Name Schlansky
Mr. Schlansky

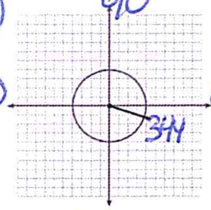
Date ______________
Algebra II

Trigonometry Review Sheet

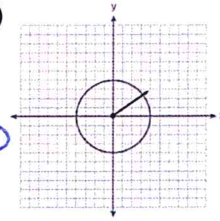
$6 \cdot \frac{180}{\pi} \approx 344°$

1. Which of the following sketches would represent 6 radians?

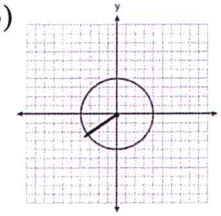
1)



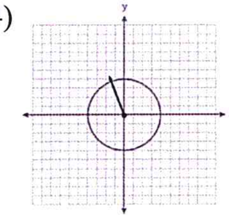
2)



3)



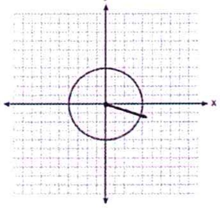
4)



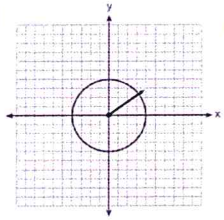
$3.9 \cdot \frac{180}{\pi} = 223°$

2. Which of the following sketches would represent 3.9 radians?

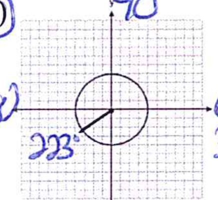
1)



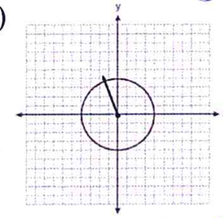
2)



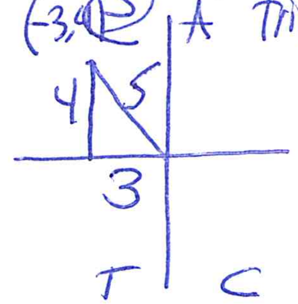
3)



4)



