

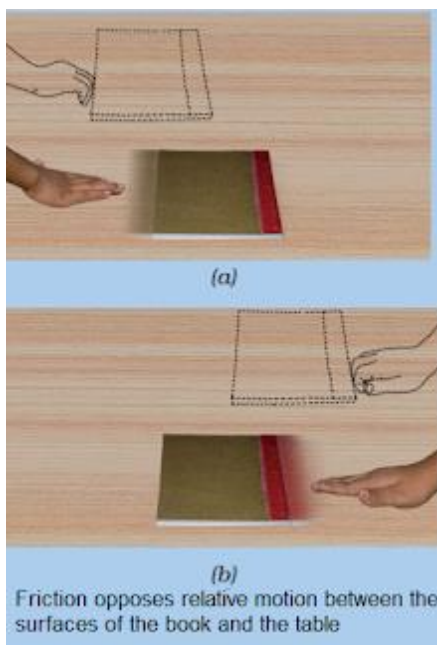
LESSON 12

FRICTION

Introduction

→ The vehicles, any object, moving over the surface of another object slows down due to the force of friction applied on it.

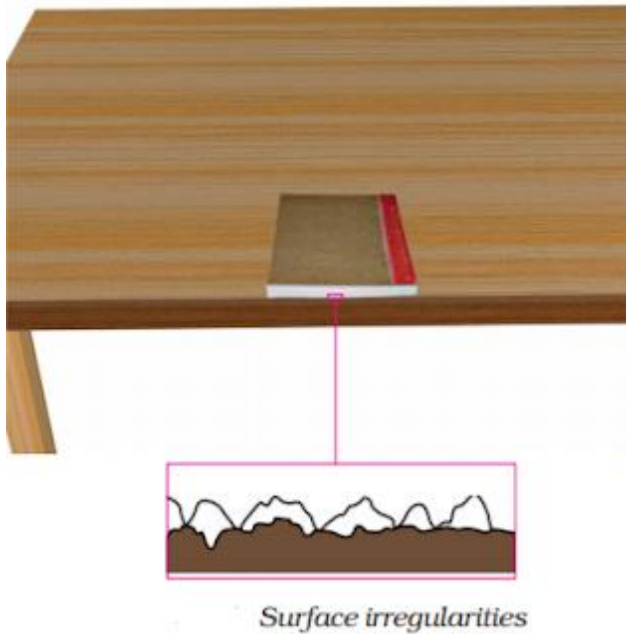
Friction



→ It is an opposing force that acts between surfaces in contact moving with respect to each other.

→ It always opposes relative motion between two surfaces.

Cause of friction



→ Friction is caused by the irregularities on the two surfaces in contact.

→ We are able to walk because of the force of friction.

Nature of surfaces for Friction

Smooth surfaces: less friction

Rough surfaces: greater friction

Friction when object is pressed hard

Greater pressing force means Greater friction.

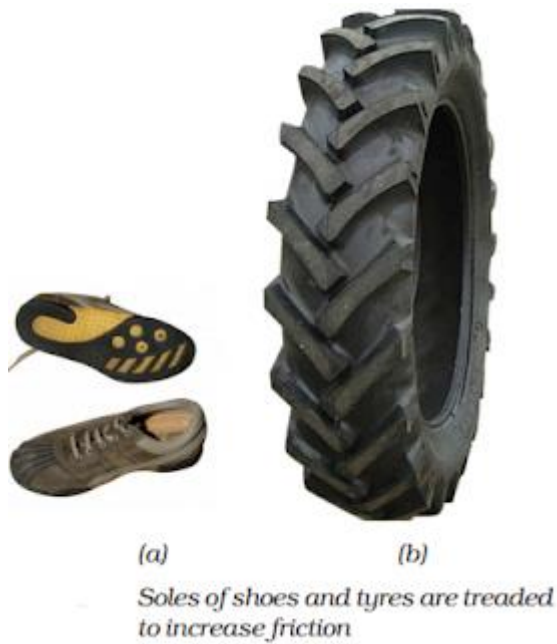
Friction according to mass of object

Greater mass: Greater friction

Sliding friction < Static friction

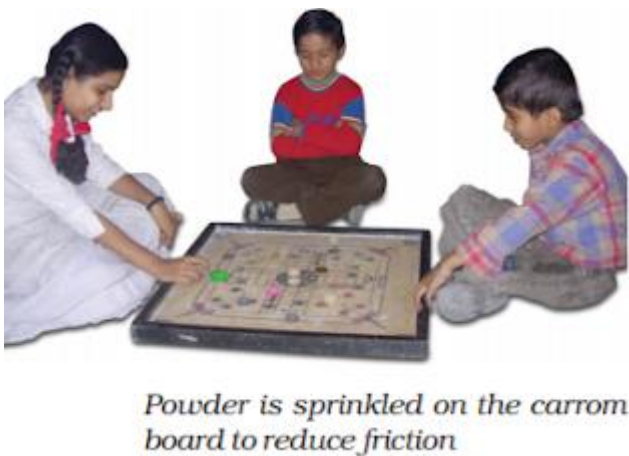
Rolling friction < Sliding friction

Examples where friction is useful



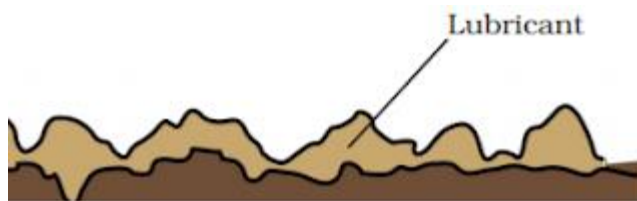
- (i) Walking
- (ii) Handling any object
- (iii) Rolling motion of ball or wheel

Examples where friction is harmful



- (i) Energy dissipation of engine due to friction between surfaces in motion.
- (ii) More energy is lost in pulling or pushing an object in rough surfaces.

(iii) Wear and tear of shoe soles and tyres.



Action of lubricant

(iv) Lubrication: Powder on carom board, oil in machine

(v) Wheel: Wheels reduce friction (because rolling friction < sliding friction).

(vi) Shoe soles and tires are treaded to increase friction for a better grip.

(vii) Fluid friction is minimised by giving suitable shapes to vehicles moving through fluids.

Rolling Friction



Rolling reduces friction

→ When a body rolls over the surface of another body, the resistance to its motion is called rolling friction.

Sliding Friction

→ When a body slides over the surface of another body, the

resistance to its motion is called sliding friction.

- Rolling friction < Sliding friction

→ Ball bearings change sliding friction into rolling friction.

Fluid Friction

→ Fluid friction is minimised by giving suitable shapes to vehicles moving through fluids.

- Fluid friction is also called drag.

→ Friction force depends upon the speed of the object with respect to the fluid.

→ Friction force depends upon the shape of the and nature of the fluid.