

RADIANT

2026



Physics

Laws of Motion

Lecture - 01

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Topics *to be covered*



1

Force

2

Contact Forces

3

Non-Contact Forces



Force $\rightarrow$ Pull or Push $F = ma$

Effects of force

Rest $\rightarrow$ motion

motion $\rightarrow$ Rest

Shape change

Velocity $\uparrow \downarrow$

Direction change

Unit:- N or newton
(C.G.S):- Dyne

$$1\text{ N} = 10^5 \text{ Dyne}$$

1 N = ... Dyn

$$A \rightarrow 10^{-5}$$

$$B \rightarrow 10^{-7}$$

$$C \rightarrow 10^{-5}$$

$$D \rightarrow 10^{-7}$$



Force



A force is that physical cause which changes (or tends to change) either the size or the shape or the state of rest or of motion of the body.



Force



Force

PUSH or a PULL upon an object ?





Force





Force





Contact Forces



The forces which are applied on bodies by making a physical contact, are called the contact forces.



Contact Forces



Frictional Force



Spring Force



Muscular Force



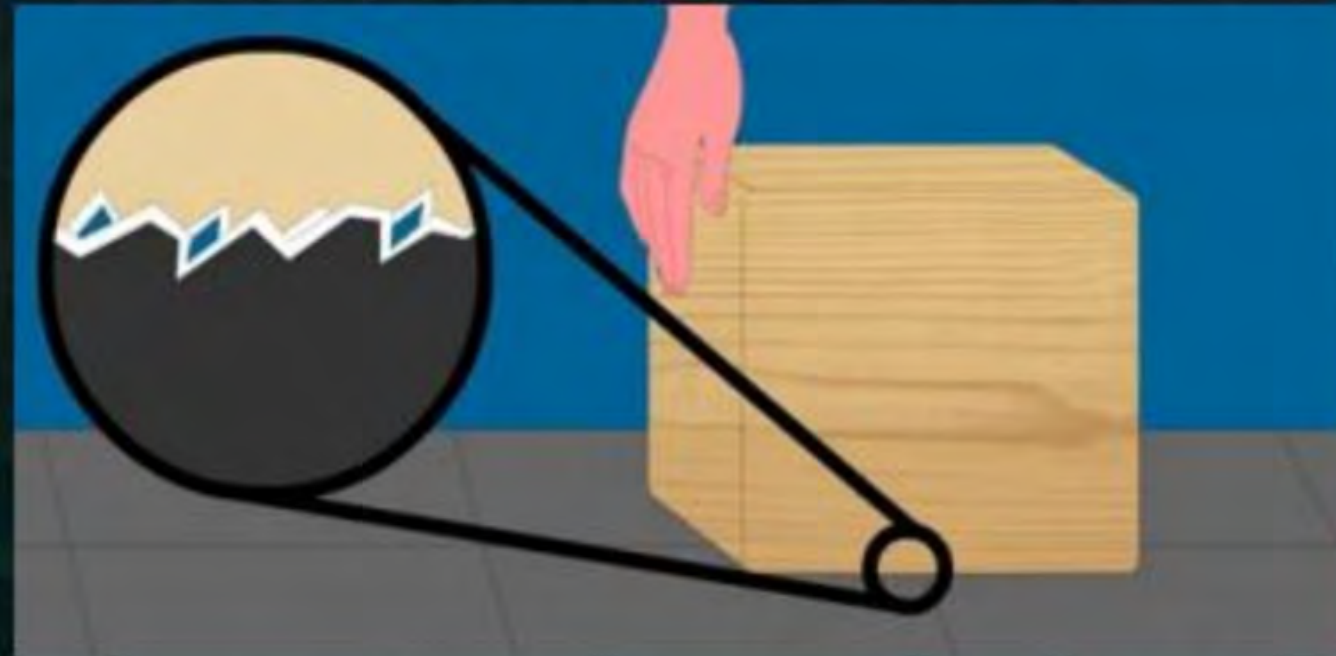


Contact Forces





Frictional Force



friction

$A \rightarrow \text{Contact}$

$B \rightarrow \text{Non-Contact}$

$C \rightarrow \text{force}$



Frictional Force



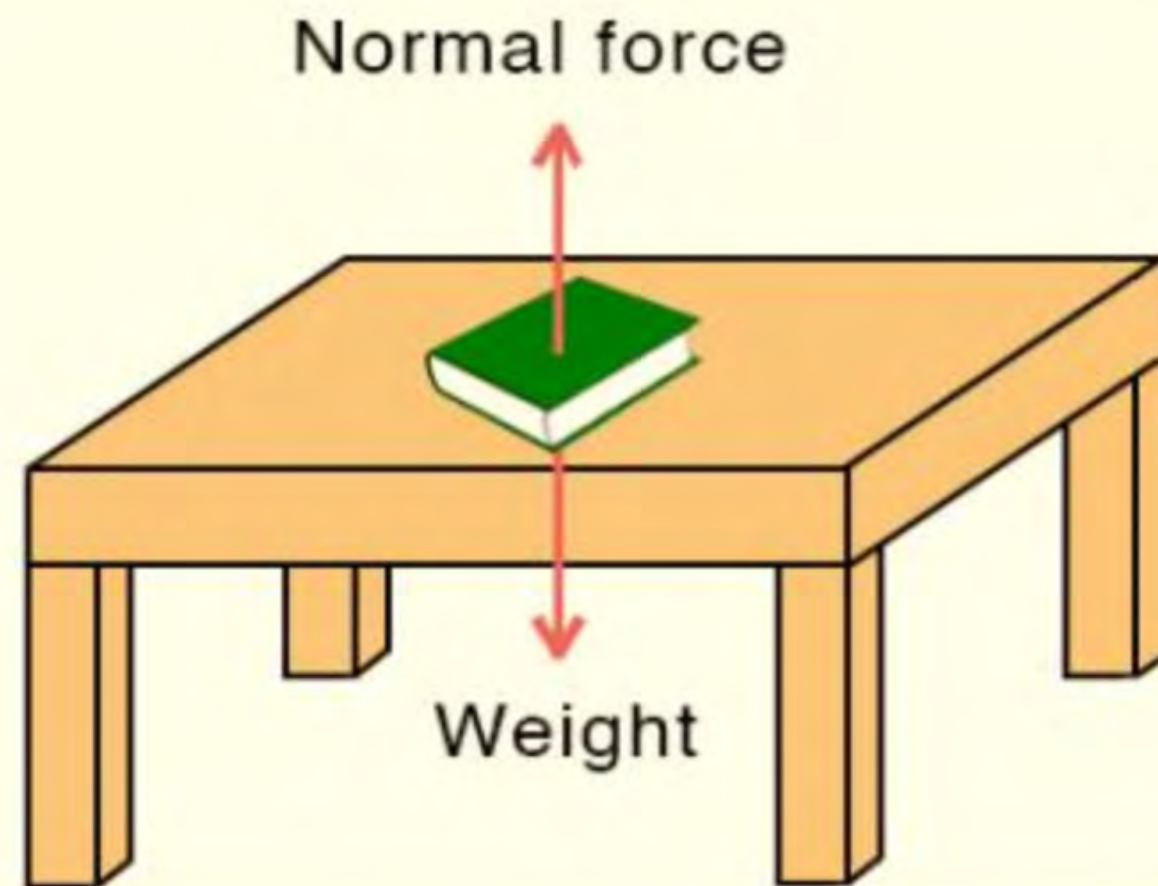
When a body slides (or rolls) over a rough surface, a force starts acting on the body in a direction opposite to the motion of the body, along the surface in contact. This is called the frictional force or the force of friction.