3. If θ passes through (-3,4), find:



a) $\cos\theta$ $-\frac{3}{5}$

b) $\sin\theta$ $\frac{4}{5}$

c) $\tan\theta$ $-\frac{4}{3}$

d) $\sec\theta$ $-\frac{5}{3}$

e) $\csc\theta$ $\frac{5}{4}$

f) $\cot\theta$ $-\frac{3}{4}$

$2^2+7^2=c^2$
$4+49=c^2$
$\sqrt{53}=\sqrt{c^2}$
$\sqrt{53}=c$

4. If θ passes through (2,-7), $\sec\theta$ must be:

1) $\frac{\sqrt{53}}{7}$

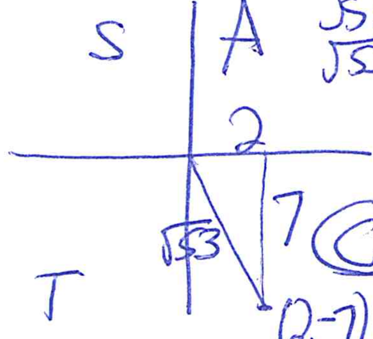
2) $\frac{\sqrt{53}}{2}$

3) $-\frac{\sqrt{53}}{7}$

4) $-\frac{\sqrt{53}}{2}$

$\cos\theta = \frac{+2}{\sqrt{53}}$

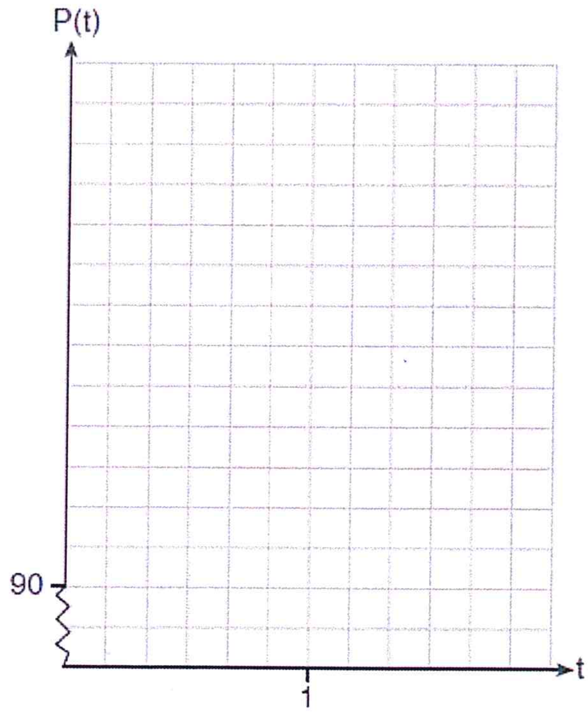
$\sec\theta = \frac{\sqrt{53}}{2}$



5. The resting blood pressure of an adult patient can be modeled by the function P below, where $P(t)$ is the pressure in millimeters of mercury after time t in seconds.

$$P(t) = 24\cos(3\pi t) + 120$$

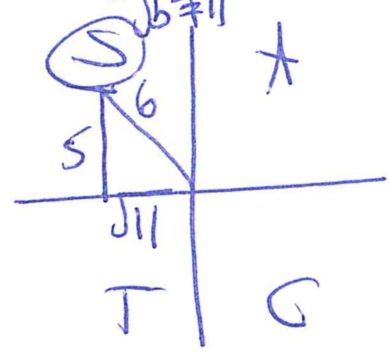
On the set of axes below, graph $y = P(t)$ over the domain $0 \le t \le 2$.



Determine the period of P. Explain what this value represents in the given context. Normal resting blood pressure for an adult is 120 over 80. This means that the blood pressure oscillates between a maximum of 120 and a minimum of 80. Adults with high blood pressure (above 140 over 90) and adults with low blood pressure (below 90 over 60) may be at risk for health disorders. Classify the given patient's blood pressure as low, normal, or high and explain your reasoning.

$5^2+b^2=6^2$
$25+b^2=36$
$-25 \quad -25$
$\sqrt{b^2}=\sqrt{11}$

5. If $\sin\theta = \dfrac{5}{6}$ and θ is in Quadrant II, find:



a) $\cos\theta$ $\quad -\dfrac{\sqrt{11}}{6}$

b) $\sin\theta$ $\quad \dfrac{5}{6}$

c) $\tan\theta$ $\quad -\dfrac{5}{\sqrt{11}}\dfrac{\sqrt{11}}{\sqrt{11}} \quad -\dfrac{5\sqrt{11}}{11}$

d) $\sec\theta$ $\quad -\dfrac{6}{\sqrt{11}}\dfrac{\sqrt{11}}{\sqrt{11}} \quad -\dfrac{6\sqrt{11}}{11}$

