FORCE & PRESSURE

Force

Push or pull acting upon an object due to ist interraction with another object

Types of Forces

Contact Forces	**Contact forces are the type of forces that result when the interacting bodies are in physical contact with each other.**	
For Example:		
1).	**Muscular Force**	The force required to push, pull or lift objects is produced by the muscles of our body is called Muscular force.
2).	**Frictional Force**	Frictional force or friction is the force which tries to stop / prevent the movement of objects across the surface.
		It arises when an object tries to move along the surface of another object.
		Friction makes it hard to slide, it generates heat and even causes damage to machine parts
3).	**Elastic Spring Force**	Elastic force are contact forces that come into play when objects are stretched, bent or twisted.

Non Contact Forces Forces that act even when the agent applying the force and the object on which the force is being applied are not physically touching each other are called Non – Contact forces.

Examples-Non Contact Forces

1).	**Gravitational Force**	- The Earth pulls all objects towards itself with a force.
		- This force is called gravitational force.
		- Since, this force exerted by the Earth can act from a distance, it is a non-contact force.
		- The gravitational force exerted by the Earth on an object depends on the mass of the object. This force is referred to as weight of the object.
		- If the mass of an object is more , then the force of gravity is more on it and the object is said to be weighing more .
		- Because the earth has such a large mass, objects on the earth and near the earth are pulled towards the earth (due this gravity) rather than towards each other.
		- Each celestial body exerts a gravitational pull. But the amount of pull it exerts depends on its OWN MASS too.
		- Since the mass of moon is much less than the mass of earth , there is a smaller force of gravity which pulls objects towards it with lesser force. Hence we weigh less on the moon.
		- In fact, the Moon only has 1/6 the gravity that Earth does. This means you weigh six times less on the Moon than you do on Earth!

2).	**Magnetic Force**	- Force exerted by a Magnet on another magnet or a magnetic material is called Magnetic force.
		- Magnets exert forces of attraction or repulsion on other magnets.
		- Like poles repel each other & unlike poles attract each other.
		- Since magnetic force can act from a distance it is a non contact force.

3).	**Electrostatic Force**	The force exerted by a charged body on another charged or uncharged body is known as Electrostatic force.
		e.g. When we rub a plastic comb rigorously on dry hair it acquires charge that is produced on rubbing it. This charge acquired by the comb then exerts a force called electrostatic force that attracts pieces of paper towards it.
		Since the Electrostatic force can act from a distance, there it is also a Non contact force.

Direction of a Force	The direction of force – away from us when we push something. / towards us when we pull something.
	- If two forces are acting in the same direction, they add up.
	- If two forces are equal and are acting in opposite directions, they will balance each other. Thus there will be no net force acting (the object will not move).
	- If two forces are acting in opposite directions, then the net force will be the different between the 2 forces. In this case, the net force will act in the direction of the larger force.

PRESSURE

Pressure is defined as the effect of force acting on a unit area of a surface.
Therefore, Pressure = Force / Area = F/A [Pressure is the force on an object that is spread over a surface area]

Pressure that is exerted on a body depends on two things:-

a. The amount of force applied

B.The area that is pressing .If the area where the force is acting is large, then the force gets spread over this larger area.

Note:

- Effects of a force depends on its magnitude as well the area over which it is acting.
- Pressure exerted is directly proportional to force. Therefore, larger the force, larger will be the pressure exerted.
- Also, the pressure is inversely proportional to the area of contact. Therefore, smaller the area of contact, larger will be the pressure exerted.

- **FORCE↑PRESSURE↑** **AREA↑ PRESSURE↓**
- **FORCE↓PRESSURE↓** **AREA↓PRESSURE↑**

UNITS OF PRESSURE

Pressure = Force/ Area
S.I. unit of force =Newton = N
S.I. unit of area = m^2

SI Unit: $\frac{N}{m^2}$

∴ 1 Pascal is the pressure that results from the action of 1 N of force acting on a square metre of area.
[It is named after the French mathematician named Blaise Pascal.]

PRESSURE EXERTED BY LIQUIDS

1. Liquids exert pressure in downward direction.
2. The pressure exerted by liquids at the bottom depends on the height of the liquid column.
3. Liquids exert equal pressure at the same depth.
4. The pressure exerted by liquids increases with depth.

PRESSURE EXERTED BY GASES

Gases too exert pressure like liquids and solids.

PRESSURE

1. The surface of the earth is surrounded by an envelope of air, called atmosphere.
2. The pressure exerted by the atmosphere on the earth is called Atmospheric pressure.
3. Atmospheric pressure is exerted on an object due to the weight of the air column above it. Our bodies, too experience this pressure all the time.
4. Human beings do not get crushed under the pressure of the atmosphere because their bodies get used to this pressure. This is made possible by the internal pressure developed by the fluids inside the body cells of humans and other animals. Their blood pressure is slightly more than the atmospheric pressure.
5. At high altitudes, one feels popping in the ears due to the reduced atmospheric pressure. The popping helps to balance the difference in pressure in and outside the body. (Problem like nose bleeding also takes place at high altitudes since our blood pressure is much higher than the pressure outside).
6. The instrument used for measurement of atmospheric pressure is called a **barometer.**