Normal Reaction Force



Normal Force Example





Normal Reaction Force



**Kinetic
Friction**

**Static
Friction**





Normal Reaction Force

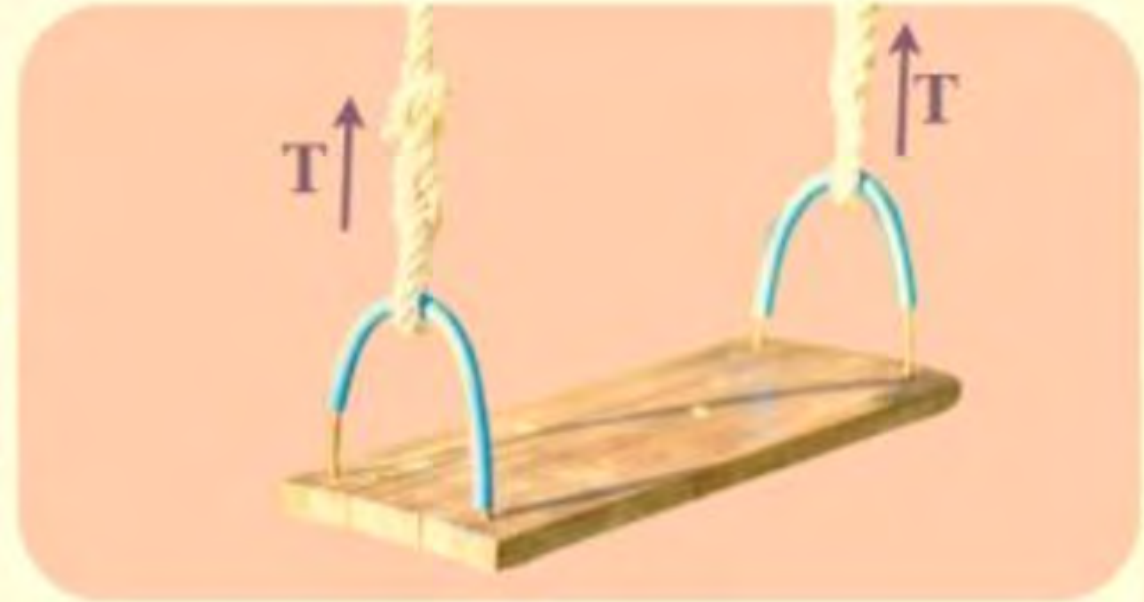
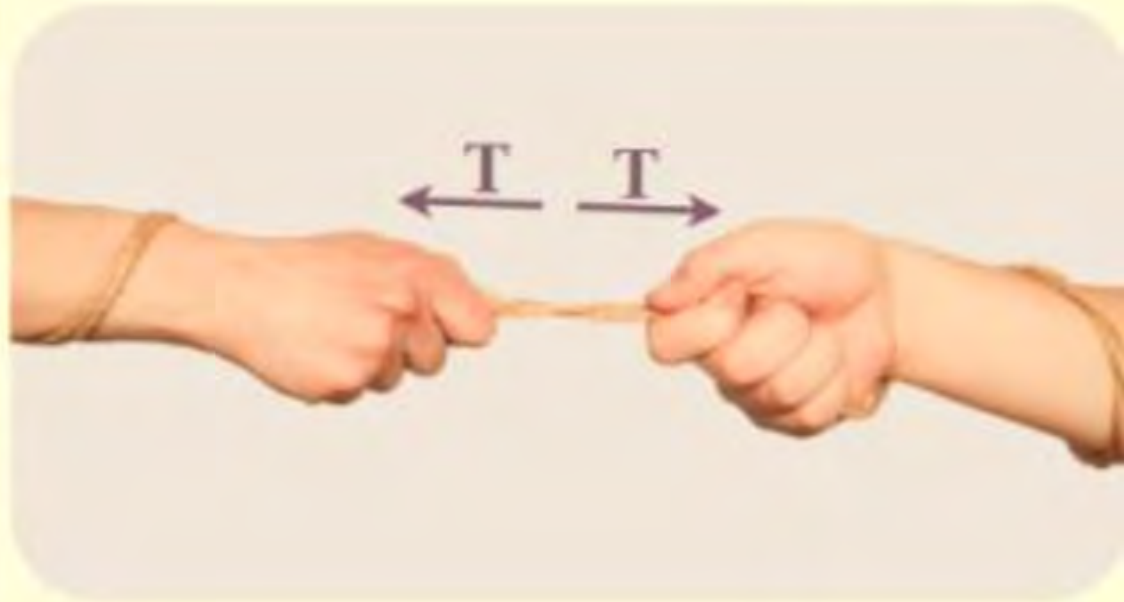


When a body is placed on a surface, the body exerts a force downwards, equal to its weight, on the surface, but the body does not move (or fall) because the surface exerts