

12 am = midnight
12 pm = noon

check your parentheses in the calculator.

- a) 1 period = 12 hours
 $b = \frac{2\pi}{12} = \frac{\pi}{6}$
 amp = 2
 vs = 3
 ps = none

$$h(t) = 2\cos\left(\frac{\pi}{6}(t)\right) + 3$$

- b) 12 am \rightarrow 2:30pm
 $t = 14.5$ hrs.

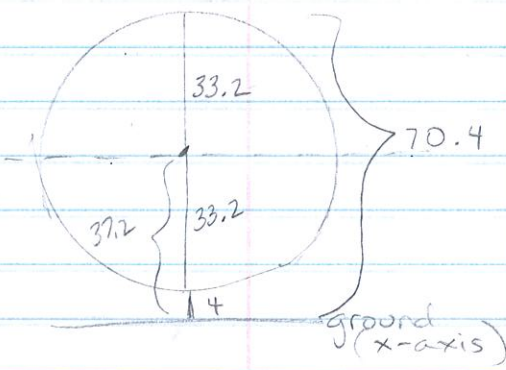
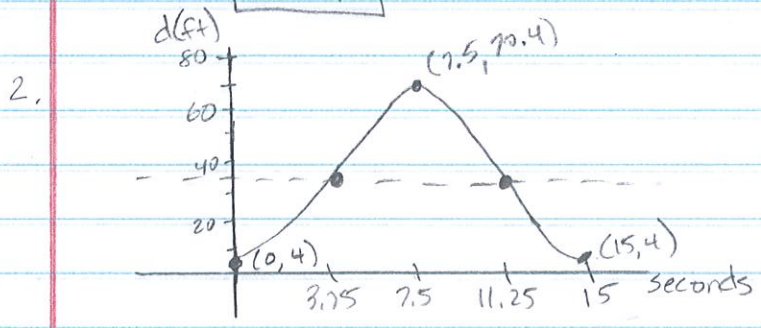
2nd Calc \rightarrow value 14.5

$$3.5 \text{ ft.}$$

- c) graph equation $y = 4$

2nd Calc \rightarrow intersection (scroll near intersection) Enter x3

10 am



- a) amp = 33.2
 period = 15 seconds
 vs = 37.2
 ps = none

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

* At time (0), height is 4 ft.

$$h(t) = -33.2\cos\left(\frac{2\pi}{15}(t)\right) + 37.2$$

- b) 69.7 ft

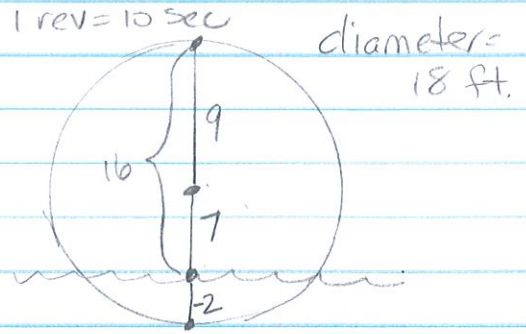
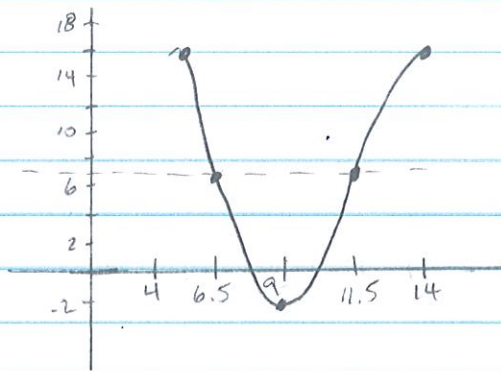
2nd Calc - value $x=52$ $y=69.7$

- c) graph equation $y = 27$

3 seconds

2nd Calc Intersection \rightarrow

3.



a) period = 10 sec $b = \frac{2\pi}{10} = \frac{\pi}{5}$
 amp = 9
 VS = 7
 PS = 4

