**BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI**

**CLASS 8**

**NOTES TERM –I**

## FRICTION

1. The force which always opposes the motion of one object over another object in contact with it, is called **friction.**
2. The force of friction always acts in a direction opposite to the direction in which an object moves (or tends to move).
3. **Cause of friction :** Friction is caused by the interlocking of irregularities in the surfaces of two objects which are in contact with each other. In order to move one object over the other, we have to apply force to overcome interlocking.
4. **Factors affecting friction:**
   The friction between two surfaces depends on two factors:
   - ***the nature of two surfaces (smoothness or roughness of the two surfaces)***
     More the roughness of a surface, larger is the number of irregularities on its surface & hence greater will be the friction.
   - ***the force with which two surfaces are pressed together.***
     Pressing together two surfaces of objects with a greater force will increase the interlocking in the two surfaces & hence increase the friction.

   **NOTE:** The force of friction **does not depend on the 'amount of surface area'** of two objects which is in contact with each other.

5. Friction is of three types:
   **(i) Static friction:** ***The maximum frictional force present between two objects when one object just tends to move or slip over the surface of the other object.***
   The object remains static in this case.

   **(ii) Sliding friction:** ***The frictional force present when one object slides over the surface of another object are known as sliding friction.***

   When the object starts sliding, the contact point on its surface, do not get enough time to lock into the contact points on the other object. So **sliding friction is always less than static friction.**
   **(iii) Rolling friction:** ***When an object rolls over the surface of another object, then the frictional force that comes into picture is called rolling friction.***
   **Rolling friction is less than sliding friction.**

   **NOTE: Static friction > Sliding friction > Rolling friction.**

6. Friction is a necessary evil because in some cases, friction is useful & we want to keep it but in other cases friction is harmful.
7. **Advantages of friction:**
   - It is the friction between the sole of our shoes & ground that enable us to walk without slipping.
   - It is the friction between brake pad & rim that prevents the wheel from moving ahead. Due to this, the running bicycle slows down & finally stops.
   - Friction enables us to write on paper.
     It is due to the friction between tip of the pencil & paper that rubs off black graphite particles from the tip of the pencil which stick to the paper & leave black marks on paper. In case of smooth surface friction is not sufficient to rub off that black graphite.
   - It is the friction between the surface of wall & nail which holds the nail Tightly in the wall.
   - Friction enables us to light a matchstick. When we rub the matchstick against a rough surface, then friction between the tip of matchstick & rough surface produces heat, as a result matchstick catches fire.

**Disadvantages of friction:**

- Friction wears away the soles of our shoes.
- Due to friction between the surface of tyres & the surface of road, the tyres wear out gradually.
- Friction wears out the brake pads of vehicles gradually. As a result brake pads of cycles have to be replaced quite often.
- Friction wears out steps of staircases in foot over- bridges.
- Friction produces unwanted heat which can damage & reduce the efficiency of machines.

8. **Methods of increasing friction:**
   - Grooves are made in the soles of shoes, treads are made in the tyers of vehicles, spikes are made in the shoes of players to increase friction so as to provide a better grip on the ground.
   - Gymnasts apply some coarse substance on their hands to increase friction for better grip.

**Methods of reducing friction:**

Friction can be reduced:

- By making the surface smooth by polishing.
- By applying lubricants (like oil or grease).
  Applying oil or grease helps in avoiding interlocking between the two rubbing surfaces to a large extent. As a result friction is reduced.
- By using wheels to move objects.
- By using ball bearings between the moving parts of machines.

**NOTE:**

(i) In some machines, it may not be advisable to use oil as lubricant. In such machines, an air cushion between the moving parts is used to reduce friction.

**(ii) Friction can never be entirely eliminated.**

9. **Fluid friction**
   - Friction exerted by fluids ie gases or liquid is termed as fluid friction or drag.
   - The magnitude of drag (fluid friction) depends on
     - Speed of the object
     - Shape of the object
     - Size of the object
     - Nature of fluid.
   - When object moves through the fluids, they have to overcome friction acting on them. In this process they lose energy. Therefore efforts are being made to minimize energy by giving special shape to the objects called **'streamlined shape'**. That's why cars, airplanes & rockets streamlined.