an equal and opposite force on the body normal to the surface which is called the normal reaction force.



Tension Force as Applied Through Strings

Tension Force





Tension Force as Applied Through Strings

Tension Force

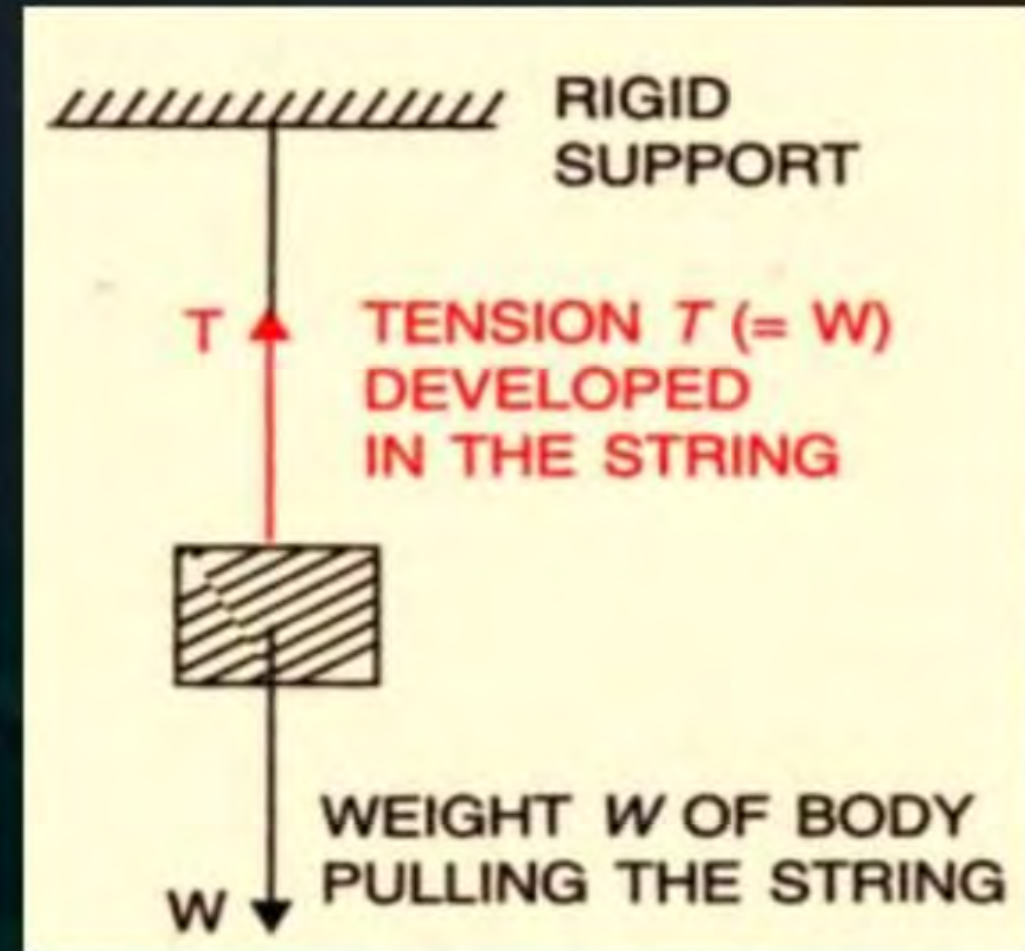
*"A force transmitted through a wire, rope or a string when it is pulled from **opposite ends** is known as a Tension Force"*





