

# FORCE

Force is physical quantity that brings an object from rest to motion or motion to rest.

Will this ball start moving?

Object at rest will remain at rest



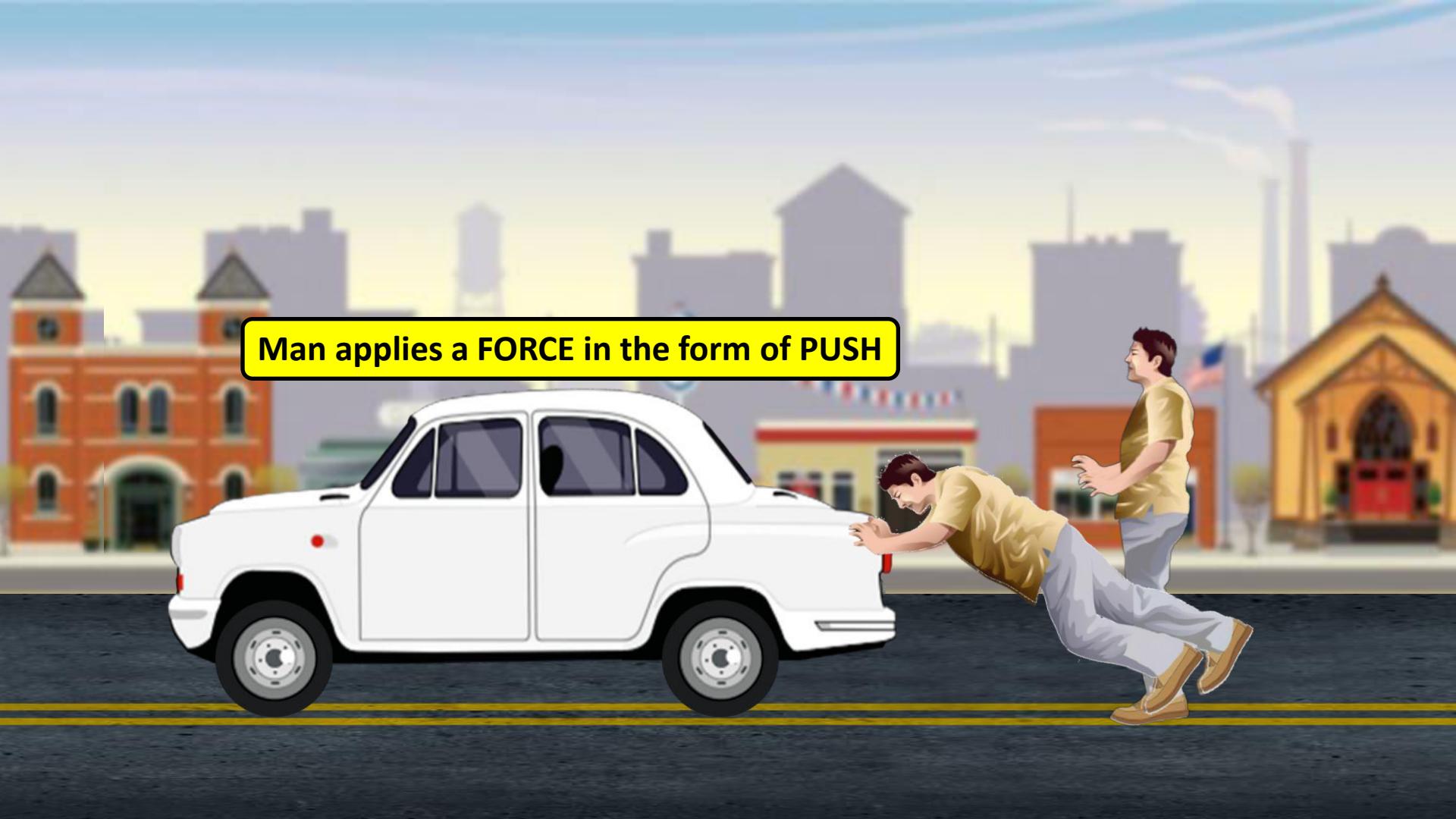
Why did the ball stop?

