Force and Pressure

Introduction of Force & Its types

INTRODUCTION

We use force all the time. We use force to open a door, to pick up the school bag, to brush our teeth, to squeeze out toothpaste from a tube, to turn on a tap and so on. Even the earth is exerting a force on us all time. It is pulling all of us and all things on earth towards it.In fact we use force for every single action of ours! You have studied about force in previous classes.

Do you remember what a force is?

FORCE

The external agent which tends to set a body in motion or which changes the speed and direction of motion of a body or which can change the shape of a body is called force.

(i) To push or to pull is also called as force.

(ii) It is a vector quantity

UNIT OF FORCE

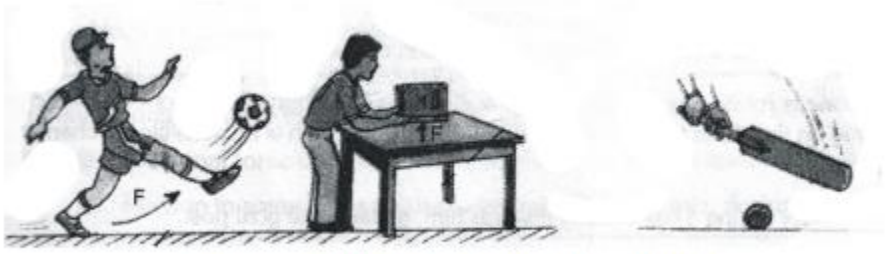
(i) The SI unit (in standard international system) of force is called Newton and its symbol is N (kg × m/ sec2)

(ii) C.G.S unit of force is dynes (gm cm/s2) 1 Newton = 105 dynes, 1 N = kg – m/s2 = 1(1000 gm) (100 cm/s2) = 105 gm–cm/s2 So that 1 N = 105 dyne

EFFECT OF FORCE

1. **FORCE CAN MOVE A BODY LYING AT REST**

   Example :



Force exerting on bodies to move them from rest

(a) Kicking a stationary football.

(b) Lifting a book kept on a table top.

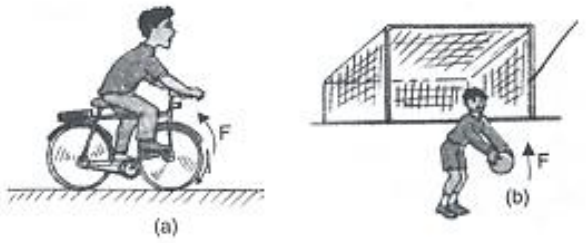
(c) Hitting a stationary ball with a bat.

2. FORCE CAN STOP A MOVING BODY

Example :

(a) A goalkeeper stopping a football moving towards the goal post.

(b) A moving bicycle coming to rest on applying brakes. Here the frictional force between the brake lining of the brake shoe and the bicycle wheel rim, acts to stop the bicycle.



Force exertef to stop a moving body

3 FORCE CAN CHANGE THE SPEED OF A MOVING BODY

Ex. To decrease speed, force is applied in a direction which is opposite to the motion of the body. If we apply force in the direction of motion of the body, it tends to increase the speed of the body. For example, if your friend is riding a bicycle and you push the bicycle in the same direction. The speed of bicycle will increase. On the other hand if you pull the bicycle, i.e., you apply force against the direction of motion, the speed of bicycle decreases.

(a)Force exerted in the direction od velocity (b) Force exerted in opposite direction of velocity

4. FORCE CAN CHANGE THE DIRECTION OF A MOVING BODY

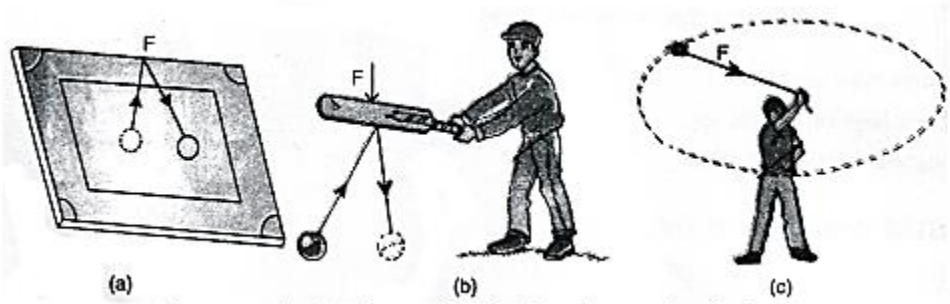
Example :

(a) A carrom counter changes its direction after a collision.

(b) When a batsman hits a ball, he changes the direction of the ball.

(c) When a stone is rotated in a circular path, the direction of motion of the stone change continuously. The force acting on the stone towards the centre of the circular path is responsible for changing the direction of the stone.

(d) A football player hitting a ball coming towards him, towards the goal post.



Force exerted to change the direction of a moving body

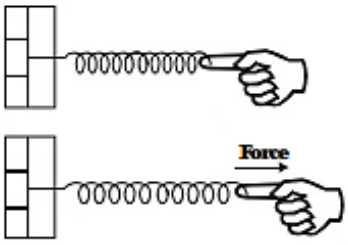
5. FORCE CAN CHANGE THE SHAPE AND SIZE OF AN OBJECT

Example :

(a) When we squeeze a toothpaste tube, it gets flattened.

(b) When we stretch a rubber band, its shape and size changes.
Force exerted to stretch a spring Force

(c) On stretching a spring, its length changes.



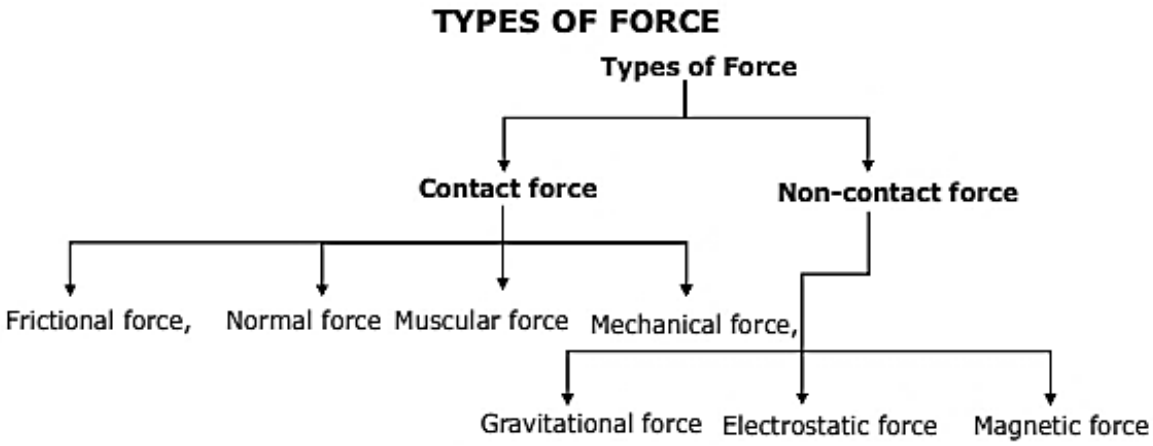
Force exerted to stretch a spring

6. FORCE CAN MAKE A BODY ROTATE.

Example :

(a) When electric current is passed through a motor of a ceiling fan, forces are produced in the dynamo (or motor) which makes the fan to rotate.

(b) For closing a door you apply a push. To conclude → a force can accelerate a body, change its shape and size or can produce a rotational effect.



- **CONTACT FORCE:** When a force involves direct contact of two bodies, we call the force a contact force.
- **NON-CONTACT FORCE**: The force which a body applies on another body when the two bodies are not in contact with each other is called non-contact force.