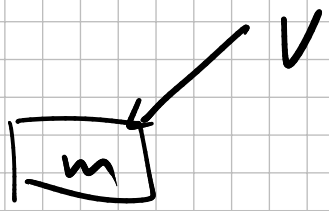
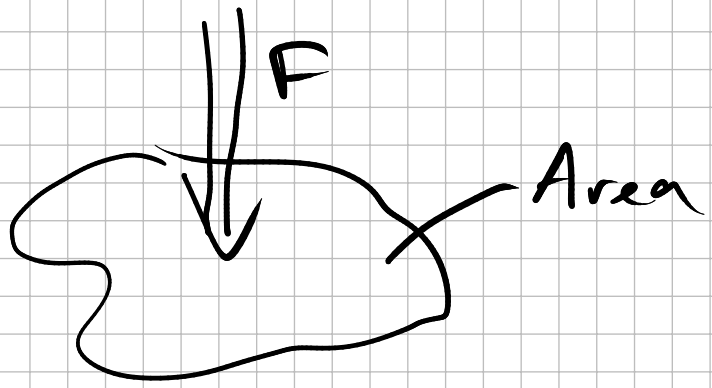
Fluids

Density:

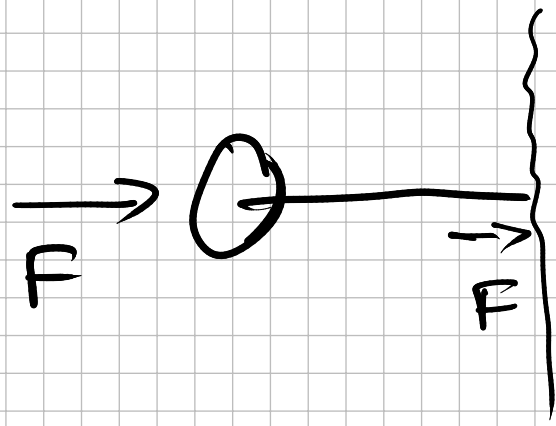


$$\rho = \frac{m}{V} = \left[\frac{kg}{m^3}\right]$$

Pressure



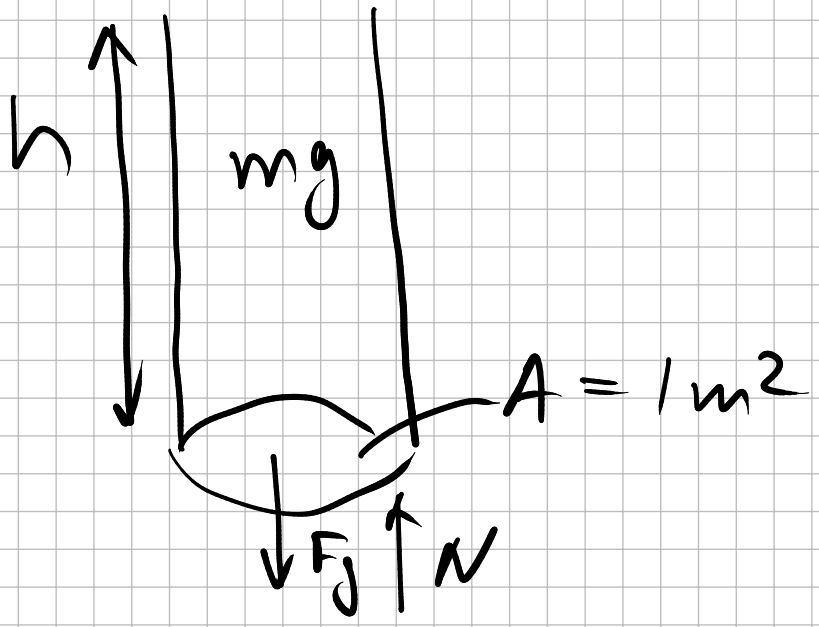
$$P = \frac{F}{A} = \left[\frac{N}{m^2}\right] = [Pa]$$



Density

$$\rho_{air} \simeq 1.2 \ \frac{kg}{m^3}$$

$$1 atm = 100 \ kPa = 10^5 \ Pa$$



$$P = \frac{F}{A} = \frac{mg}{A} = \frac{\rho_0 A \cdot h \cdot g}{A}$$

$$P_{atm} = \rho g h$$

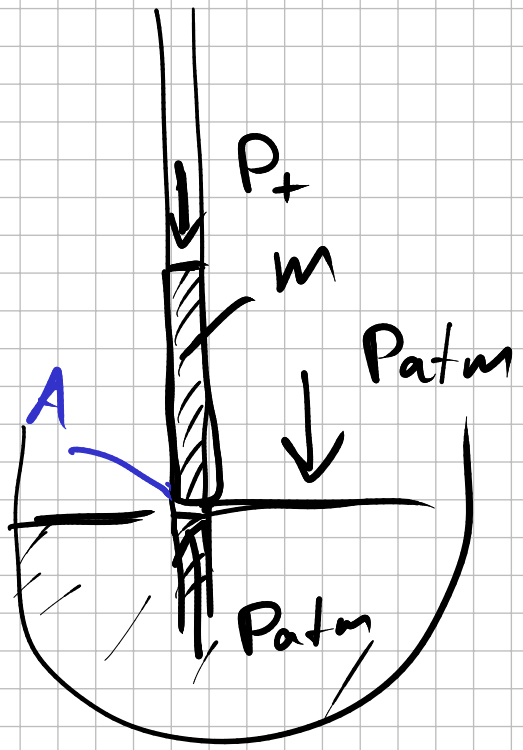
$$10^5 \ Pa \simeq 1 \ \frac{kg}{m^3} \cdot 10 \ \frac{m}{s^2} \cdot h$$

$$h = \frac{10^5}{10} = 10^4 \ m = 10 \ km$$

Weight → mass of the atmosphere

$$p = \frac{mg}{A} \quad \Rightarrow \quad m = \frac{p \cdot A}{g} = \frac{10^5 \text{ Pa} \cdot 1 \text{ m}^2}{10 \text{ m/s}^2}$$

$$= 10^4 \text{ kg} \approx 10 \text{ T}$$



$$\underbrace{P_+ \cdot A}_{F_+} + mg = P_{atm} \cdot A$$

$$P_+ \cdot A + \rho g h \cdot A = P_{atm} \cdot A$$

$$h = \frac{P_{atm}}{\rho g} =$$

$$= \frac{10^5\ Pa}{1000 \frac{kg}{m^3} \cdot 10 \frac{m}{s^2}} =$$

$$= 10\ m$$