Inverse Trig Functions – Honors Precalc Worksheet

Name Key **Date** _____ **Period** _____

Find the exact value without using a calculator.

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

2. $\tan^{-1} 0 = 0$

3. $\cos^{-1}\left(\frac{1}{2}\right) = \pi/3$

4. $\tan^{-1} 1 = \pi/4$

5. $\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right) = -\pi/4$

6. $\cos^{-1} 0 = \pi/2$

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

Find the exact value without a calculator.

7. $\cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right)$ $\cos(\pi/6) = \sqrt{3}/2$

8. $\sin^{-1}\left(\cos\left(\frac{\pi}{4}\right)\right)$ $\sin^{-1}(\sqrt{2}/2) = \pi/4$

9. $\cos\left(2\sin^{-1}\left(\frac{1}{2}\right)\right)$ $\cos(2(\pi/6)) = \cos\pi/3 = 1/2$

10. $\arcsin\left(\cos\left(\frac{\pi}{3}\right)\right)$ $\sin^{-1}(1/2) = \pi/6$

Solve each of the following over the given interval. If the interval is given in radians, answer in radians (rounded to the nearest thousandth) if it is given in degrees, answer in degrees (rounded to the nearest tenth)

11. Find the exact solutions of each equation over the interval $[0, 2\pi)$.

a) $\csc^2 x - 1 = 3$ $\csc^2 x = 2$ $\csc x = \pm 2$ $\sin x = \pm 1/2$ $\pi/6, 5\pi/6, 7\pi/6, 11\pi/6$

b) $2\tan x = -2$ $\tan x = -1$ $\frac{3\pi}{4}, \frac{7\pi}{4}$

12) Find the exact solutions of each equation over the interval $[0, 360°)$.

$\tan\theta = -\sqrt{3}$

a) $2\cos\theta = \sqrt{3}$ $\cos\theta = \sqrt{3}/2$ $\pi/6, 11\pi/6$

b) $\tan^3\theta = -\sqrt{3}\tan^2\theta$ $\tan^3\theta + \sqrt{3}\tan^2\theta = 0$ $\tan^2\theta(\tan\theta + \sqrt{3}) = 0$ $\tan\theta = 0$ $\tan\theta = -\sqrt{3}$

13) $30°, 330°$

14) $0, 180°, 120°, 300°$

Suppose θ lies in Quadrant II and its reference angle is $\alpha = 41.8°$. What is the measure of θ?

A. 41.8°

B. 138.2°

C. 221.8°

D. 318.2°

$180 - 41.8$

138.2

Which are the exact solutions of $4\sec\theta = 8$ over the interval $[0°, 360°)$?

A. 45°, 225°

B. 45°, 135°

C. 60°, 300°

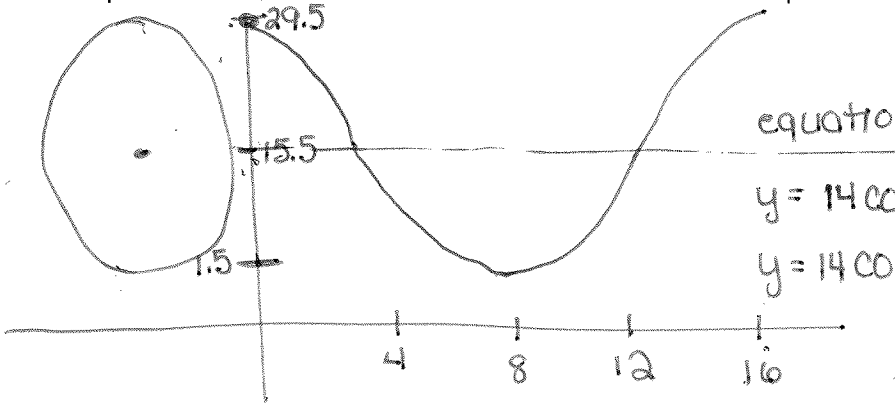
D. 30°, 330°

$\sec\theta = 2$ $\cos\theta = 1/2$ $60°, 300°$

$4\csc\theta = 8$ $\csc\theta = 2$ $\sin\theta = \frac{1}{2}$

HONORS PRECALC
MODELING SINUSOIDAL FUNCTIONS NAME_____

1. A carnival ferris wheel with a radius of 14 m makes one complete revolution every 16 seconds. The bottom of the wheel is 1.5 m above the ground. If a person is at the top of the wheel when a stop watch is started, determine how high above the ground that person will be after 1 minute and 7 seconds. Sketch one period of this function.



