CLASS VIII: PHYSICS
Ch-7 FRICTION (notes)

Friction: is the force that resist motion when the surface of one body moves or tends to move on the surface of another body.

E.g. When you stop pedalling, the cycle stops due to friction.

Note: 1. Friction causes heating of the surfaces in contact.

2. Friction is caused due all the surfaces that have irregularities and which get interlocked.

CHARECTERISTICS OF FRICTION:

(Ans to the Q.no. 7:1 (2nd part of question) of textbook exercises)

1. Friction acts when bodies are in Contact.
2. Friction always opposes the motion of the bodies in contact.
3. It increases when surfaces are pressed harder.
4. It causes Wear and tear of the surfaces of contact of the bodies.

FACTORS AFFECTING FRICTION:

(Ans to the Q.no. 6:2 of textbook exercises)

The magnitude of friction depends on:

i. Nature of the surface in contact (shape, smoothness)
   a. Rough surface--> more friction --> more irregularities --> strong interlocking
   b. Smooth surface --> less friction --> less irregularities --> weak interlocking

E.g. 1. It is more comfortable to walk on a marble floor than on a rough surface like road.

2. Pushing an object on cemented floor is easier than on grass because cemented floor offers less friction.

ii. Weight of the body.

   a. Heavier objects offer more friction because surfaces are pressed harder leads to strong interlocking of surfaces in contact.

   *Surfaces are pressed harder -> strong interlocking-> more friction

   b. lighter objects offer less friction because surfaces are pressed lighter leads to weak interlocking of surfaces in contact.

   *Surfaces are pressed lightly -> weak interlocking-> less friction

E.g. More force is required to push a heavy box kept on the floor as the two surfaces are pressed harder to overcome more friction.

H.W: Complete intext Q&A's from Pg. No 100 of textbook exercises

TYPES OF FRICTION:

i) **Static friction:** is the amount of force applied, when an object starts moving from its state of rest. There is due to strong interlocking of irregularities.

E.g. When you push heavy box on the floor, the force that you apply to start and moving on the floor determines the static friction**. (Ans to the Q.no. 7: 2(a) of textbook exercises, pg. no 106)**

Note: The maximum force of friction when the object is just beginning to move is called limiting friction.

ii) **Sliding friction:** It is the friction that exists between the two surfaces in contact when one object is sliding over another object.

When one object starts sliding, irregularities on its surface, do not get enough time to interlock with the contact points of other surface. So, sliding friction is less than static friction.

NOTE: It is easier to move an object, when an object is already in motion.
(Ans to the Q.no. 7:2(b) of textbook exercises, pg. no 106)

iii) **Rolling friction:** It is the friction that exists between the two surfaces in contact, when one object is rolling over another object.
E.g. small wheels of suitcase offer rolling the friction
NOTE: *Rolling friction is much less than sliding friction because interlocking is very weak due to fewer contact points.
*Ball bearings convert sliding friction into rolling friction.

FLUID FRICTION/ DRAG:

- The force of friction excreted by fluids (liquids and gases) is called Fluid friction or drag.
- It opposes the motion of an object moving through fluids.
- It depends on the shape, size, speed and on the density of the fluid.
  (Ans to the Q.no. 6:1 of textbook exercises, pg. no 106)
- Fluid friction can be minimised by having streamlined shape objects (narrow in front and back, broad in middle)
  E.g. 1. Fish, birds, cars, boats, aeroplanes etc have streamlined bodies.
  2. Air cushion in hovercraft reduces friction.

H. W: Complete exercises Q.no 5 in TB pg. no 105)

FACTORS AFFECTING THE FRICTION:

FRICTION IS A NECESSARY EVIL:

Friction acts all the time around us. Sometimes, it is useful while sometimes it is harmful.

ADVANTAGES OF FRICTION:**(Ans to the Q.no. 7:4 of textbook exercises, pg. no 106)**

Friction helps us

a) to stand, walk, and run
b) to hold things in our hand
c) to write
d) to slow down or stop moving objects
e) to light up a match stick, and many more in our daily activities.

DISADVANTAGES OF FRICTION :(Ans to the Q.no. 6: 6 of textbook exercises, pg. no 106)

a) It causes wear and tear of sole of shoes and tyres of vehicles.
b) It produces heat and causes loss of energy that reduces the efficiency of machines.
   (Ans to the Q.no. 6:5 of textbook exercises, pg. no 106)
c) It slows down motion even when it is not desired.

H.W: Complete intext questions 1-3 from Pg. No 103

METHODS TO REDUCE FRICTION: (Ans to the Q.no. 7:3 of textbook exercises, pg. no 106)

i. Polishing or smoothening the surface.
ii. Lubricating the surface- Lubricants like oil, grease or graphite powder etc, form a thin layer between the two rubbing surfaces, making the irregularities smooth and interlocking weak. Thus, lubricants reduce friction.
*Lubricants also reduce wear and tear as less heat is produced between the moving parts of a machine
iii. Using wheels and ball bearing- to convert sliding friction into rolling friction.
iv. Using air cushion-between two rubbing surfaces ex: hovercraft.
v. Streamlined shape- of an object like ship or aeroplane.
vi. Using anti-friction alloys.

METHODS TO INCREASE FRICTION:

i. Treading of tyres:
   a. Grooves on the sole of shoes, treads on the tyres of vehicles give a better grip on ground.
   b. Synthetic rubber is used for tyres has large coefficient of friction with the road. **(Ans to the Q.no. 6:3 of textbook exercises, pg. no 106)**
   c. Spike shoes help to run faster to increase friction so that they do not slip. **(Ans to the Q.no. 6:4 of textbook exercises, pg. no 106)**
   d. In the brakes system of bicycles, rubber pads are used.
   e. Hard brushes are used for cleaning.

ii. Sanding:
   a. Kabaddi players rub their hands with soil to get a better grip.
   b. Sand and gravel are thrown on wet/ slippery roads.
   c. Sides of match box are made rough.

H.W: Complete intext questions 4,5 from pg.no 103 and and Exercises Q. no 4 pg. no 105 in TB

HOTS:

1.Q) Discuss the consequences in total absence of friction.

Ans: In total absence of friction:

life will not be same as we now. We will not able to walk or write or do all those activities that we enjoy. So friction is absolutely important in our lives.

2.Q) Why does a drop or two of oil stop doors from squeaking?

- The drops of oil reduce friction between the hinges of doors.
- Continuous movement of hinges on each other, they get a bit worn out and start squeaking.
- Drops of oil ensure an easy relative motion between these solid surfaces. Thus, squeaking stops by oiling.

H.W: Complete Q. no 1,2 OF Exercises pg. No 104 in TB