Chapter 15 - Hydrostatic pressure and its applications

Pressure = …….. acting on a unit ……..

Pressure (P) = …….. / ……..

Question 1

200N of force was exerted on a 4m^2 wooden plank. Find the pressure exerted on the wooden plank.

Pressure = ……. / …….

= ……. / …….

= …….

= …….

Pressure is measured in …… or in ……..

Since pressure has only a …….. and no ……., it is a ……. quantity.

Question 2

A 50kg cuboid shaped object had a length of 10m, width of 5m and a height of 2m.

(i) Find the weight of the object

(ii) Find the pressure exerted on the floor when the largest area was kept facing the floor.

(iii) Find the pressure exerted on the floor when the smallest area was kept facing the floor

(i) Weight = …… x ……

= …….. x …….

= ……..

(ii) Pressure = ……. / ……..

= …… / ……

= …….. / ……

= ……

* Therefore when the …… is more, the ……. will be less.

* When the …… is less, the …… will be more.

The paw prints of a dog were more prominent on the beach than the foot prints of a man. Explain scientifically.

The ……. of the paws of a dog is much ……. than the …… of the feet of a man. Therefore the …….. exerted by the dog is ……. than the …… exerted by the man. Therefore the paw prints of a dog is ……. prominent than the foot prints of a man.

Instances where the ……. is ……. to ……. the …….

1) …… of a building.
2) …… of a …….. tire.
3) …… worn by …….. when removing …….. (……..)
4) Vehicle ……. are kept on a ……. when lifting a vehicle.
5) When putting up ……., the iron ……. are kept on a ……

Instances where the ……. is made …… to ……. the …….

1) Needles, pins, nails, safety pins etc
2) Blades, knives, swords, axes, scissors etc

Question 3

Find the pressure exerted by a brick which had a mass of 500g. The area of the brick which was touching floor was 80cm^2.

Mass of the brick = ……

Weight of the brick = …….. x ……..

= …… x ……..

= ……

Therefore the force exerted on the floor by the brick = ……..

Area of the brick which was touching the floor = ……../……

= ……..

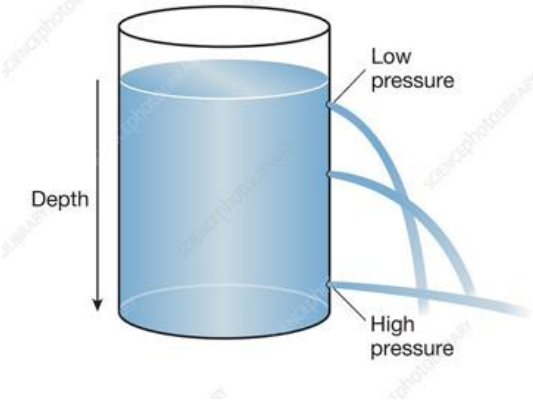
Therefore the pressure exerted by the brick on the floor = …… / ……

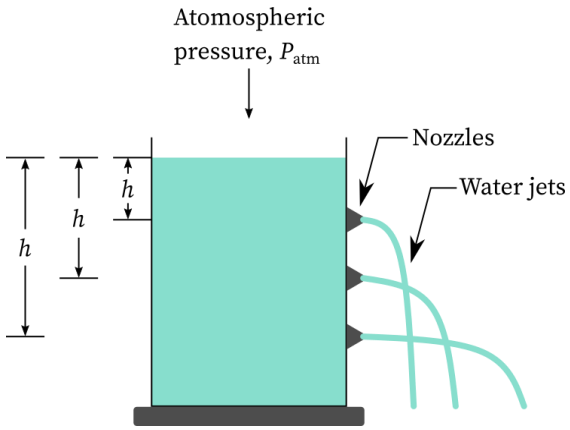
= …….. / …….

= ……

= ……

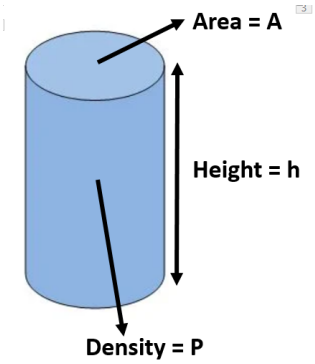
Hydrostatic Pressure





Liquid …….. (…….. pressure) …….. when the ……. of the liquid ……..

Calculating the hydrostatic pressure



Density = …… / ……

…….. x …….. = mass

Mass = ……. x ……..

Mass = …….. x (……. x ……)

Weight = ……. x ……

Weight = (……. x …… x ……) x ……..

Force = ……..

Force = …… x …… x …… x ……..

Pressure = ……. / ……..

Pressure = (…… x …… x …… x ……) / ……

Pressure = ……. x ……. x ……..

P = …… x ……x …….

P = ……

P = ……. is measured in ……..