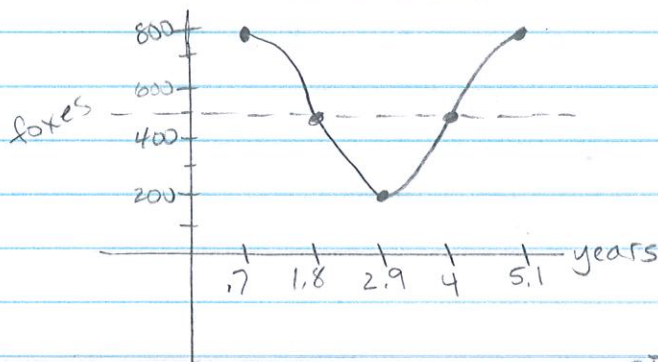
$$d(t) = 9 \cos \frac{\pi}{5} (t - 4) + 7$$

b) -2, the lowest part of the wheel is under water.

c) 4.2 ft. 2nd Calc \rightarrow value $x=17$ $y=4.2$

d) 2nd Calc zero $x=0.8$ Sec the wheel is coming out of the water.

4.



$$VS = \frac{800 + 200}{2} = 500$$

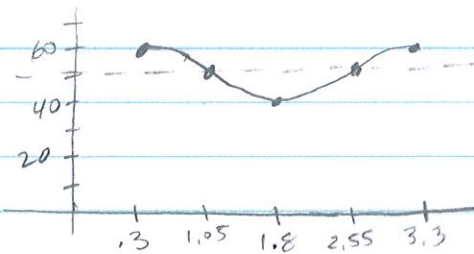
a) period = $5.1 - .7 = 4.4$ $b = \frac{2\pi}{4.4} = \frac{\pi}{2.2}$ or $\frac{5\pi}{11}$
 amp = $800 - 500 = 300$
 VS = 500
 PS = .7

$$f(t) = 300 \cos \frac{5\pi}{11} (t - .7) + 500$$

b) $f(7) = 227$ foxes
 $f(8) = 337$ foxes
 $f(9) = 726$ foxes
 $f(10) = 726$ foxes

c) graph equation $y = 300$
 Between 2.3 years and 3.5 years

5.



$$d = \frac{40+60}{2} = 50$$

a. amp = $60 - 50 = 10$

period = $3.3 - .3 = 3$

VS = 50

ps = .3

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

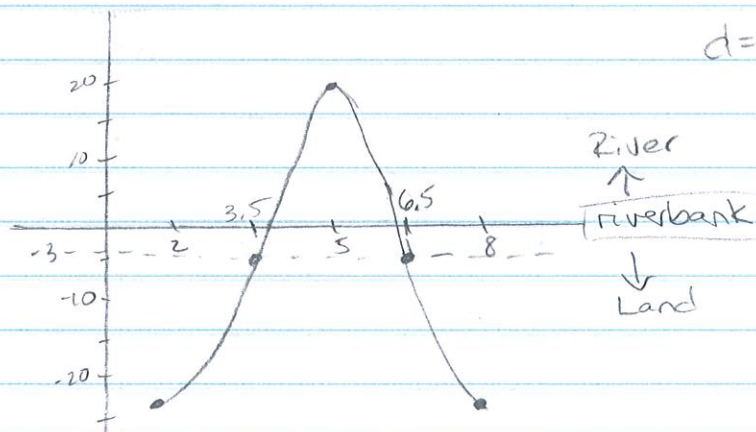
$$d(t) = 10 \cos \frac{2\pi}{3}(t - .3) + 50$$

b. 43.3 cm

c. $x=0$, 58.1 cm

d. graph equation $y=59$, 2nd Calc intersections prior to .03 seconds
1.08 seconds

6.



