Key

Math 4

Name _____

Date _____

4-5 Inverse Trigonometry

Learning goal:
I can solve trigonometric equations algebraically (for primary values), including equations that involve factoring.

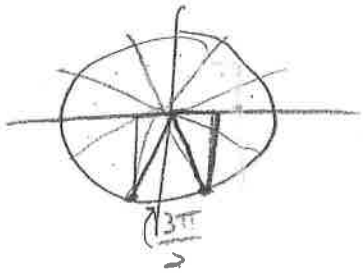
Solve the below equations using your knowledge of the unit circle. All answers should be exact values in radians.

1. $\sin x = -\frac{\sqrt{3}}{2}$ → Long side of 30-60-90

→ Negative means down (since sine = y)

$X = \frac{8\pi}{6} = \frac{4\pi}{3}$

$X = \frac{5\pi}{3}$



2. $\sec x = 2$

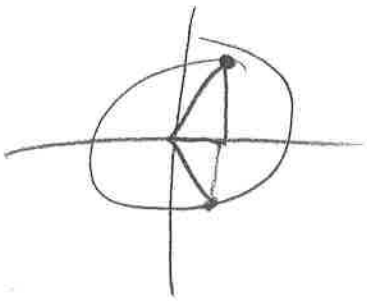
$(\cos x)\ \frac{1}{\cos x} = 2 \cdot (\cos x)$

$1 = 2 \cdot \cos x$

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

$X = \frac{\pi}{3}$

$X = \frac{5\pi}{3}$



3. $\sin x = \tan^2 x \cdot \sin x$ ★ Do not divide by sin x on both sides!

$0 = \tan^2 x \cdot \sin x - \sin x$

$\sin x(\tan^2 x - 1) = 0$

$\sin x = 0$

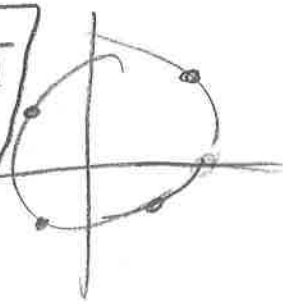
$X = 0, \pi, 2\pi$

$\tan^2 x - 1 = 0$

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

$\tan x = \pm 1$

$X = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$



4. $2\sin^2 x - \sin x - 1 = 0$ → Looks like $2x^2 - x - 1 = 0$... FACTOR!!

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

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

$2\sin x + 1 = 0$

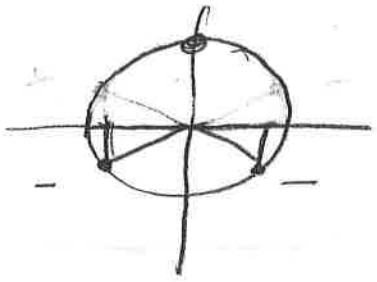
$\sin x = -\frac{1}{2}$

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$

$\sin x - 1 = 0$

$\sin x = 1$

$x = \frac{\pi}{2}$



5. $\tan^2 x - \sec x - 1 = 0$

$\tan^2 x = \sec^2 x - 1$

$(\sec^2 x - 1) - \sec x - 1 = 0$

$\sec^2 x - 1 - \sec x - 1 = 0$

$\sec^2 x - \sec x - 2 = 0$ → Think $x^2 - x - 2 = 0$ & factor!

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

$(\sec x - 2)(\sec x + 1) = 0$

$\sec x - 2 = 0$

$\sec x = 2$

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

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

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

$\sec x + 1 = 0$

$\sec x = -1$

$\frac{1}{\cos x} = -1$

$\cos x = -1$

$x = \pi$