

Honors Pre-Calc
Midterm Practice Test

Name Key
Date _____ Period _____

Choose the best answer.

1.) Convert 144° from degrees to radians.

a.) $\frac{4\pi}{5}$

b.) $\frac{3\pi}{5}$

c.) $\frac{8\pi}{5}$

d.) $\frac{2\pi}{5}$

2.) Convert $\frac{7\pi}{10}$ from radian measure to degree measure.

a.) 154.29°

b.) 126°

c.) $257.14\pi^\circ$

d.) 252°

3.) Use the arc length formula and the given information: $s = 18\text{cm}$, $\theta = 54^\circ$, to find the radius.

a.) $\frac{30}{\pi}\text{cm}$

b.) $\frac{120}{\pi}\text{cm}$

c.) $\frac{60}{\pi}\text{cm}$

d.) $\frac{1}{3}\text{cm}$

The radius of a car wheel is 15 inches. How many revolutions per minute is the wheel making when the car is traveling 30 mph. Round your answer to the nearest revolution.

a.) 3318 rpm

b.) 9 rpm

c.) 336 rpm

d.) 2101 rpm

5.) Find the value of the unique real number θ between 0 and 2π that satisfies the given condition:

$$\tan \theta = 1 \text{ and } \sin \theta < 0$$

a.) $\frac{7\pi}{4}$

b.) $\frac{5\pi}{4}$

c.) $\frac{3\pi}{4}$

d.) $\frac{7\pi}{6}$

6.) Use a calculator to evaluate $\cos 0.2261$. Round your answer to 4 decimal places.

a.) 0.2300

b.) 1.026

c.) 0.2242

d.) 0.9745

7.) Give the exact value of $\cos 150^\circ$.

a.) $\frac{\sqrt{3}}{2}$

b.) $\frac{\sqrt{2}}{2}$

c.) $-\frac{\sqrt{3}}{2}$

d.) $-\frac{\sqrt{2}}{2}$

8.) Find $\tan \theta$ if $\cos \theta = \frac{1}{4}$ and $\sin \theta < 0$.

a.) 4

b.) $\frac{-\sqrt{15}}{15}$

c.) $-\sqrt{17}$

d.) $-\sqrt{15}$

9.) Find $\csc \theta$ if $\cot \theta = -\sqrt{15}$ and $\cos \theta < 0$.

a.) $-\frac{1}{4}$

b.) $\frac{1}{4}$

c.) 4

d.) -4

10.) Simplify the expression: $\cos \theta - \cos \theta \sin^2 \theta$.

a.) $\sec^2 \theta$

b.) $\tan^2 \theta$

c.) $\cos^3 \theta$

d.) $\sin \theta$

11.) Simplify the expression: $\frac{\cos^2 x + \sin^2 x}{\cot^2 x - \csc^2 x}$.

a.) $\csc x$

b.) -1

c.) 1

d.) $\sec x$

12.) Simplify the expression: $\cos x + \sin x \tan x$.

a.) $\tan x - 1$

b.) $\csc x$

c.) $\cot x - 1$

d.) $\sec x$

13.) Rewrite each expression in factored form: $\sin^2 x + \sin x - 2$.

a.) $(\sin x + 2)(\sin x + 1)$

b.) $(\sin x - 2)(\sin x - 1)$

c.) $(\sin x - 2)(\sin x + 1)$

d.) $(\sin x + 2)(\sin x - 1)$

14.) Simplify the expression: $\frac{\sin^2 x - 1}{1 + \sin x}$.

a.) $-\cos x$

b.) $\sin x - 1$

c.) $\sin^2 x + 1$

d.) $\sin x + 1$

15.) Identify the amplitude, period, and phase shift: $y = 5 \cos\left(3x + \frac{\pi}{2}\right)$.

$$A = 5$$

$$P = \frac{2\pi}{3}$$

$$P.S. x = -\frac{\pi}{6}$$

16.) Find the exact value of y.

a.) $y = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

$$\frac{\pi}{3}$$

b.) $y = \arctan(1)$

$$\frac{\pi}{4}$$

17.) Find the remaining 5 trig ratios if $\tan \theta = \frac{9}{40}$ (in Quadrant I).