$$d = \frac{-23+17}{2} = -3$$

a. amp = $17 - (-3) = 20$

period = $8 - 2 = 6$ $b = \frac{2\pi}{6} = \frac{\pi}{3}$

VS = -3

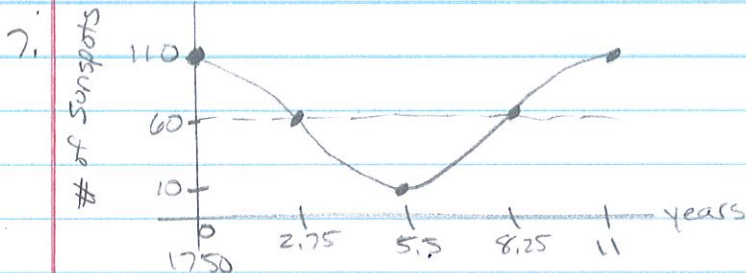
ps = 2

$$d(t) = -20 \cos \frac{\pi}{3}(t - 2) - 3$$

b. -16.4 ft., Zoey was over land.

c. when $y=0$, $x = .36$ seconds (use 2nd Calc \rightarrow zero)

d. The rope comes to rest at the vertical shift $y = -3$



Calculator window

X min 0
X max 12
X scale 10
Y min 0
Y max 120
Y scale 10

a. Period: $1948 - 1750 = 198$

$\frac{198}{18} = 11 \text{ years}$

b. Amp: $\frac{110 - 10}{2} = \frac{100}{2} = 50$

$b = \frac{2\pi}{11}$

VS: $110 - 50 = 60$

PS: none

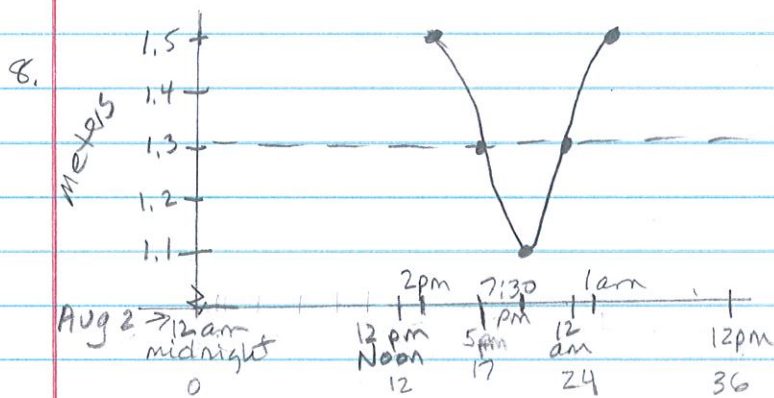
$S(t) = 50 \cos \frac{2\pi}{11}(t) + 60$

c. $2020 - 1750 = 270$ $S(270) = 12$ sunspots

d. graph equation $y = 35$, Set window to X min 270
2nd Calc #5 \rightarrow Enter X3, X \approx 271

