Chapter Six Practice Test **Name:** Answer Key

1. Change -312° to radian measure in terms of π.

$-312 \times \frac{\pi}{180} = \boxed{\frac{-26\pi}{15}}$

2. Change $-\frac{23\pi}{6}$ radians to degree measure. Round to the nearest tenth.

$-\frac{23\pi}{6} \times \frac{180}{\pi} = \boxed{-690°}$

3. Determine the angular velocity if 11.3 revolutions are completed in 3.9 seconds. Round to the nearest tenth.

$11.3 \times 2\pi = 22.6\pi$

$\omega = \frac{\theta}{t} = \frac{22.6\pi}{3.9} \approx \boxed{18.2 \text{ rad/sec}}$

4. A gyroscope of radius 18 centimeters rotates 35 times per minute. Find the linear velocity of a point on the edge of the gyroscope. Round to the nearest tenth.

$V = r\frac{\theta}{t} = 18\left(\frac{70\pi}{1}\right) \approx \boxed{3958.4 \text{ cm/min}}$

$35 \times 2\pi = 70\pi$

OR $\boxed{66.0 \text{ cm/sec}}$

5. An arc is 0.04 meters long and is intercepted by a central angle of $\frac{\pi}{8}$ radians. Find the diameter of the circle. Round to the nearest tenth.

$S = r\theta$

$0.04 = r\left(\frac{\pi}{8}\right)$

$r \approx 0.102(2) = \boxed{0.2 \text{ m}}$

6. Find the area of sector if the central angle measures 225° and the radius of the circle is 11.04 meters. Round to the nearest tenth.

$225 \times \frac{\pi}{180} = \frac{225\pi}{180}$

$A = \frac{1}{2}r^2\theta$

$= \frac{1}{2}(11.04)^2\left(\frac{225\pi}{180}\right)$

$\approx \boxed{239.2 \text{ m}^2}$

7. Write an equation of the cosine function with amplitude 20, period $\frac{\pi}{2}$, phase shift of 2π and a vertical shift of 4.

$\frac{2\pi}{k} = \frac{\pi}{2}$ $4 = k$ $\frac{c}{4} = 2\pi$

$\frac{4\pi}{\pi} = \frac{k\pi}{\pi}$ $c = 8\pi$

$y = \pm 20\cos(4\theta - 8\pi) + 4$

8. Write an equation for a cotangent function with period $\frac{\pi}{3}$, phase shift $-\frac{\pi}{12}$, and vertical shift –4.

$\frac{\pi}{k} = \frac{\pi}{3}$ $k = 3$ $\frac{c}{3} = \frac{-\pi}{12}$

$c = \frac{-\pi}{4}$

$y = \cot(3\theta + \frac{\pi}{4}) - 4$

9. State the amplitude, period, phase shift, and vertical shift for $y = -\sin(3\theta - \frac{\pi}{5}) + 2$.

Amp = 1

Period $\frac{2\pi}{3}$

$PS = \frac{\frac{\pi}{5}}{3} = \frac{\pi}{5} \cdot \frac{1}{3} = \frac{\pi}{15}$

VS = 2

10. Write the equation for the inverse of $y = \text{Arctan}(x + 3)$.

$x = \text{Arctan}(y + 3)$

$\tan x = y + 3$

$\tan x - 3 = y$

11. Evaluate $\text{Cos}^{-1}(\sqrt{3}/2)$.

$\frac{\pi}{6}$

12. Evaluate $\sin(\text{Cos}^{-1}(\frac{1}{2}) + \text{Sin}^{-1} 0)$.

$\sin(\frac{\pi}{3} + 0)$

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

13. Write a sinusoidal function that models the monthly temperatures in Detroit, using t = 1 to represent January.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
25.3	27.1	35.8	48.2	59.5	69.1	73.8	72.1	64.6	53.4	41.4	30.2

$A = \frac{73.8 - 25.3}{2} = 24.25$

$VS = \frac{73.8 + 25.3}{2} = 49.55$

$y = 24.25\sin\left(\frac{\pi}{6}t - c\right) + 49.55$

$25.3 = 24.25\sin\left(\frac{\pi}{6}(1) - c\right) + 49.55$

$2.09 = c$

$25.3 = 24.25\cos\left(\frac{\pi}{6} - c\right) + 49.55$

$-2.62 = c$

$\frac{2\pi}{k} = 12 \quad k = \frac{\pi}{6}$

$y = 24.25\sin\left(\frac{\pi}{6}t - 2.09\right) + 49.55$

$y = 24.25\cos\left(\frac{\pi}{6}t + 2.62\right) + 49.55$

14. A tractor tire has a diameter of 6 feet and is revolving at a rate of 45 rpm. At t = 0, a certain point on the tread of the tire is at height 0.