What if there is no force?



Object in motion will remain in motion.



A man in a yellow shirt and blue pants is pushing a white car from behind. He is leaning forward with his hands on the front bumper. Another man in a yellow shirt and blue pants stands behind him, watching. The scene is set on a city street with buildings and a church in the background.

**Man applies a FORCE in the form of PUSH**



Man applies a FORCE in the form of PUSH



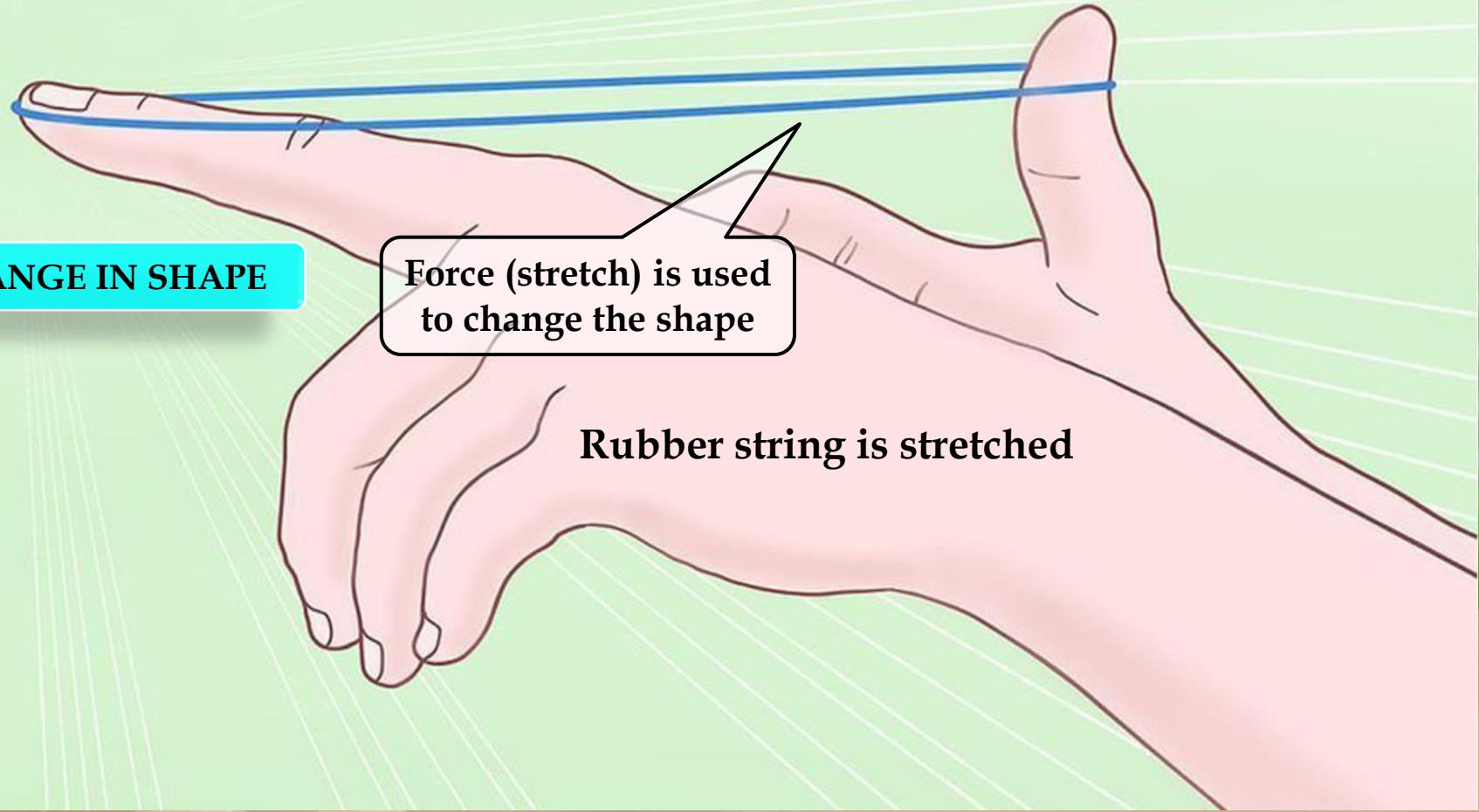
**Bull applies a FORCE in the form of PULL**



A **FORCE** is a **push** or **pull** upon an object resulting from its interaction with another object.



