

TEXTBOOK EXERCISES (SOLVED)

(A) Fill in the Blanks

1. is an opposing force which comes into play when one surface moves over another surface.

2. Friction on the bodies moving through fluids is called
3. Rubbing both hands produces due to friction.

Ans. 1. Frictional force, 2. fluid friction, 3. heat.

(B) Write True (T) or False (F)

1. Use of rollers in trolley bags makes it difficult to pull the trolley.

2. Oiling and greasing minimize the friction.

3. We throw sand on a slippery path to increase friction.

Ans. 1. (F), 2. (T), 3. (T).

(C) Match Column 'A' with Column 'B'

| Column 'A' | Column 'B' |
|---|--------------------------|
| 1. Ships, boats and airplanes are made in this shape | (a) Ball Bearings |
| 2. The sole of shoes of the athletes have special features called | (b) Atmospheric friction |
| 3. The opposing force due to fluid friction | (c) Grooves |
| 4. This phenomenon saves us from meteors or shooting stars. | (d) Streamlined |
| 5. Machinery parts having least friction due to | (e) Drag |

Ans.

| Column 'A' | Column 'B' |
|---|--------------------------|
| 1. Ships, boats and airplanes are made in this shape | (d) Streamlined |
| 2. The sole of shoes of the athletes have special features called | (c) Grooves |
| 3. The opposing force due to fluid friction | (e) Drag |
| 4. This phenomenon saves us from meteors or shooting stars. | (b) Atmospheric friction |
| 5. Machinery parts having least friction due to | (a) Ball Bearings |

(D) Choose the Correct Answer

1. Which type of friction is greatest ?

(a) Sliding friction

(b) Rolling friction

(c) Static friction

(d) None of these.

Ans. (c) Static friction.

2. We use these measures to minimize friction :

(a) Make surfaces smooth

(b) Use ball bearings

(c) Apply oil or grease

(d) All of these.

Ans. (d) All of these.

3. We adopt following measures to increase friction :

(a) Use rollers

(b) Treads on tyres

(c) Use oil or grease

(d) Make surfaces smooth.

Ans. (b) Treads on tyres.

4. Which of the following is an example of sliding friction ?

- (a) Dragging a sand bag on floor
- (b) Use of rollers in a trolley
- (c) Use of ball bearings
- (d) Labourers use rollers to pull logs of wood.

Ans. (a) Dragging a sand bag on floor.

5. This shape help aquatic animals to swim in water :

- (a) Flat body
- (b) Streamlined body
- (c) Broad body
- (d) Rough body.

Ans. (b) Streamlined body.

(E) Very Short Answer Type Questions

Q. 1. How did early man learnt to make fire ?

Ans. Early man learned to make fire by rubbing two stones together. The reason for fire is the friction, which arose from the roughness of the grooves or roughness between the two stones.

Q. 2. What is drag ?

Ans. Drag : It is a type of mechanical force, which comes into play, in the direction opposite to the relative motion between solid object and fluid (liquid or gas). This drag force acts in the opposite direction to the continuous flow. This force also acts between the interfaces of two liquids.

Q. 3. Why do we use roller trolley to pull luggage ?

Ans. A roller trolley is easier to pull because rolling friction is less than the sliding friction. Therefore we use roller trolley to pull luggage.

Q. 4. Write two methods to increase friction.

Ans. Methods to increase the friction :

(i) By increasing the roughness of the surfaces in contact.

(ii) By making grooves and treads on the surfaces.

Q. 5. Write any two situations where friction is experienced ?

Ans. 1. When we hit the ball, it rolls and stops after covering some distance. We know that to stop the motion of an object, force has to be applied in the direction opposite to the direction of motion. Therefore, we can say that the stopping of the ball is caused by the frictional force acting between the ball and the floor.

2. Push a book placed on a table. You will see that the book will stop after covering a short distance. We know that only some force can stop the motion of an object. Therefore, there must be some force to stop the motion of the book. This force is acting between the two surfaces opposite to the direction of the motion of the book, which is opposing the motion of the book. This is the frictional force between the two.

