9-16-13 (1)

Sample A

(3)

(a) $0 = T + B - mg$

$\downarrow$

$0 = 4000N + \rho_w V_D g - Mg$

$V_D = \dfrac{Mg - 4000N}{\rho_w}$

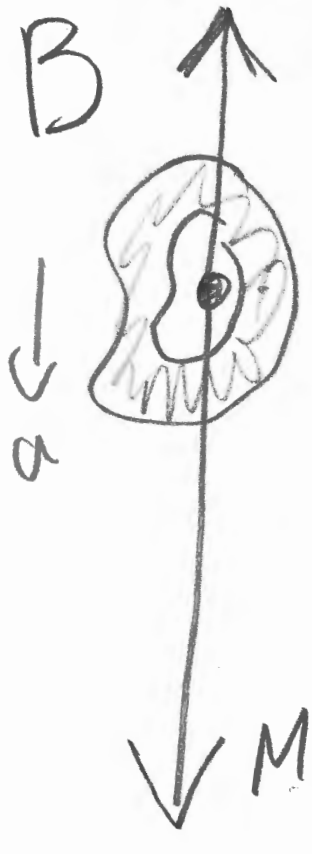
$= \dfrac{(600)(9.8) - 4000N}{(1000)(9.8)}$

(b.) $M = \rho_{FE} \cdot (V_D - V_C)$

$\dfrac{M}{\rho_{FE}} = V_D - V_C$

$V_C = \boxed{V_D - \dfrac{M}{\rho_{FE}}}$

(c) Down obviously since $T > 0$ and string is above (before cut)



$T = 0 \Rightarrow Ma = Mg - B$

(d) $Ma = Mg - B$

$Ma = Mg - \rho_w \cdot V_b \cdot g$

$$a = g - \frac{\rho_w V_b \cdot g}{M}$$

(4)

$$P_1 + \rho_\ell g y_1 + \frac{1}{2}\rho_\ell V_1^2 = P_2 + \rho_\ell g y_2 + \frac{1}{2}\rho_\ell V_2^2$$

$A_1 V_1 = A_2 V_2$ where $A_1 \approx \infty$

THUS: $V_1 = 0$

$$4\text{ATM} \times 10^5 + (1000)g(10) = 1\text{ATM} \times 10^5 + \frac{1}{2}(1000)V_2^2$$

solve for $V_2 = 28.22\ m/s$

$$A_2 V_2 = \frac{\Delta V}{\Delta t}, \quad \Delta V = 600 \times 10^{-3}\ m^3$$

$$\Delta t = \frac{600 \times 10^{-3}}{A_2 V_2}$$

Sample A

(6.) see pre-lecture CH15 Reflow

$y = 2A \sin kx \cdot \sin \omega t$

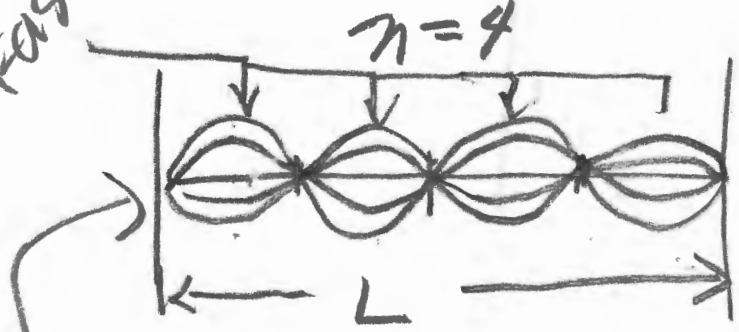
$= (8.4) \cdot \sin(0.44\pi \cdot x) \cdot \sin(50\pi \cdot t)$

$k = \frac{0.44\pi \text{ RAD}}{m}$ $\quad k = \frac{2\pi}{\lambda} = 0.44\pi$

$\lambda = \frac{2\pi}{0.44\pi} = \frac{2}{0.44}$

$= 4.55\ m$

Fastest



(a) $L = 2\lambda$

$= 2 \cdot (4.55\ m)$

$= 9.1\ (m)$

(b)

(c) $2A = 8.4 \Rightarrow A = 4.2\ \underline{cm}$

(d) $v_y = \frac{\partial y}{\partial t} = 2A\omega \cdot \sin kx \cdot \cos \omega t$

$|v_y|_{MAX} = \boxed{2A\omega} = \boxed{2(0.042) \cdot 50\pi}$

(6.)

(e) $V_y = 2A\omega \sin kx \cdot \cos \omega t$

$|V_y|_{MAX}$ when $\sin kx = 1$

$$kx = (2m+1)\frac{\pi}{2}, \quad m = 0, 1, 2, 3, \ldots$$

$$x = \frac{(2m+1)\pi/2}{2\pi/\lambda}$$

$$= \frac{(2m+1)\lambda}{4}$$

$m = 0: \frac{\lambda}{4}$

$m = 1: \frac{3}{4}\lambda$

$m = 2: \frac{5}{4}\lambda$

$m = 3: \frac{7}{4}\lambda$

$\lambda = 4.55\,(m)$

(6)

(f) Evaluate:

$v_y = 2A\omega \sin kx \cdot \cos \omega t$

Plug in $x = 3.0\,cm$

$= 0.003\,(m)$

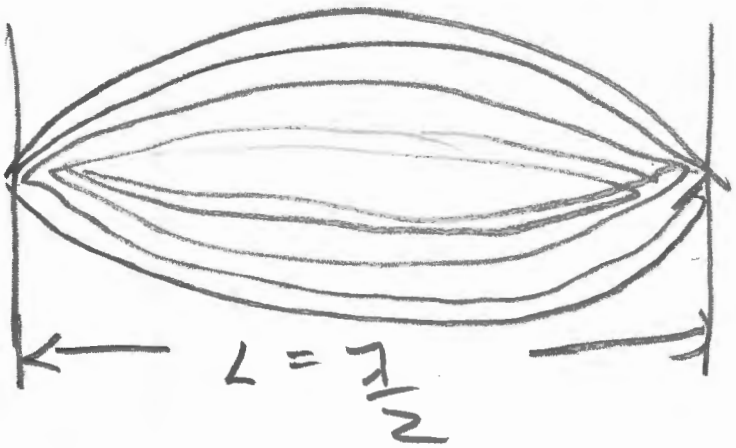
$t = 0.06\,(s)$

Check if $v_y > 0$ OR $v_y < 0$

$v_y > 0$: moving v_p

$v_y < 0$: moving DOWN

(g) $n = 1$



(h)

$y = 2A \sin kx \cdot \sin \omega t$

$k = \frac{2\pi}{\lambda}$ and $\lambda = 2L$

(6-)

(1)

ALSO: $f = \frac{nV}{2L}$ and $n = 1$

$$\omega = 2\pi f = \frac{2\pi V}{2L}$$

$$y = 2A \sin \frac{2\pi}{2L} \cdot x \cdot \sin \frac{2\pi V}{2L} t$$

$$\boxed{y = 2A \sin \frac{\pi}{L} x \cdot \sin \frac{\pi V}{L} t}$$

note $v = \frac{\omega}{k}$

NOTE: $50\pi = 2\pi f_4$

$$50\pi = \frac{2\pi \cdot 4V}{2L}$$

$$\rightarrow V = \frac{50\pi}{\pi 4} = \frac{50}{4}$$

$K = 0.440\pi \frac{rad}{m}$

$$y = 2A \sin \frac{\pi}{L} x \cdot \sin \cdot \frac{\pi}{L} \cdot \frac{50}{4} \cdot t$$

$L = 9.1 m$, $A = 4.2 cm$