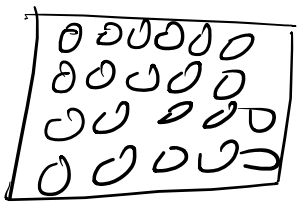
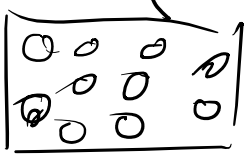
Solid

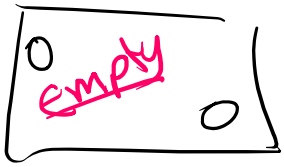


X
no pressure

Liq



Gas



compressed
volume ↑ ↓

Pressure

$P = \rho g \Delta h$

inside fluids

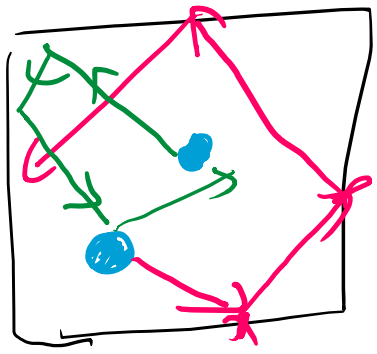
density

Pressure.

$P = \frac{F}{A}$ → force or weight

at surfaces

Pressure based on particle model



Particles collide with each other & with the wall of container

Speed of particles ∝ Temp

"KE"