$$\sin \theta = \frac{9}{41}$$

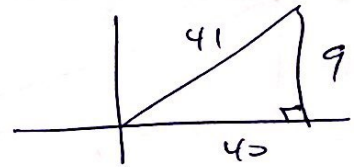
$$\csc \theta = \frac{41}{9}$$

$$\cos \theta = \frac{40}{41}$$

$$\sec \theta = \frac{41}{40}$$

$$\tan \theta = \frac{9}{40}$$

$$\cot \theta = \frac{40}{9}$$



18.) Find two coterminal angles, one positive and one negative, with $\frac{\pi}{9}$.

$$\frac{19\pi}{9}, -\frac{17\pi}{9}$$

19.) A ferris wheel with a diameter of 225 feet takes 44 seconds to rotate once.

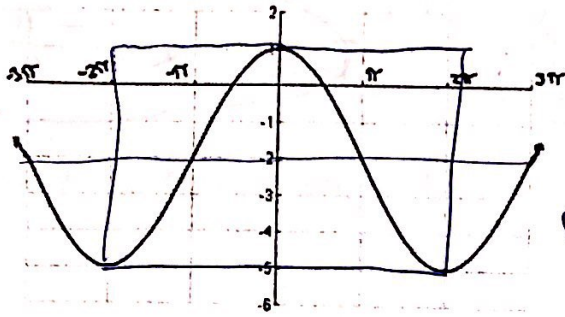
a.) Determine the angular velocity in rad/sec of the ferris wheel.

$$143 \text{ rad/sec}$$

b.) Determine the linear velocity in ft/sec of the ferris wheel.

$$16.065 \text{ ft/sec}$$

20.) Write a sine and cosine function for the given graph:



$\sin: y = 3 \sin\left(\frac{1}{2}(x + \pi)\right) - 2$

$y = 3 \sin\left(\frac{1}{2}x + \frac{\pi}{2}\right) - 2$

$\cos: y = -3 \cos\left(\frac{1}{2}(x + 2\pi)\right) - 2$

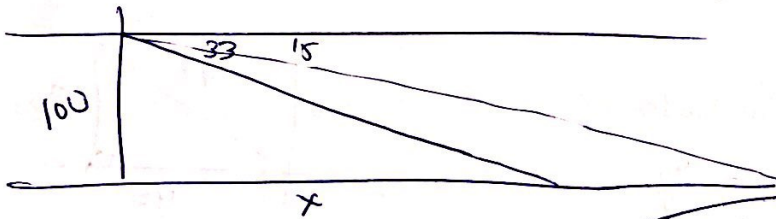
$y = -3 \cos\left(\frac{1}{2}x + \pi\right) - 2$

$P = 4\pi = \frac{2\pi}{b} \implies b = \frac{1}{2}$

$a = 3$

$d = -2$

21.) From the top of a 100-ft building a man observes a car moving toward him. If the angle of depression of the car changes from 15° to 33° during the period of observation, how far does the car travel?



$\tan 33 = \frac{100}{x} = 153.986$

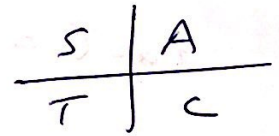
$\tan 15 = \frac{100}{y} = 373.205$

219.2 ft.

22.) Find the other five trigonometric ratios given: $\cos \theta = \frac{7}{25}$ and $\tan \theta < 0$.

$\sin \theta = \frac{-24}{25}$

$\csc \theta = \frac{-25}{24}$

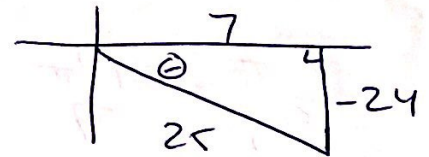


$\cos \theta = \frac{7}{25}$

$\sec \theta = \frac{25}{7}$

$\tan \theta = \frac{-24}{7}$

$\cot \theta = \frac{-7}{24}$



**** Review solving problems.