NO CALCULATOR

REASSESSMENT UNIT 6

U6LT1 – I can convert to radians, degrees.

Convert to degrees. $0 \le \theta \le 360°$

1. $\frac{\pi}{9} \cdot \frac{180}{\pi} = \frac{180}{9} = \boxed{20°}$

2. $\frac{-2\pi}{5} \cdot \frac{180}{\pi} = -72°$ ⇒ $\boxed{288°}$

3. $\frac{11\pi}{\cancel{3}} \cdot \frac{\overset{60}{180}}{\pi} = 660$ ⇒ $\boxed{300°}$

Convert to radians. $0 \le \theta \le 2\pi$

4. $200° \cdot \frac{\pi}{180} = \frac{20\pi}{18} = \boxed{\frac{10\pi}{9}}$

5. $-100°$ ⇒ $260° \cdot \frac{\pi}{180} = \frac{26\pi}{18} = \boxed{\frac{13\pi}{9}}$

6. $-70°$ $290° \cdot \frac{\pi}{180} = \boxed{\frac{29\pi}{18}}$

U6LT2 – I can evaluate the exact values of trig functions including quadrantal angles.

Find the exact values.

7. $\tan -\frac{\pi}{3} = -\sqrt{3}$

8. $\csc 30° = \boxed{2}$ $\frac{1}{\sin 30}$

9. $\sec \frac{-13\pi}{6} = \frac{2}{\sqrt{3}}$ or $\boxed{\frac{2\sqrt{3}}{3}}$ $\frac{1}{\cos}$

10. Find cot θ if sin θ = $\frac{3}{5}$ and tan θ < 0.

bowtie 3 5 −4 5 3 4

$\boxed{\cot\theta = -4/3}$

11. Find sec θ if the terminal side of the angle is (-6, 9).

$6^2 + 9^2 = c^2$

$36 + 81 = c^2$ $c = \sqrt{117}$

(-6, 9) 9 −6

$\boxed{\sec\theta = \frac{\sqrt{117}}{-6}}$

12. Find csc θ if tan θ = $-\frac{7}{4}$ and sin θ > 0

$49 + 16 = c^2$

$c = \sqrt{65}$

−7 4

$\boxed{\csc\theta = \frac{\sqrt{65}}{-7}}$

13. $\sin\left(\frac{2\pi}{3}\right) = \boxed{\frac{\sqrt{3}}{2}}$

14. $\cot\left(\frac{-\pi}{4}\right) = \boxed{-1}$

15. $\sin 135°$ $\frac{\sqrt{2}}{2}$

16. $\tan(-150°) = \frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$

17. $\sec\left(\frac{11\pi}{6}\right) = \frac{2}{\sqrt{3}}$ or $2\sqrt{3}/3$ $\frac{1}{\cos}$

18. $\cos 660° = \boxed{\frac{1}{2}}$ ↓ 300

19. $\cot(-26\pi) = 0$

20. $\csc\left(-\frac{7\pi}{4}\right) = \sqrt{2}$ or $\frac{2}{\sqrt{2}}$ $\frac{1}{\sin}$

U6LT3

Directions: Write the *exact* trigonometric value of the following problems.

21. $\cos^{-1}\frac{\sqrt{3}}{2} =$ ~~[illegible]~~ 150° or $\frac{5\pi}{6}$ rad

22. $\sin^{-1}\frac{\sqrt{2}}{2}$ $\frac{\pi}{4}$ or 45°

23. $\arcsin(-1)$ $\boxed{-\pi/2 \text{ or } -90°}$

24. $\cos^{-1}(-1)$ 180° or π rad

25. $\arctan(1)$ $\frac{\pi}{4}$ or 45°

26. $\tan^{-1}(-1)$ $-\pi/4$ or $-45°$

27. $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$ $-\pi/6$ or $-30°$

28. $\arccos\left(-\frac{\sqrt{2}}{2}\right)$ 135° or $3\pi/4$

29. $\cos^{-1} 0$ ~~[illegible]~~ $\frac{\pi}{2}$ or 90°

30. $\cos\left(\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)\right) = \boxed{1/2}$ $\pi/3$ or 60