(F) Short Answer Type Questions

Q. 1. Write two methods to increase friction.

Ans. Methods of increasing frictional force :

1. Roughness increases the irregularities of the surfaces in contact. By doing this, the contact between the two surfaces increases to a considerable extent, as a result of which the frictional force increases. Because the irregularities get stuck in each other, therefore greater force is needed to apply for the motion of the object i.e. the opposing force (friction force) increases.

2. Grooves and treads on the surfaces of objects increase the frictional force.

3. Some material which has rough surface is applied to the contact surface to increase the roughness. While playing *kabaddi*, the players apply dust to their hands to increase the force of friction, so that the opposing player does not slip from the hands.

Q. 2. How does atmosphere save us from shooting stars ?

Ans. When a shooting star moving at high speed enters the atmosphere, lot of heat is

generated due to fluid friction which causes the shooting stars to burn to ashes before it reaches the earth. In this way the atmosphere saves us from shooting stars.

Q. 3. Write any three situations where friction is harmful for us.

Ans. 1. We do not get 100% efficiency or work capacity due to friction as some energy is lost in overcoming the force of friction.

2. Earthquake also occurs due to friction which causes loss of life and property.

3. The parts of the machines wear out by rubbing against each other, i.e. friction is the cause of breakage.

4. Heat generated by friction destroys machines.

Q. 4. Why do the ships, boats and airplanes are made streamlined?

Ans. When moving through a fluid medium (liquid or gas), objects/organisms have to expend their energy against fluid friction. If fluid friction is reduced, the speed of the object increases. Therefore objects like ships, boats and airplanes, which have to move through a fluid are given a special shape, which is called streamlined shape.

Q. 5. Why do we rub our hands in winter?

Ans. When we rub our hands together for few minutes in winter, our hands become warm. The reason for this warmth is the frictional force generated due to the relative motion of hands against each other.

(G) Long Answer Type Questions

Q. 1. Friction is a necessary evil. Explain with examples.

Ans. Friction is a necessary evil because it is both an enemy and a friend. It is helpful :

(i) In walking.

(ii) In running motors and machinery.

(iii) During application of brakes.

It is an enemy, because :

(i) It causes wear and tear.

(ii) Energy is expended in the form of heat.
(iii) Reduces the efficiency of the machine.
(iv) Lubricating machine parts costs a lot of money.

Q. 2. Write few methods to reduce friction.

Ans. Methods of Reducing Friction : Friction can be reduced by the following methods :

1. By making the surfaces in contact smooth : Smoothness of surfaces in contact reduces the surface irregularities and thus preventing the interlocking to great extent. Therefore, the projections of one surface do not fit into the depressions of the other surface resulting in reduced frictional force.

2. By sprinkling a fine powder or applying a lubricant (grease or oil) to the contact surface : This forms a thin layer between the two surfaces, which reduces the contact between the two surfaces, as a result of this frictional force gets reduced.

Example : (i) If we sprinkle fine talcum powder or vegetable starch or boric acid powder on the carrom board, then the speed of the coins and the striker will increase due to reduced friction.



Fig. By sprinkling fine talcum powder on Carrom board frictional force is reduced.

(ii) Lubricants such as grease or oil are applied to the parts of machines to reduce the friction between surfaces in mutual contact. This therefore, reduces the wear and tear of the machines.



Fig. Applying Lubricants on the machine parts reduces friction.

3. By converting sliding friction into rolling friction : Rolling friction is always less than sliding friction, so the opposing force is much less in case of rolling object. That is, the speed of the object increases. Rollers, ball-

bearings and wheels are used for rolling motion. The invention of the wheel is a great invention which has made the life of the entire humanity lot more comfortable and faster.

Example : (i) Use of ball bearings in bicycle axles and fans.

(ii) Use of wheels in heavy vehicles.

(iii) Use of rollers to carry and lift heavy objects easily.

4. Making streamlined shape : Cars, airplanes, ships and submarines are given a special shape known as streamlined shape, so as to reduce the drag and increase their speed.