FORCE AND PRESSURE

Force - A force is a push or a pull or both. A force cannot be seen but we can ~~feel~~ ~~and~~ feel and observe the effects of the force.

Push - A force to move an object away from our bodies.

Pull - A pull is when we apply a force to move an object towards our body

Combination of Push and Pull :-

* Playing a Guitar
* Sawing a wood
* Scrubbing the floor
* Rowing a boat

Definition of force : Push or pull acting on an object is defined as force

SI unit of Force : N (Newton)

CGS unit of Force : Dyne

1 Newton : 10^5 Dyne

Other unit kgWt (kilogram weight)

1 kgWt = 9.8 N

Object moves when, force is applied to it.

Ex: Pushing a table to move, closing the doors, opening a drawers, lifting a book, objects at rest will not move until force is applied to it..

* Interaction between bodies is necessary for the force to come into action.

* Interaction can be by direct or Indirect contact (pushing a door) between bodies or from a distance (magnet pulling an iron nail towards itself)

* Unbalanced forces acting in opposite direction combine by subtraction

* The net force is the difference between and is exerted in the direction of the larger force.

* Force could be largers or smallers than the others.

* The strength of a force is usually expressed by its magnitude. We have also to specify the direction in which a force acts.

* If the direction of the magnitude of the applied force changes, its effect also changes.

In general, more than one force may be acting on an object. However, the effect on the object is due to the net force acting on it.

The effects of force are:

* Changes the shape temporarily.
* Changes the shape permanently
* Changes the direction of a moving object.
* Changes the speed of a moving object.
* Stops a moving object or makes a stationary object move.
* Force applied on an object may change its speed.
* If the force applied on the object is in the direction of its motion, the speed of the object increases.
* If the force applied in the direction opposite to the direction of motion, then it results in a decrease in the speed of the object.

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• Object moves when force is applied to it.

Eg: Pushing a table to move, closing a door, opening a drawer, lifting a book, lifting a book. Object at rest will not move unless force is applied to it
• Interaction between bodies is necessary for the force to come into action.
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PRESSURE EXERTED BY FLUIDS

* Pressure depends on the density of the liquid. The denser the liquid, the greater the pressure at any given depth.
* The pressure experienced by deep-sea divers is so great that they have to wear specially designed suits to protect themselves. They use special suits diving suits ~~to protect themselves.~~ They use and buoyancy compensators to combat the weight of their diving equipment and the water pressure at great depths.

* Dams are made stronger and thicker at the bottom than at the top to withstand the high pressures at greater depths.

FACTORS AFFECTING THE LIQUID PRESSURE

1. Height of the liquid column.
2. The density of the liquid

EXPRESSION FOR PRESSURE EXERTED BY A LIQUID

☆ Consider a vessel filled with a liquid of density ρ.
☆ Now imagine an area of cross-section A at a depth h shown in figure.
☆ The force on the area A = weight of the liquid contained in the imaginary liquid column.
i.e. F = Mass of liquid in the column of depth.
= Volume X Density X g
= $Ah \times \rho \times g$ or $F = Ah\rho g$

Therefore, pressure of the liquid at a depth is given by $P = \frac{F}{A} = \frac{Ah\rho g}{A}$ or $P = h\rho g$.

Thus, pressure exerted by a liquid (or fluid) is directly proportional to:
(i) The height of the fluid column.

PASCAL'S LAW

According to this law, the pressure applied to an enclosed liquid is transmitted undiminished to every portion of the liquid and the walls of the containing vessel.

ARCHIMEDES PRINCIPLE

According to this principle, when a body is immersed wholly or partially in a fluid, it loses its weight which is equal to the weight of the fluids displaced by the body.

MANOMETER

☆ It is an instrument used to measure pressure.
☆ An open tube manometer is a simplest type of pressure gauge which measures pressure.
☆ It consists of a U-shaped tube containing a liquid.
☆ One arm of the tube is open to air and the other arm is connected to the vessel in which we want to measure the pressure.
☆ The difference in liquid level represents the applied pressure.

APPLICATIONS OF PRESSURE

Drinking straw:

☆ Straw is used to suck up aerated water.
☆ When air is sucked in, it causes a decrease in air pressure inside the straw. The outside atmospheric pressure forces the liquid