Key → on separate paper

Math 4

Name _____

Date _____

4-5 Inverse Trigonometry Practice

You must show all work on another piece of paper.

I can use and define the six trigonometric functions: sine, cosine, tangent, cosecant, secant, and cotangent

I can solve trigonometric equations algebraically, including equations that involve factoring

Solve for x (in radians). Exact primary values only!

"C" Problems

1. $\cos x = -\frac{1}{\sqrt{2}}$

2. $\csc x = 2$

3. $2\sin x = 6$

4. $\sin x = \frac{\sqrt{3}}{2}$

5. $\tan x = \frac{1}{\sqrt{3}}$

"B" Problems

6. $\sin x + \sin x \cot x = 0$

7. $2\cos^2 x - 3\cos x + 1 = 0$

8. $4\sin^2 x = 1$

9. $\tan^2 x \sin x = -\sin x$

10. $\csc x = \sin^2 x \csc x$

11. $2\sin\left(x + \frac{\pi}{6}\right) = 1$

"A" Problems

12. $-2\sin^2 x - 5\cos x + 4 = 0$

13. $2\cos^2 x + \sin x - 1 = 0$

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

M4 U4 L2 I1 Practice ANSWERS

C Problems

1.) $\cos x = -\frac{1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

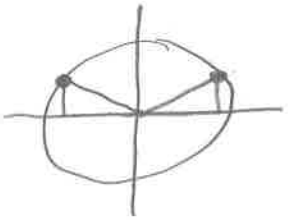
$\boxed{x = \frac{3\pi}{4}, \frac{5\pi}{4}}$

2.) $\csc x = 2$

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

$1 = 2 \cdot \sin x$

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



$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$

3.) $2\sin x = 6$

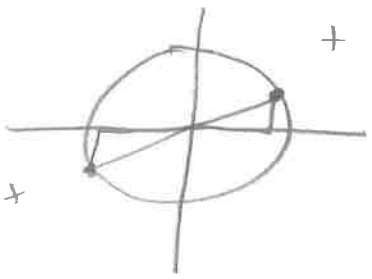
$\sin x = 3$

$\boxed{\text{No solution}}$ Sine is never > 1 when looking at Unit circle.

4.) $\sin x = \frac{\sqrt{3}}{2}$

$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}}$

5.) $\tan x = \frac{1}{\sqrt{3}} = \frac{\frac{1}{2} \rightarrow \sin x}{\frac{\sqrt{3}}{2} \rightarrow \cos x}$



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

or $\frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}}$

→

B Problems

$\sin x + \sin x \cot x = 0$

6.) $\sin x (1 + \cot x) = 0$

$\sin x = 0$ $\quad 1 + \cot x = 0$

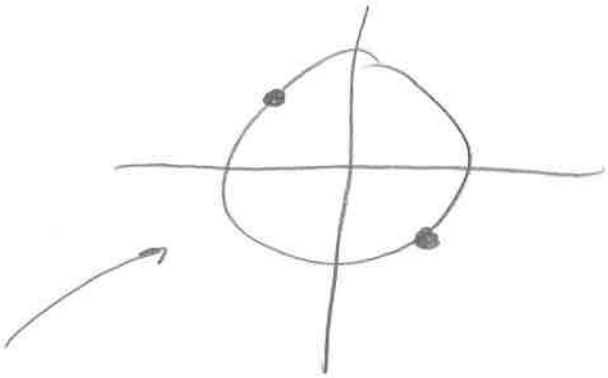
$\boxed{x = 0, \pi, 2\pi}$

$\cot x = -1$

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

$\tan x = -1$

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



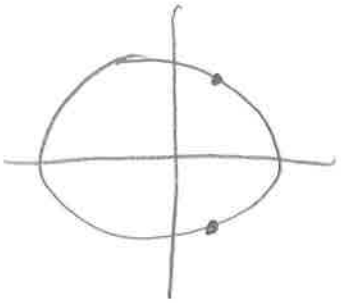
7.) $2\cos^2 x - 3\cos x + 1 = 0$ → Think $2x^2 - 3x + 1 = 0$

