Revision Notes for Class 8 Science

Chapter 9 – Friction

Friction: The force that opposes the relative motion between two surfaces of objects when they come in contact. Frictional force always acts in a direction opposite to the direction of applied force.

What are the causes of Friction?

Frictional force comes into play between two surfaces due to irregularities on the surfaces of the objects coming in contact, causing interlocking of micro-level irregularities between the two surfaces and ploughing of harder surfaces into smoother surfaces.

Force of Friction

- **Opposes Motion**: Friction is a force that opposes the motion of one surface moving over another.
- **Depends on Surface**: The roughness or smoothness of surfaces affects the amount of friction between them.
- **Acts in Opposite Direction**: Friction always acts in the opposite direction of the movement, slowing objects down.
- **Generates Heat**: When two surfaces rub against each other, friction can produce heat.
- **Varies with Weight**: The heavier an object, the more friction it experiences due to the increased contact force between surfaces.

Factors Affecting Friction:

a. The roughness of the surface is present.

b. The extent by which the two surfaces can be pressed together.

c. Nature of the surfaces coming in contact.

Friction is a necessary evil. why?

Friction has advantages so considered a friend but due also has some disadvantages, then it is a foe. Depending on the circumstance, friction could be of help or could be a problem. Therefore, it is a necessary evil.

How can we Increase Friction?

a. We can increase friction by pressing the surfaces together very strongly. For example, when we apply brakes while riding a bicycle or car, the brake pads are pressed against a moving part of the wheel which leads to increased friction force.

b. Friction can also be increased by increasing the roughness of the surfaces which are coming in contact. For example, the threading of shoes and tires is done to increase friction which causes its movement on the road without slipping.

How can we reduce friction?

a. Frictional force acting between the sliding surfaces of two objects can be reduced by making the surfaces in contact smooth by polishing them.

b. Sliding friction between the moving parts of vehicles and machinery can be reduced by applying oil, grease, graphite or any other lubricant.

The rolling frictional force is usually smaller than the sliding frictional force. Hence, sliding friction is generally replaced by rolling friction by using rollers, like ball bearings are used between the hub and the axles in the moving parts of machines and vehicles.

c. Friction can be reduced by providing wheels, hence used in suitcases, and school bags of kids.

Wheels Reduce Friction:

a. Static Friction: When a body is at rest, the force of friction acting on it is known as static friction. This force is always equal and opposite to the applied force on the object. The force which is acting, when the body is just at the point of sliding on the surface is known as limiting friction.

b. Sliding friction: The frictional force which opposes the sliding motion between two surfaces which are in contact. Sliding friction is generally smaller than static friction.

c. Rolling Friction: The frictional force which is present between the two surfaces when one body rolls over the other body. The rolling frictional force is usually smaller than the sliding frictional force.

Fluid Friction

- Air, water, and other fluids exert frictional force (drag) on objects moving through them.
- The frictional force depends on the object's speed, shape, and the nature of the fluid.
- Objects moving through fluids lose energy due to friction, so efforts are made to reduce this friction.
- Special shapes, inspired by nature (birds and fish), are designed to minimize energy loss due to drag.

- Vehicles, including aeroplanes, are designed with shapes that reduce fluid friction for better efficiency.
- The body of aeroplanes, boats, fishes and birds are able to move through fluids because of their streamlined shape, in order to reduce the friction due to fluid and avoid any energy loss.

Effects of Friction:

a. Friction generates heat.

b. Friction is responsible for causing wear and tear in tyres.

c. Frictional force always opposes motion.

Advantages of Friction:

a. It is due to friction between pen and paper which allows us to write on paper.

b. Frictional force between our feet and the ground allows our movements like standing, walking and running.

c. Frictional force between the surface of the road and the tyres of our vehicles allows the vehicles to move on the road without slipping.

Disadvantages of Friction:

a. Due to friction, moving objects tend to stop or slow down as their motion is opposed.

b. Due to friction heat is generated leading to wastage of energy in machines.

c. Friction is responsible for the wear and tear of moving parts of machinery, soles of shoes, and tyres on the road after some time.