# EFFECTS OF FORCE



# EFFECTS OF FORCE



Rest → Motion      Motion → Rest      Change in speed

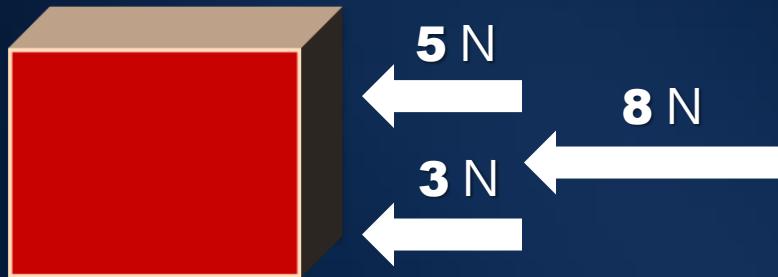
So the different effects of force are



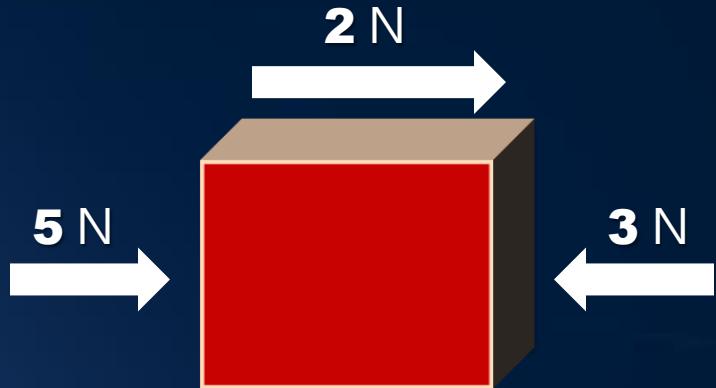
Change in direction

Change in shape

## Forces acting in same direction



## Forces acting in opposite direction



- Effective force is equal to addition of forces.

- Effective force is equal to subtraction of forces.
- Effective force is in direction of larger force.

# FORCE

## Contact Forces

A force which acts through a direct contact of objects is called **Contact force**

## Non Contact Forces

Are of **two** types

1

Muscular Force

2

Frictional Force

1

## Muscular Force

Can you push or lift books lying on a table without touching it?



No !!!!



1

## Muscular Force

The force resulting due to the action of muscles is known as the muscular force

No !!!!

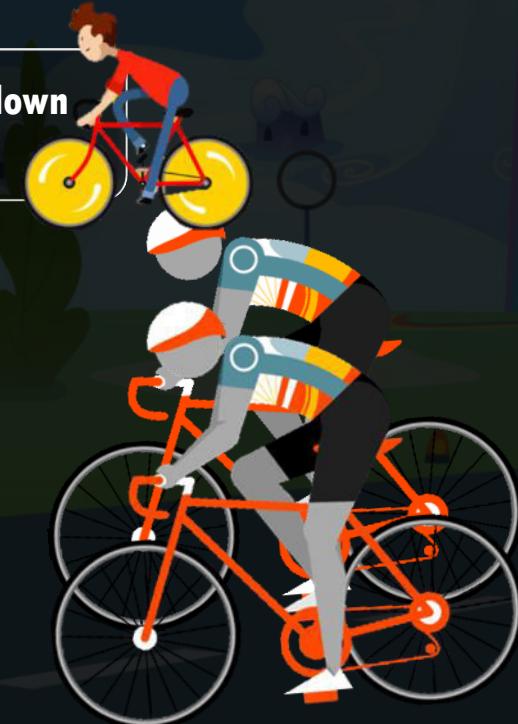
Can you lift a bucket of water without holding it?