$KE = \frac{1}{2}mv^2$

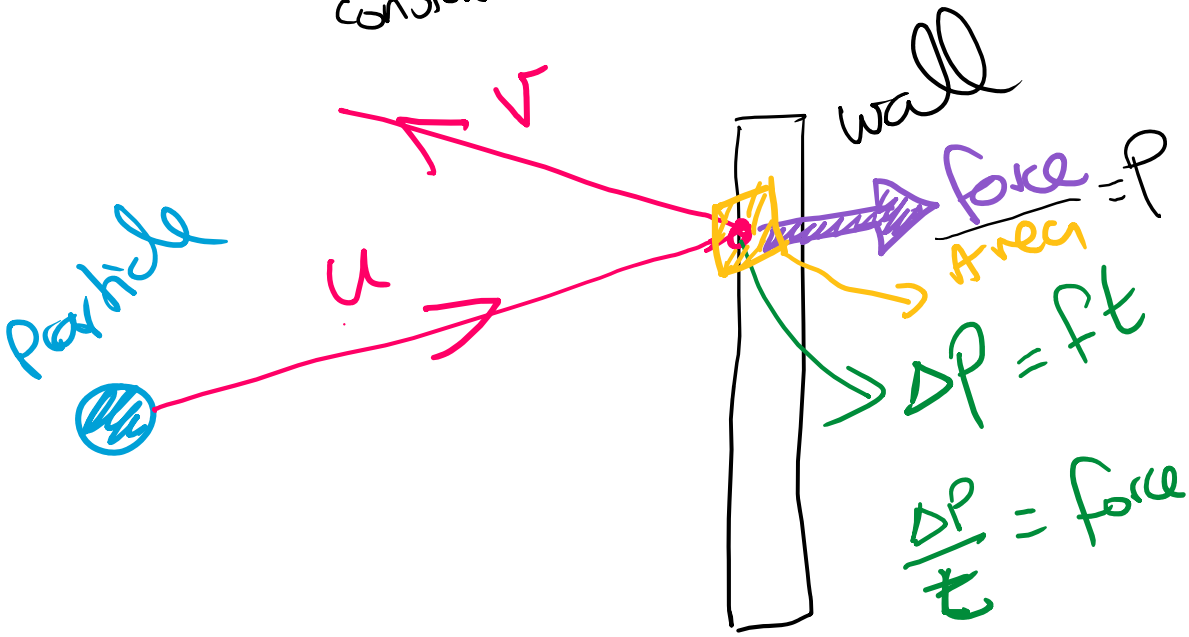
Momentum "p" = mv

change in momentum $\Delta p = m(v-u)$

↳ impulse = Ft

