



মণিপুরৰ শাসন (আৰু)

DEPARTMENT OF EDUCATION (S)

Government of Manipur

CHAPTER- 11:

FORCE AND PRESSURE

Notes:

Force

- Force is an external agency which can change or tends to change the state of rest or motion or shape of a body.
- Simply force is a push or a pull on an object.
- A force arises due to the interaction between two objects.
Example: Car being pushed by a man.
- Force has magnitude as well as direction. Magnitude is the strength of a force.
- Forces applied on an object in the same direction add to one another.
Example: Pushing a heavy box by two friends in the same direction makes it easier to move.
- If the two forces act in the opposite directions on an object, the net force acting on it is the difference between the two forces.
- The net force of an object is zero if the two forces acting on it in the opposite direction are equal.
Example: In the tug-of-war when two teams pull equally hard, the rope does not move in any direction.
- 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.**

Effects of force

- A force may bring a change in the state of motion, i.e.,
 - A force may make an object move from rest.
Examples: Taking a penalty kick in football, lifting a book from the table.
 - A force may change the speed of an object if it is moving.
Example: When a child applies force on the moving tyre, the speed of the tyre increases.

- A force may change the direction of its motion of an object.

Example: A hockey player changes the direction of the moving ball with a flick of the stick.

- A force may cause a change in the shape of an object.

Example: Rolling a ball of dough to make a chapatti.

- A force may cause some or all of these effects.

Types of force

- (i) Contact force
- (ii) Non-contact force

Contact force

Forces that can be applied only when it is in contact with an object is called contact force.

Types of contact force

- (a) **Muscular force:** The force resulting due to the action of muscles is known as muscular force. Example: Bullocks or horses carry heavy loads with muscular force.
- (b) **Friction:** The force that opposes the motion of an object is called frictional force. It always acts on all the moving objects and its direction is always opposite to the direction of the motion. Example: A rolling ball along the ground gradually slows down and finally comes to rest due to the force of friction between the surface of the ball and the ground.

Non-contact force

Forces which do not involve contact between two bodies on which they act are called non-contact forces.

Types of non-contact force

- (a) **Magnetic force:** Forces exerted by magnets on iron and other magnets are called magnetic force. Examples: (a) Attraction of iron by a magnet when brought near to it.
- (b) Repulsion of two magnets when their same poles are brought together.

(b) **Electrostatic force:** The forces exerted by a charged body on another charged or uncharged body is known as electrostatic force. Example: A straw rubbed with paper attracts another straw and repels it if it is also been rubbed with a sheet of paper.

(c) **Gravitational force:** It is the force that every object exerts on every other object. Example: Force of gravity due to which every objects fall towards the earth.

Pressure

The force acting on a unit area of the surface is called pressure.

$$\text{Pressure} = \frac{\text{force}}{\text{area on which it acts}}$$

- The smaller the area, larger the pressure on a surface for the same force. Example: It is easier to push a nail in a wooden plank through its pointed end.
- The larger the area, smaller the pressure on the surface for the same force. Example: Bags are provided with broad straps to make it easier to carry.
- Liquids and gases exert pressure on the walls of their containers. Pressure exerted by water at the bottom of the container depends on the height of its column. Higher the column, higher is the pressure it exerted.
- **Atmospheric pressure:** The pressure exerted by air around us is known as atmospheric pressure.
- The weight of air in a column of the height of the atmosphere and the area 15 cm x 15 cm is nearly equal to the weight of an object of mass 225 kg (2250 N). However, we are not crushed under this weight because the pressure inside our bodies is equal to the atmospheric pressure and cancels the pressure from outside.



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