31. $\sin\left(\cos^{-1}\left(-\frac{1}{2}\right)\right) = \boxed{\frac{\sqrt{3}}{2}}$ 120°

32. $\tan\left(\sin^{-1} 0\right) = \boxed{0}$

33. $\cot\left(\cos^{-1} 0\right)$ $= 0$

90

34. $\sin^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right) = -\pi/3$ or $-60°$

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

35. $\cos^{-1}\left(\sin\left(\frac{5\pi}{4}\right)\right) = \frac{3\pi}{4}$ or $135°$

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

36. $\tan^{-1}\left(\cos\left(\frac{\pi}{2}\right)\right) = 0°$ or 0 rad

0

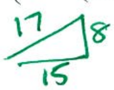
37. $\sin^{-1}\left(\sin\left(\frac{3\pi}{4}\right)\right) = 45°$ or $\pi/4$ rad

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

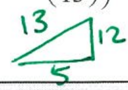
38. $\cos^{-1}\left(\sin\left(-\frac{\pi}{3}\right)\right) = \pi/6$ or $30°$

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

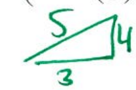
39. $\cos\left(\sin^{-1}\left(\frac{8}{17}\right)\right) = \boxed{\frac{15}{17}}$



40. $\sin\left(\cos^{-1}\left(\frac{5}{13}\right)\right) = \boxed{\frac{12}{13}}$



41. $\tan\left(\cos^{-1}\left(\frac{3}{5}\right)\right) = \frac{4}{3}$



U6LT4 Law of Sines and Cosines **CALCULATORS ALLOWED**

Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

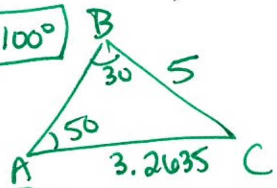
Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

Solve for the missing parts of the triangle.

44. $A = 50°, B = 30°, a = 5$

$\boxed{\angle C = 100°}$



$$\frac{\sin 50}{5} = \frac{\sin 30}{b}$$

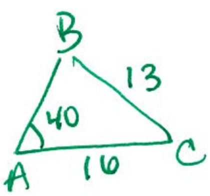
$$b = \frac{5\sin 30}{\sin 50} = \boxed{b = 3.2635}$$

$$\frac{\sin 100}{c} = \frac{\sin 50}{5}$$

$\boxed{c = 6.4279}$

45. $A = 40°, b = 16, a = 13$

Angle Side-Side! Ahhh!



First triangle

$$\frac{\sin B}{16} = \frac{\sin 40}{13}$$

$B = \sin^{-1}(0.79)$

$\boxed{\angle B = 52.29}$

$\boxed{\angle C = 87.71}$

$\boxed{c = 46.63}$

$$\frac{\sin 87.71}{c} = \frac{\sin 40}{30}$$

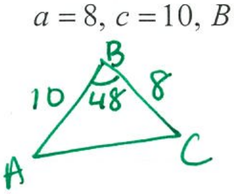
Second Triangle

$\boxed{\angle B = 127.71}$

$\boxed{\angle C = 12.29}$

$\boxed{c = 9.93}$

46. $a = 8,\ c = 10,\ B = 48°$



$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

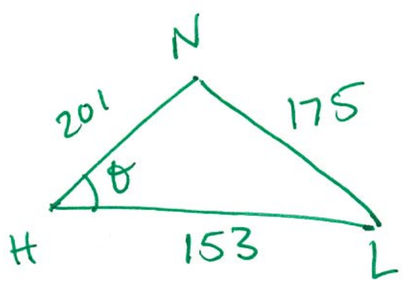
$$b^2 = 8^2 + 10^2 - 2(8)(10)\cos(48)$$

$\boxed{b = 7.5458}$

So $\frac{\sin 48}{7.545} = \frac{\sin A}{8}$

$\boxed{\angle A = 51.99°}$ $\boxed{\angle C = 99.99°}$

47. Harry, Louis, and Niall are camping in their tents. If the distance between Harry and Louis is 153 feet, the distance between Niall and Harry is 201 feet, and the distance between Louis and Niall is 175 feet, what is the angle between Harry and Niall?