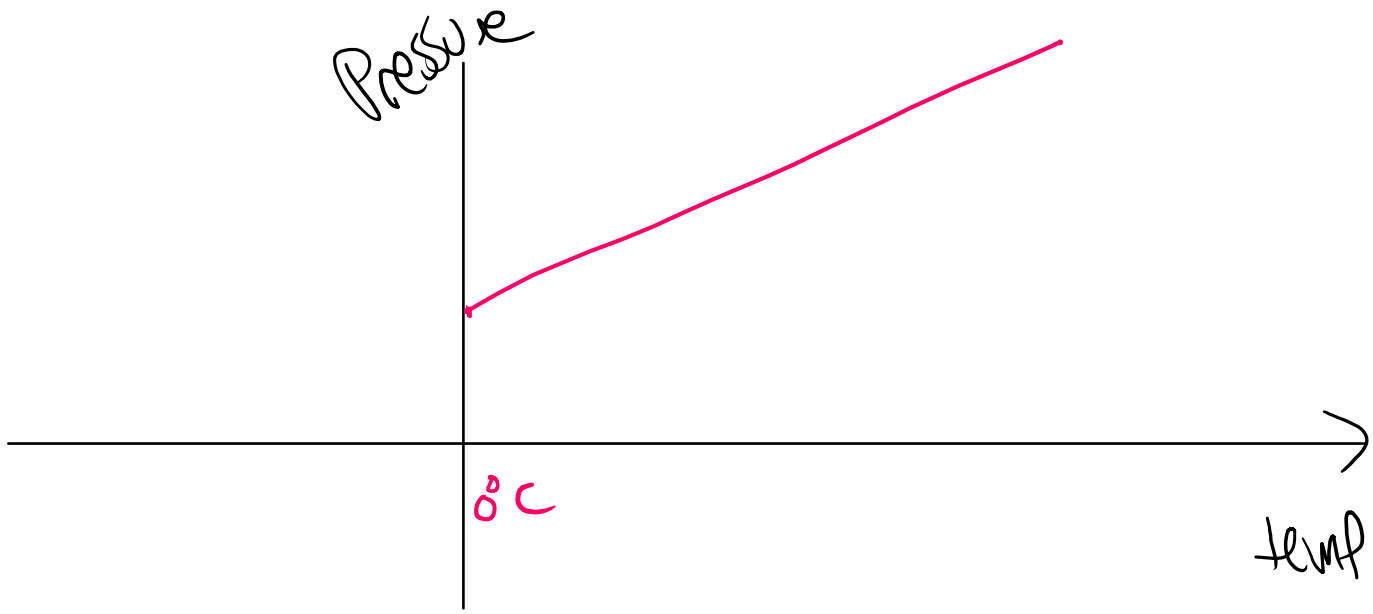
$$\Delta p = \text{impulse} = m(v-u) = ft$$

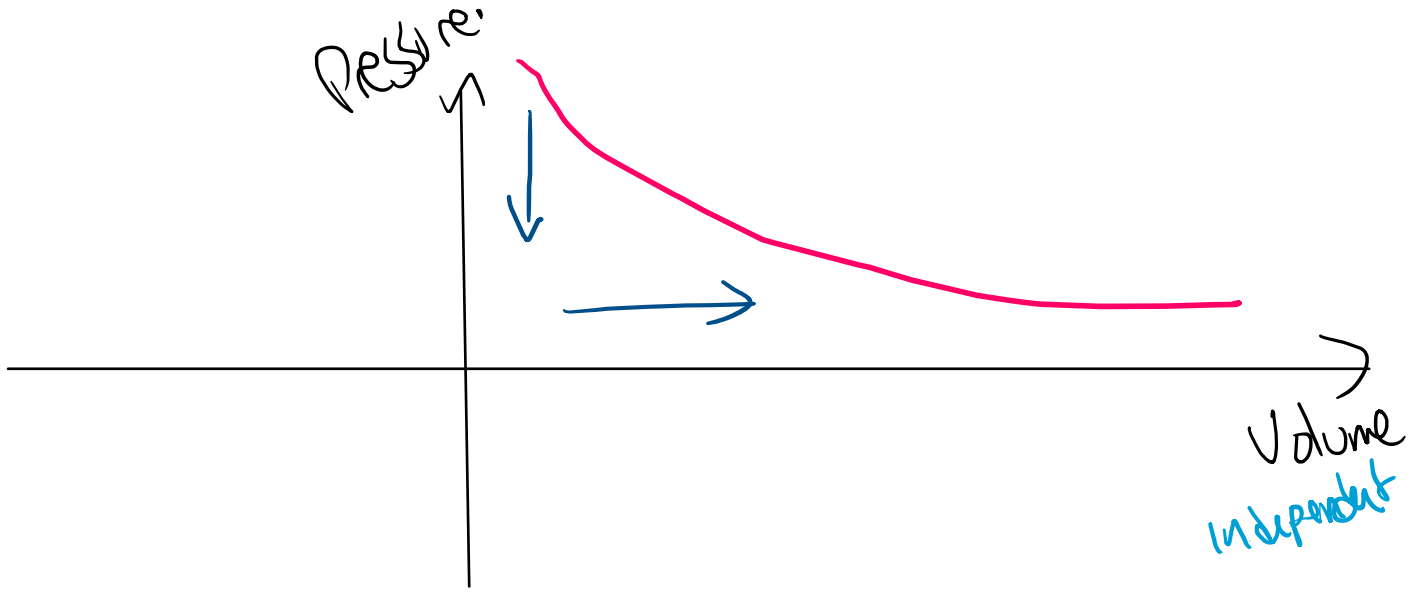
$p = m v$ (m: constant; v: speed, direction)

