose tangent has value of -1

What is the reference angle? _____.

What quadrants have positive tangent values? _____

Solve: $\tan(t)=-1$ for $0<t<2\pi$ _____

All Solutions: _____

(Solving Basic Equations Worksheet)

Other Trig Functions: Solve for $0<t\le 2\pi$

$\sec(t)=2$ $\cot(t)=0$ $\csc(t)=-2/\sqrt{3}$

Forwards and backwards, mixed: Simplify or Solve

$\tan(t)=\sqrt{3}/3$ $\cos(5\pi/3)$ $\cot(\pi)$ $\sin(t)=-\sqrt{2}/2$