#4 $\boxed{\Delta L = \alpha L_0 \Delta T}$ m

$\Delta A = \beta A_0 \Delta T$

$\Delta V = \gamma V_0 \Delta T$

$\alpha = 6.9 \times 10^{-5} \frac{1}{^\circ C} \longleftarrow \frac{1}{K}$

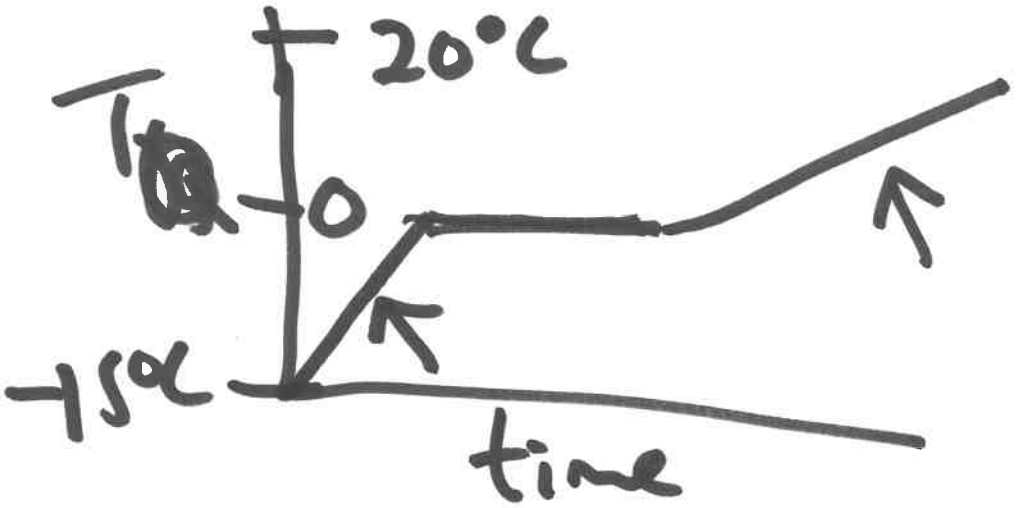
$L_0 = 14{,}000 \text{ ft} \left(\frac{1 \text{ m}}{3.28 \text{ ft}}\right) = 4268 \text{ m}$

$\Delta T = 5^\circ C$

$\Delta L = 6.9 \times 10^{-5} \frac{1}{^\circ C} (4268 \text{ m}) \, 5^\circ C$

$= 1.47 \text{ m}$

#10



Warming ice

$$Q_1 = mC_{ice}(15°C)$$
$$(.2kg)2090(15°C)$$
$$= 6270\ J$$

$$Q_2 = mL$$
$$= (.2\ kg)(333{,}000)$$

$$Q_3 = mC_{water}(20°$$
$$= (.2)(4186)(20°C)$$

$$Q_{total} = Q_1 + Q_2 + Q_3 = 89{,}614\ J$$

#15

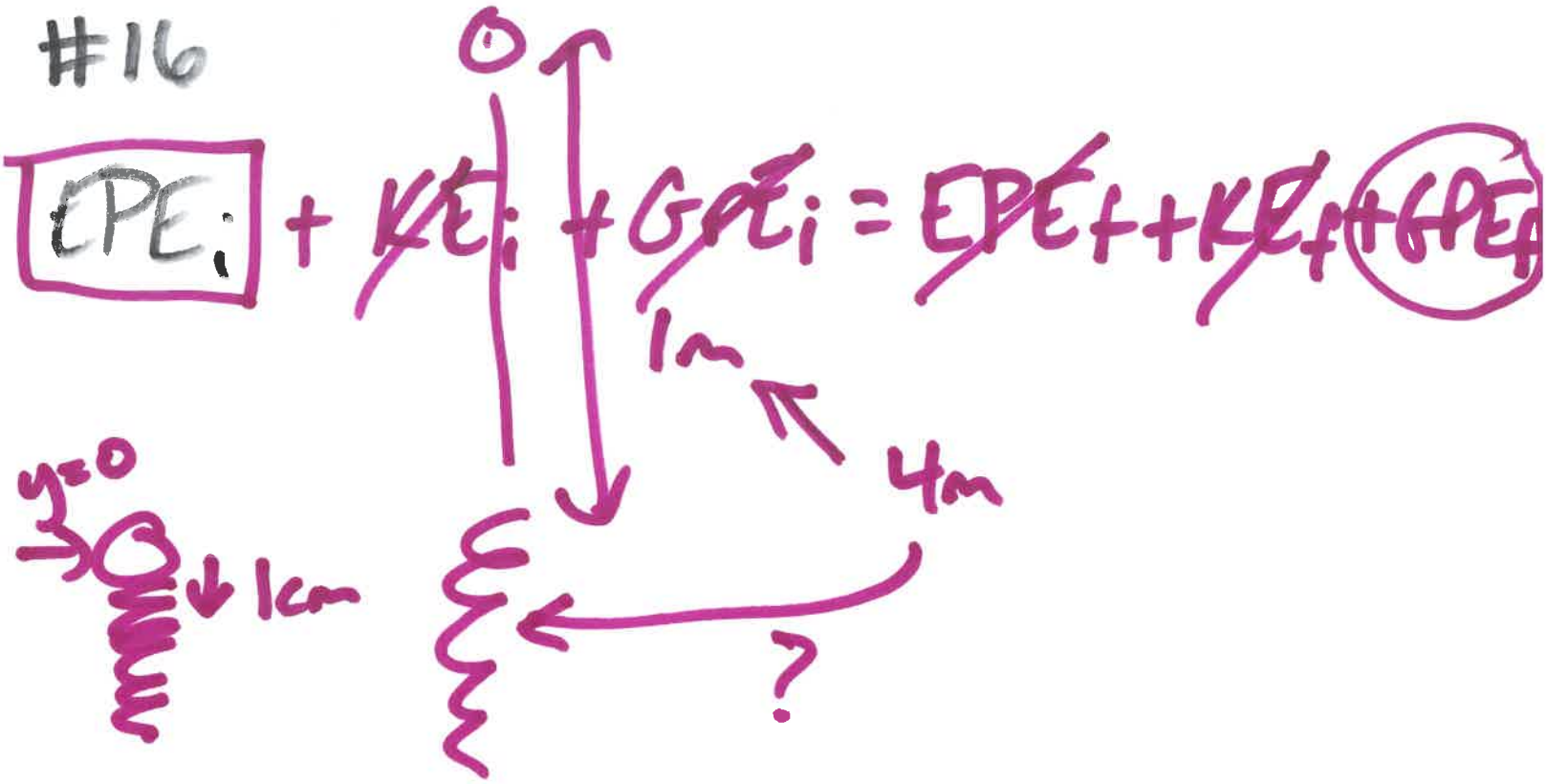
$$T_{\text{Pendulum}} = 2\pi\sqrt{\frac{L}{g}}$$