$$H^2 = N^2 + L^2 - 2NL\cos\theta$$

$$175^2 = \cancel{2}153^2 + 201^2 - 2(153)(201)\cos\theta$$

$$\frac{175^2 - 153^2 - 201^2}{-2(153)(201)} = \cos\theta$$

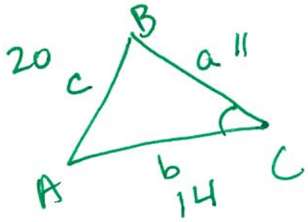
$$\boxed{\theta = 57.35°}$$

U6LT5 Area of a triangle **CALCULATORS ALLOWED**

$Area = \frac{1}{2}ab\sin C$

Find the area of triangle ABC.

48. a =11, b= 14 c= 20



$Area = \frac{1}{2}(11)(14)\sin 105.6°$

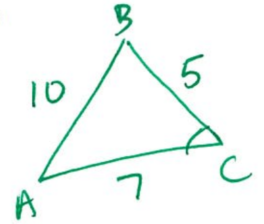
$\boxed{A = 74.16\,u^2}$

units cm or m

Need an angle $\cos C = \frac{c^2 - a^2 - b^2}{-2ab} = -.2695$

$c^2 = a^2 + b^2 - 2ab\cos C$ $\boxed{\text{So } \angle C = 105.6°}$

49. a = 5, b = 7, c = 10

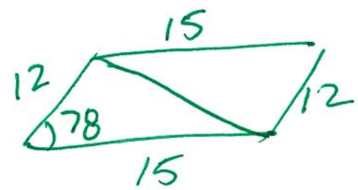


$Area = \frac{1}{2}(5)(7)\sin 111.8$

$= \boxed{16.25\,u^2}$

$c^2 = a^2 + b^2 - 2ab\cos C$ So $\angle C = 111.8°$

50. Find the area, to the nearest square inch, of a parallelogram with sides of length 12 in and 15 in and included angle of 78°.