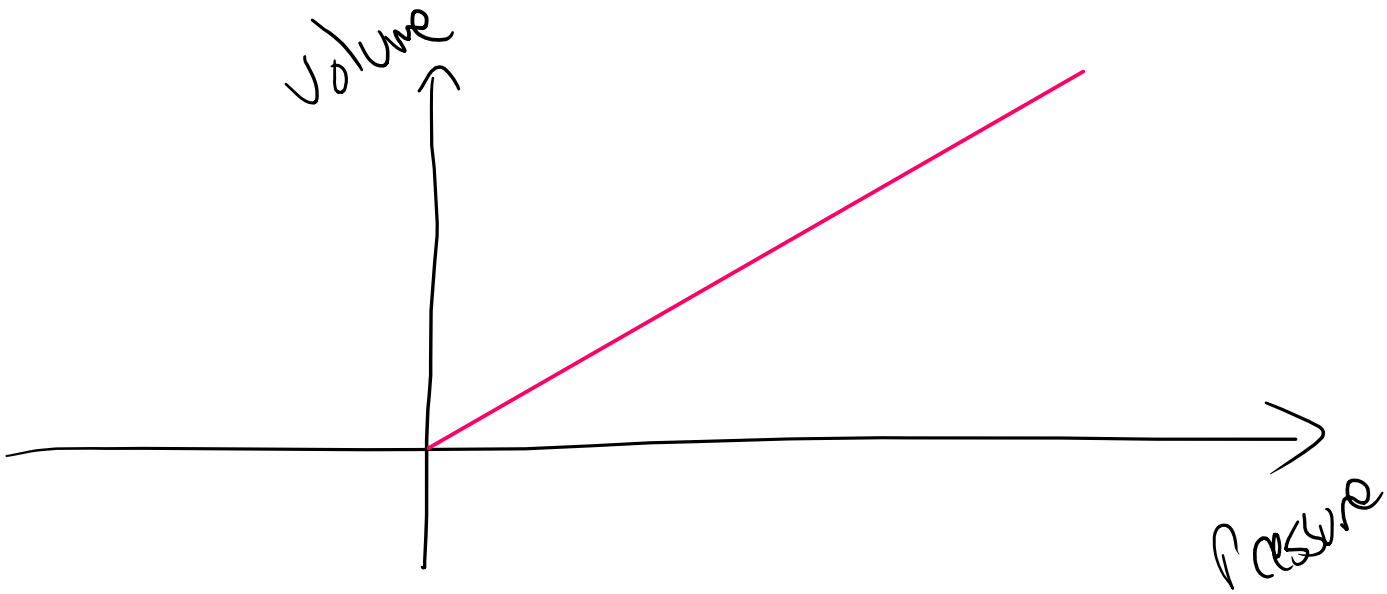


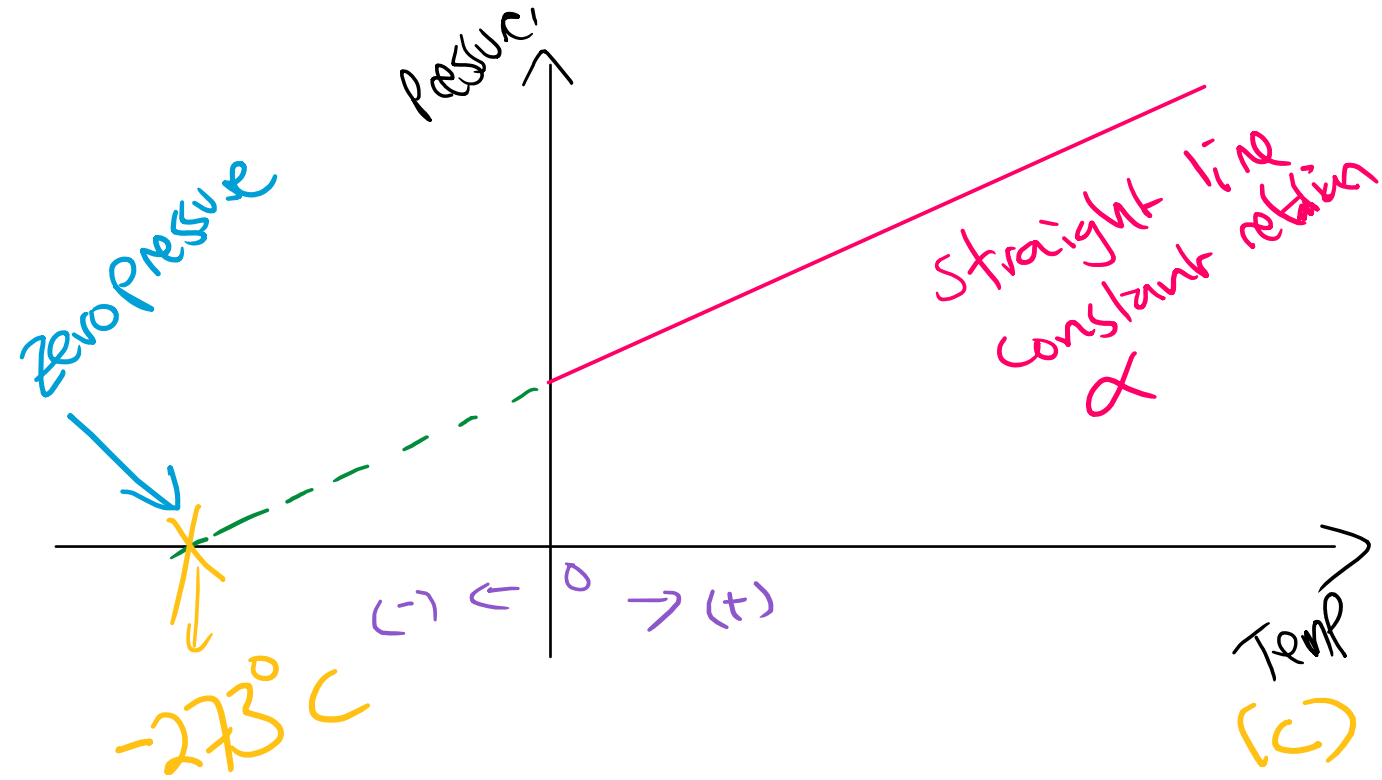
How to increase pressure:

