$$W = 2000 + 1000 \sin\left(\frac{\pi t}{6}\right) \qquad S = 10{,}000 + 5000 \cos\left(\frac{\pi t}{6}\right)$$

V.S = 2000

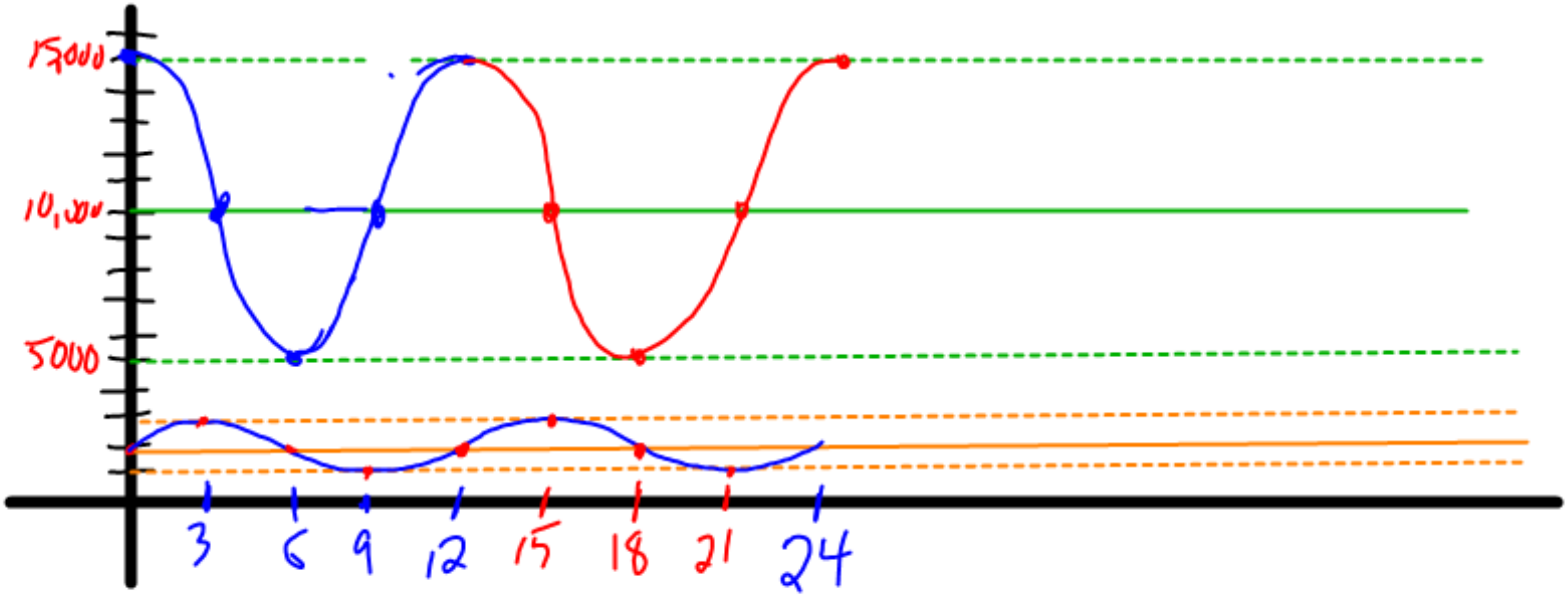
Ampl = 1000

$Per = \frac{2\pi}{\pi/6} = 2\pi \cdot \frac{6}{\pi} = 12$

V.S. = 10,000

Ampl = 5,000

$Per = \frac{2\pi}{\pi/6} = 12$



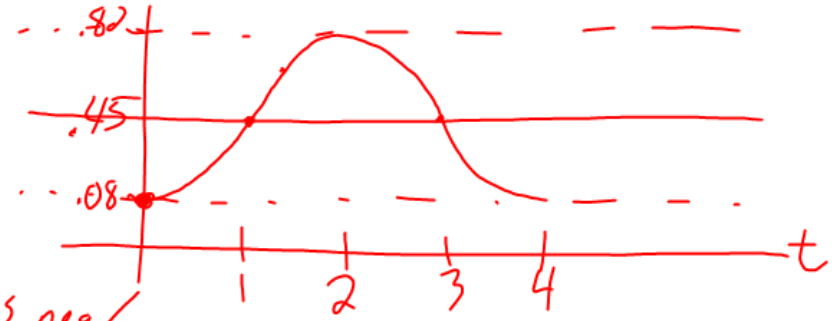
2 **HEALTH** **An average seated adult breathes in and out every 4 seconds. The average minimum amount of air in the lungs is 0.08 liter, and the average maximum amount of air in the lungs is 0.82 liter. Suppose the lungs have a minimum amount of air at $t = 0$, where t is the time in seconds.**

Per = 4

min = .08

max = .82

(b.)



min @ t=0 → A is neg/cosine

$V.S. = \frac{.08 + .82}{2} = .45$

$Ampl = \frac{.82 - .08}{2} = .82 - .45 = .45 - .08 = .37$

P.S. = 0 → C = 0

$Per = 4 = \frac{2\pi}{K}$

$K = \frac{2\pi}{4}$

$K = \frac{\pi}{2}$

(a.) $y = A\cos(Kt - C) + h$

$y = -.37\cos\left(\frac{\pi}{2}t\right) + .45$

(c.) at t = 5.5

$y = -.37\cos\left(\frac{\pi}{2}(5.5)\right) + .45$

y = .71 liters

$$y = A\cos(kt - c) + h$$

max = 13.75

min = 10.53

A is neg

$$\text{Ampl} = \frac{13.75 - 10.53}{2} = 1.61$$

$$\text{V.S.} = \frac{13.75 + 10.53}{2} = 12.14$$

$$\text{Per} = 12 = \frac{2\pi}{k}$$

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

$$k = \frac{\pi}{6}$$

$$y = -1.61\cos\left(\frac{\pi}{6}t - c\right) + 12.14$$

$$13.75 = -1.61\cos\left(\frac{\pi}{6}(6) - c\right) + 12.14$$

$$-12.14 \qquad -12.14$$

$$\frac{1.61}{-1.61} = \frac{-1.61\cos(\pi - c)}{-1.61}$$

$$-1 = \cos(\pi - c)$$

$$\cos^{-1}(-1) = \pi - c$$

$$-\pi$$

$$\cos^{-1}(-1) - \pi = -c$$