equation

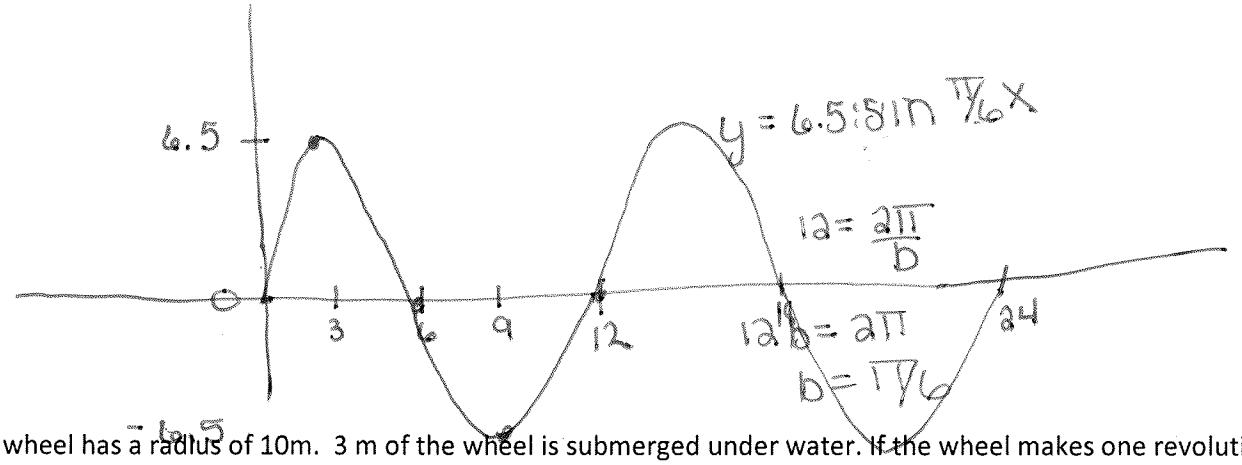
$y = 14\cos \pi/8 (x) + 15.5$

$y = 14\cos \pi/8 (67) + 15.5$

$\frac{2\pi}{b} = 16$ $\frac{16b}{16} = \frac{2\pi}{16} = \pi/8$

2. The alternating half-daily cycles of the rise and fall of the ocean are called tides. Tides in one section of the Bay of Fundy caused the water level to rise 6.5 m above mean sea-level and to drop to 6.5m below. The tide completes one cycle every 12 h. Assuming the height of water with respect to mean sea-level to be modelled by a sine function,
(a) draw the graph for the motion of the tides for one complete day;

(b) find an equation for the graph in (a)