P = ……. is measured in ……..

h = ……. is measured in ……

g = ……. is measured in ……..

Therefore the hydrostatic …… (liquid ……..) depends only on

(i) ……. of the liquid column

(ii) …… of the liquid

(iii) ……..

Question - 1

A swimming pool was 6m deep. Find the pressure exerted on the floor by water. (Density of water = 1000kgm^{-3} and gravitational acceleration = 10ms^{-2})

P = ……

P = …… x ……. x ……

P = ……..

Question - 2

At which depth can the same pressure be found in sea. (density of sea water = 1200kgms^{-2})

P = ……

60000Pa = …… x ……. x ……

h = ……/…….

h = ……..

Question 3

Find the pressure exerted by a 20cm tall water column. (Density of water = 1000kgm^{-3}. Gravitational acceleration = 10ms^{-2})

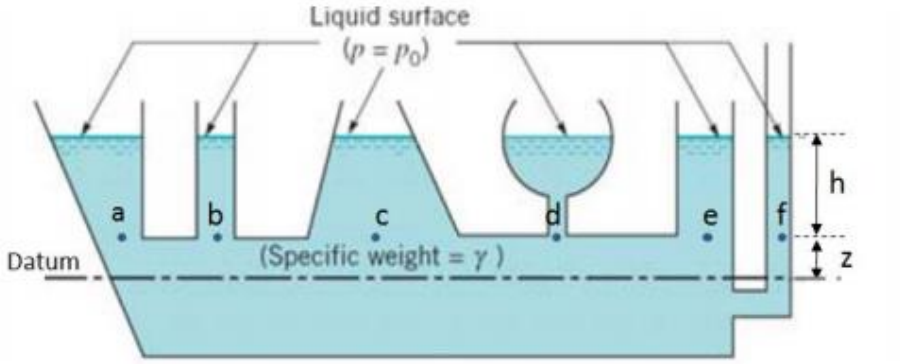
P = ……

P = …….. x …….. x ……..

P = ……..

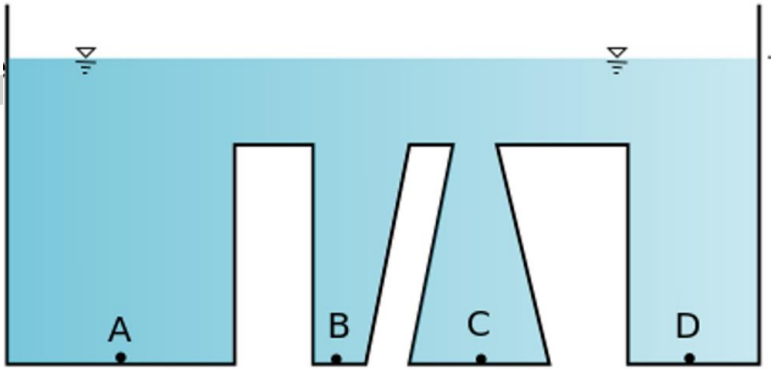
Question 4

1-2) At which of the points a, b, c, d, e, f in the following container the hydrostatic pressure is the greatest? Explain. (3 marks)



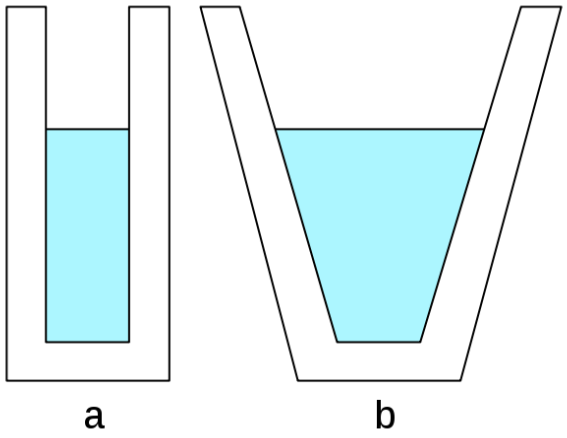
Question 5

Which points will have the highest pressure and the lowest pressures respectively.



