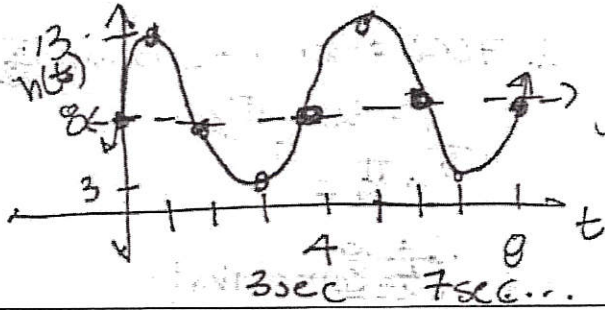


1. Trampoline Problem

- a. $\frac{2\pi}{\pi} = 2$ set up $2\pi \cdot \frac{2}{\pi} = 4$ 4 seconds ; $\frac{60}{4} = 15$ jumps
 b. $3 + 4n, n \in \mathbb{Z}$



2. Electric Current Problem

period: $\frac{1}{60}$

$$B = \frac{2\pi}{\frac{1}{60}} = 120\pi$$

A = 5

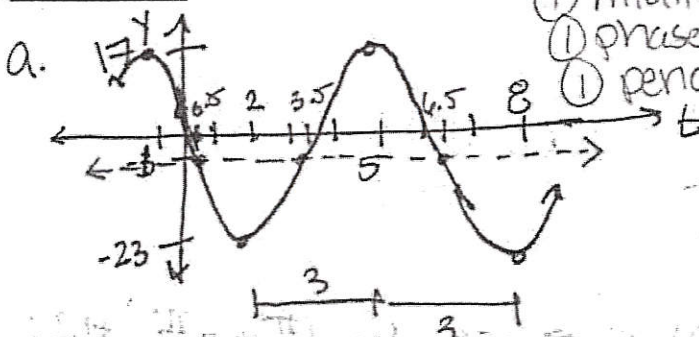
D = 0

$$y = A \cos(Bx - C) + D$$

$$I = 5 \cos(120\pi t)$$

- (1 pt) \rightarrow B value
- (1/2) amp = 5
- (1/2) variables
- (1/2) phase shift

3. Tarzan Problem



(1) midline, amp, y axis

(1) phase shift

(1) period

$$C. y = 20 \cos\left(\frac{\pi}{3}(0) + \frac{\pi}{3}\right) - 3$$

$$y = 20 \cos\left(\frac{\pi}{3}\right) - 3$$

$$y = 20\left(\frac{1}{2}\right) - 3$$

$$y = 7$$

$$b. y = 20 \cos\left(\frac{\pi}{3}t + \frac{\pi}{3}\right) - 3$$

$$y = -20 \cos\left(\frac{\pi}{3}t - \frac{2\pi}{3}\right) - 3$$

$$y = -20 \sin\left(\frac{\pi}{3}t - \frac{\pi}{6}\right) - 3$$

$$y = 20 \cos\left(\frac{\pi}{3}t - \frac{2\pi}{3}\right) - 3$$

(1/2) pt. amp/midline match

(1) B value =

(1) phase shift/distributed

7 ft from river bank on west side

4. Rabbits and Coyotes Problem

a. $R = 25000 + 15000 \cos\left(\frac{\pi}{12}t\right) = 25000 + 15000 \cos\left(\frac{\pi}{3}\right)$
 $= 25000 + 7500$
 $= 32500$ Rabbits

b. $7000 = 5000 + 2000 \sin\left(\frac{\pi}{12}t\right)$

$1 = \sin\left(\frac{\pi}{12}t\right)$

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

$12 = 2t$

$t = 6$ months

5. Temperature Problem

a. axis $C = 19$
amp 3

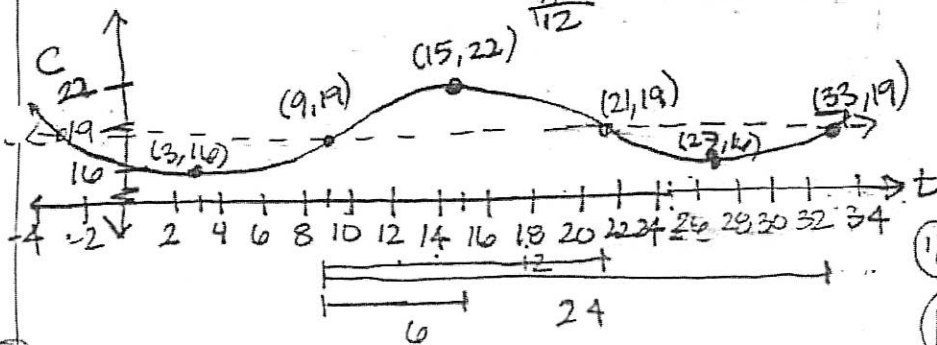
period: $\frac{2\pi}{\frac{\pi}{12}} = 24$ hours

P.S. $\frac{\frac{3\pi}{4}}{\frac{\pi}{12}} = \frac{3\pi}{4} \cdot \frac{12}{\pi} = 9$ hours

b. $16^\circ C$ occurs at 3 AM each day

c. $19^\circ C$

d. 3 PM



axis labeled

everything matches

6. Daylight Problem

$b = 6$, max: 16 $\rightarrow V.S + 12$ (d)
 $t = 12$, min: 8 amp 4 (a)

$\frac{1}{2}$ period: $12 - 6 = 6$

period: 12 hours

$B = \frac{2\pi}{12} = \frac{\pi}{6}$

amp variables

midline

B value

phase shift/distributed

Sample answers: $h = 4 \cos\left(\frac{\pi}{6}(t-6)\right) + 12$

$h = 4 \cos\left(\frac{\pi}{6}t - \pi\right) + 12$

$h = -4 \cos\left(\frac{\pi}{6}t\right) + 12$

$h = -4 \cos\left(\frac{\pi}{6}t - 2\pi\right) + 12$

$h = 4 \sin\left(\frac{\pi}{6}t - \frac{\pi}{2}\right) + 12$

$h = -4 \sin\left(\frac{\pi}{6}t - \frac{3\pi}{2}\right) + 12$