To apply a force on an object, body has to be in contact with the object.

## 2

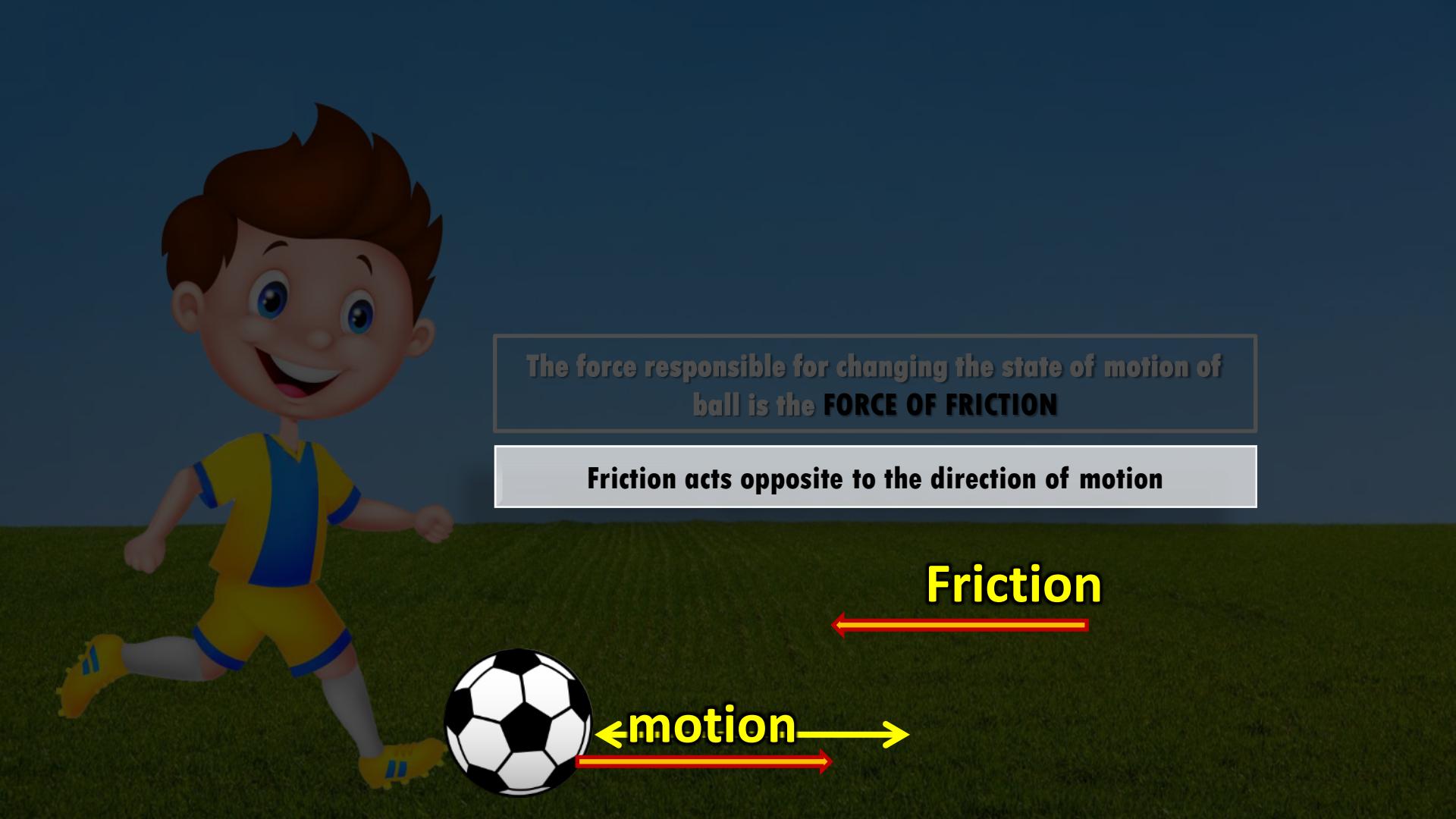
## Frictional Force

When we stop pedalling a bicycle, it gradually slows down and finally comes to a stop





A car also comes to rest once its engine is switched off.