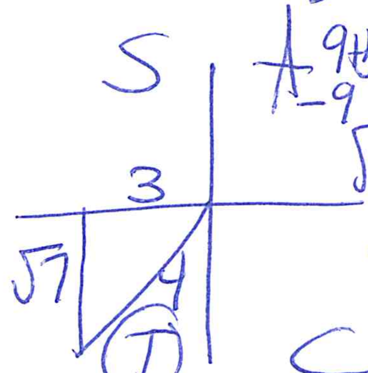
e) $\csc\theta$ $\quad \dfrac{6}{5}$

f) $\cot\theta$ $\quad \dfrac{\sqrt{11}}{-5}$

$3^2+b^2=4^2$
$9+b^2=16$
$-9 \quad -9$
$\sqrt{b^2}=\sqrt{7}$
$b=\sqrt{7}$

6. If $\cos\theta = -\frac{3}{4}$ and θ is in Quadrant III, then $\sin\theta$ is equivalent to

$\sin\theta = -\dfrac{\sqrt{7}}{4}$

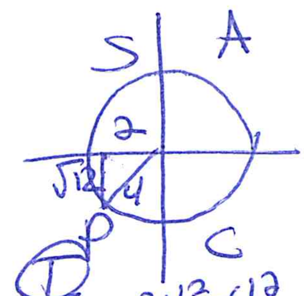


1) $-\frac{\sqrt{7}}{4}$ 3) $-\frac{5}{4}$

2) $\frac{\sqrt{7}}{4}$ 4) $\frac{5}{4}$

7. A circle centered at the origin has a radius of 4 units (hypotenuse). The terminal side of an angle, θ, intercepts the circle in Quadrant III at point P. The x-coordinate of point P is 2. Find all six trigonometric functions.

* I don't care about reducing the fraction for these.



a) $\cos\theta$ $\quad -\dfrac{2}{4} \quad -\dfrac{1}{2}$

b) $\sin\theta$ $\quad -\dfrac{\sqrt{12}}{4}$

c) $\tan\theta$ $\quad \dfrac{\sqrt{12}}{2}$

d) $\sec\theta$ $\quad -\dfrac{4}{2} \quad -2$

e) $\csc\theta$ $\quad -\dfrac{4}{\sqrt{12}}\dfrac{\sqrt{12}}{\sqrt{12}} \quad -\dfrac{4\sqrt{12}}{12}$

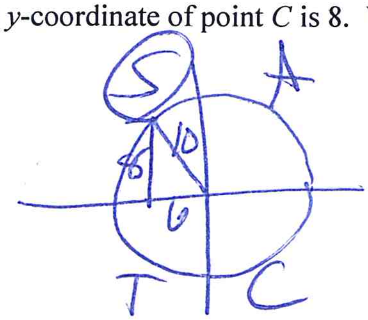
f) $\cot\theta$ $\quad \dfrac{2}{\sqrt{12}}\dfrac{\sqrt{12}}{\sqrt{12}} \quad \dfrac{2\sqrt{12}}{12}$

$2^2+b^2=4^2$
$4+b^2=16$
$-4 \quad -4$
$\sqrt{b^2}=\sqrt{12}$
$b=\sqrt{12}$

8. A circle centered at the origin has a radius of 10 units (hyp). The terminal side of an angle, θ, intercepts the circle in Quadrant II at point C. The y-coordinate of point C is 8. What is the value of $\cos\theta$?

$\cos\theta = -\dfrac{6}{10}$

$\cos\theta = -\dfrac{3}{5}$



$8^2+b^2=10^2$
$64+b^2=100$
$-64 \quad -64$
$\sqrt{b^2}=\sqrt{36}$
$b=6$

1) $-\frac{3}{5}$ 3) $\frac{3}{5}$

2) $-\frac{3}{4}$ 4) $\frac{4}{5}$

	30	45	60
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tan	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

−.866..

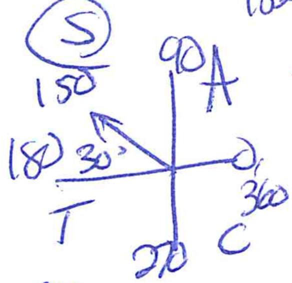
9. What is the exact value of $\cos\left(\frac{5\pi}{6}\right)$? (or)

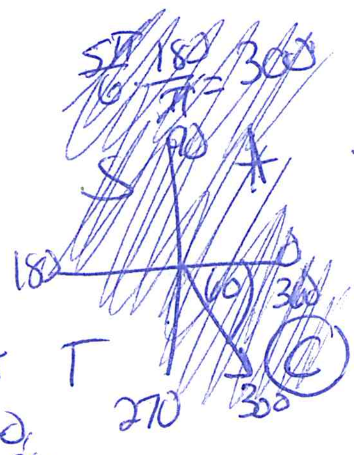
1) $\frac{\sqrt{3}}{2}$

2) $\frac{1}{2}$

3) $-\frac{\sqrt{3}}{2}$ −.866..