Tension Force as Applied Through Strings

When a body is suspended by a string attached to a rigid support, the body, due to its weight W , pulls the string vertically downwards and the string in its stretched condition pulls the body upwards by a force which balances the weight of the body. This force developed in the string is called tension (or the force of tension) T . Fig. shows the two forces.





Force Exerted by a Spring



Consider a spring with its one end kept fixed [Fig.]. If its other end is either stretched [Fig.] or compressed [Fig.], the spring exerts a force F opposite to the direction of displacement of its free end, the magnitude of this force is directly proportional to the magnitude of displacement *i.e.*, its elongation or compression. This force is called restoring force. A spring-balance works on this principle.

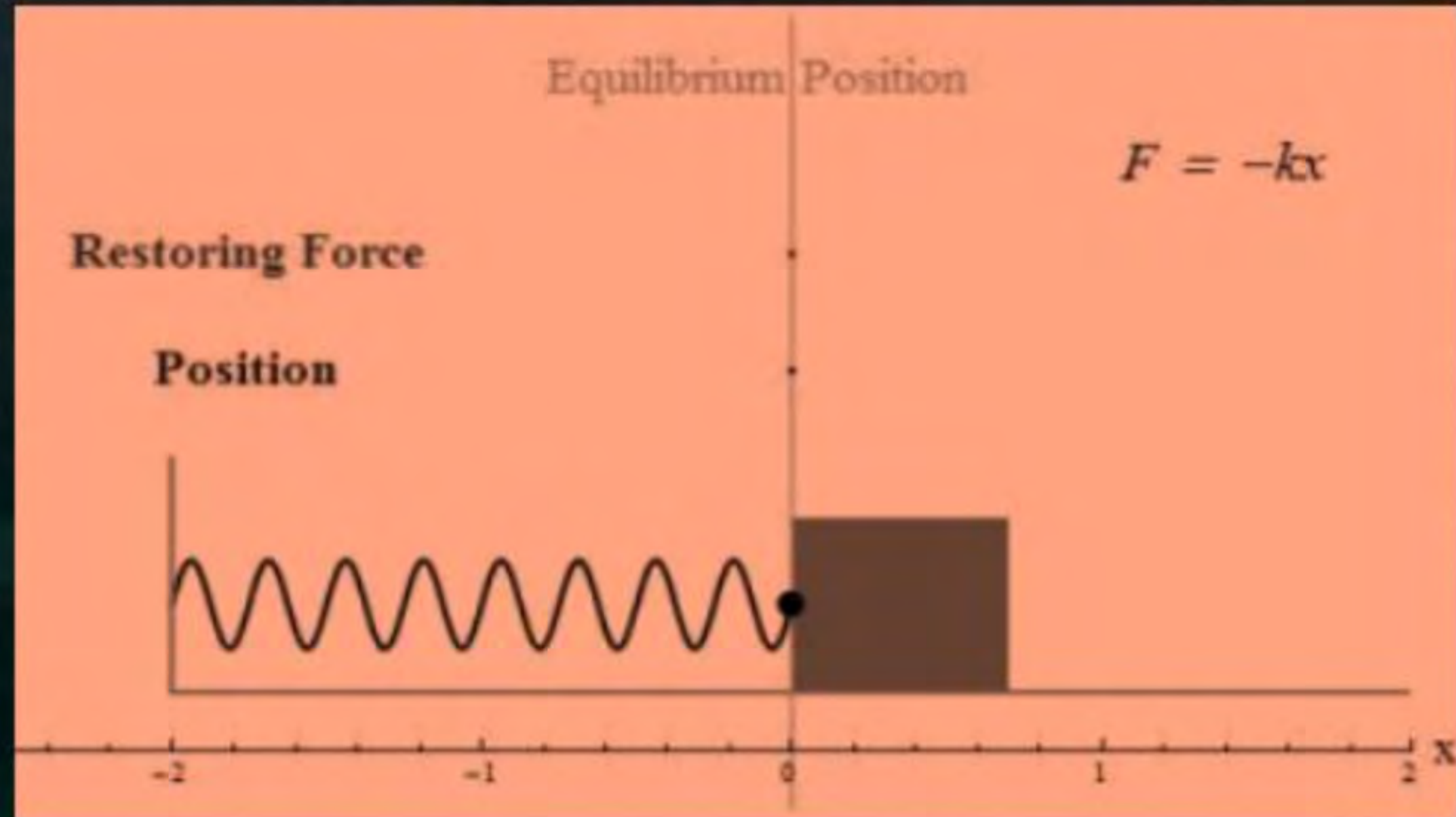


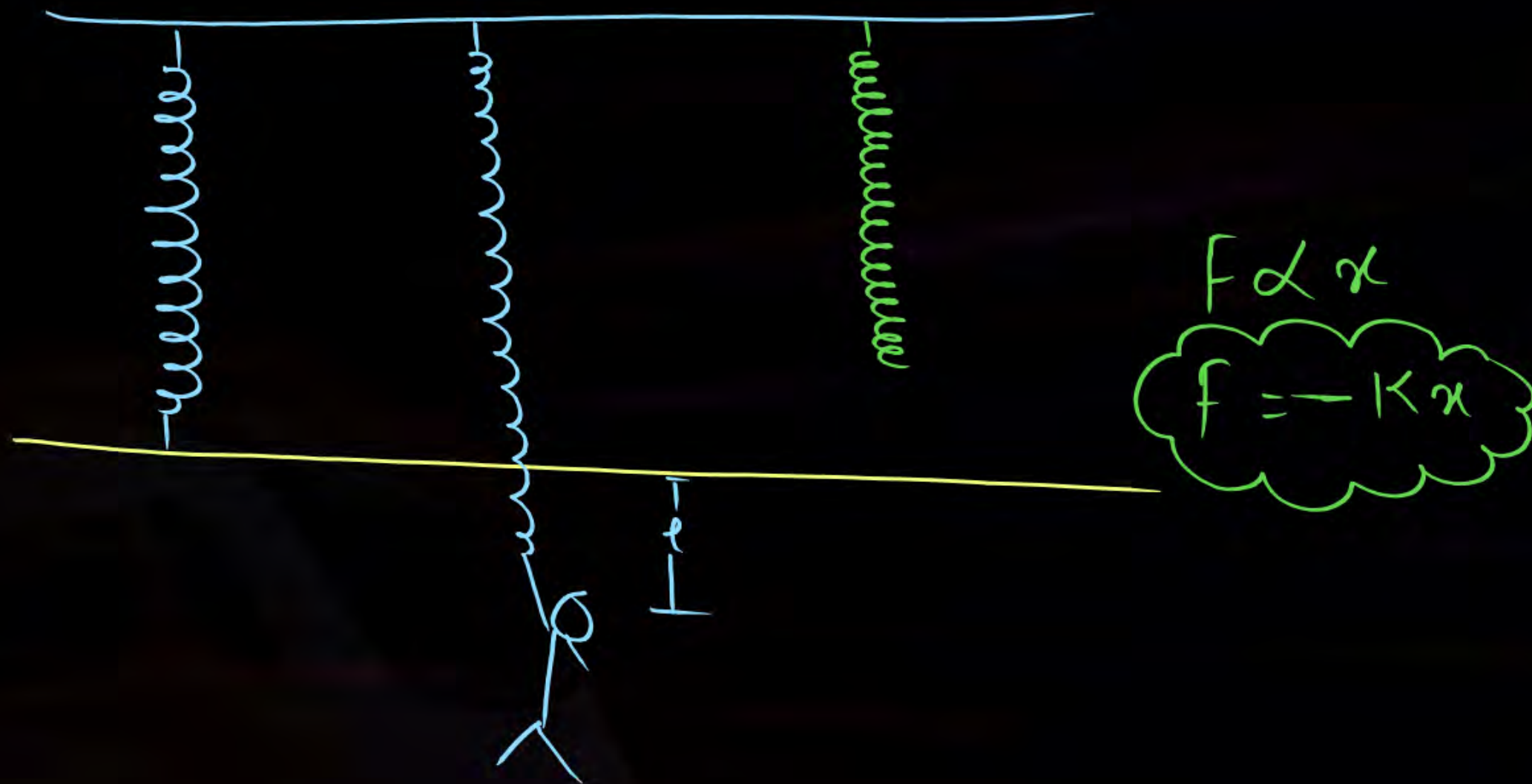
Force Exerted by a Spring





Force Exerted by a Spring







Non-Contact Forces



The forces experienced by bodies even without being physically touched, are called the non-contact forces or the forces at a distance.



