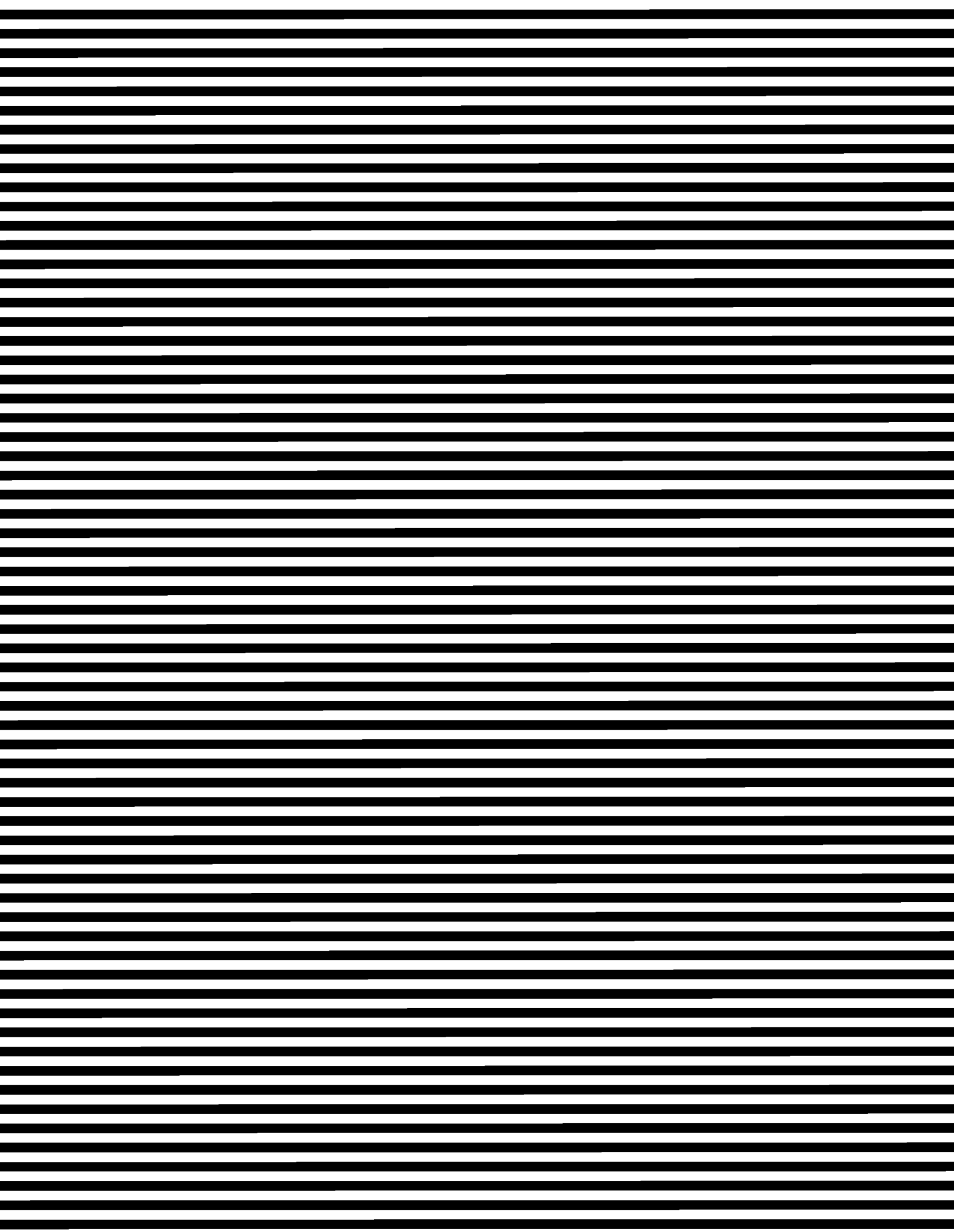


HW #7

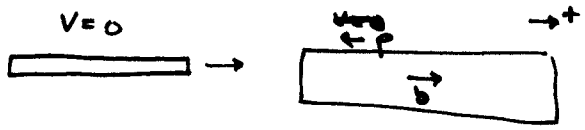
7.6.) a.) $\Delta p = mv_f - mv_0$ $\quad m = 0.045\ kg \quad v_f = 28\ m/s \quad v_0 = 0$

$\Delta p = (0.045)(28)$ $\quad \Delta t = 6.0 * 10^{-3}\ s$

$= 1.3\ kg\,m/s$

b.) $\bar{F}? = \frac{\Delta p}{\Delta t} = \frac{1.3}{6.0 * 10^{-3}}$ $\quad \bar{F} = 220N$ ∥ to $\vec{v}$

7.16.)