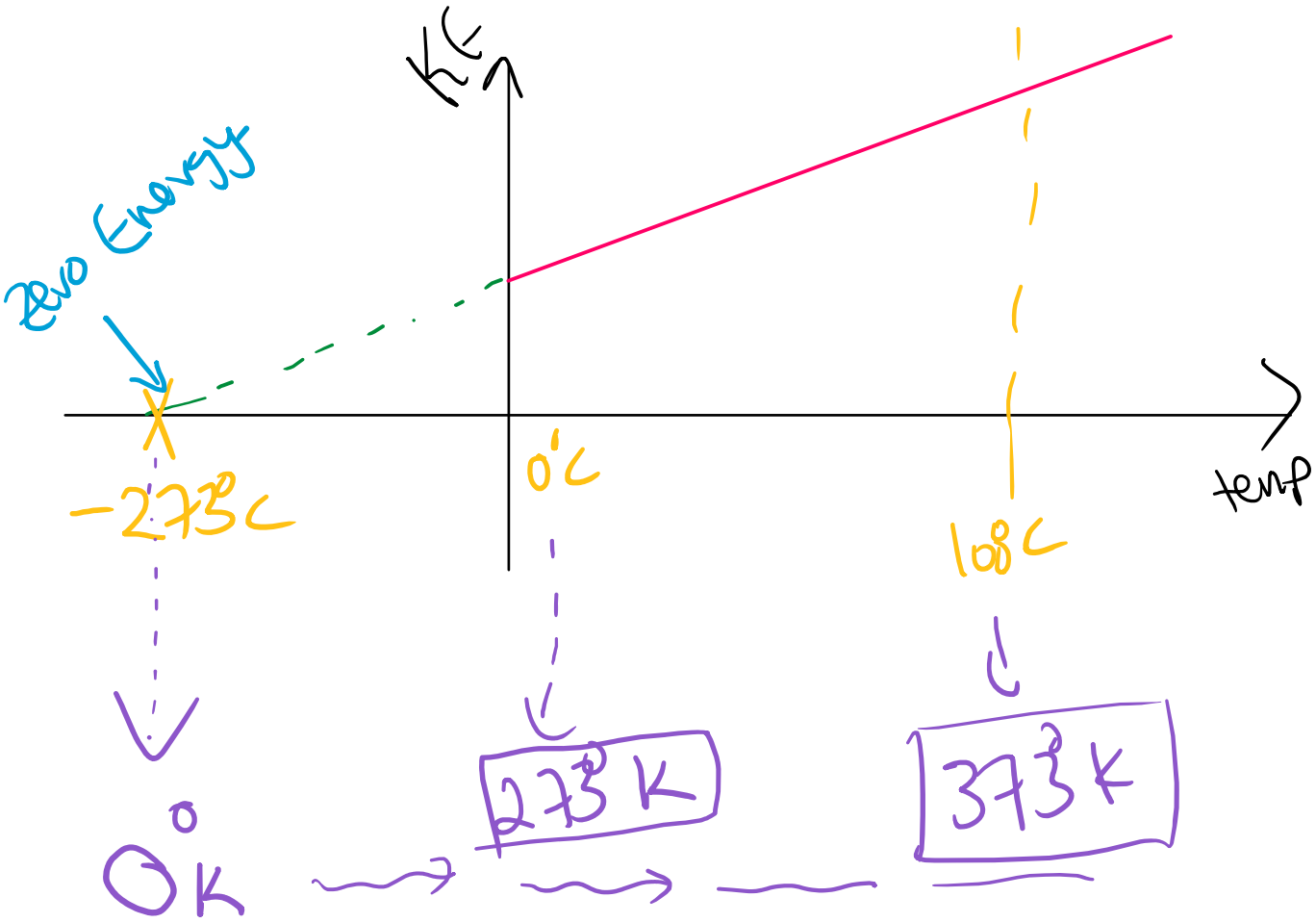
1. increase velocity ⇒ heating (inc temp)
2. increase mass ⇒ nº of particles
3. decrease volume ⇒ smaller area


