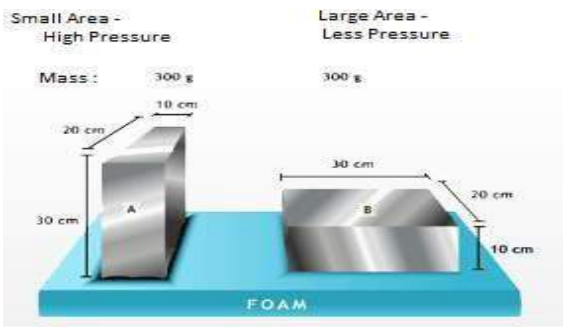
Pressure

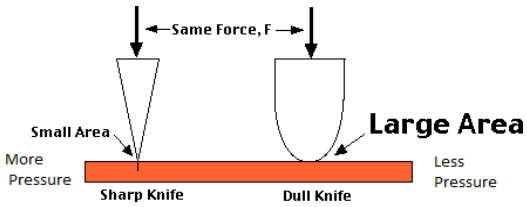
Thrust & Pressure:

Thrust = Force = weight = mass x gravity (SI unit – newton N)

Pressure = thrust on unit area (SI unit – N/m^2 or pascal (Pa))

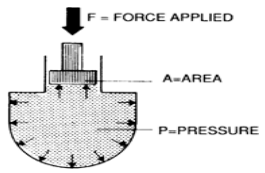


$$Pressure = \frac{Force}{Area} = \frac{F}{A}$$



Transmission of Pressure in liquids – Pascal's law :

The pressure exerted at any point on an enclosed liquid is transmitted equally and undiminished in all directions.

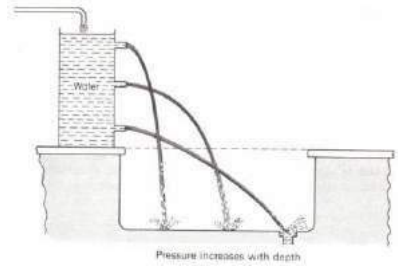


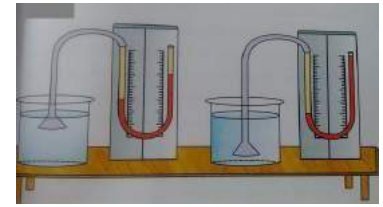
Consequences of liquid pressure

1. Deep down under ocean, the pressure is very high to crush human body. So deep sea divers wear special suits
2. Submarines are built of thick sheets of metal to withstand high pressure under water
3. Deep sea fishes when brought up to surface burst open.

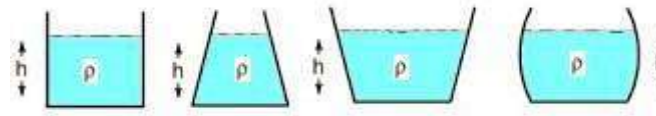
Pressure in Fluids:

- Pressure at a point inside the liquid increases with increase in depth from free surface.



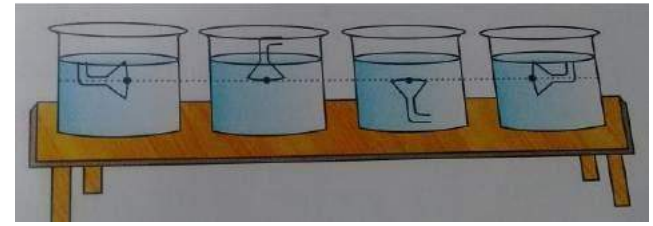


- Pressure does not depend upon size and shape of the container

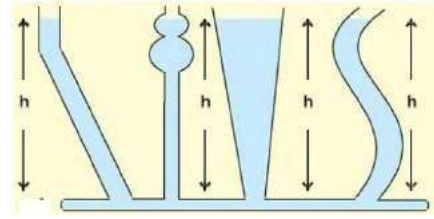


$P = \rho gh$

- In a stationary liquid, pressure is the same at all points on a horizontal plane.
- Pressure is same in all direction about a point in the liquid



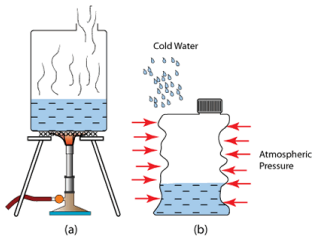
- Liquid exerts pressure on the sides of the container
- Liquid seeks its own level



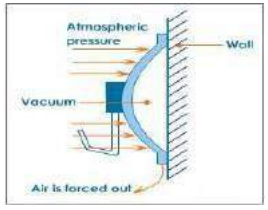
Atmospheric Pressure:

Thrust exerted per unit area of earth surface due to column of air is called atmospheric pressure on the earth surface.

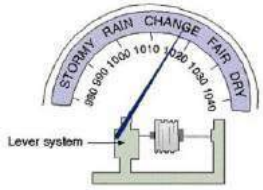
Demonstartion of atmospheric Pressure



Consequences of Atmospheric Pressure:



Aneroid Barometer:



No liquid.
Light & portable.
No prior adjustments.

Uses:

- To measure atmospheric pressure
- Weather forecast
- As an altimeter

Altimeter:

Altimeter measures the height (altitude) of a certain place.

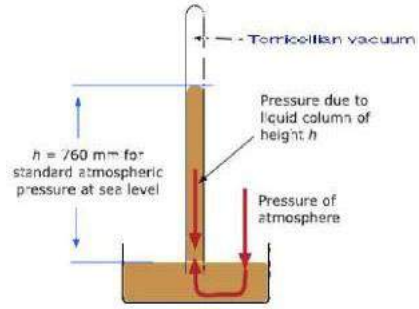
Pressure decreases by 1 cm for every 125 m increase in height.

Measurement of Atmospheric Pressure:

Instrument used: - Barometer

Types of Barometer: 1) Simple Barometer, 2) Fortin's Barometer and 3) Aneroid Barometer

Simple Barometer:



Atmospheric pressure at any place = $hdg\ Nm^{-2}$

Where, h = barometric height,

d = density of mercury

g = acceleration due to gravity

Mercury as Barometric liquid:

- As density of Hg is greater than all other liquids, only 0.76 m of mercury column balances the atmospheric pressure.
- Hg doesn't stick to glass tube
- Shiny and opaque
- Vapour pressure of Hg is very negligible – so more accurate reading.

Disadvantages of simple barometer

- No protection for glass tube
- Not convenient to move to other place
- Surface of mercury trough is open, chances of impurities falling in.
- A scale cannot be fixed to the tube.