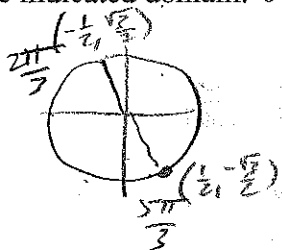**Honors Algebra 3-4**
5.3 Worksheet

Name _Key_
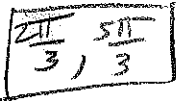
Period _____

Solve the equation in the indicated domain: $0 \le x \le 2\pi$

1. $\tan x + \sqrt{3} = 0$
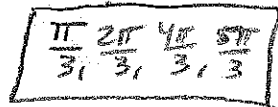
$\tan x = \dfrac{-\sqrt{3}}{1} \Big/ \dfrac{2}{2}$ $\dfrac{\sin}{\cos}$

$\boxed{\dfrac{2\pi}{3}, \dfrac{5\pi}{3}}$

$\left(-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right)$ $\dfrac{2\pi}{3}$

$\left(\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right)$ $\dfrac{5\pi}{3}$

2. $4\cos^2 x = 1$

$\cos^2 x = \dfrac{1}{4}$

$\cos x = \pm \dfrac{1}{2}$

$\dfrac{2\pi}{3}\left(-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right)$ $\dfrac{\pi}{3}\left(\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right)$

$\dfrac{4\pi}{3}$ $\dfrac{5\pi}{3}$
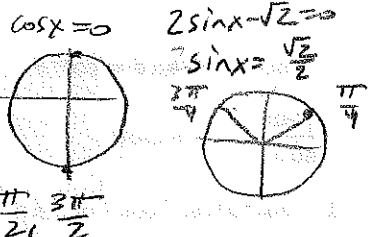
$\boxed{\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}}$

3. $2\sin x \cos x = \sqrt{2}\cos x$

$2\sin x \cos x - \sqrt{2}\cos x = 0$

$\cos x\left(2\sin x - \sqrt{2}\right) = 0$

$\boxed{\dfrac{\pi}{4}, \dfrac{\pi}{2}, \dfrac{3\pi}{4}, \dfrac{3\pi}{2}}$

$\cos x = 0$ $2\sin x - \sqrt{2} = 0$

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

$\dfrac{3\pi}{4}$ $\dfrac{\pi}{4}$

$\dfrac{\pi}{2}, \dfrac{3\pi}{2}$

4. $\tan x \sec x = \tan x$

$\tan x \sec x - \tan x = 0$

$\tan x(\sec x - 1) = 0$

$\boxed{0, \pi}$

$\tan x = 0$ $\sec x - 1 = 0$
$\sin x = 0$ $\sec x = 1$
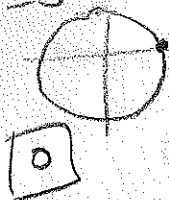 $\cos x = 1$
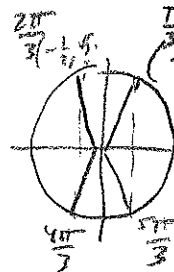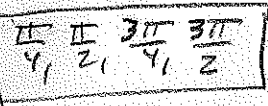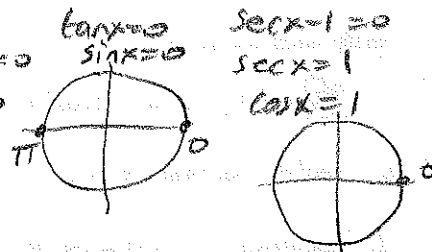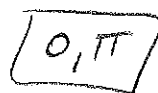
5. $\cos x + 2 = 3\cos x$

$\cos x + 2 - 3\cos x = 0$

$-2\cos x + 2 = 0$

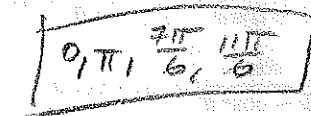$-2(\cos x - 1) = 0$

$\cos x - 1 = 0$
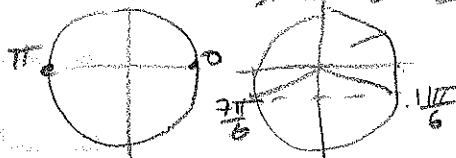
$\cos x = 1$

$\boxed{0}$

6. $2\sin^2 x + \sin x = 0$

$\sin x(2\sin x + 1) = 0$
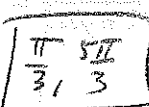
$\sin x = 0$ $2\sin x = -1$
  $\sin x = -\dfrac{1}{2}$

