Solving Trig Equations Day 3

Name: _____ Date: _____

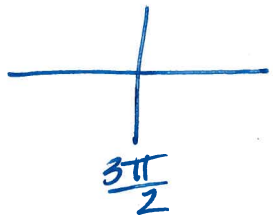
Example 1: Double Angle

$\left(\sin\theta\cos\theta=\frac{-1}{2},\right)\cdot 2$ if $0\le\theta<2\pi$

$2\sin\theta\cos\theta = -1$

$\sin(2\theta) = -1$

$\sin u = -1$



$u = \frac{3\pi}{2} + 2\pi K$

$2\theta = \frac{3\pi}{2} + 2\pi K$

$\theta = \frac{3\pi}{4} + \pi K$

$\theta = \frac{3\pi}{4}$

$\theta = \frac{3\pi}{4} + \frac{4\pi}{4} = \frac{7\pi}{4}$

$\boxed{\theta = \frac{3\pi}{4}, \frac{7\pi}{4}}$

Example 2: Pythagorean Id Substitution

$3\cos\theta+3=2\sin^2\theta,$ if $0\le\theta<2\pi$

$3\cos\theta + 3 = 2(1-\cos^2\theta)$

$3\cos\theta + 3 = 2 - 2\cos^2\theta$

$2\cos^2\theta + 3\cos\theta + 1 = 0$

$2x^2 + 3x + 1 = 0$

$(2x + 1)(x + 1) = 0$

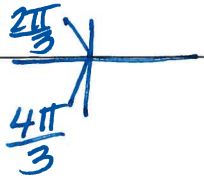
$2\cos\theta + 1 = 0$

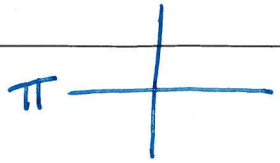
$\cos\theta = -\frac{1}{2}$

$\cos\theta + 1 = 0$

$\cos\theta = -1$

$\boxed{\theta = \frac{2\pi}{3}, \frac{4\pi}{3}, \pi}$





Example 3: Quadratic Formula

· Pyth Id
· No Soln.

$\cos^2\theta+\sin\theta=2$, if $0\le\theta<2\pi$

$1-\sin^2\theta+\sin\theta=2$

$-2 \qquad -2$

$-1-\sin^2\theta+\sin\theta=0$

$-\sin^2\theta+\sin\theta-1=0$

$\sin^2\theta-\sin\theta+1=0$

$x^2-x+1=0$

$x=\dfrac{+1\pm\sqrt{(-1)^2-4(1)(1)}}{2(1)}$

$x=\dfrac{1\pm\sqrt{1-4}}{2}$

$x=\dfrac{1\pm i\sqrt{3}}{2}$

No real solution

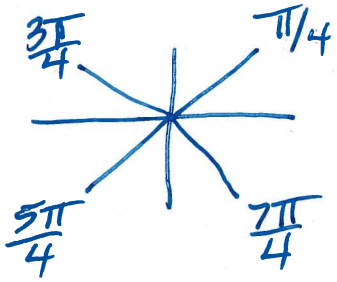
Example 4: Reciprocal Ids

$\tan\theta=\cot\theta$, if $0\le\theta<2\pi$

$\tan\theta=\dfrac{1}{\tan\theta}$

$\sqrt{\tan^2\theta}=\sqrt{1}$

$\tan\theta=\pm1$



$\theta=\dfrac{\pi}{4},\ \dfrac{3\pi}{4},\ \dfrac{5\pi}{4},\ \dfrac{7\pi}{4}$