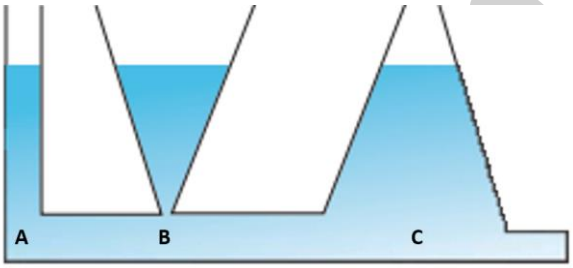
Question 6

Which vessel will have the highest hydrostatitc pressure



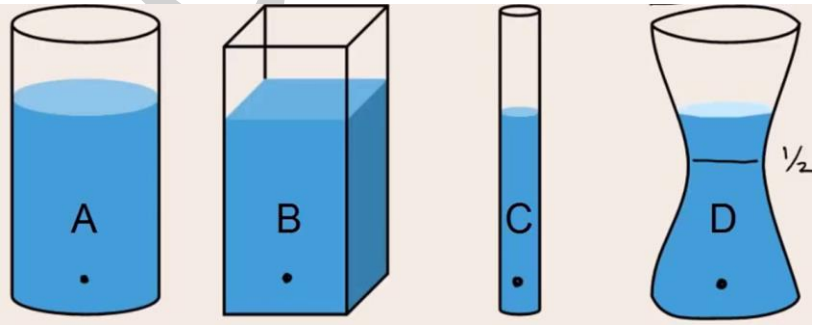
Question 7

Which point will have the highest pressure and the lowest pressure respectively.



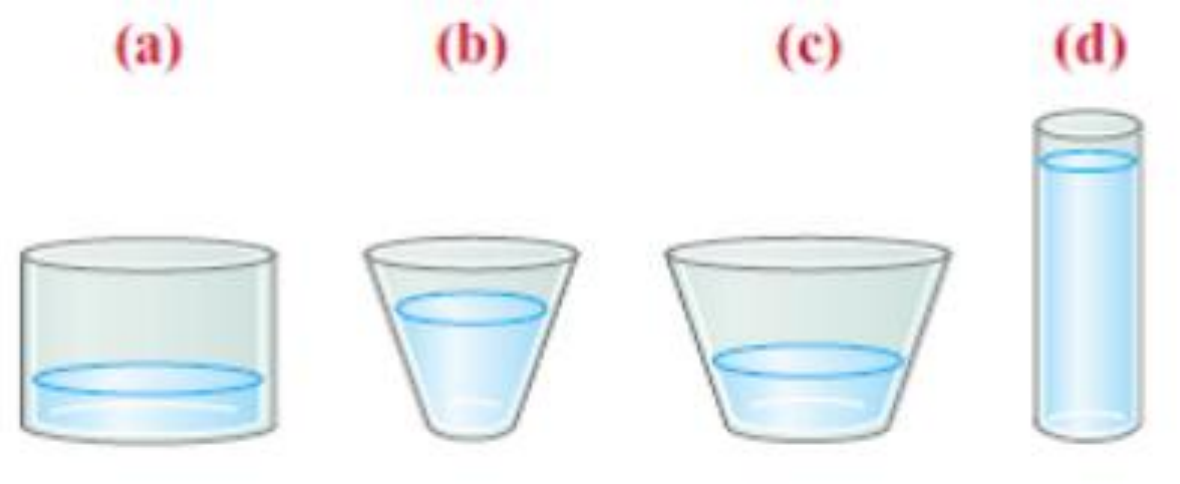
Question 8

Which points will have the highest and the lowest pressures respectively.



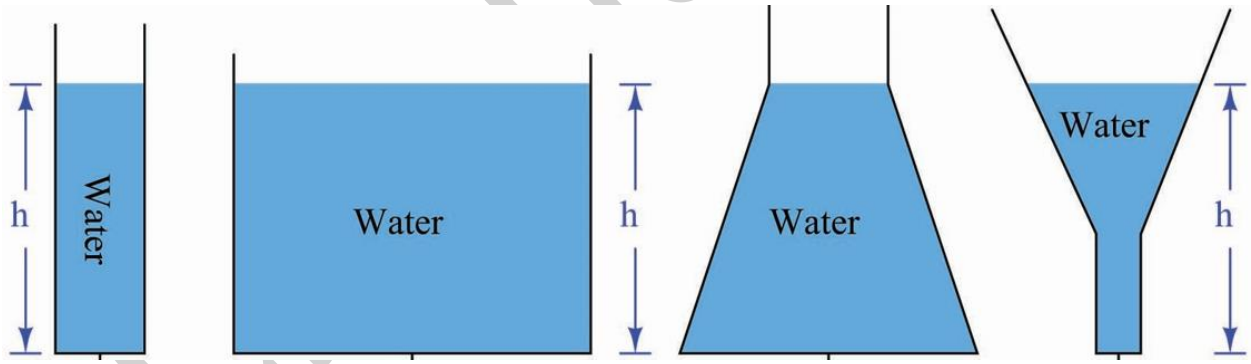
Question 9

All 4 containers have equal volume of same liquid. Which container has the highest pressure at the base