Gravitational Force



In universe, each particle attracts the other particle due to its mass. This force of attraction between them is called the gravitational force.





Gravitational Force



$$F = G \frac{m_1 m_2}{r^2}$$

Weakest force

Sorry ...



Weakest force

(i) Gravitational

(ii) Electrostatic force

(iii) Frictional force

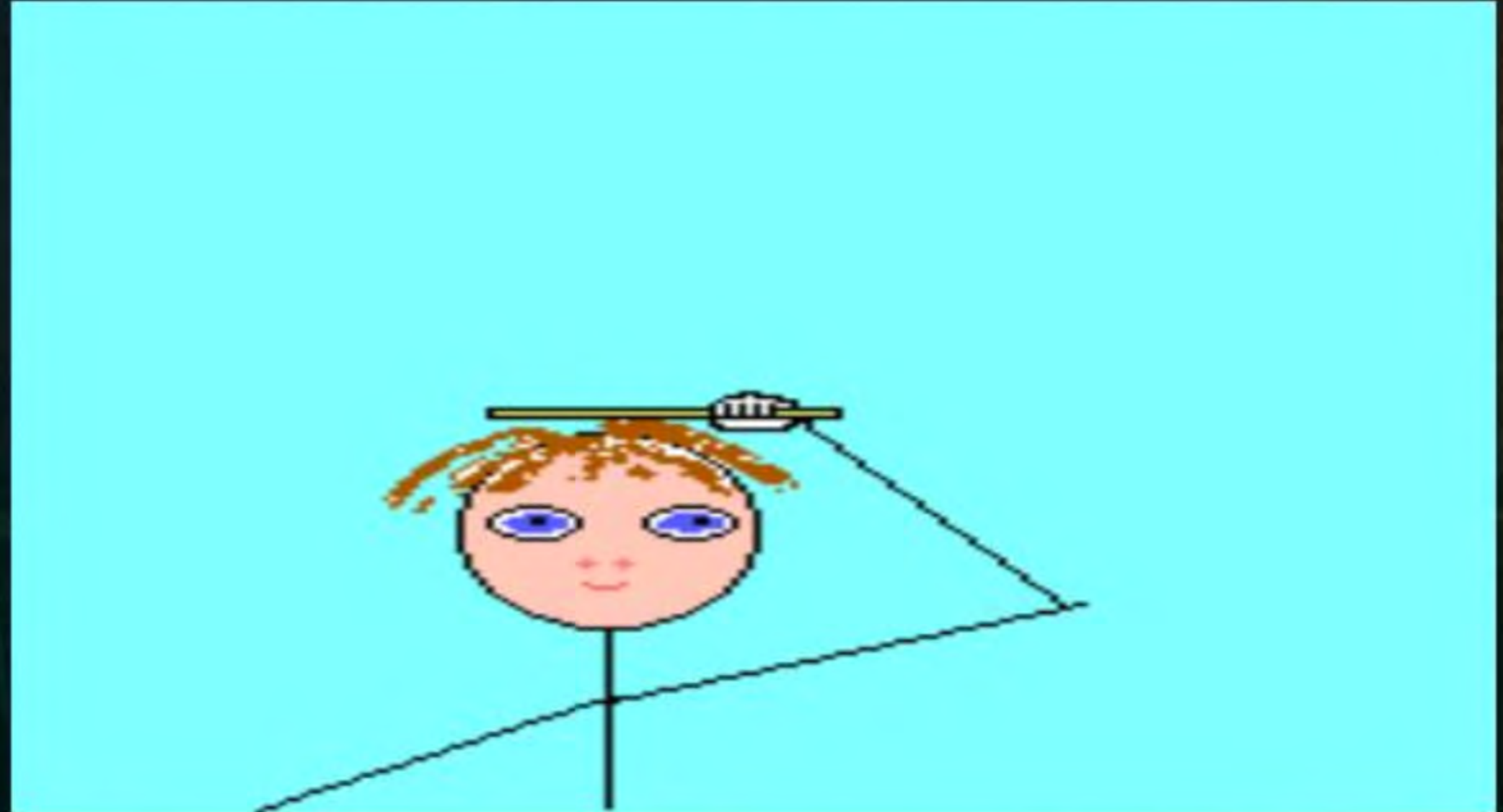


Gravitational Force





Electrostatic Force





Electrostatic Force





Electrostatic Force





Electrostatic Force



Two like charges repel, while two unlike charges attract each other. The force between the charges is called the electrostatic force. This force acts between the charged objects even when they are separated.