Pressure
0°C
temp


Pressure
Volume
independent


Volume
Pressure





0° K → 273 K → 373 K

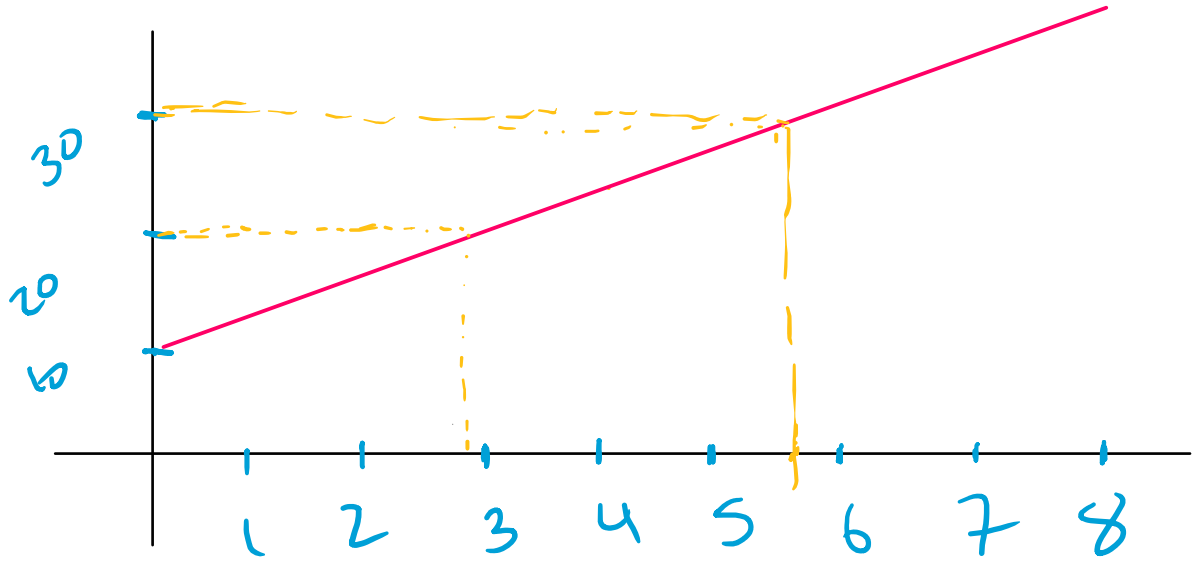
kelvin

absolute zero

$$K = C + 273$$

Relation of pressure & volume.

$$P \; V = \text{constant}$$



$\frac{20}{2.8} = 7.1$ $\quad \frac{30}{5.6} =$

const

$$P_1 V_1 = P_2 V_2$$

Boyles law

Example a diver exhales under water & releases an air bubble of volume $2cm^3$ the pressure at that depth is 3×10^5 P calculate the volume of the bubble at the surface of the sea.

$P_{atm} = 1 \times 10^5 Pa$

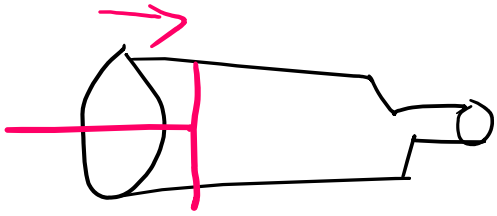
$P_1 V_1 = P_2 V_2$

$2\ cm^3$

$3 \times 10^5 \times 2 = 1 \times 10^5 V_2$

$V_2 = \frac{3 \times 10^5 \times 2}{1 \times 10^5} = 6\ cm^3$

Example



a medical syringe holds 3 cm^3 of medicine at normal Atmospheric pressure. the nurse pushes the piston making the volume 2cm^3. Calculate the Pressure at the nozzle.

