

Name _____ Date _____ raw scaled percent

Math 11 Trimester 2 Exam 1P (150 points)
Trigonometry I - Practice

- **Answers must be completely simplified. No denominators may include radicals. All fractions reduced. Arithmetic must be completely performed; e.g. write 9 instead of $\sqrt{81}$.**
- **All angles you write for answers must be written with respect to the angle zero (the positive horizontal axis) and measured in the positive direction (counter clockwise). For example, write $\theta = \frac{3\pi}{2}$ rather than $\theta = -\frac{\pi}{2}$.**
- **All answers must be exact unless the question states otherwise.**
- **All questions count 15 points.**

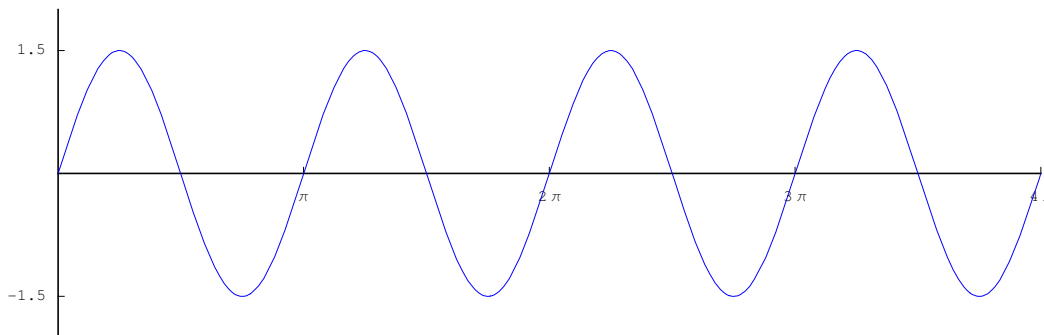
- **A. Answer the following.**

[1] Write the exact value of $\sin\left(\frac{49\pi}{12}\right)$.

[2] Write the exact value of $\cos\left(\frac{55\pi}{12}\right)$.

[3] Graph $y = \sec x$, $0 \leq x \leq 2\pi$.

[4] The graph of $y = f(x)$ appears below. Write $f(x)$.



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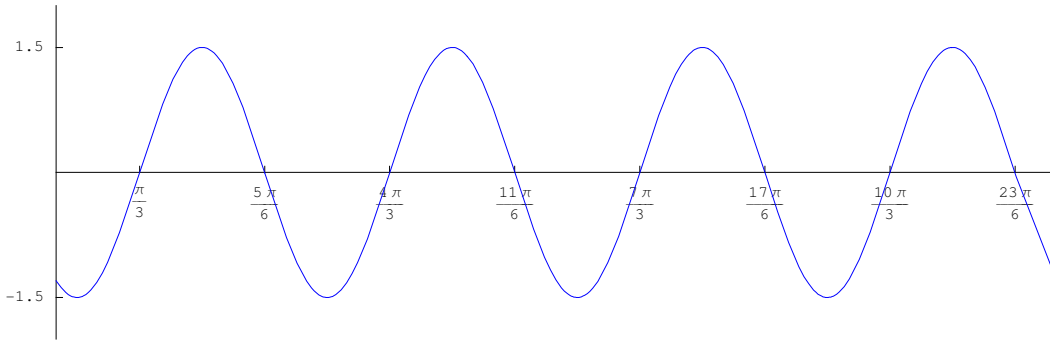
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[5] The graph of $y = f(x)$ appears below. Write $f(x)$.



[6] Let $f(x) = \frac{2}{3} \sin(3x - \frac{\pi}{18})$. State the amplitude, frequency, period, and magnitude and direction of shift. Then sketch the function.

[7] Proof Here

[8] Find all values of x that make the following equation true. $\sin^2 x - \frac{7}{2} \sin x + \frac{3}{2} = 0$.

[9] Find all values of x that make the following equation true. $\cos^2 x + \sin x = -1$.

[10] Find all values of x that make the following equation true. $\sin 2x = \cos 3x$.

Solutions for Trimester 2 Exam 1P (these have been checked)

[1] Write the exact value of $\sin\left(\frac{49\pi}{12}\right)$.

$$\sin\left(\frac{49\pi}{12}\right) = \sin\left(\frac{48\pi}{12} + \frac{\pi}{12}\right) = \sin\frac{\pi}{12}$$

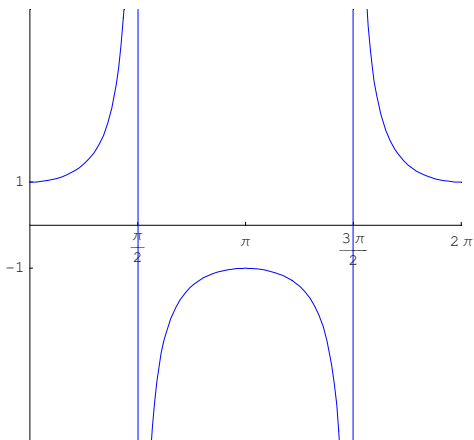
$$\begin{aligned}\sin\frac{\pi}{12} &= \sin\left(\frac{\pi}{3} - \frac{\pi}{4}\right) \\ &= \sin\frac{\pi}{3} \cos\frac{\pi}{4} - \sin\frac{\pi}{4} \cos\frac{\pi}{3} \\ &= \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ &= \frac{\sqrt{6}-\sqrt{2}}{4}\end{aligned}$$

[2] Write the exact value of $\cos\left(\frac{55\pi}{12}\right)$.