Area of one triangle =

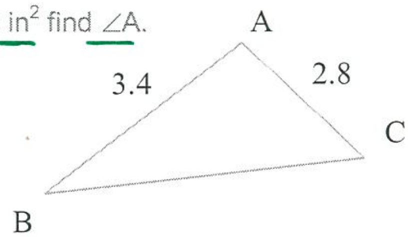
$\frac{1}{2}(12)(15)\sin(78)$

So double it ⇒

$(12)(15)\sin(78) =$

$\boxed{176.066}$

51. Given the area of the triangle is 4.2 in^2 find $\angle$A.



$Area = \frac{1}{2} bc \sin A$

$4.2 = \frac{1}{2}(2.8)(3.4)\sin A$

$\frac{8.4}{(2.8)(3.4)} = \sin A$

$.8824 = \sin A$

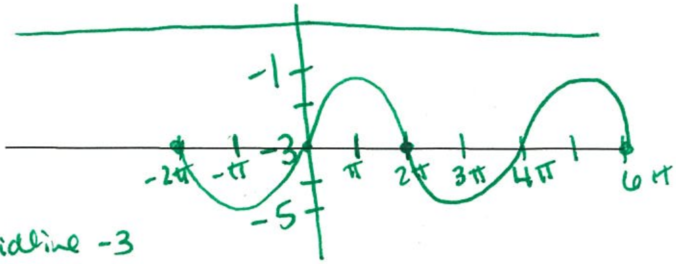
$\sin^{-1}(.8824) = A$

$\boxed{A = 61.9°}$

REASSESSMENT REVIEW UNIT 7

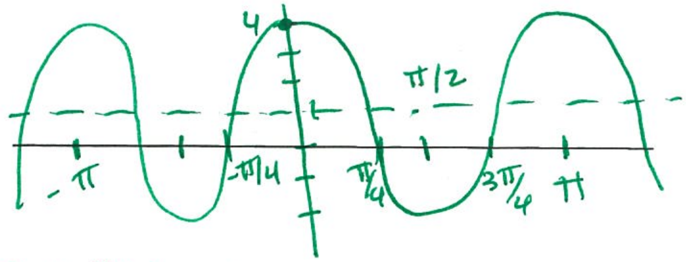
U7LT1

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



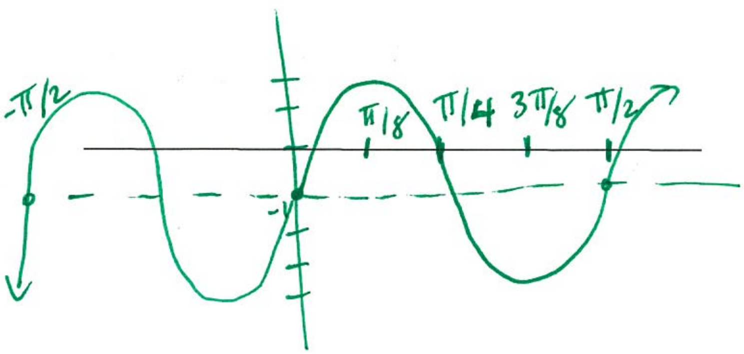
① midline -3
② Amp 2
③ Period $\frac{2\pi}{1/2} \Rightarrow 4\pi$
④ P.S. $\frac{\pi}{1/2} = \boxed{2\pi \text{ to the right}}$

2.Graph: $y = 3cos2x + 1$

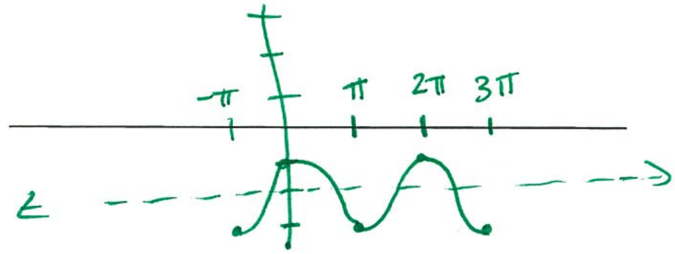


① Midline y=1
② Amp 3
③ Period $2\pi/2 = \pi$
P.S. None

3. Graph: y=3sin(4x)-1 Period $= \frac{2\pi}{4} = \frac{\pi}{2}$



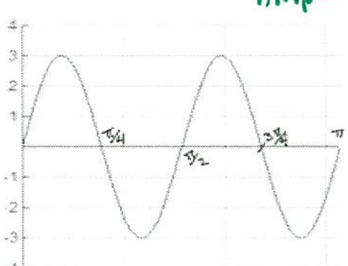
4. Graph: y = -cos(x – π) - 2



5.

midline = 0
Amp = 3
Period $= \pi/2$

$\frac{2\pi}{b} = \frac{\pi}{2}$ $\boxed{b=4}$



$\boxed{y = 3\sin(4x)}$

or

$\boxed{y = 3\cos(4x - \pi/2)}$

*Note everything is the same except the P.S.

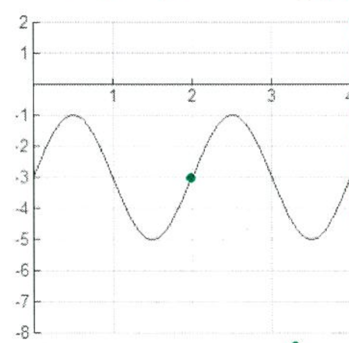
$\frac{C}{4} = \frac{\pi}{8}$

$C = \pi/2$

6.

