

$$1) 1 \text{ atm} = 101,325 \text{ Pa}$$

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

$$P = \rho g h$$

$$h = \frac{P}{\rho g} = \frac{101,325}{(1000)(9.8)} = 10.34 \text{ m}$$

$$2) \rho = 2 \text{ g/cm}^3 = 2000 \text{ kg/m}^3$$

$$P_T = 1960.1 \text{ Pa}, P_S = 1960 \text{ Pa}$$

$$P_T = P_S + \frac{\rho V^2}{2}$$

$$V = \sqrt{\frac{2(P_T - P_S)}{\rho}} = \sqrt{\frac{2(1960.1 - 1960)}{2000}} = 0.01 \text{ m/s} = 10 \text{ mm/s}$$

$$3) P_S = 1960 \text{ Pa}$$

$$P_S = \rho g h$$

$$h = \frac{P_S}{\rho g} = \frac{1960}{(2000)(9.8)} = 0.1 \text{ m} = 100 \text{ mm}$$

4) a. R_1 and $R_4 \rightarrow$ tension, R_2 and $R_3 \rightarrow$ compression

b. R_1 and $R_4 \rightarrow$ increase, R_2 and $R_3 \rightarrow$ decrease

$$5) mgh = \frac{1}{2} m v^2$$

$$v = \sqrt{2gh} = \sqrt{2(9.8)(10)} = 14 \text{ m/s}$$

$$a \approx \frac{\Delta v}{\Delta t} = \frac{14}{10 \times 10^{-3}} = 1400 \text{ m/s}^2$$

$$a|_{g's} = \frac{1400}{9.8} = 142.86 \text{ g's}$$