Electrostatic Attraction



Electrostatic Repulsion



Electrostatic Repulsion





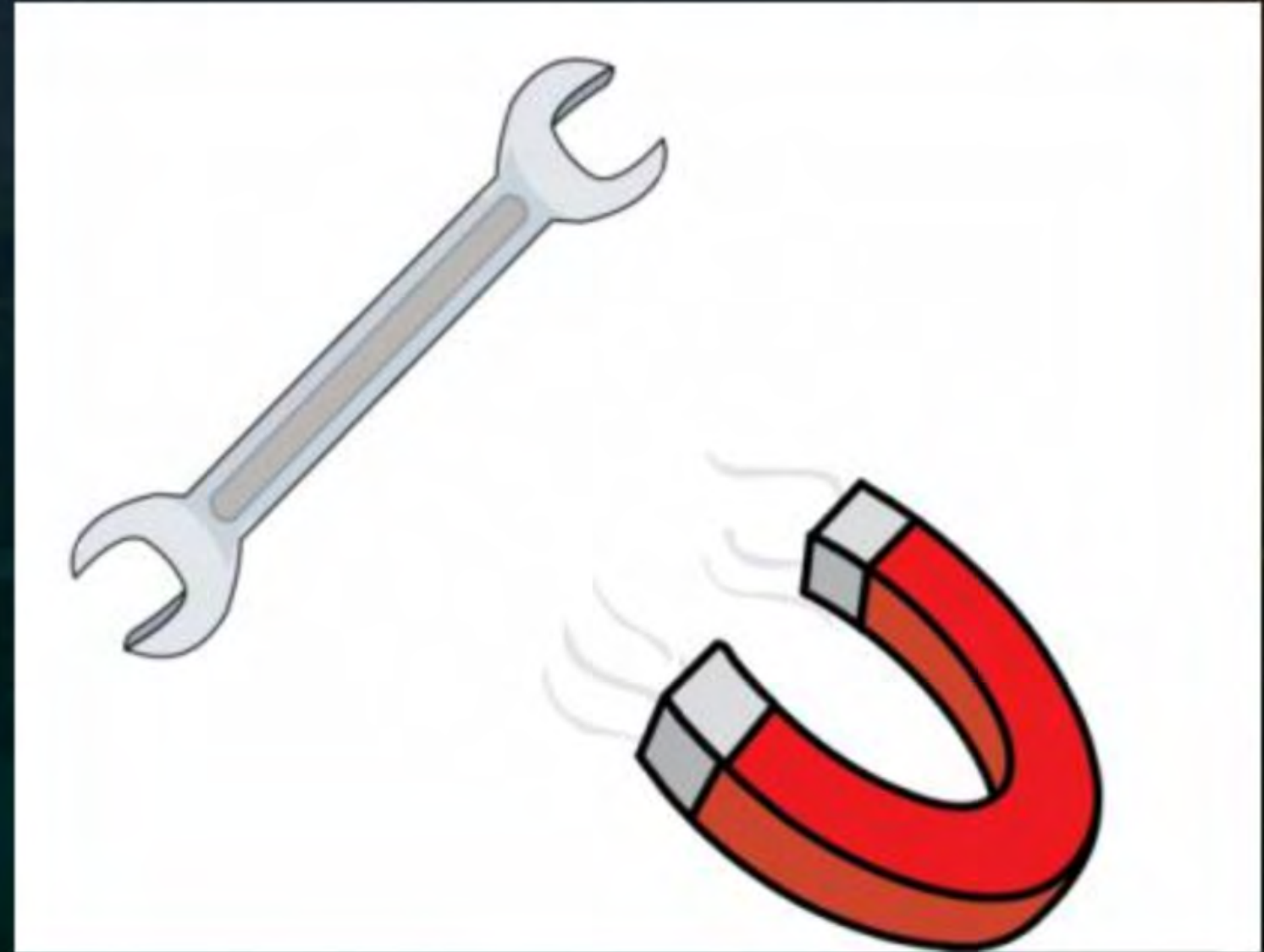
Magnetic Force



Two like magnetic poles repel, while two unlike magnetic poles attract each other. The force between the magnetic poles is called the magnetic force. This force acts even when the magnetic poles are at a separation.