4) $-\frac{1}{2}$





Q S F R

IV − cos 30

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

$\frac{5\pi}{6}\cdot\frac{180}{\pi} = 150°$

10. What is the exact value of ~~tan~~ sin $\left(\frac{3\pi}{4}\right)$? (or)

.707..

1) $\frac{\sqrt{3}}{2}$

2) $\frac{\sqrt{2}}{2}$ .707..

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

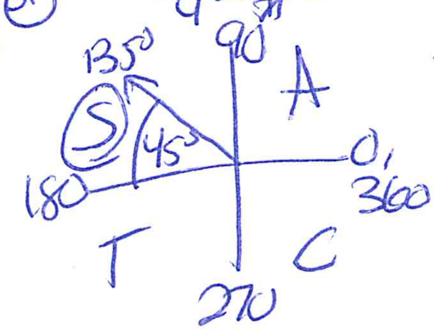
4) $-\frac{\sqrt{2}}{2}$

$\frac{3\pi}{4}\cdot\frac{180}{\pi} = 135°$

Q S F R

II + sin 45

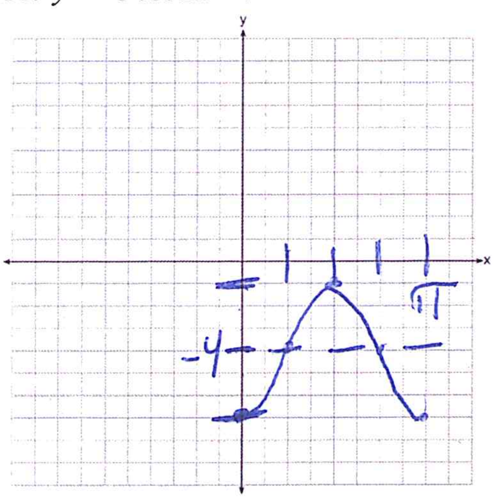
$\frac{\sqrt{2}}{2}$



Graph one full cycle of the following sinusoidal functions:

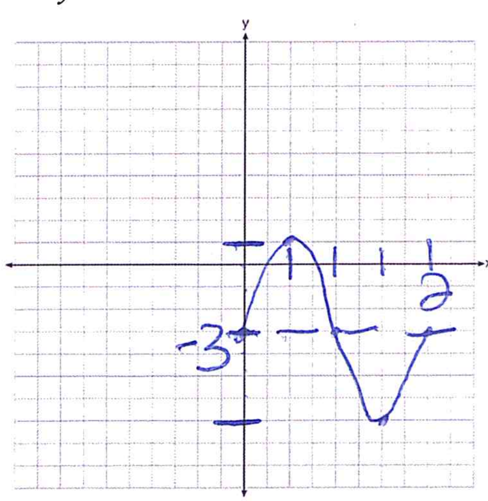
11. $y = -3\cos 2x - 4$

amp=3
−cos
freq=2
shift=−4
$p = \frac{2\pi}{2} = \pi$



12. $y = 4\sin \pi x - 3$

amp=4
+sin
freq=π
shift=−3
$p = \frac{2\pi}{\pi} = 2$



ampsinfreqxshift

multiple choice
Cancel out wrong choices

Open response
$f=\frac{2\pi}{p}$ mid $=\frac{\min+\max}{2}$
amp sin freq x shift

13. The depth of the water at a marker 20 feet from the shore in a bay is depicted in the graph below.

If the depth, d, is measured in feet and time, t, is measured in hours since midnight, what is an equation for the depth of the water at the marker?