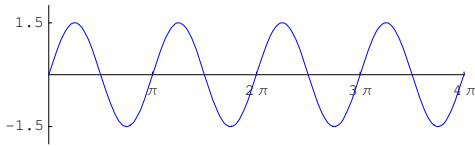
$$\cos\left(\frac{55\pi}{12}\right) = \cos\left(\frac{48\pi}{12} + \frac{7\pi}{12}\right) = \cos\frac{7\pi}{12}$$

$$\begin{aligned}\cos\frac{7\pi}{12} &= \cos\left(\frac{\pi}{3} + \frac{\pi}{4}\right) \\ &= \cos\frac{\pi}{3} \cos\frac{\pi}{4} - \sin\frac{\pi}{4} \sin\frac{\pi}{3} \\ &= \frac{1}{2} \cdot \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} \\ &= \frac{\sqrt{2}-\sqrt{6}}{4}\end{aligned}$$

[3] Graph $y = \sec x$, $0 \leq x \leq 2\pi$.

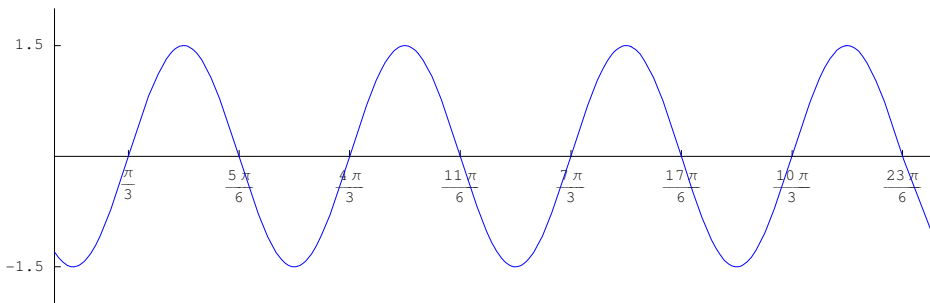


[4] The graph of $y = f(x)$ appears below. Write $f(x)$.



$$y = 1.5 \sin 2x$$

[5] The graph of $y = f(x)$ appears below. Write $f(x)$.



$$y = 1.5 \sin 2 \left(x - \frac{\pi}{3} \right)$$

[6] Let $f(x) = \frac{2}{3} \sin(3x - \frac{\pi}{18})$. State the amplitude, frequency, period, and magnitude and direction of shift. Then sketch the function.

$$f(x) = \frac{2}{3} \sin 3 \left(x - \frac{\pi}{54} \right)$$

Amplitude = $\frac{2}{3}$, frequency = 3, period = $\frac{2\pi}{3}$, shift = $\frac{\pi}{54}$, right.

[7] Proof Here

[8] Find all values of x that make the following equation true. $\sin^2 x - \frac{7}{2} \sin x + \frac{3}{2} = 0$.

$$\sin^2 x - \frac{7}{2} \sin x + \frac{3}{2} = 0$$

$$2 \sin^2 x - 7 \sin x + 3 = 0$$

$$(2 \sin x - 1)(\sin x - 3) = 0$$

$$\sin x = \frac{1}{2} \text{ OR } \sin x = 3$$

Since the sine of no number is 3, the solutions will come only from $\sin x = \frac{1}{2}$. Then,
 $\sin x = \frac{1}{2}$

$$\Rightarrow \sin(x + 2n\pi) = \frac{1}{2} \text{ or } \sin(\pi - x + 2n\pi) = \frac{1}{2}$$

$$\Rightarrow x + 2n\pi = \frac{\pi}{6} \text{ or } \pi - x + 2n\pi = \frac{\pi}{6}$$

$$\Rightarrow x = \frac{\pi}{6} + 2n\pi \text{ or } x = \frac{5\pi}{6} + 2n\pi, n \in \mathbb{Z}$$

[9] Find all values of x that make the following equation true. $\cos^2 x + \sin x = -1$.

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

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

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

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

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

$$\Rightarrow \sin x = 2 \text{ OR } \sin x = -1$$

$$\Rightarrow \sin x = -1$$

$$\Rightarrow \sin x = \sin(\pi + 2n\pi)$$

$$\Rightarrow x = \pi + 2n\pi$$

[10] Find all values of x that make the following equation true. $\sin 2x = \cos 3x$.

$$\sin 2x = \sin\left(\frac{\pi}{2} + 3x\right) \quad \text{OR} \quad \sin 2x = \sin\left(\frac{\pi}{2} - 3x\right)$$

$$\iff \sin 2x = \sin\left(\frac{\pi}{2} + 3x + 2n\pi\right) \quad \text{OR} \quad \sin 2x = \sin\left(\frac{\pi}{2} - 3x + 2n\pi\right)$$

$$\iff 2x = \frac{\pi}{2} + 3x + 2n\pi \quad \text{OR} \quad 2x = \frac{\pi}{2} - 3x + 2n\pi$$

$$\iff x = -\frac{\pi}{2} + 2n\pi \quad \text{OR} \quad 5x = \frac{\pi}{2} + 2n\pi$$

$$\iff x = -\frac{\pi}{2} + 2n\pi \quad \text{OR} \quad x = \frac{\pi}{10} + \frac{2n\pi}{5}$$