$$P_1V_1 = P_2V_2$$

$$1\times10^5 \times 3 = P_2 \times 2$$

$$P_2 = \frac{1\times10^5 \times 3}{2} = 1.5\times10^5 \ P_a$$

Example

ρ = density

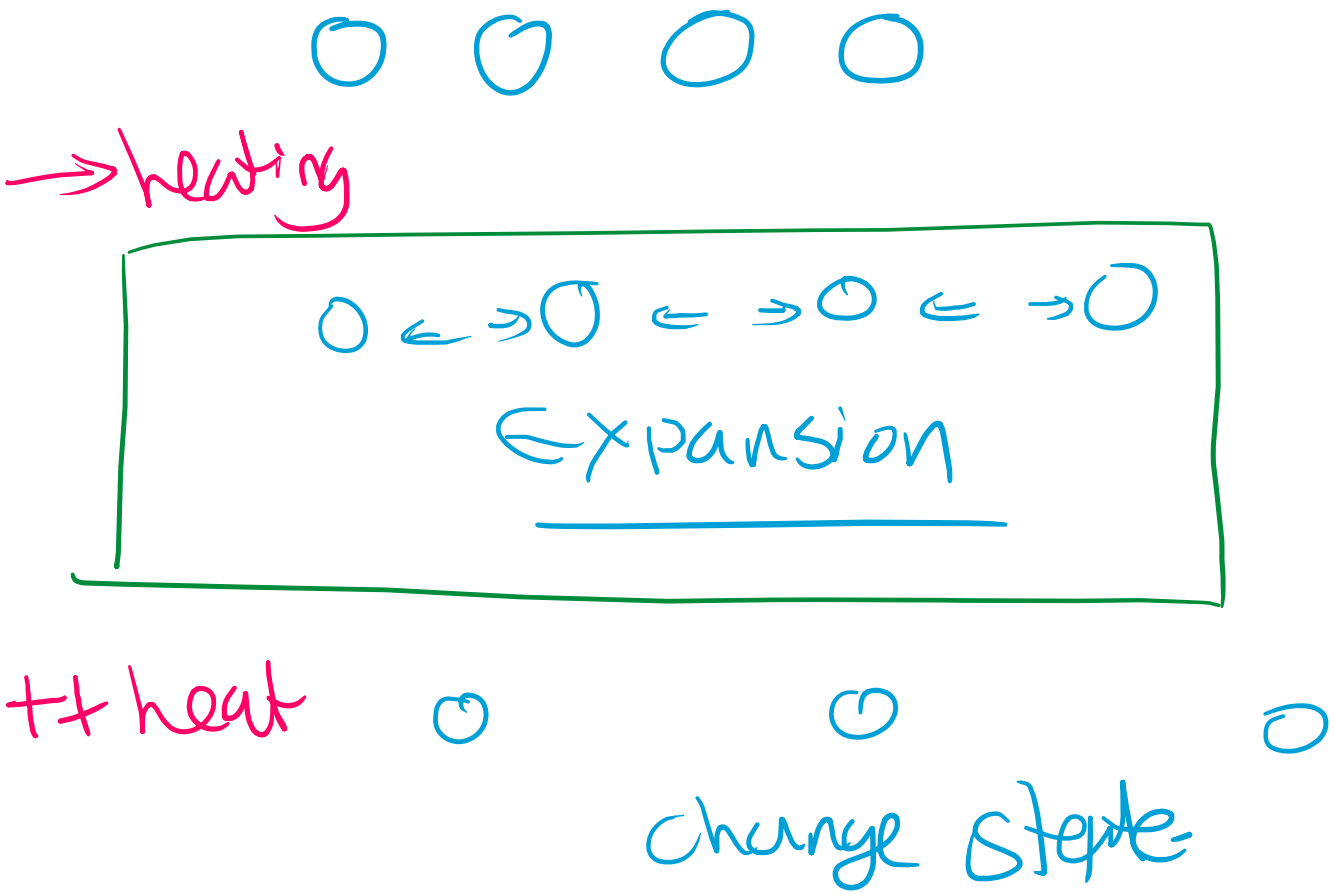
What is the height of Earths atmosphere. $\rho_{air} = 1.225\ kg/m^3$

