CHAPTER- 12

FRICTION

SOLUTIONS:

EXERCISES

1. Fill in the blanks.

   (a) Friction opposes the___________ between the surfaces in contact with each other.

   (b) Friction depends on the _________of surfaces.

   (c) Friction produces_________.

   (d) Sprinkling of powder on the carom board __________ friction.

   (e) Sliding friction is ________than the static friction.

Ans: (a) relative motion (b) nature (c) heat (d) reduce (e) smaller

2. Four children were asked to arrange forces due to rolling, static and sliding frictions in a decreasing order. Their arrangements are given below.

   Choose the correct arrangement.

   (a) Rolling, static, sliding

   (b) Rolling, sliding, static

   (c) Static, sliding, rolling

   (d) Sliding, static, rolling

Ans. (c) Static, sliding, rolling

3. Alida runs her toy car on dry marble floor, wet marble floor, newspaper and towel spread on the floor. The force of friction acting on the car on different surfaces in **increasing order** will be

   (a) wet marble floor, dry marble floor, newspaper and towel.

   (b) newspaper, towel, dry marble floor, wet marble floor.

   (c) towel, newspaper, dry marble floor, wet marble floor.

   (d) wet marble floor, dry marble floor, towel, newspaper.

Ans.(a) wet marble floor, dry marble floor, newspaper and towel.

4. Suppose your writing desk is tilted a little. A book kept on it starts sliding down. Show the direction of frictional force acting on it.

Ans. When a book on the desk is started sliding down, a frictional force acts between the book and the surface of the desk. The direction of the frictional force on the book is opposite to the direction of its motion and acts in an upward direction.

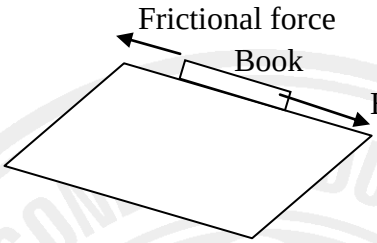

Fig : The frictional force acting on the sliding down book from the desk.

5. You spill a bucket of soapy water on a marble floor accidently. Would it make it easier or more difficult for you to walk on the floor? Why?

Ans.We can walk on floor because of the friction present between our feet and the ground. But the force of friction between the feet and the ground decreases and cannot make a proper grip on the floor when there is soapy water spilt on the floor. Hence, it would make more difficult to walk on the soapy floor.

6. Explain why sportsmen use shoes with spikes.

Ans. Sportsmen use shoes with spikes because with the help of spikes the force of friction between the shoes and the ground increases and provide the shoes better grip on the ground while running.

7. Iqbal has to push a lighter box and Seema has to push a similar heavier box on the same floor. Who will have to apply a larger force and why?

Ans. Seema has to apply larger force than Iqbal because when the heavy object is placed on the floor, the interlocking of irregularities on the surface of the box and the floor become strong and the force of friction will increase if the two surfaces are pressed harder. Hence, more force is required to overcome the interlocking.

8. Explain why sliding friction is less than static friction.

Ans. Irregularities present on the two surfaces in contact interlock with one another and force of friction arises. The sliding objects get less time to interlock into the contact points on the floor. Thus, interlocking is not strong so it is easier to move an object already in motion than to get it started.

9. Give examples to show that friction is both a friend and a foe.

Ans. Examples are given below to show that friction is both a friend and a foe.

Friction as a friend:

(i) It helps us to catch any object.

(ii) It helps us to walk.

(iii) It helps us to write on any object.

Friction as a foe:

(i) It wears out the materials

(ii) When a machine is operated, heat produces due to friction causes much wastage of energy.

(iii) It causes damage to the parts of the operating machines and tools.

10. Explain why objects moving in fluids must have special shapes.

Ans. When objects move through fluids, an opposing force is exerted to oppose its motion through the fluids. The frictional force exerted by fluid is known as drag force. This frictional force depends on the shape of the object and the nature of the fluid. In order to overcome the friction exerted by fluids and lose less energy while moving, objects are given special shapes like spindle shape.

Extra Questions And answers:

Q1. What is the cause of friction?

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

Q2. What would happen if there were no force of friction?

Ans: Many problems could have been arising if there were no force of friction. One cannot able to walk at all if there were no friction. One could not write pen or pencil if there was no friction. If an object started moving, it would never stop if there were no friction. One could not fix a nail on the wall or tie a knot. Without friction no building could be constructed.

Q3. On what factors does the fluid friction depends?

Ans: The fluid friction depends on its speed with respect to the fluid. The frictional force also depends on the shape of the object and the nature of the fluid.

Q4. Why do we sprinkle fine powder on the carom board ?

Ans: We sprinkled fine powder on the carrom board in order to increase efficiency by reducing friction.

Q5. Enlist any three methods for reducing friction.

Ans. i. By applying a lubricant.

ii. By using ball bearing.

iii. By polishing surfaces.