$y = 6.5\sin \pi/6 x$

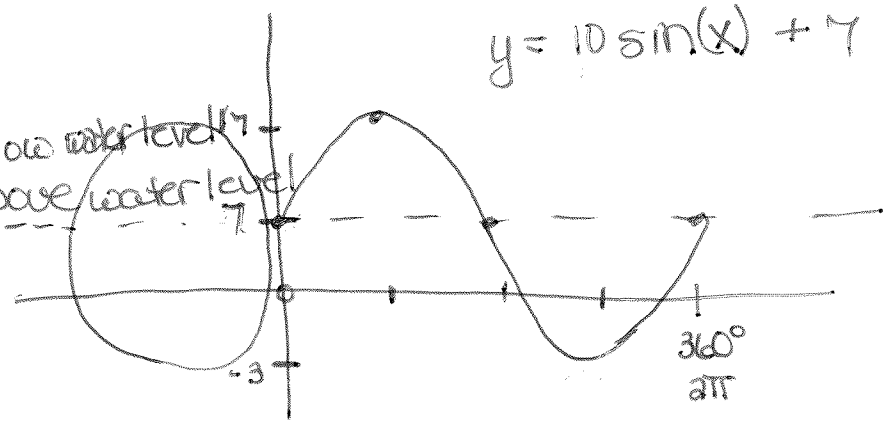
$12 = \frac{2\pi}{b}$

$12b = 2\pi$

$b = \pi/6$

3. A water wheel has a radius of 10m. 3 m of the wheel is submerged under water. If the wheel makes one revolution in 360 degrees and the bucket starts at the center and goes up, find:

a) amplitude 10
b) period 360°
c) b 1
d) d 7
e) minimum height 3 ft below water level
f) maximum height 17 ft above water level
g) Equation of graph
h) sketch of graph



$y = 10\sin(x) + 7$

$\frac{360}{b} = 360$

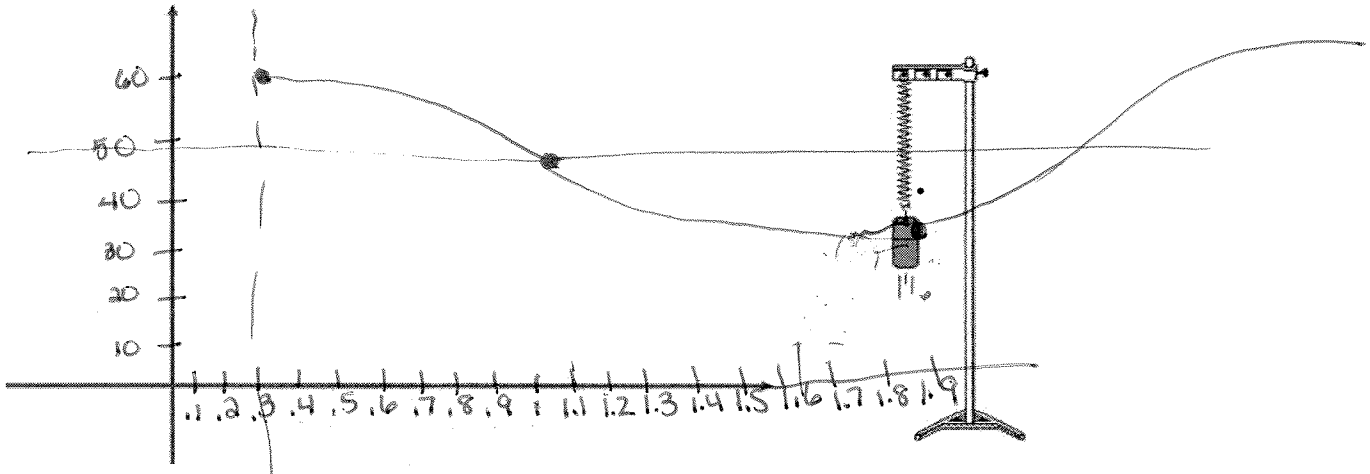
$b = 1$

4. A weight attached to a long spring is being bounced up and down by an electric motor. As it bounces, its distance from the floor varies periodically with time. You start a stop watch. When the stopwatch reads 0.3 seconds the weight reaches its first high point 60 ~~cm~~ cm above the ground. The next low point, 40 cm above the ground, occurs at 1.9 seconds.

a) sketch a graph of the function.

b) Write an equation expressing the distance above ground in terms of the numbers of seconds the stopwatch reads.

c) How high is the mass above the ground after 17.2 seconds?



cos amp 10

period 3.2

$b = \frac{2\pi}{b} = 3.2$

$b = \frac{2\pi}{3.2} = \frac{20\pi}{32} = \frac{5\pi}{8}$

1.9 − .3 = 1.6

.8

1 / 1.6 / x 2 / 3.2

.3 right

$y = 10\cos\frac{5\pi}{8}(t - .3) + 50$

$= 10\cos\frac{5\pi}{8}(17.2 - .3) + 50$