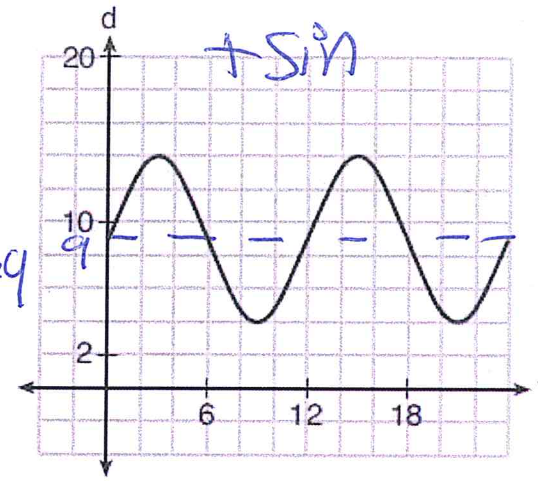
1) $\cancel{d = 5\cos\left(\frac{\pi}{6}t\right) + 9}$

2) $\cancel{d = 9\cos\left(\frac{\pi}{6}t\right) + 5}$

3) $d = 9\sin\left(\frac{\pi}{6}t\right) + 5$

4) $d = 5\sin\left(\frac{\pi}{6}t\right) + 9$

Shift=9



14. Which equation is graphed in the diagram below?

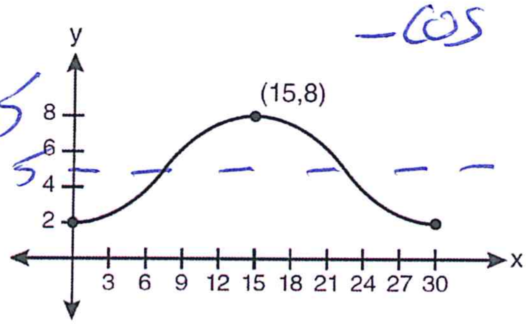
1) $\cancel{y = 3\cos\left(\frac{\pi}{30}x\right) + 8}$

2) $\cancel{y = 3\cos\left(\frac{\pi}{15}x\right) + 5}$

3) $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$

4) $y = -3\cos\left(\frac{\pi}{15}x\right) + 5$

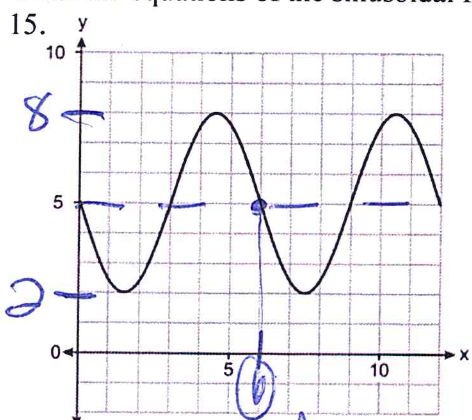
Shift=5



$-\cos$

Write the equations of the sinusoidal functions given below.

15.



Period

$f=\frac{2\pi}{6}$

$f=\frac{\pi}{3}$

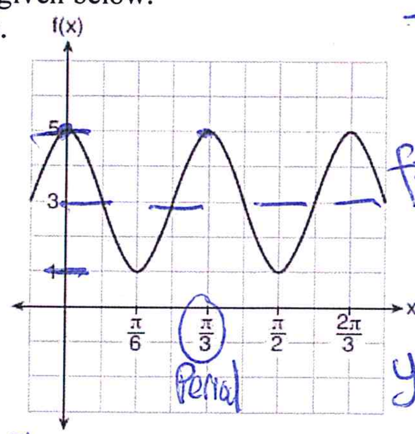
midline $=\frac{2+8}{2}$

midline $=5$

$y=$ amp sin freq x shift

$y=-3\sin\left(\frac{\pi}{3}x\right)+5$

16.



