$$T = 2\pi\sqrt{\frac{L}{g}}$$

L

g ↓ T ↑

$$T_E = 1s = 2\pi\sqrt{\frac{L}{9.8\ m/s^2}}$$

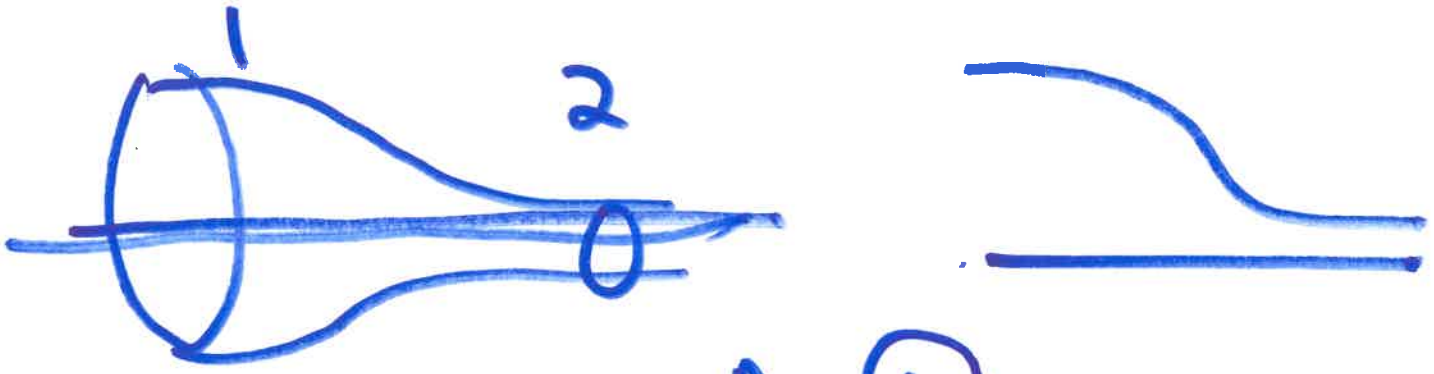
$$\left(\frac{1}{2\pi}\right)^2 = \left(\sqrt{\frac{L}{9.8}}\right)$$

$$\left(\frac{1}{2\pi}\right)^2 = \frac{L}{9.8}$$

$$L = 9.8\left(\frac{1}{2\pi}\right)^2 = \text{~~24.8 m~~}\ 0.248\ m$$

$$T_{moon} = 2\pi\sqrt{\frac{L}{g_{moon}}} = 2\pi\sqrt{\frac{\text{~~24.8~~}\ 0.248}{1.63\ m/s^2}}$$

~~24.2 s~~ too big 2.45 s



$$A_1 v_1 = A_2 v_2$$

$$\frac{A_1 v_1}{A_2}$$

$$v_2 = \frac{A_1}{A_2} v_1 = \left(\frac{10\ \text{cm}^2}{4\ \text{cm}^2}\right) 258 \frac{\text{cm}}{\text{s}}$$

$$= 645 \frac{\text{cm}}{\text{s}} \left(\frac{1\ \text{m}}{100\ \text{cm}}\right)$$

$$= 6.45\ \text{m/s}$$

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$$

$$-\frac{1}{2}\rho v_2^2$$

$$P_2 = P_1 + \frac{1}{2}\rho v_1^2 - \frac{1}{2}\rho v_2^2$$

$$P_1 + \frac{1}{2}\rho (v_1^2 - v_2^2) \leftarrow$$

$$= 1.2\times10^5\ \text{Pa} + \frac{1}{2}\left(1650\ \frac{\text{kg}}{\text{m}^3}\right)\left(\left(2.53\ \frac{\text{m}}{\text{s}}\right)^2 - \left(6.45\ \frac{\text{m}}{\text{s}}\right)^2\right)$$