L same

thus

T same

#16



$$\frac{1}{2}kx^2 = mgh$$

$$\frac{kx^2}{k} = \frac{2mgh}{k}$$

$$x^2 = \frac{2mgh}{k} \qquad x = \sqrt{\frac{2mgh}{k}}$$

$$\frac{x_{h\to 4h}}{x_h} = \frac{\sqrt{\frac{2mg(4h)}{k}}}{\sqrt{\frac{2mgh}{k}}} = \sqrt{4} = 2$$

#18

λ f

$$v = \lambda f$$

$$c = 3 \times 10^8 \text{ m/s} = \lambda f$$

$$f = 100.1 \text{ MHz} \left(\frac{1{,}000{,}000 \text{ Hz}}{1 \text{ MHz}} \right) \quad 10^6$$

$$100.1 \times 10^6 \text{ Hz}$$

$$1.001 \times 10^8 \text{ Hz}$$

$$\frac{v = \lambda f}{f}$$

$$\lambda = \frac{v}{f} = \frac{3 \times 10^8 \text{ m/s}}{1.001 \times 10^8 \text{ Hz}}$$

$$= 2.997 \text{ m}$$

#6 WA

thickness = 0.62 cm = 0.0062 m

$A = 1 \times 2\,m = 2\,m^2$

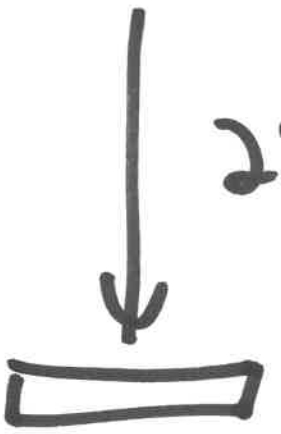
$\Delta T = 30°C$

$$P = \frac{k_{glass} A \Delta T}{t}$$

b) Energy lost $P = \frac{Q}{t}$

$$Q = P(24hr)\left(\frac{60m}{1hr}\right)\left(\frac{60s}{1m}\right)$$

0 65g ↑ty #12 WA



Part A Free Fall

$a = -9.8\ m/s^2$

$V_0 = 0$

$V_f = ?$ ←

$\Delta y = -28.3\ m$

