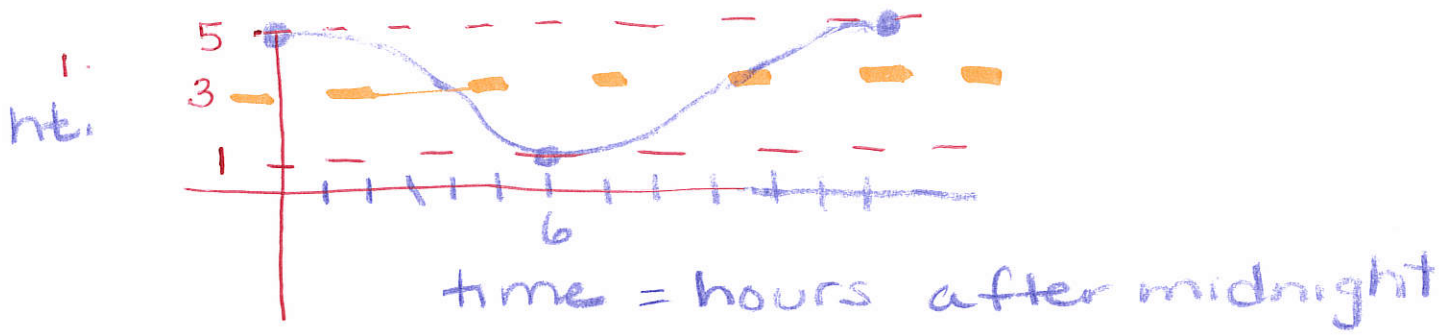


Sinusoidal Functions as Math Models ①



MAX: (12, 5) (0, 5)

MIN: (18, 1) (6, 1)

per = 2 (diff in consecutive max/min)
 = 2(6) = 12 = $\frac{2\pi}{b}$

so $12b = 2\pi$
 $b = \pi/6$

$d = \frac{\text{MAX} + \text{MIN}}{2} = \frac{5+1}{2} = 3 = d$

$|a| = \text{distance from max to mid} = 2$

POSSIBLE EQUATIONS

1. $y = 2 \cos \left[\frac{\pi}{6} (x) \right] + 3$

2. $y = -2 \cos \left[\frac{\pi}{6} (x-6) \right] + 3$

3. $y = -2 \sin \left[\frac{\pi}{6} (x-3) \right] + 3.$

b. 2:30 pm = 14.5 hours after midnight
 $\therefore x = 14.5$. Sub into eq. $\Rightarrow 3.5$ feet.

c. After 6 pm. $y = 4$

$y_1 =$
 $y_2 = 4$

CALC INTERSECT
 10:30 a.m.

a. Ferris wheel

$$r = 33.2 \text{ feet}$$

$$\therefore |a| = 33.2$$

1 rev = 1 period

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

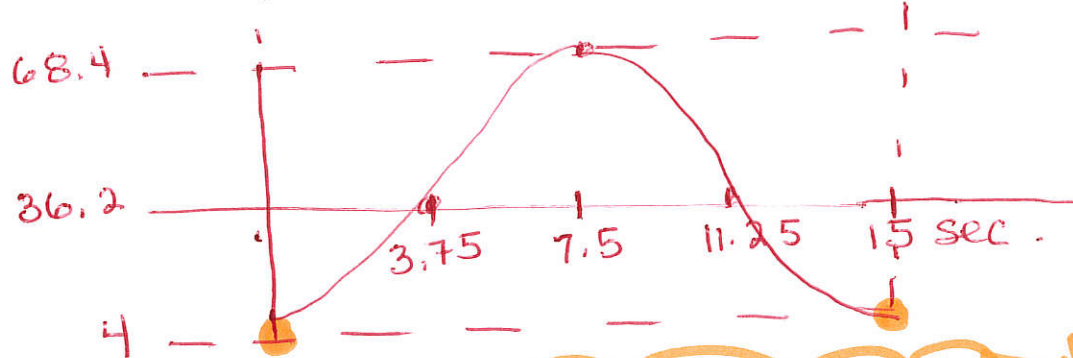
$$15b = 2\pi$$

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

$$\therefore d = 36.2$$

$$+33.2 \begin{cases} \text{min} = 4 \text{ ft} \\ \text{mid} = 36.2 \text{ ft} \end{cases}$$

