

10.2 - Solving Trigonometric Equations Notes

Solving trig equations use both the reference angles and trigonometric identities that you've memorized, together with a lot of the algebra you've learned. Be prepared to need to *think* in order to solve these equations.

In what follows, it is assumed that you have a good grasp of the trig-ratio values in the first quadrant, how the unit circle works, the relationship between radians and degrees, and what the various trig functions' curves look like, at least on the first period. If you're not sure of yourself, go back and review those topics first.

Solving trigonometric equations is very similar to solving “regular” equations. You want to:

- Isolate trigonometric term ($\sin x$, $\cos x$, *etc.*)
- Use order of operations
- Factor if necessary

** When solving, check to see if the problem is asking for the answer in radians or degrees.

Example 1) $\sin x + 2 = 3$

Example 2) $\tan^2 x + 3 = 0$

Example 3) $2 \cos^2 x - \sqrt{3} \cos x = 0$

Example 4) $\sin^2 x - \sin x - 2 = 0$

Reciprocal Trigonometric Functions

Reciprocal Identities		
$\sin \theta = \frac{1}{\csc \theta}$	$\cos \theta = \frac{1}{\sec \theta}$	$\tan \theta = \frac{1}{\cot \theta}$
$\csc \theta = \frac{1}{\sin \theta}$	$\sec \theta = \frac{1}{\cos \theta}$	$\cot \theta = \frac{1}{\tan \theta}$

Remember SohCahToa:

$$\sin \theta = \frac{O}{H} \quad \cos \theta = \frac{A}{H} \quad \tan \theta = \frac{O}{A}$$

So the reciprocal functions will have reciprocal fractions:

$$\csc \theta = \frac{H}{O} \quad \sec \theta = \frac{H}{A} \quad \cot \theta = \frac{A}{O}$$

Example 5) What values of x make the statement true:

$$\sec x = \frac{-2}{\sqrt{3}}$$