Magnetic Force





Magnetic Force





General Character of Non-contact Forces

- (i) The gravitational force is always of attractive nature, while the electrostatic force and the magnetic force can be either attractive or repulsive.
- (ii) The magnitude of non-contact forces on the two bodies depends on the distance of separation between them. It decreases with the increase in separation and increases as the separation decreases. It varies inversely as the square of distance of separation *i.e.*, on doubling the separation, the force becomes one-fourth.

$$F \propto \frac{1}{r^2}$$

Question



Which of the following is a contact force:

- A** electrostatic force
- B** gravitational force
- C** frictional force
- D** magnetic force.

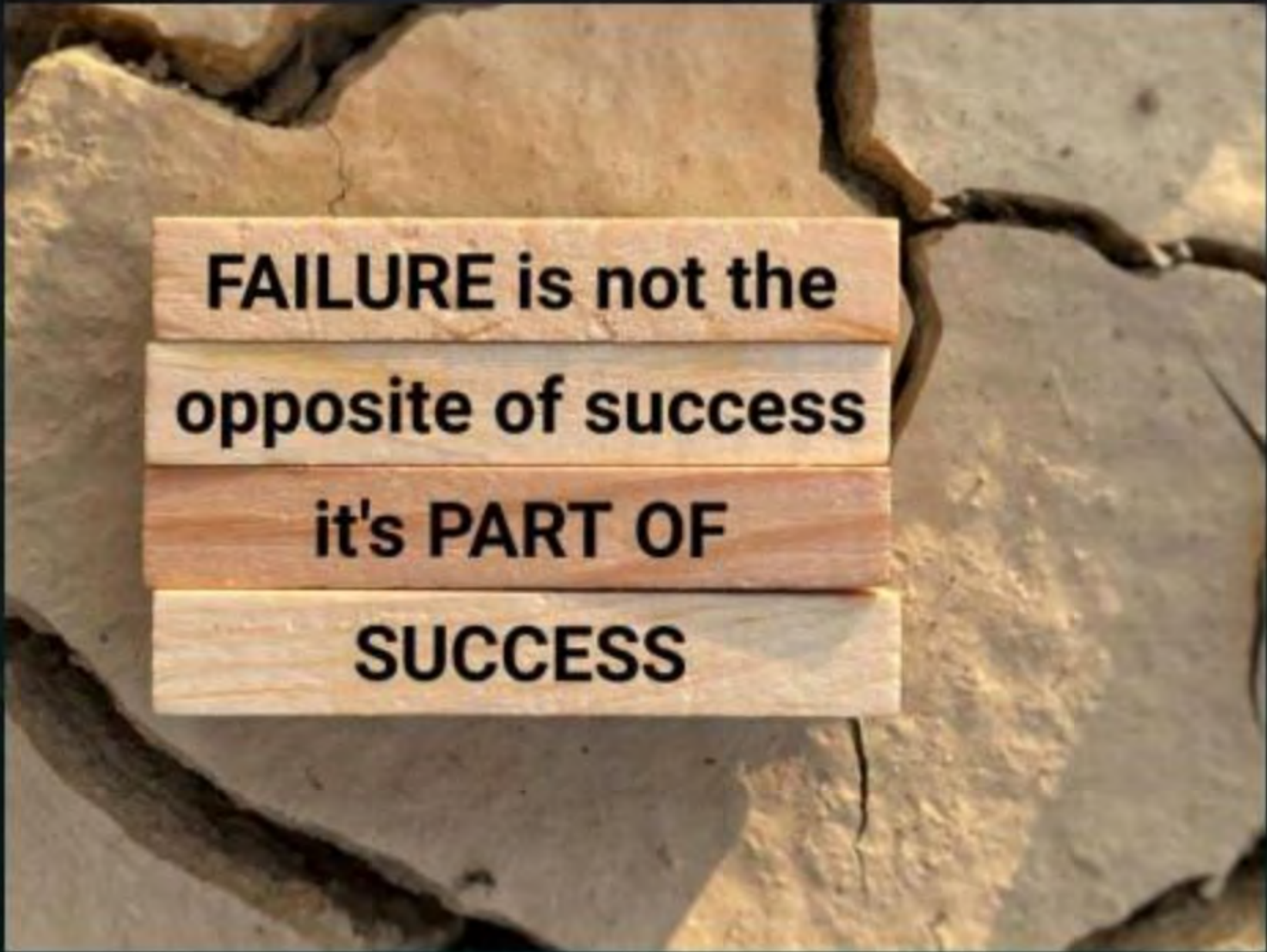


Question



The non-contact force is:

- A** force of reaction
- B** force due to gravity
- C** tension in string
- D** force of friction

The image features a central graphic with four horizontal wooden planks stacked vertically. Each plank contains a portion of a motivational quote in a bold, black, sans-serif font. The background of the graphic is a close-up of a light-colored, textured stone wall with several prominent, dark, irregular cracks running across it. The entire graphic is centered on a dark, textured blue background.

**FAILURE is not the
opposite of success
it's PART OF
SUCCESS**

 **Thank** *you* 