$$+33.2 \begin{cases} \text{max} = 68.4 \text{ ft} \end{cases}$$



$$y = -33.2 \cos \left[\frac{2\pi}{15} x \right] + 36.2$$

$$y = 33.2 \cos \left[\frac{2\pi}{15} (x - 7.5) \right] + 36.2$$

b. let $x = 52$ seconds
sub into calc \rightarrow

$$69.7 \text{ ft.}$$

c. let $y_2 = 27$

calc intersect

$$3.0 \text{ sec}$$

3. 1 rev = 10 sec
 \therefore period = 10 sec

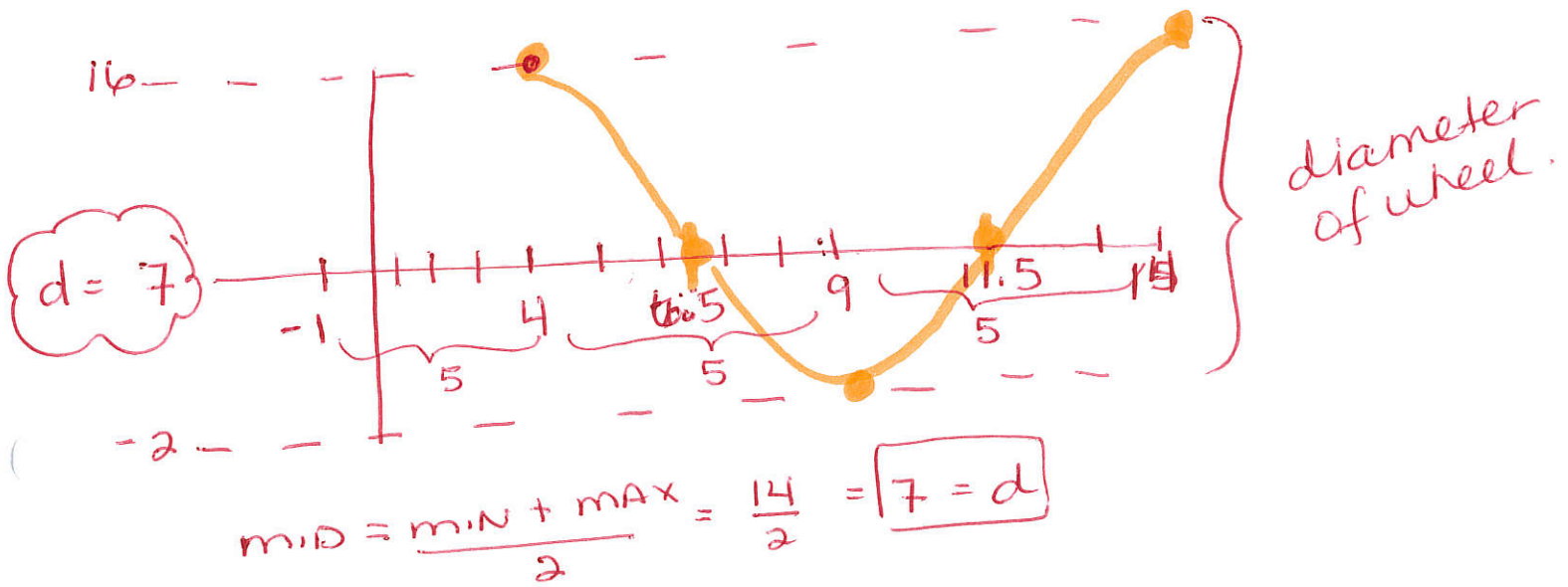
$d = 18$
 $\therefore r = 9 = |a| = 9 \text{ ft}$

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

$10b = 2\pi$

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

MAX (4, 16)