$$\sqrt{V_f^2} = \sqrt{V_0^2 + 2a\Delta y}$$

$$= \pm\sqrt{0^2 + 2\left(-9.8\tfrac{m}{s^2}\right)(-28.3\,m)}$$

$$= -23.55\ m/s$$

Part B  15cm

$V_{0B} = V_{fA} = -23.55\ m/s$

$V_{fB} = 0$ Δx $t = 9.2\ m/s$

$$t = 9.2\,ms\left(\frac{1\,s}{1000\,ms}\right) = 0.0092\,s$$

~~$V_f = V_0 + at$~~ ←

$$V_f^2 = V_0^2 + 2a\Delta x$$

$$\Delta x = V_0 t + \frac{1}{2}at^2$$

$$a = \frac{V_f - V_0}{t} = \frac{0 - (-23.55\frac{m}{s})}{0.0092s}$$

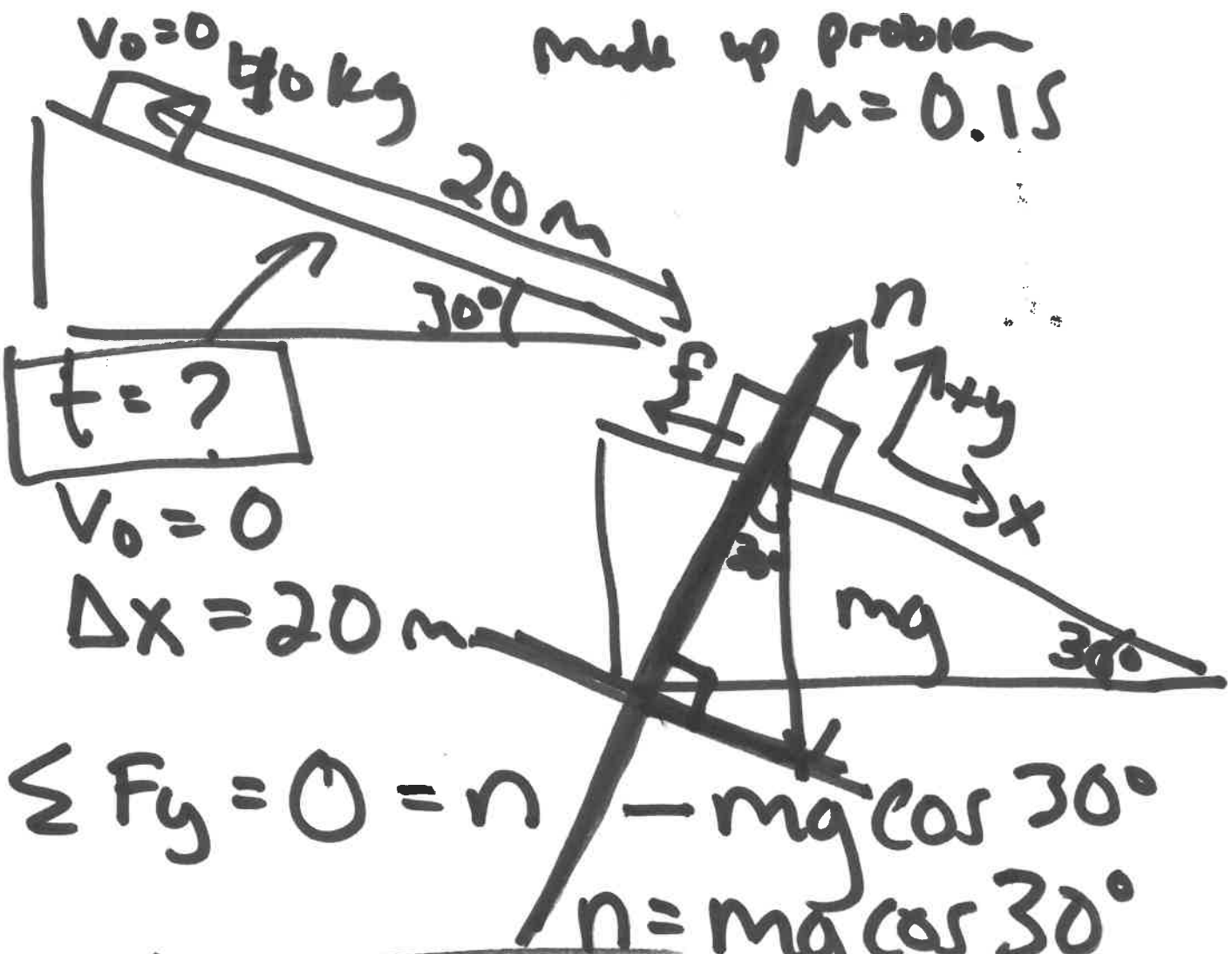
$$= 2560\sim\frac{m}{s^2}$$

$$\Delta x = (-23.55\tilde{\frac{m}{s}})(.0092) + \frac{1}{2}(2560\tilde{\frac{m}{s^2}})(.0092s)^2$$

$$= -0.108\ m$$

made up problem

$\mu = 0.15$



$$\Sigma F_y = 0 = n - mg\cos 30°$$

$$n = mg\cos 30°$$

$$\Sigma F_x = ma_x = -\mu mg\cos 30° + mg\sin 30°$$

$$a_x = -\mu g\cos 30° + g\sin 30°$$

$$= 3.63 \text{ m/s}^2$$

$v_0 = 0 \quad t = ? \quad \Delta x = 20$ m

$$\Delta x = \cancel{v_0 t} + \frac{1}{2}at^2$$

$$\frac{2\Delta x}{a} = t^2 \qquad t = \sqrt{\frac{2\Delta x}{a}}$$

$$= 3.32 \text{ s}$$