The force responsible for changing the state of motion of ball is the **FORCE OF FRICTION**

Friction acts opposite to the direction of motion

Friction

← motion →

# FORCE

## Contact Forces

A force which acts through a direct contact of objects is called **Contact force**

1

Muscular Force

2

Frictional Force

## Non Contact Forces

A force which acts between two objects even if they are not in contact is called **Non contact force**

1

Gravitational Force

2

Electrostatic Force

3

Magnetic Force

# FORCE

## Contact Forces

A force which acts through a direct contact of objects is called **Contact force**

## Non Contact Forces

A force which acts between two objects even if they are not in contact is called **Non contact force**

1

Muscular Force

1

Gravitational Force

2

Frictional Force

2

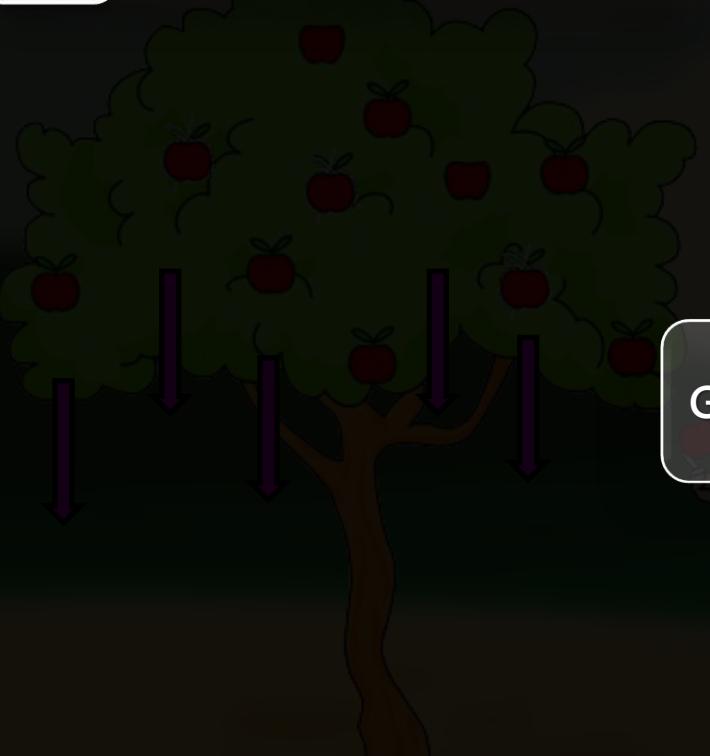
Electrostatic Force

3

Magnetic Force

1

## Gravitational Force



Objects get pulled towards earth due to force of gravity.

**Remember !!!**  
Gravitational force is always  
a force of attraction



1

## Gravitational Force



Why does the river water start flowing downwards ?

Water in rivers flows downward due to the force of gravity.

