Name: Answers Block: ____

Date: ____

Class Examples: Solving Trigonometric Equations (Day 1) **Honors PreCalculus**

Solve each equation.

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

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

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

S | A $\frac{\pi}{3}$ / T | C $-\frac{\pi}{3}$

$\theta = \frac{\pi}{3} \pm 2\pi n$

$-\frac{\pi}{3} \pm 2\pi n$

2. $4\cos^2\theta - 3 = 0$

$\cos^2\theta = \frac{3}{4}$

$\cos\theta = \pm\frac{\sqrt{3}}{2}$

S | A $\frac{\pi}{6}$ / T | C

$\theta = \frac{\pi}{6} \pm 2\pi n, \frac{5\pi}{6} \pm 2\pi n$

$\frac{7\pi}{6} \pm 2\pi n, \frac{11\pi}{6} \pm 2\pi n$

3. $\tan(2\theta) = -1$

$\tan\theta = -1$

$\frac{3\pi}{4}$ S | A $\frac{\pi}{4}$ / T | C $-\frac{\pi}{4}$

$2\theta = \frac{3\pi}{4} \pm 2\pi n \quad 2\theta = -\frac{\pi}{4}$

$\theta = \frac{3\pi}{8} \pm \pi n \quad \theta = -\frac{\pi}{8} \pm \pi n$

4. $\sqrt{3}\cot\theta + 1 = 0$

$\cot\theta = -\frac{1}{\sqrt{3}}$

$\tan\theta = -\sqrt{3}$

$\frac{2\pi}{3}$ S | A $\frac{\pi}{3}$ / T | C $-\frac{\pi}{3}$

$\theta = \frac{2\pi}{3} \pm 2\pi n$

$-\frac{\pi}{3} \pm 2\pi n$

$\sin\theta = 1$

5. $5\csc\theta - 3 = 2$

$\csc\theta = 1$

(0,1) / (-1,0) S | A (1,0) / T | C / (0,-1)

$\theta = \frac{\pi}{2} \pm 2\pi n$

6. $\text{Tan}\frac{\theta}{2} = -1$

$\tan\theta = -1$

$\frac{3\pi}{4}$ S | A $\frac{\pi}{4}$ / T | C $-\frac{\pi}{4}$

$\frac{\theta}{2} = \frac{3\pi}{4} \pm 2\pi n \quad \frac{\theta}{2} = -\frac{\pi}{4}$

$\theta = \frac{3\pi}{2} \pm 4\pi n, -\frac{\pi}{2} \pm 4\pi n$

7. $2\cos^2\theta + \cos\theta - 1 = 0$

$a=2 \quad b=1 \quad c=-1$

$2 \cdot -1 = -2$

$-2 + -1 = 1$

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

$(2\cos\theta - 1)(\cos\theta + 1) = 0$

S | A $\frac{\pi}{3}$ / T | C $-\frac{\pi}{3}$

$\cos\theta = \frac{1}{2} \quad \cos\theta = -1$ (-1,0)

$\theta = \frac{\pi}{3} \pm 2\pi n \quad \theta = \pi \pm 2\pi n$

$-\frac{\pi}{3} \pm 2\pi n$

8. $\cos^2\theta - \sin^2\theta + \sin\theta = 0$

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

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

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

$-2 \cdot 1 = -2$

$-2 + 1 = -1$

$\frac{2\sin\theta}{-2} \quad \frac{2\sin\theta}{1} = \frac{\sin\theta}{-1}$

$(\sin\theta - 1)(2\sin\theta + 1) = 0$

(0,1)

$\sin\theta = 1 \quad \sin\theta = -\frac{1}{2}$

S | A $\frac{\pi}{6}$ / T | C $-\frac{\pi}{6}$ / $\frac{7\pi}{6}$

$\theta = \frac{\pi}{2} \pm 2\pi n$

$\theta = \frac{7\pi}{6} \pm 2\pi n$

$-\frac{\pi}{6} \pm 2\pi n$

9. A golfer hits a golf ball with an initial velocity of 100 miles per hour. The range R of the ball as a function of the angle θ to the horizontal is given by $R(\theta) = 672\sin(2\theta)$, where R is measured in feet.

a) At what angle θ should the ball be hit if the golfer wants the ball to travel 450 feet (150 yards)?

$450 = 672\sin 2\theta$

$.670 = \sin(2\theta)$

$\sin^{-1}(.670) = 2\theta$

137.933 SHIFT sin 42.067

$2\theta = 42.067$ $2\theta = 137.933$

$\theta = 21.036°$ or $\theta = 68.967°$

b) At what angle θ should the ball be hit if the golfer wants the ball to travel 540 feet (180 yards)?

$540 = 672\sin(2\theta)$

$.804 = \sin(2\theta)$

$\sin^{-1}(.804) = 2\theta$

126.527 SHIFT sin 53.473

$2\theta = 126.527$ $2\theta = 53.473$

$\theta = 63.264°$ or $\theta = 26.736°$

c) Can the golfer hit the ball 720 feet (240 yards)?

$720 = 672\sin(2\theta)$

$1.071 = \sin(2\theta)$

$\sin^{-1}(1.071) = 2\theta$

↑ undefined

No.