Amp = 3

VS = 3

60/45 = 4/3 sec for one revolution (period)

$\frac{2\pi}{k} = \frac{4}{3}$

$8\pi = 4k$

$\frac{8\pi}{4} = k$

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

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

15. An oar floating on the water bobs up and down, covering a distance of 12 feet from its lowest point to its highest point. The oar moves from its lowest point to its highest point and back to its lowest point every 15 seconds. Write a cosine function with phase shift 0 for the height of the oar after t seconds.

Amp = 6

VS = 0 (sea level)

period = 15

$\frac{2\pi}{k} = 15$

$15k = 2\pi$

$k = \frac{2\pi}{15}$

$y = -6\cos\left(\frac{2\pi}{15}t\right)$

Use the sine or cosine graph to find each value.

16. $\cos\left(\frac{-9\pi}{2}\right)$ 0

17. $\sin(3\pi)$ 0

18. $\csc(\pi)$ undefined

Graph each function.

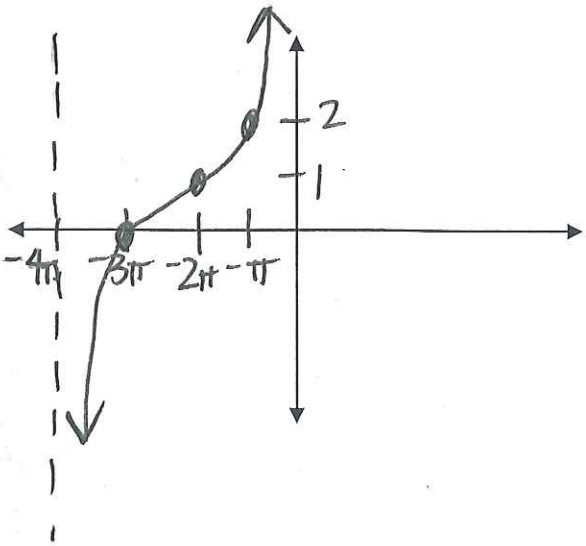
19. $y = \tan(\frac{\theta}{4} + \frac{\pi}{2}) + 1$

period $= 4\pi$

$PS = \frac{-\frac{\pi}{2}}{\frac{1}{4}} = -2\pi$

-2π & 2π

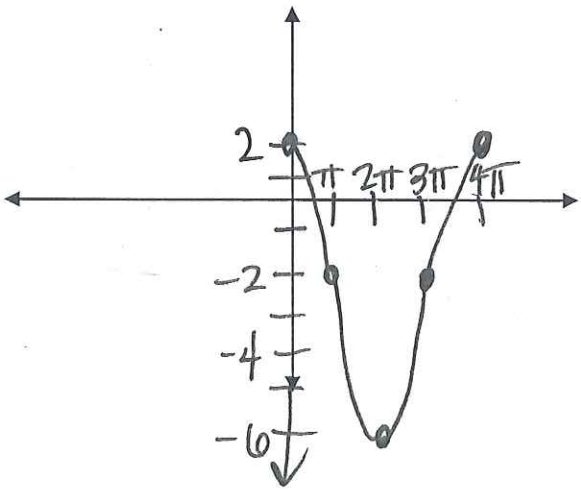
θ	w/ps	
-2π	-4π	und
$-\pi$	-3π	0
0	-2π	1
π	$-\pi$	2
2π	0	und



20. $y = -4\cos(\frac{\theta}{2} + \pi) - 2$

per: $\frac{2\pi}{\frac{1}{2}} = 4\pi$

θ	
0	2
π	-2
2π	-6
3π	-2
4π	2



21. $y = 2\sin(4\theta + \frac{\pi}{2}) - 5$

per: $\frac{2\pi}{4} = \frac{\pi}{2}$

θ	
0	-3
$\pi/8$	-5
$\pi/4$	-7
$3\pi/8$	-5
$\pi/2$	-3