$1750 + 271 = 2021$

e. 2nd Calc Max X=275 $1750 + 275 = 2025$



$\frac{1.5 + 1.1}{2} = 1.3$

$1.5 - 1.3 = .2$

a. amp = .2
period = $13 - 2 = 11$

$b = \frac{2\pi}{11}$

VS = 1.3

PS = 14

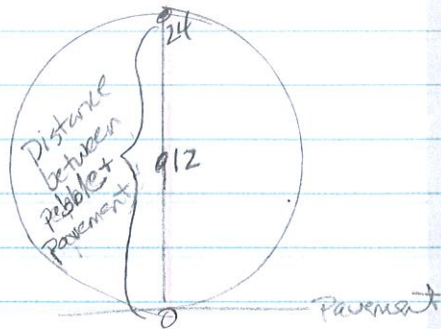
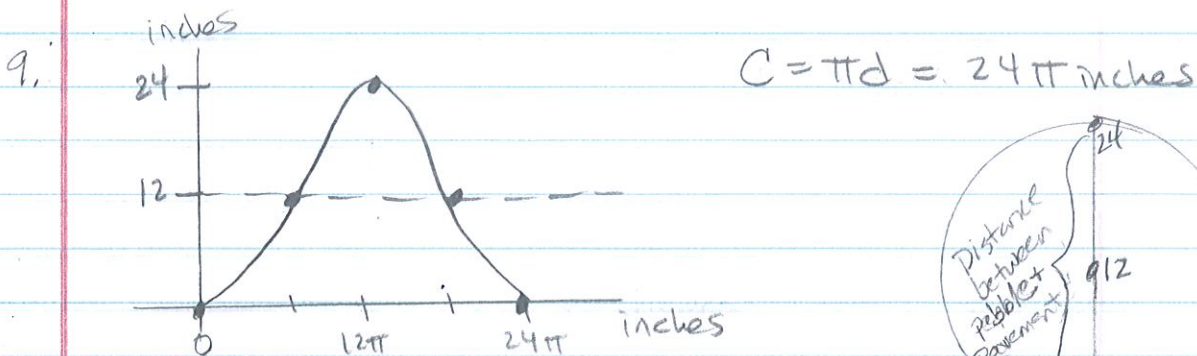
$d(t) = .2 \cos \frac{2\pi}{11}(t - 14) + 1.3$

b. At 5pm, # of hours: $x = 12 + 5 = 17$ $f(17) = 1.27$ meters

c. 2nd Calc Min $x = 8.5 \Rightarrow 8:30 \text{ am}$

d. graph $y = 1.27$ At 1st intersection, $x = 6.013$ hours after midnight

approx, 6:00 am



a. amp = 12
 period = 24π
 VS = 12
 PS = none

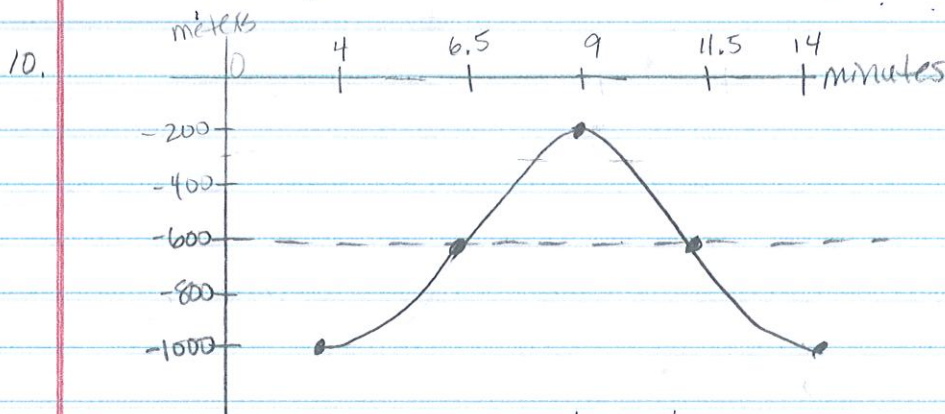
$$b = \frac{2\pi}{24\pi} = \frac{1}{12}$$

$$h(x) = -12 \cos \frac{1}{12} x + 12$$

b. 2nd Calc Evaluate $x=15$, 8.2 inches

c. graph equation $y=11$, 2nd Calc intersect

$$17.8 \text{ m } \approx 57.5 \text{ m}$$



$$-\frac{1000+200}{2} = \frac{-1200}{2} = -600$$

a. amp = $-600 - (-200) = |-400| = 400$

period = $14 - 4 = 10$

$$b = \frac{2\pi}{10} = \frac{\pi}{5}$$

VS = -600

PS = 4

$$d(t) = -400 \cos \frac{\pi}{5}(t-4) - 600$$

b. 2nd Calc Evaluate $x=0$

$d(0) = -216$ meters; yes the submarine can communicate with ships on the surface because the depth is not below 300 meters.

c. graph $y = -300$

$$.15 \text{ min or } .15(60) = 9 \text{ seconds}$$

$$7.8 \text{ min or } 7.8(60) = 468 \text{ seconds}$$