Period=2
$\Rightarrow b = \pi$

midline = -3
Amp = 2



$y = 2\sin(\pi x) - 3$

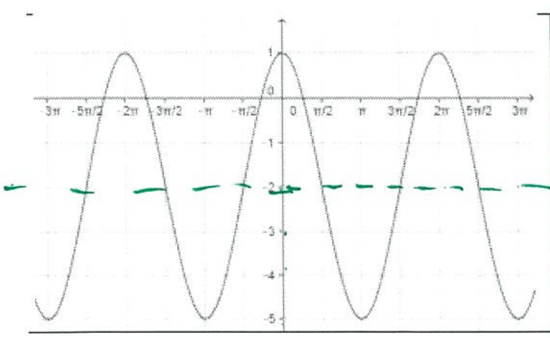
or

$y = 2\cos(\pi x - \pi/2) - 3$

$\frac{C}{\pi} = \frac{1}{2}$

7.

mid= -2
Amp=3
Period=2π



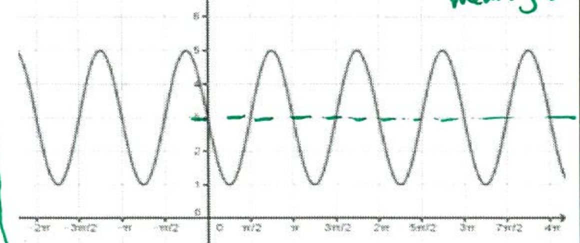
$y = 3\cos(x) - 2$

or

$y = 3\sin(x + \pi/2) - 2$

8.

mid = 3 Amp = 2 Period=π meaning b=2



$y = -2\sin(2x) + 3$

or

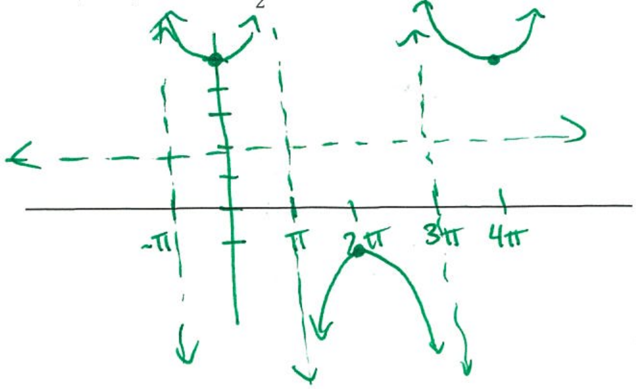
$y = -2\cos(2x - \pi/2) + 3$

U7LT2

Cos

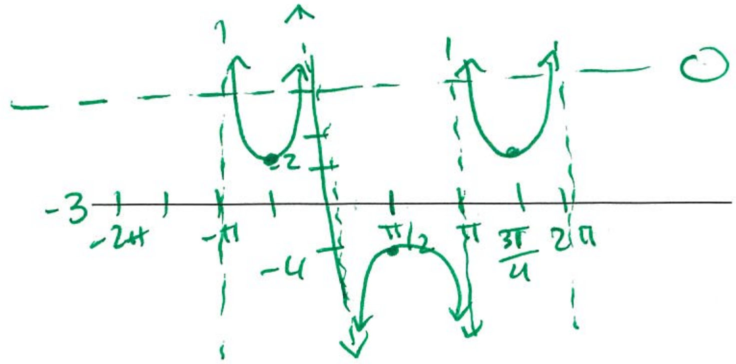
$\text{Period} = \frac{2\pi}{1/2} = 4\pi$