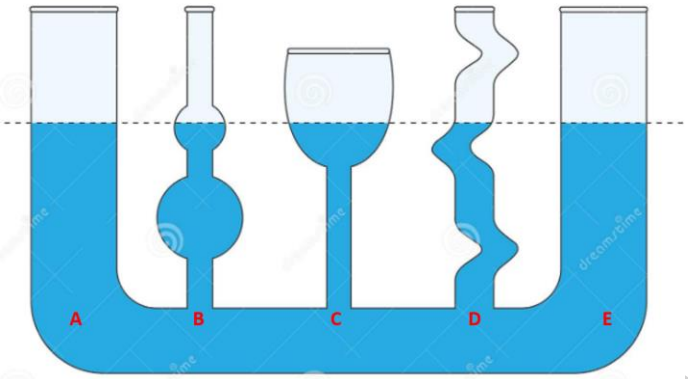
Question 10

Which container has the highest liquid pressure



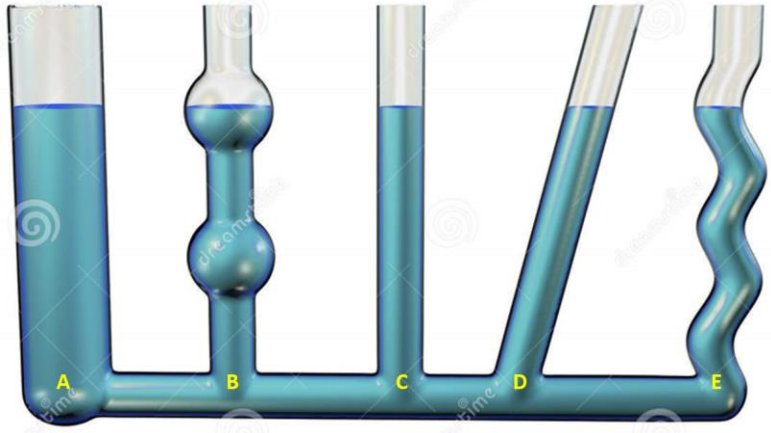
Question 11

Which points will have the highest and the lowest pressures respectively.

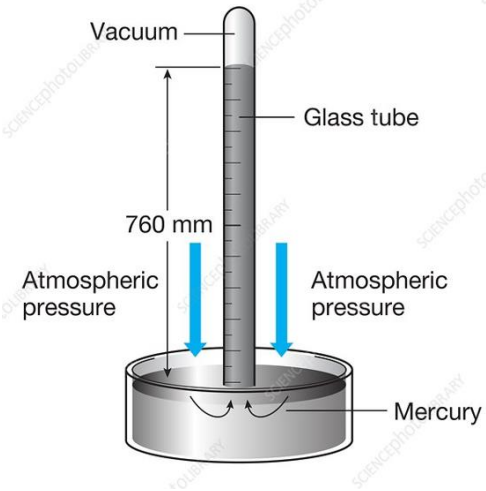


Question 12

Which points will have the highest and lowest pressures respectively.



Mercury barometer



Find the pressure exerted at point A by a 760mm mercury column.
(Density of mercury = 13600kgm^{-3} Gravitational acceleration = 10ms^{-2})

P_A =

P_A =

P_A =

The pressure at B = Pressure at A (same level)

The pressure at B =

The pressure at B is produced by the …….. above B (atmosphere)

The atmospheric pressure = ……

= ……

= ……

= ……

Therefore the atmospheric pressure = …….. = ……..

Find the height of the water column necessary to measure atmospheric pressure if water is used instead of a mercury.
(Density of water = 1000kgm^{-3}. Gravitational acceleration = 10ms^{-2})

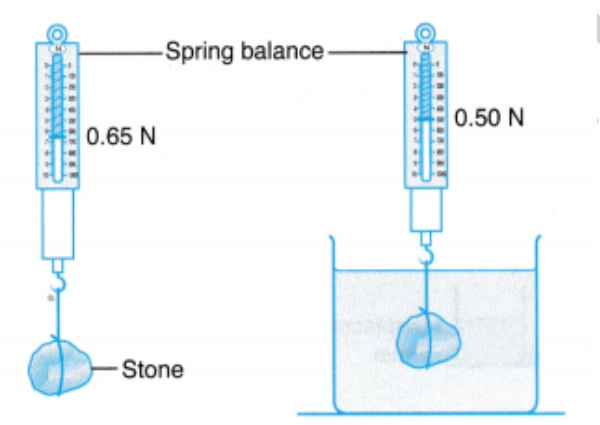
Pressure at B = Pressure at A
103,360 = …….
103,360 = …… x h x …….
103360/…….. = h
…… = h

Upthrust force

1) When an object is …… of ……. submerged in a ……. (……. or ……) the …….. will exert a …… on the ……. in the …… direction.

2) This ……. exerted by the …….. on the …… in the …… direction is called the ……..

Question 13



The weight of an object air was 0.65N. Its weight in water was 0.50N. Find the Upthrust force.

Weight of object in air = ……
Weight of object in water = ……
Therefore the Upthrust force = ……