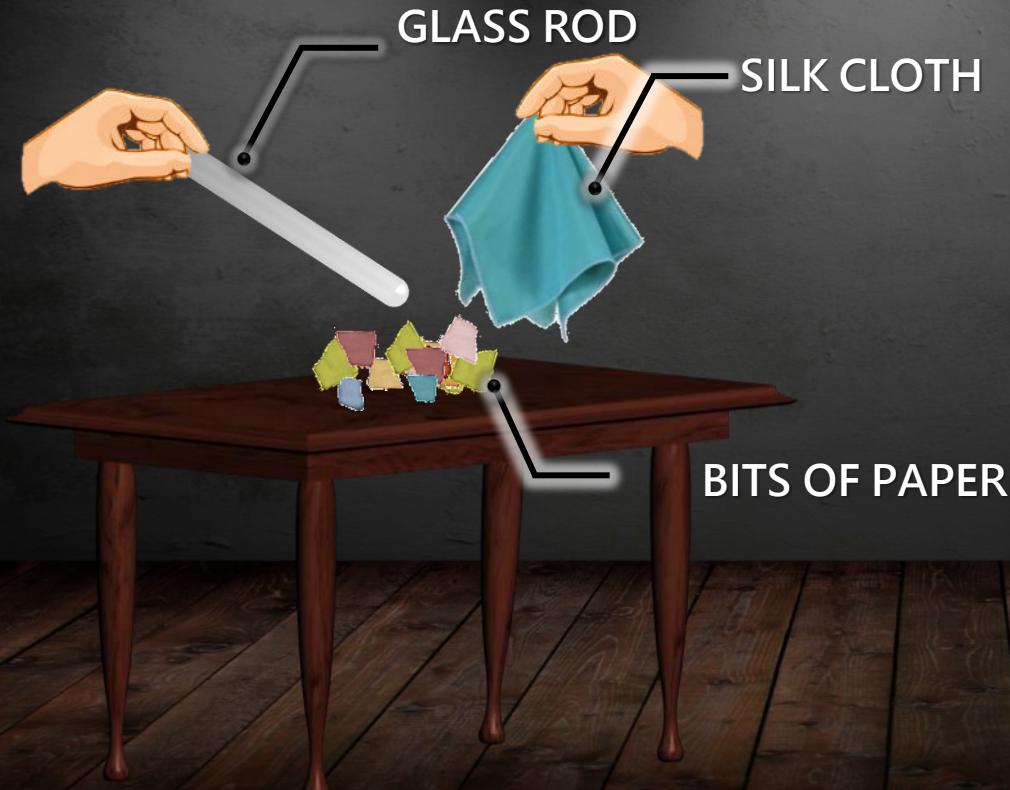


2

## Electrostatic Force

Do you observe any effect?

NO



2

## Electrostatic Force



2

## Electrostatic Force

Bits of paper get attracted



The force exerted by a charged body on another charged or uncharged body is known as electrostatic force.

## 3

## Magnetic Force



**FORCE OF ATTRACTION**

A diagram of a single cylindrical magnet with a central circular core. Magnetic field lines are shown as blue lines radiating outwards from the top and entering the bottom. Intense energy or force is depicted as white lightning bolt-like patterns emanating from the magnet's poles, particularly around the central core.

Force exerted by a magnet without being in contact with it is called magnetic force.

Description of situation	Drawing a bucket from a well	Firing a bullet from a gun	Moving a trolley
Action			
Effort leads to force (Yes/No)			
Is the effort involved an interaction between two objects? (Yes/No)			



**Let us understand pressure**

Why tyres in heavy vehicles are wider ?

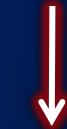


$$\text{Pressure} = \frac{\text{Force}}{\text{Area } (1\text{m}^2)}$$

Unit surface area

AREA

PRESSURE



"Force applied on unit area is called PRESSURE."

## THRUST-PERPENDICULAR FORCE

Thus FORCE is SAME but the  
Effect of Force depends on

the AREA OF CONTACT

Consider another pin flying horizontally on the surface

When AREA OF CONTACT is LESS,  
PRESSURE is MORE.

Force is applied perpendicular to the board.  
surface of the board at the head of the pin

A

B

**Nail with flat head on the wall**



**Area and pressure are inversely proportional.**



## Why do school bags have broad shoulder straps ?

- (i) The pressure produced by a given force depends on the area of the surface on which the force acts.
- (ii) Greater the surface area less is the pressure produced.
- (ii) School bags have broad shoulder straps so that the weight of the bag is distributed on a large surface and hence pressure decreases on the shoulder.





Why are ski-boards that are used to glide over snow long and broad ?

- (i) Effect of force decreases as area increases.
- (ii) On a long and broad board, effect of force on ice decreases and comes easier.

Is PRESSURE exerted only by solids ?????