9.Graph: $y = 3sec\frac{x}{2} + 2$



Left π

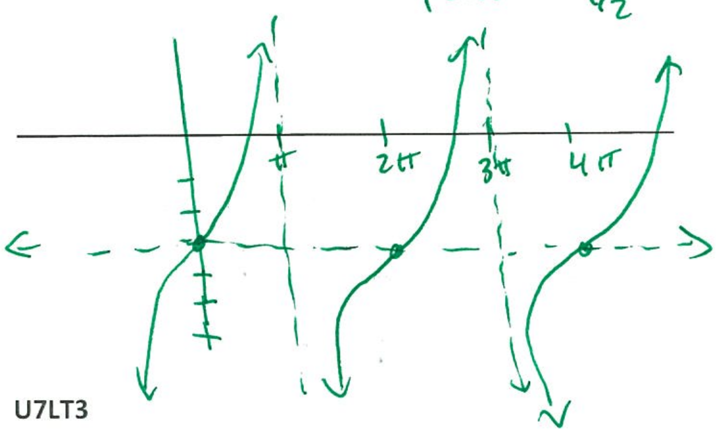
10.Graph: $y = -\csc(x + \pi) - 3$



11.Graph: $y = 4tan\frac{x}{2} - 3$

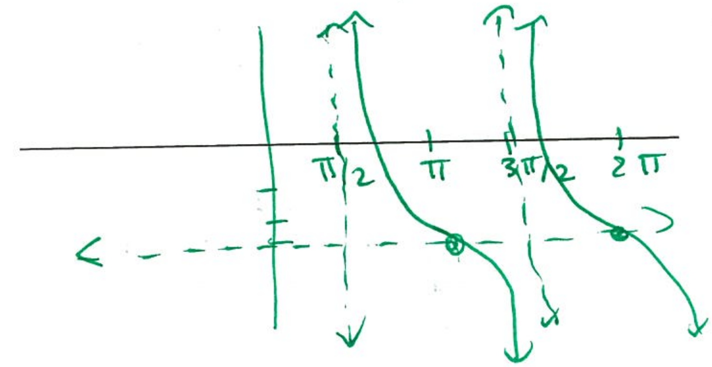
Starts with inflection pt.

$\text{Period} = \frac{\pi}{1/2} \Rightarrow 2\pi$



12.Graph: $y = \cot\left(x - \frac{\pi}{2}\right) - 3$

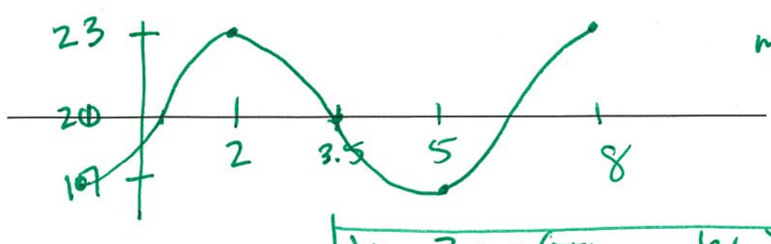
P.S. π/2 Right Period π



U7LT3

13. Tarzan swings back and forth on a grapevine going back and forth across a river bank, going alternatively over land and water. Jane decides to model his motion and starts her stopwatch. Let t be the number of seconds the stopwatch reads and let y be the number of meters Tarzan is from the riverbank. Assume y varies sinusoidally with t, and that y is positive when Tarzan is over the water and negative when he is over the land.
Jane finds that when t=2, Tarzan is at one end of his swing, where y=23 and at t=5 he reaches the other end of the swing with y=17.

Sketch the graph of the function and write an equation from the graph.



Amp = 3
midline = 20
cos shifted 2 right
Period = 6
$\frac{2\pi}{b} = 6 \quad b = \pi/3$
$2 = \frac{c}{b}$
$c = 6/\pi$

$\boxed{y = 3\cos\left(\pi/3\, x - 6/\pi\right) + 20}$

Where is Tarzan at 16 seconds?

Plug in 16

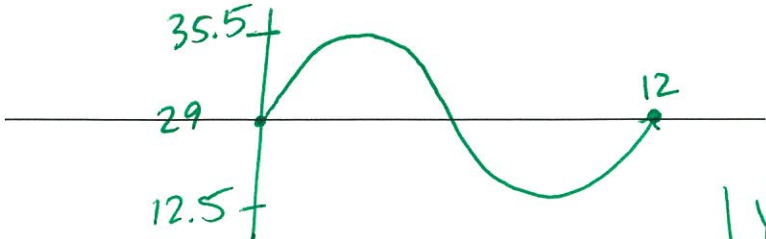
State two times that Tarzan is exactly crossing the river bank?