If period = 10
 then $\frac{1}{2}$ period = 5

phase shift \rightarrow 4 for pos cos

$\therefore c = 4$

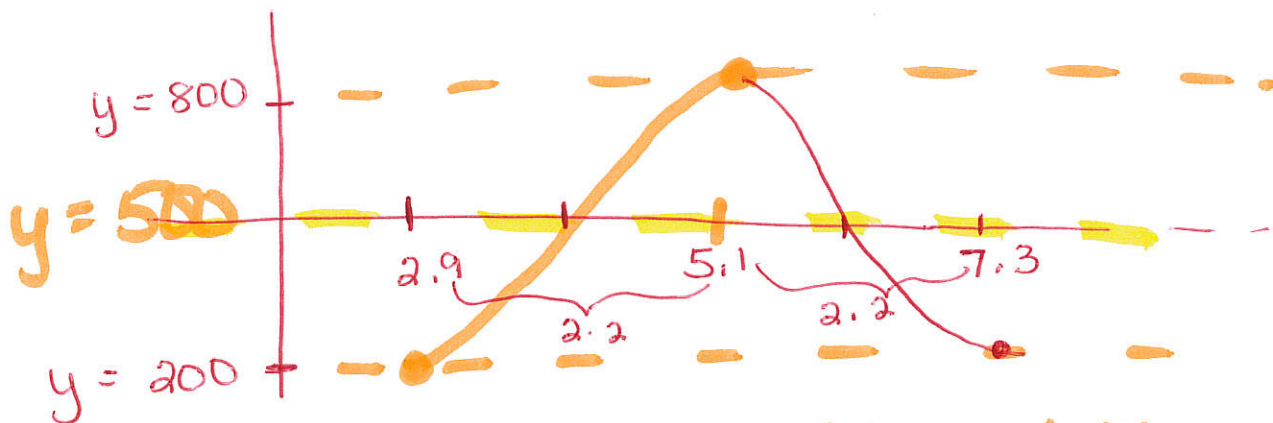
$a = \text{pos}$

EQ $y = 9 \cos \left[\frac{\pi}{5} (x - 4) \right] + 7$

4. FOX

$$(2.9, 200) = \text{min}$$

$$(5.1, 800) = \text{max}$$



$$\text{Mid} = \frac{\text{Min} + \text{MAX}}{2} = \frac{1000}{2} = 500$$

$$\frac{1}{2} \text{ per} = 5.1 - 2.9 = 2.2$$

$$1 \text{ per} = (2.2)(2) = 4.4 \text{ years.}$$

$$4.4 = \frac{2\pi}{b}$$

$$4.4b = 2\pi$$

$$b = \frac{2\pi}{4.4} = \frac{20\pi}{44} = \frac{10\pi}{22}$$

$$= \frac{5\pi}{11} = b$$

$$d = 500$$
$$|a| = 300$$

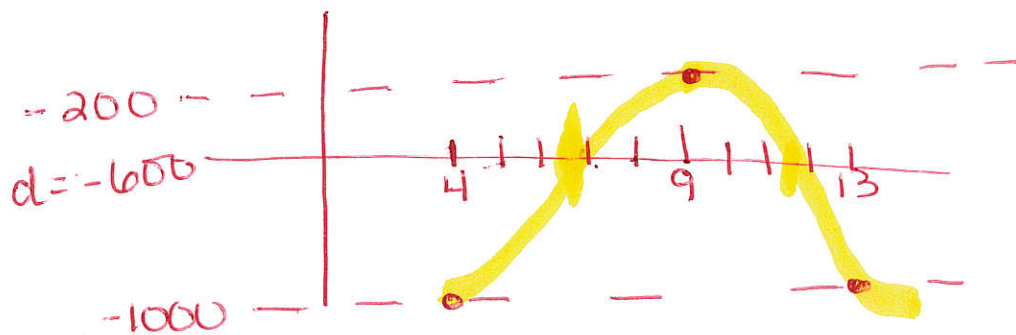
For neg cos
p.s is 2.9 right

$$y = -300 \cos \left[\frac{5\pi}{11} (x - 2.9) \right] + 500$$

11. Porpoise

min (4, -1000)

max (9, -200)



$$d = \frac{-1200}{2} = -600$$

$$|a| = 400$$

neg cos $\rightarrow c = 4$
 $x - 4$

$$\frac{1}{2} \text{ per} = 5$$
$$1 \text{ per} = 10 = \frac{2\pi}{b}$$

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

$$y = -400 \cos \left[\frac{\pi}{5} (x - 4) \right] - 600$$

$$\text{pos cos } y = 400 \cos \left[\frac{\pi}{5} (x - 9) \right] - 600$$

Since go deeper 1st, start e max.