

# Solving Trigonometric Equations Part Two

DAY 7

Solve the equation on the interval  $0 \leq x < 2\pi$ .

1.  $\sin(2x) = \frac{1}{2}$

2.  $\tan\left(\frac{1}{2}\theta\right) = 1$

## Solving Trig Equations (Complex Angle)

### General Solutions:

1. Substitute  $\theta$  for the angle.
2. Isolate the trig.
3. Find the unit circle values.  
Write as a general solution (combine into one statement if you can)  
(ie:  $\theta = \underline{\hspace{2cm}} + 2\pi k$  and  $\theta = \underline{\hspace{2cm}} + 2\pi k$ )
4. Back substitute.
5. Solve for the variable.

### Find the solutions on the interval $[0, 2\pi)$ :

1. Follow the steps above (find the general solutions first)
2. Substitute 1 for k.
3. Combine the terms and find the magic number (numerator)
4. Use the magic number to GENERATE all the solutions on the interval  $[0, 2\pi)$ .
5. Check for extraneous solutions.

**EXAMPLE ONE**→ Solve the following trigonometric functions on the interval  $0 \leq x < 2\pi$ .

$$1 - \sin^2\left(2x + \frac{\pi}{2}\right) = 0$$

**EXAMPLE TWO**→ Write the general solution to the trigonometric equation.

$$2\sin^2\left(\frac{\theta}{3}\right) - \sin\left(\frac{\theta}{3}\right) - 1 = 0$$

**EXAMPLE THREE**→ Find the general solution to the trigonometric equation.

$$\cos(4x) + \sin(4x)\tan(4x) = 2$$

**Quick Check**→ Solve the following equations.

$$9\sin^2 \alpha = \sin^2 \alpha + 8\sin \alpha - 2$$

General solution:

Solution on the interval  $[0, 2\pi]$ :