PARAGON CONVENT SCHOOL

SECTOR : 24 B, CHANDIGARH

LESSON - 12

FRICTION

Summary:

- Friction is an important contact force.
- Frictional force exists between two surfaces in contact and it always acts in the direction opposite to motion.
- Friction is generated when the surfaces of two objects lock with each other.
- Static friction is the force that does not allow an object at rest to move.
- Sliding friction is the force that brings a moving object to rest.
- Rolling friction is the friction between a spherical object and the surface on which it rolls.
- A smooth surface will generate less friction whereas a rough surface will generate more friction.
- Friction depends on mass and surface area of an object.
- Friction always generates heat. This principle is used to make matchboxes and lighters.
- Friction in fluids is called drag.
- Streamlined shape of an object minimizes the drag when it moves through fluids.

Multiple Choice Questions (Page No. 174)

1. (d) 2. (c) 3. (d) 4. (a) 5. (d)

SECTION A

Oral questions

Q1.- What is friction?

Ans.- The force acting along the two surfaces in contact which opposes the motion of one object over the other is called friction.

Q2.- What is the cause of friction?

Ans.- When an object is pulled over another, tiny hills and valleys present on both the surfaces in contact get entangled with one another. This interlocking of the two surfaces opposes the motion of one object over another and gives rise to friction.

Q3.- What is rolling friction?

Ans.- The opposing force that comes into play when one object is rolling over the surface of another object is called rolling friction. Eg. Rolling of a wheel or a log of wood.

Science Quiz

Q1.- Name the maximum force that comes into play when the object just starts sliding over another object.

Ans.- Limiting friction

Q2.- Why do athlete wear spiked shoes?

Ans.- Athletes wear spiked shoes to increase friction because spiked shoes have better grip on the ground and prevent slipping.

Q3.- Why is it difficult to walk on wet marble floor?

Ans.- It is difficult to walk on wet marble floor because friction on the surface of wet marble is very less as compared to friction on dry marble.

Tick (√) the correct options

1. (a) 2. (c) 3. (c) 4. (d)

Circle the odd ones. Give reasons for your choice

1. Lubricants Polishing Streamlining Making groves

Ans.- Making grooves → This is to increase friction, whereas others are used to decrease friction.

2. Static friction Limiting friction Rolling friction Kinetic friction

Ans.- Rolling friction → It is a type of kinetic friction, whereas others are types of friction.

3. Bird Fish Speed boat Insect

Ans.- Insect → It doesn't have a streamlined body, whereas others have streamlined body.

Fill in the blanks

1. less 2. increase 3. friction 4. streamlined

SECTION B

Multiple Choice Questions

1. (c) 2. (b) 3. (a)

Very Short Answer Questions

Q1.- Name the two factors affecting friction.

Ans.- (i) Nature of surfaces in contact with each other

(ii) Weight of the object

Q2.- Give one example of sliding friction.

Ans.- When a wooden block is moved over the surface of a table, it slides. The opposing force acting here is sliding friction.

Q3.- Give one example of rolling friction.

Ans.- When a wheel or circular disc rolls on a flat surface, the opposing force

acting here is rolling friction.

Short Answer Type- I Questions

Q1.- What is meant by streamlined shape?

Ans.- The special shape of a body or an object around which a fluid (liquid or air) can flow, offering minimum amount of friction is called streamlined shape.

Q2.- What are lubricants? Give one example.

Ans.- The substances which reduce friction are called lubricants. For example, oil, grease

Short Answer Type-II Questions

Q1.- What are the different ways of increasing friction?

Ans.- The different ways of increasing friction are-

(i) By making the surfaces rough : Friction can be increased by increasing the roughness of the surfaces in contact. For example, the surface of the head of a matchstick and the sides of a matchbox are deliberately made rough to increase the friction to produce more heat because of which the matchstick lights up easily.

(ii) By making grooves : We can increase the friction in case of tyres of bicycles, cars, buses, etc., by making grooves in them. Due to greater friction, the tyres get a better grip on the road which prevents skidding of the vehicles.

Q2.- Explain why rolling friction is less than sliding friction.

Ans.- Rolling friction is less than sliding friction because the area of contact of the surfaces is reduced when we use round objects (e.g., wheels, ball bearings, roller bearings, etc.). In case of sliding friction, the area of contact is greater and offers more friction. So, whenever possible, sliding friction is replaced by rolling friction.

Q3.- Nitika is getting late and so she drives her car in high speed. Suddenly, she sees a small child crossing the road. She immediately applies the brakes and saves the child.

A) What happens when we apply brakes?

B) What can we learn from Nitika?

Ans.- (a) When we apply brakes, the car stops due to the force of friction between the brakes' lining and the drum of the wheel.

(b) We should try to be punctual by proper time management and be cautious. We should always care for others. A person's life is valuable than anything else in this world and we should always try to save one's life.

Long Answer Questions

Q1.- Give reasons for the following:

A) The bodies of the birds are streamlined.

B) When we strike a matchstick against the rough surface, it catches fire.

C) Grooves are made in tyres.

D) A lubricant reduces friction.

Ans.- (a) The bodies of birds are streamlined such that they experience least amount of friction due to air.

(b) When we strike a matchstick against a rough surface, it catches fire because the force of friction raises the temperature of the matchstick head to such an extent that the chemicals stored in it catches fire to produce flame.

(c) Grooves are made in tyres to increase friction due to which the tyres get a better grip on the road. This prevents skidding of the vehicles.

(d) A lubricant reduces friction by forming a thin layer between the moving surfaces so that they do not directly rub each other.

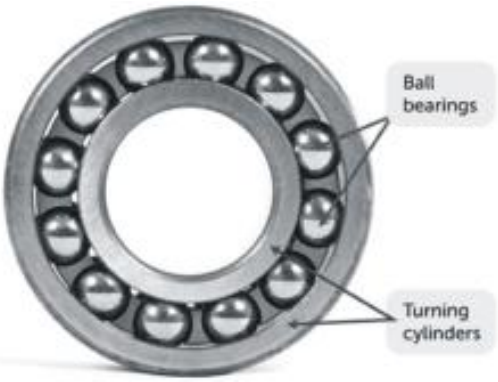
Q2.- a) What is ball bearing? How does a ball bearing reduce friction?

b) Draw a labelled diagram of ball bearing used to reduced friction.

Ans.- (a) Ball bearing is a hollow, circular device containing small metal balls which are fitted around the moving part of a machine (like an axle). The ball bearing reduces the friction by converting sliding friction into rolling friction. For

example, when the axle of a machine fitted with ball bearing rotates, then the metal balls also roll and hence, the friction is reduced.

b) Ball bearings to reduce friction



Q3.- What is the relationship among - (a) magnitude of friction and weight of the object

(b) friction and nature of surfaces in contact with each other.

(c) friction and area of the surface in contact with each other.

Ans.- (a) The magnitude of friction increases with the increase in weight of an object.

(b) Smooth surfaces offer less friction and rough surfaces offer more friction.

(c) Friction increases with the increase in area of surfaces in contact with each other.