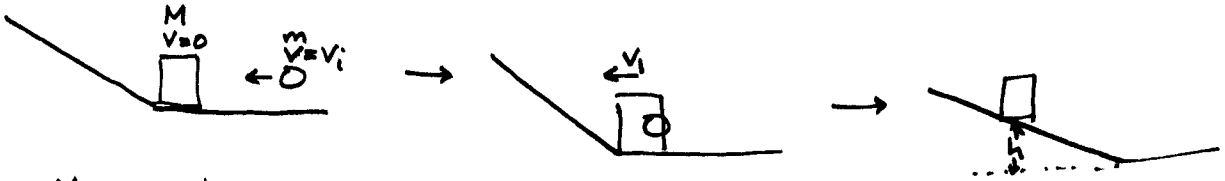


$m_b = 0.050\ kg \quad m_p = 85\ kg$

$m_b v_b + m_p v_p = 0$ → Conservation of p $\quad v_b = 0.25\ m/s$

$v_p = -\frac{m_b v_b}{m_p}$ $\quad v_p = -1.5 * 10^{-4}\ m/s$

7.28.)



$M = 30\ kg \quad m = 5\ kg \quad v_i = 10\ m/s$ $\quad h?$

find v_1 first

$mv_i = (M+m)v_1 \Rightarrow v_1 = \frac{mv_i}{M+m}$ (cons. of p)

find h $\quad \frac{1}{2}(m+M)v_1^2 = (m+M)gh$ (cons of E)

$h = \frac{1}{2g}v_1^2 = \frac{1}{2g}\left(\frac{mv_i}{M+m}\right)^2 = \frac{1}{2(9.8)}\left(\frac{5(10)}{30+5}\right)^2$

$h = 0.104\ m$

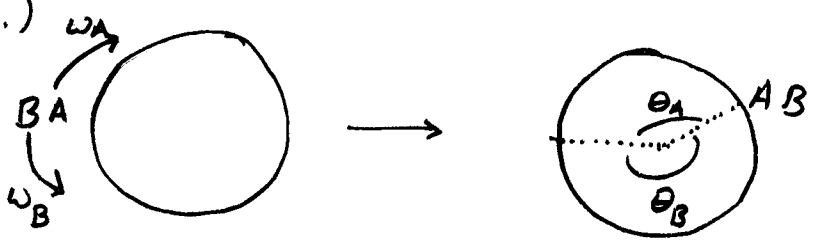
HW #7 (pg 2)

8.8.) $\omega = 5.2\ rad/s \quad \bar{\alpha} = 4.0\ rad/s^2 \quad \omega_0 = 0$

t for drier to come to speed

$$\alpha = \frac{\Delta\omega}{\Delta t} \qquad \Delta t = \frac{\Delta\omega}{\alpha} = \frac{5.2 - 0}{4.0} = \underline{1.3\ s}$$

8.12.)



$\omega_A = 1.7 * 10^{-3}\ rad/s$

$\omega_B = 3.4 * 10^{-3}\ rad/s$

$$\theta_A = \omega_A t + \tfrac{1}{2}\alpha_A t^2 \qquad \theta_B = \omega_B t + \tfrac{1}{2}\alpha_B t^2$$

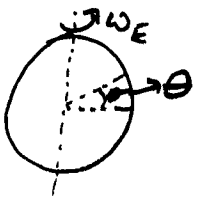
$$\theta_A = 2\pi - \theta_B$$

$$2\pi - \theta_B = \omega_A t \rightarrow \theta_B = 2\pi - \omega_A t$$

$$\Rightarrow 2\pi - \omega_A t = \omega_B t \qquad 2\pi = (\omega_A + \omega_B)t \qquad t = \frac{2\pi}{\omega_A + \omega_B}$$

$$\underline{t = 1200\ s}$$

8.34.)

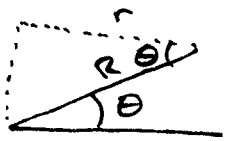


$$\omega_E = \frac{2\pi}{T_E} = 7.31 * 10^{-5}\ rad/s$$

$$R_E = 6.38 * 10^6\ m$$

a.) @ Equator $V_T = \omega_E R_E = \underline{4.66 * 10^2\ m/s}$

b.) θ? for $V_\theta = \frac{1}{3} V_T$ (part a)



$r = R\cos\theta$

$$r\omega_E = \frac{R_E \omega_E}{3} \qquad R_E \cos\theta = \frac{R_E}{3} \qquad \cos\theta = \frac{1}{3}$$

$$\theta = \cos^{-1}\frac{1}{3} \Rightarrow \underline{\theta = 70.6^\circ}$$