$\boxed{0, \pi, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}}$

$\dfrac{7\pi}{6}$ $\dfrac{11\pi}{6}$

7. $2\cos^2 x - 5\cos x + 2 = 0$

$u = \cos x$

$2u^2 - 5u + 2 = 0$

$(2u - 1)(2u - 4)$

$(2u - 1)(u - 2)$

$(2\cos x - 1)(\cos x - 2) = 0$

$\cos x = \dfrac{1}{2}$ $\cos x = 2$
  no sol'n

$\dfrac{\pi}{3}$

$\dfrac{5\pi}{3}$

$\boxed{\dfrac{\pi}{3}, \dfrac{5\pi}{3}}$
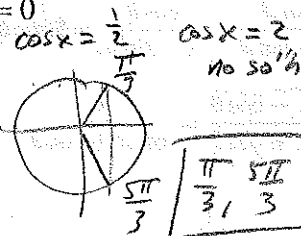
8. $\sin^2 x + 5\sin x + 6 = 0$

$u = \sin x$

$u^2 + 5u + 6 = 0$

$(u + 2)(u + 3)$

$(\sin x + 2)(\sin x + 3) = 0$

$\sin x = -2$ $\sin x = -3$
no sol'n no sol'n

$\boxed{\text{No sol'n}}$

9. $4\csc^2 x + 4\csc x + 1 = 0$

$4u^2 + 4u + 1 = 0$

$(4u + 2)(4u + 2) = 0$

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

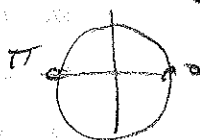$(2\csc x + 1)(2\csc x + 1) = 0$

$2\csc x + 1 = 0$
$2\csc x = -1$
$\csc x = -\dfrac{1}{2}$
$\sin x = -2$
$\boxed{\text{No sol'n}}$

10. $3\sin^2 x - \sin x = 0$

$\sin x(3\sin x - 1) = 0$

$3\sin x - 1 = 0$

$\sin x = \dfrac{1}{3}$

(calc)

$x = \arcsin \dfrac{1}{3} = \boxed{.3398}$

$\pi - .3398$

$\pi - .3398 = \boxed{2.8018}$

Answers: 1. $\dfrac{2\pi}{3}, \dfrac{5\pi}{3}$ 2. $\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}$ 3. $\dfrac{\pi}{2}, \dfrac{3\pi}{2}, \dfrac{\pi}{4}, \dfrac{3\pi}{4}$ 4. $0, \pi$ 5. 0

6. $0, \pi, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$ 7. $\dfrac{\pi}{3}, \dfrac{5\pi}{3}$ 8. no solution   9. no solution   10. $0, \pi, 0.3398, 2.8018$

Name_____

Period _____

Solve the equation in the indicated domain: $0 \le x \le 2\pi$

1. $\tan x + \sqrt{3} = 0$

2. $4\cos^2 x = 1$

3. $2\sin x \cos x = \sqrt{2}\cos x$

4. $\tan x \sec x = \tan x$

5. $\cos x + 2 = 3\cos x$

6. $2\sin^2 x + \sin x = 0$

7. $2\cos^2 x - 5\cos x + 2 = 0$

8. $\sin^2 x + 5\sin x + 6 = 0$

9. $4\csc^2 x + 4\csc x + 1 = 0$

10. $3\sin^2 x - \sin x = 0$

Answers: 1. $\dfrac{2\pi}{3}, \dfrac{5\pi}{3}$ 2. $\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}$ 3. $\dfrac{\pi}{2}, \dfrac{3\pi}{2}, \dfrac{\pi}{4}, \dfrac{3\pi}{4}$ 4. $0, \pi$ 5. 0

6. $0, \pi, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$ 7. $\dfrac{\pi}{3}, \dfrac{5\pi}{3}$ 8. no solution   9. no solution   10. $0, \pi, 0.3398, 2.8018$