Period

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

$f=\frac{2\pi}{1}\cdot\frac{3}{\pi}=6$

midline $=\frac{1+5}{2}=3$

$y=$ amp sin freq x shift

$y=2\cos(6x)+3$

amp sin freq shift

17. A person's lung capacity can be modeled by the function $C(t) = 250\sin\left(\frac{2\pi}{5}t\right) + 2450$, where $C(t)$ represents the volume in mL present in the lungs after t seconds. ~~State the maximum~~ value of this function over one full cycle, and explain what this value represents.

2700
2450 — 250, 250
2200

$2450 + 250 = 2700$ $\quad$ $2450 - 250 = 2200$

Maximum = 2700
The maximum lung capacity is 2700 mL

18. The function $d(t) = 2\cos\left(\frac{\pi}{6}t\right) + 5$ models the water depth, in feet, at a location in a bay, t hours since the last high tide. Determine the *minimum* water depth of the location, in feet, and justify your answer.

amp sin freq shift

7
5 — 2, 2
3

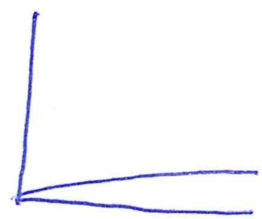
$5 + 2 = 7$ $\quad$ $5 - 2 = 3$

3 feet

19. As θ increases from $-\frac{\pi}{2}$ to 0 radians, the value of $\cos\theta$ will

1) decrease from 1 to 0
2) decrease from 0 to −1
3) increase from −1 to 0
4) increase from 0 to 1

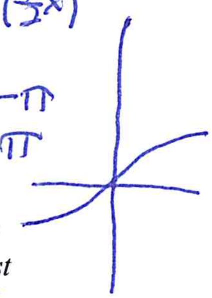
y = cos x
window:
x min: $-\frac{\pi}{2}$
x max: 0



20. Given $p(\theta) = 3\sin\left(\frac{1}{2}\theta\right)$ on the interval $-\pi < \theta < \pi$, the function p

1) decreases, then increases
2) increases, then decreases
3) decreases throughout the interval
4) increases throughout the interval

y = 3 sin(½x)
window:
x min: −π
x max: π



21. The monthly high temperature (°F) in Buffalo, New York can be modeled by $B(m) = 24.9\sin(0.5m - 2.05) + 55.25$, where m is the number of the month and January = 1. Find the average rate of change in the monthly high temperature between June and October, to the *nearest hundredth*.

6 $\quad$ 10

X	Y
6	75.504
10	59.992

$\frac{y_2 - y_1}{x_2 - x_1}$ $\quad$ $\frac{59.992 - 75.504}{10 - 6}$

$\boxed{-3.88}$

22. The height, $h(t)$ in cm, of a piston, is given by the equation $h(t) = 12\cos\left(\frac{\pi}{3}t\right) + 8$, where t represents the number of seconds since the measurements began. Determine the average rate of change, in cm/sec, of the piston's height on the interval $1 \le t \le 2$.

X	Y
1	14
2	2

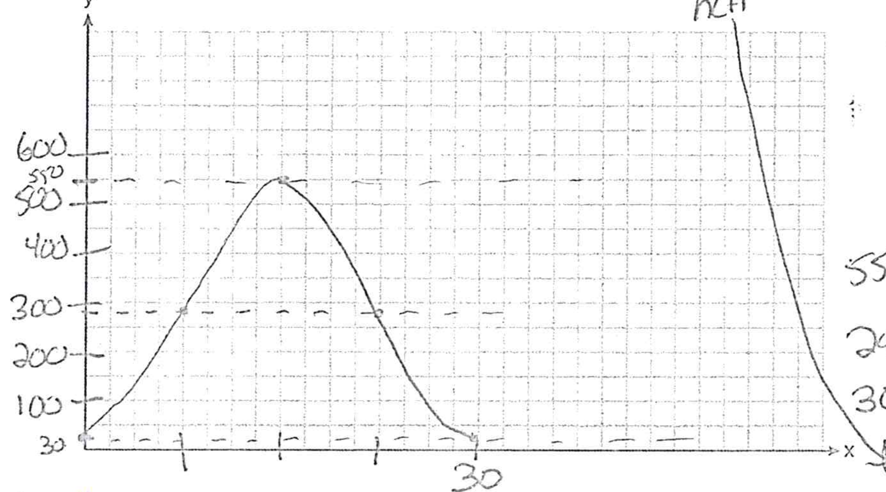
$\frac{y_2 - y_1}{x_2 - x_1}$ $\quad$ $\frac{2 - 14}{2 - 1} = \boxed{-12}$