3.5 seconds, 6.5 seconds

14. The pedals of a bicycle are mounted on a bracket whose center is 29 cm above the ground. Each pedal is 16.5 cm from the center of the bracket. Assume that the bicycle is pedaled at 12 revolutions per minute with a starting position of the ***right*** pedal in a horizontal position at t=0 seconds. Sketch the graph that models the pedals.

Period = 12

$\frac{2\pi}{b} = 12 \quad b = \pi/6$



Right pedal

$$\boxed{y = 16.5\sin(\pi/6\, x) + 29}$$

Where will the ***left*** pedal be at 40 seconds?

Left → opposite of Right

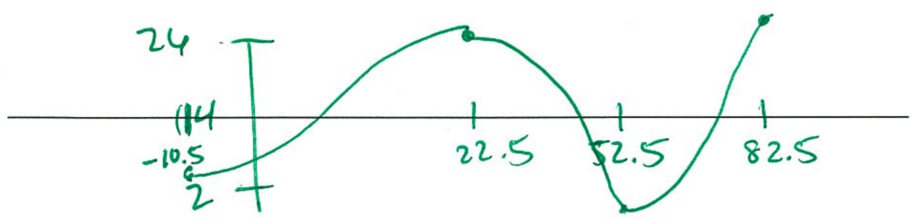
$y = -16.5\sin\left(\frac{20\pi}{3}\right) + 29 = 16.5 \cdot 0.5 + \boxed{\cancel{37.25}}$ $\cancel{12.5}$ $1/2$

15. You are on an 8-seat Ferris wheel at an unknown height when the ride starts. It takes you 22.5 seconds to reach the top of the wheel 26m above the ground. The loading platform is 2m high. The wheel makes a complete revolution in 60 seconds.

a) Create a diagram/sketch to show your location on the ride and the key features of the wheel.

$22.5 = \frac{c}{b}$

$\frac{22.5(30)}{\pi}$



~~Period $\frac{2\pi}{b} = 22.5$ $b = \pi/22.5$~~

Period $= \frac{2\pi}{b} = 60$

$\frac{\pi}{30} = b$

b) Find the sinusoidal equation that models your ride on the Ferris wheel.

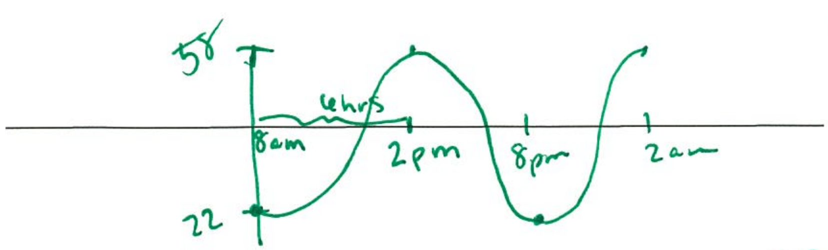
$y = 12\cos\left(\frac{\pi}{30}x - \frac{22.5(30)}{\pi}\right) + 14$

c) How high above the ground will your seat be after 90 seconds?

Don't bother

16. The water level in a city water storage tank oscillates in a simple harmonic motion. The water level varies depending on the time of day and the corresponding demand of the people. The low point of the water in the tank, 22 feet, occurs at 8am and 8pm when demand is highest. The high points occur at 2am and 2pm with a water level of 58 feet. Create a sinusoidal function equation that models the data and use it to predict the water height at 4pm.

$58 - 22 = 36 \div 2 = 18$



$$\boxed{y = -18\cos\left(\frac{\pi}{6}x\right) + 40}$$

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

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

$b = \pi/6$