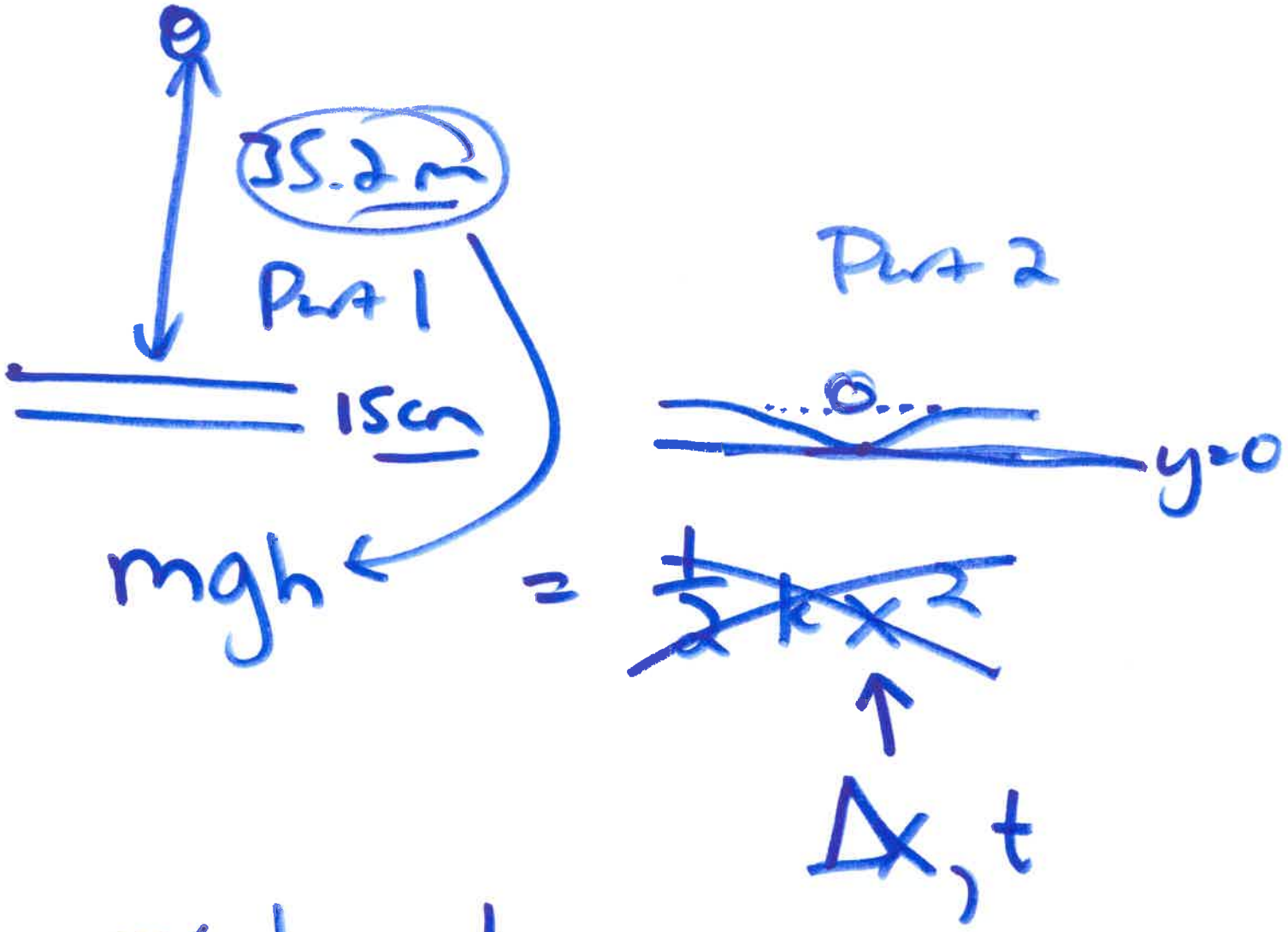
$$\rho = 1.65 \frac{g}{cm^3} \left(\frac{100\,cm}{1\,m}\right)\left(\frac{100\,cm}{1\,m}\right)\left(\frac{100\,cm}{1\,m}\right)\left(\frac{1\,kg}{1000\,g}\right)$$

$$= 1650 \frac{kg}{m^3}$$

$= 90959 \text{ Pa}$

$91,000 \text{ Pa}$

$9.1 \times 10^{4} \text{ Pa}$



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

$$v_f = \sqrt{2gh} \qquad h = 35.2\,m$$

Part 2 $v_0 = \sqrt{2gh}$ ~~$\Delta x = 0.15m$~~

$v_f = v_0 + at$ $\quad v_f = 0$ $\quad t = 9.2\,ms\left(\frac{1s}{1000s}\right) = 0.0092\,s$

$$a = \frac{v_f - v_0}{t} = \frac{0 - \sqrt{2(9.8)(35.2m)}}{.00925}$$

$$= 2855\,m/s^2$$

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

Could also use $V_f^2 = v_0^2 + 2a\Delta x$

$$\Delta x = \overbrace{\sqrt{2gh}}^{V_0} (.0092s) + \frac{1}{2}\left(-2855 \frac{m}{s^2}\right)(.0092s)$$

$$= 0.121 \text{ m}$$

or ~12 cm