Name Schlansky — Date ____________

Mr. Schlansky — Algebra II

Graphing Sinusoidal Models

23. The High Roller, a Ferris wheel in Las Vegas, Nevada, opened in March 2014. A passenger's height, in feet, above the ground after t minutes can be modeled by the equation $h(t) = -260\cos\left(\frac{\pi}{15}t\right) + 290$. Graph one full cycle of $h(t)$ on the axes provided. Identify the period and state its meaning in the context of the problem. To the *nearest tenth of a* ~~*second*~~ minute, after how much time will the passenger first reach a height of 500 feet?



$h(t) = -260\cos\left(\frac{\pi}{15}t\right) + 290$

amp = 260

−cos

freq = $\frac{\pi}{15}$

shift = 290

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

$\frac{2\pi}{1} \cdot \frac{15}{\pi} = 30$

550 ———

290 — — —

30 ———

Period = 30

It takes 30 minutes for the Ferris wheel to complete one full rotation

$500 = -260\cos\left(\frac{\pi}{15}t\right) + 290$

$Y_1 = 500$

$Y_2 = -260\cos\left(\frac{\pi}{15}t\right) + 290$

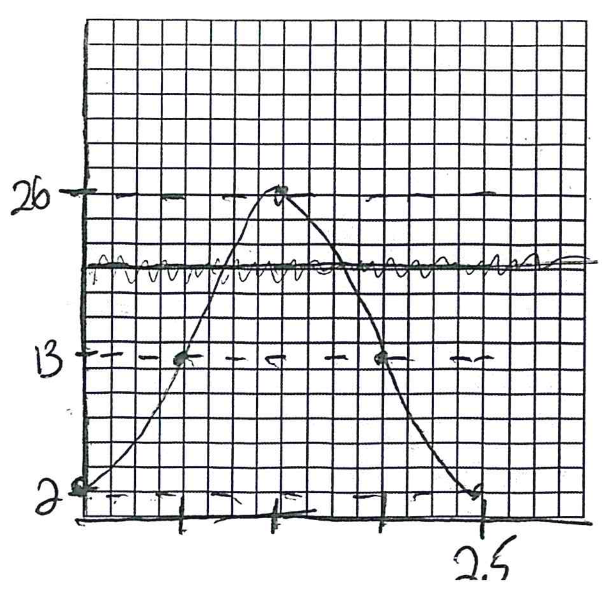
Intersect

\#9 max = 550

12.0 minutes

24. Griffin is riding his bike down the street in Churchville, N.Y. at a constant speed, when a nail gets caught in one of his tires. The height of the nail above the ground, in inches, can be represented by the trigonometric function $f(t) = -13\cos(0.8\pi t) + 13$, where t represents the time (in seconds) since the nail first became caught in the tire. Determine the period of $f(t)$. Interpret what the period represents in this context. On the grid below, graph *at least one* cycle of $f(t)$ that includes the y-intercept of the function. Does the height of the nail ever reach 30 inches above the ground? Justify your answer.

$f(t) = -13\cos(0.8\pi t) + 13$



amp = 13

−cos

freq = 0.8π

shift = 13

$P = \frac{2\pi}{0.8\pi}$

P = 2.5

Period = 2.5

It takes 2.5 seconds for the bike wheel to make one full rotation

26 ———

13 — — —

0 ———

No, the nail never reaches 30 inches because the maximum height is 26 in