Solving "Basic" Trigonometric Equations **Students will be able to solve trigonometric equations.**	Honors Precalculus

What steps are needed to solve Trig equations?

Use Algebra techniques to isolate the Trig function:

- **Add/Subtract/Multiply/Divide both sides**
  - By NUMBERS; NOT trig functions
- **Factor**
- **Use the quadratic formula**
  - $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- **Square root both sides**
- **ETC.**

Then: Use an inverse trig function ($\sin^{-1}$; $\cos^{-1}$; $\tan^{-1}$) to solve for the angle(s)

(Or recognize values of trig functions from the Unit Circle)

- Often times there are many angles that are solutions ☺

Example 1:

Solve $2sinx = 1$ for all angle values of *x* on the interval $[0, 2\pi)$

$2\sin x = 1$

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

$x = \frac{\pi}{6}, \frac{5\pi}{6}$

$30°, 150°$

Example 2:

Solve $cos2x + \sqrt{3} = -cos2x$ for all angle values of *x* on the interval $[0, 2\pi)$

$\cos 2x + \sqrt{3} = -\cos 2x$

$+\cos 2x \qquad +\cos 2x$

$2\cos 2x + \sqrt{3} = 0$

$2\cos 2x = -\sqrt{3}$

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

$2x = \frac{5\pi}{6}$ (180°) $\qquad x = \frac{5\pi}{12}$ (75°)

$2x = \frac{7\pi}{6}$ (210°) $\qquad x = \frac{7\pi}{12}$ (105°)

Solving "Basic" Trigonometric Equations Students will be able to solve trigonometric equations.	Honors Precalculus

Example 3: Solve $3cot^2x - 1 = 0$ for all values of x

$3\cot^2 x - 1 = 0$

$3\cot^2 x = 1$

$\cot^2 x = 1/3$

$\cot x = \pm \frac{1}{\sqrt{3}}$

so $\tan x = \pm\sqrt{3}$

$x = \left\{\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}\right\} + 2n\pi$

Example 4:

Solve $2sin^2x - sinx - 1 = 0$ for all values of x

If $a = \sin x$

$2a^2 - a - 1$

$(2\sin x + 1)(\sin x - 1) = 0 \leftarrow (2a+1)(a-1) = 0$

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

$2\sin x = -1$ $\qquad$ $\sin x = 1$

$\sin x = -1/2$ $\qquad$ $x = \frac{\pi}{2} + 2n\pi$

$x = \left\{\frac{7\pi}{6}, \frac{11\pi}{6}\right\} + 2n\pi$

Example 5:

Solve $\sqrt{2}csc x + 2 = 4$ for all values of x

$$\sqrt{2}\csc x = 2$$

$$\csc x = \frac{2}{\sqrt{2}}$$

so...

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

$$x = \left.\frac{\pi}{4}, \frac{3\pi}{4}\right\} + 2n\pi$$

Example 6:

Solve $sec^2 x = \frac{4}{3}$ for all values of x

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

so

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

$$x = \left.\frac{\pi}{6}, \frac{7\pi}{6}\right\} + 2n\pi$$