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

$2\cos x - 1 = 0$ $\quad \cos x - 1 = 0$

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

$\boxed{x = \frac{\pi}{3}, \frac{5\pi}{3} \qquad x = 0, 2\pi}$



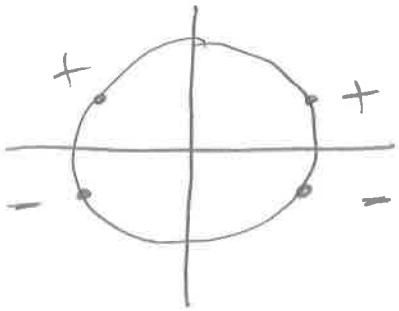
8.) $4\sin^2 x = 1$

$\sqrt{\sin^2 x} = \sqrt{1/4}$

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

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

$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$ $\quad \boxed{x = \frac{7\pi}{6}, \frac{11\pi}{6}}$



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B Problems (cont'd.)

9.) $\tan^2 x \cdot \sin x = -\sin x$

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

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

$\sin x = 0$ $\qquad$ $\tan^2 x + 1 = 0$

$\tan^2 x = -1$

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

$x = 0, \pi, 2\pi$ $\qquad$ No solution!

10.) $\csc x = \sin^2 x \csc x$

$0 = \sin^2 x \csc x - \csc x$

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

$\csc x = 0$ $\qquad$ $\sin^2 x - 1 = 0$

$\frac{1}{\sin x} = 0$ $\qquad$ $\sin^2 x = 1$

$\sin x = \pm 1$

$1 = 0 \cdot \sin x$

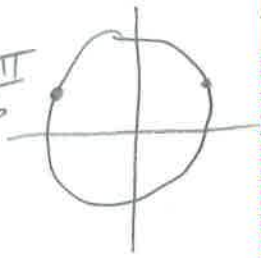
$1 \neq 0$

No solution

$x = \frac{\pi}{2}, \frac{3\pi}{2}$

11.) $2\sin\left(x + \frac{\pi}{6}\right) = 1$

$\sin\left(x + \pi/6\right) = \frac{1}{2}$ → Think of $\sin x = \frac{1}{2}$, $x = \frac{\pi}{6}, \frac{5\pi}{6}$



$x + \frac{\pi}{6} = \frac{\pi}{6}$ or $x + \frac{\pi}{6} = \frac{5\pi}{6}$

$x = 0$ $\qquad$ $x = \frac{4\pi}{6} = \frac{2\pi}{3}$

OR Let $u = x + \frac{\pi}{6}$, so $\sin u = \frac{1}{2}$

$u = \frac{\pi}{6}$ or $\frac{5\pi}{6}$

Now substitute $x + \frac{\pi}{6}$ back in for u

So $x + \frac{\pi}{6} = \frac{\pi}{6}$ or $x + \frac{\pi}{6} = \frac{5\pi}{6}$ →

$\sin^2 x + \cos^2 x = 1$

$\sin^2 x = 1 - \cos^2 x$

A Problems

12.) $-2\sin^2 x - 5\cos x + 4 = 0$

$-2(1-\cos^2 x) - 5\cos x + 4 = 0$

$-2 + 2\cos^2 x - 5\cos x + 4 = 0$

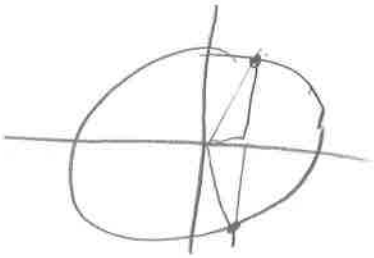
$2\cos^2 x - 5\cos x + 2 = 0$

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

$2\cos x - 1 = 0$ $\quad$ $\cos x - 2 = 0$

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

$x = \frac{\pi}{3}, \frac{5\pi}{3}$ $\quad$ No solution



13.) $2\cos^2 x + \sin x - 1 = 0$

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

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

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

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

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

$2\sin x + 1 = 0$ $\quad$ $\sin x - 1 = 0$

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

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$ $\quad$ $x = \frac{\pi}{2}$

14.) $\tan^2 x + \sec x - 1 = 0$

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

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

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

$\sec x + 2 = 0$ $\quad$ $\sec x - 1 = 0$

$\sec x = -2$ $\quad$ $\sec x = 1$

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

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

$x = \frac{2\pi}{3}, \frac{4\pi}{3}$ $\quad$ $x = 0, 2\pi$