

Friction



Friction

Friction is the force that opposes the motion of objects when they come in contact.

It acts in the **opposite direction** of the applied force.

Friction is essential for activities like **walking, writing, and stopping vehicles**.

Force of Friction: Friction occurs when two surfaces interact.

It depends on the **roughness** of the surfaces and the **force pressing the surfaces** together.

Example: *Walking without slipping, writing on paper, a ball slowing down on the ground.*

Factors Affecting Friction

- ➔ **Surface Roughness:** Rougher surfaces produce more friction.
- ➔ **Force Applied:** Pressing objects harder increases friction.

Types of Friction

- ➔ **Static Friction:** The friction that prevents an object from starting to move.
- ➔ **Sliding Friction:** The friction when an object slides over a surface.
- ➔ **Rolling Friction:** The friction that occurs when an object rolls over a surface (less than sliding friction).
- ➔ **Fluid Friction (Drag):** The resistance experienced by objects moving through fluids (liquids or gases).

Friction is Necessary

- ➔ Enables walking without slipping.
- ➔ Helps in writing and drawing.
- ➔ Allows braking in vehicles.
- ➔ Helps in holding objects.

Friction is Unwanted

- ➔ Causes wear and tear in machines.
- ➔ Wastes energy by producing heat.
- ➔ Reduces the efficiency of machines.

Ways to Increase Friction

- ➔ Make surfaces rough (e.g., using sand on icy roads).
- ➔ Add treads and grooves to tires for better grip.
- ➔ Increase the force between surfaces.

Ways to Reduce Friction

- ➔ Apply lubricants (e.g., oil or grease).
- ➔ Use ball bearings to convert sliding friction into rolling friction.
- ➔ Polish surfaces to make them smooth.

Fluid Friction

Objects moving through air or water experience **fluid friction**. It increases with the **speed** and **surface area** of the object.

- ➔ **Streamlined body shapes** (like fish, birds, and airplanes) reduce fluid friction.