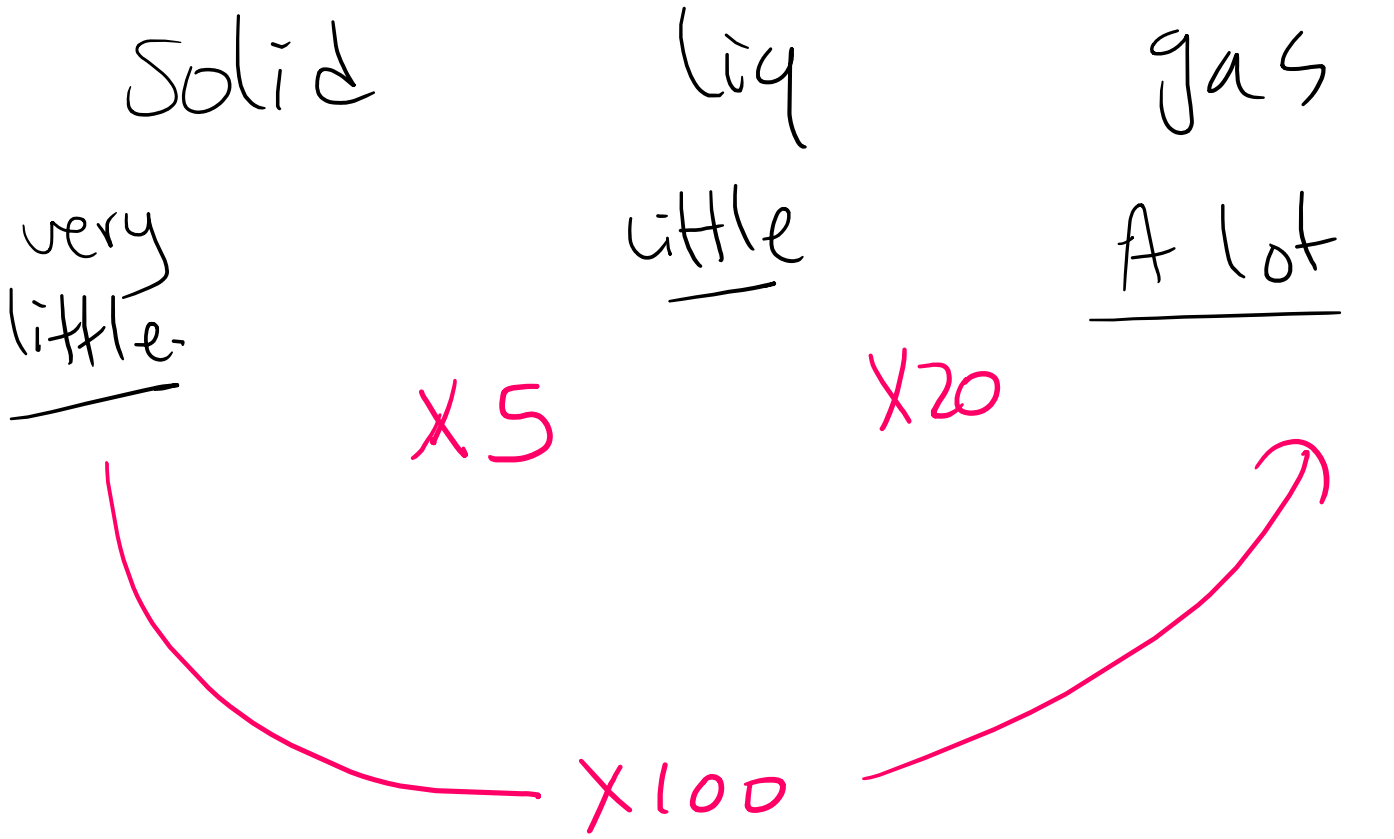
$$P = \rho g h$$

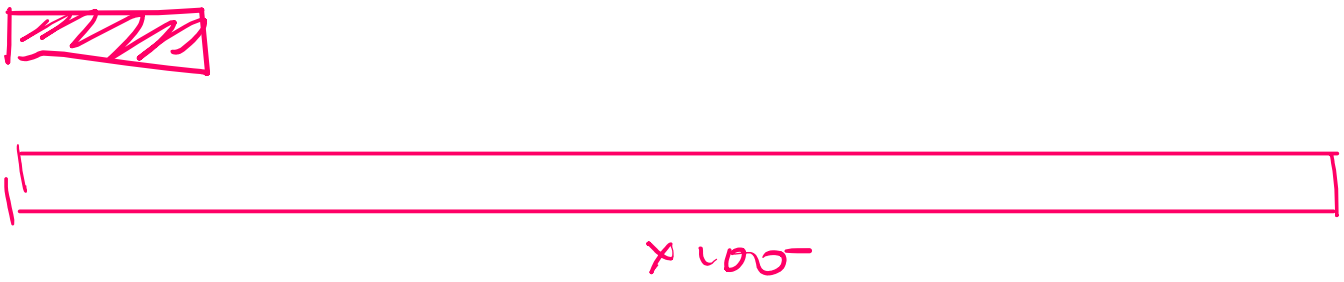
$$1 \times 10^5 = 1.225 \times 9.8 \times h$$

$$h = \frac{1 \times 10^5}{1.225 \times 9.8} = 8330\ M$$

Everything when heated expands




Solid
Liq
gas
very little.
little
A lot
X5
X20
X100


X100