

CHAPTER -9

FRICTION

EXERCISES

1 Mark Questions

Q1: Explain why sportsmen use shoes with spikes.

Answer: Sportsmen use shoes with spikes because of the better grip given by spikes while running. This is because the force of friction between the shoes and the ground increases with the help of spikes.

Q2: Define friction.

Answer: Friction is the force which resists the motion of a body, while moving on a surface.

Q3: When does static friction come into play?

Answer: Static friction comes into play to counter balance the applied force on the body.

Q4: What are lubricants?

Answer: The substances which reduce friction are called lubricants.

Q5: What is rolling friction?

Answer: When one body rolls over the surface of another body, the resistance to its motion is called the rolling friction.

Q6: What is meant by air resistance?

Answer: There is friction between a moving object and the air through which it moves, known as air resistance.

Q7: What is meant by drag?

Answer: The frictional force exerted by fluids is known as drag.

Q8: Why is it difficult to walk on ice?

Answer: It is difficult to walk on ice because the friction between feet and ice is less,

2 Mark Questions

Q1: Iqbal has to push a lighter box and Seema has to push a similar heavier box on the Who will have to apply a larger force and why?

Answer: Seema will have to apply more force because the weight of the box increase and the friction increases. For a heavier box the ridges of the surfaces get interlocked more.

Q2: Explain why sliding friction is less than static friction.

Answer: Sliding friction is less than static friction because it comes into play once the body has started sliding. To make the body slide, more force is required to overcome the irregularities in the surface of the body.

Q3: Explain why objects moving in fluids must have special shapes.

Answer: Fluids also exert a frictional force on the body moving through them. Therefore, the shape of the body is streamlined to over the frictional force of fluids and to move smoothly through them.

Q4: Name the two factors on which the magnitude of frictional force depends

Answer: Frictional force depends on

- The weight of the body and
- The nature of the surface in contact.

Q5: Give two methods by which friction is reduced in the wheels of the car.

Answer:

The wheels of the car are provided with ball bearings along the axle which reduce the friction.

The tube and tyres are inflated which reduce friction.

Q6: Give three harmful effects of friction

Answer:

- Friction generates heat, for e.g., between the parts of machinery.
- Friction causes wear and tear of the rubbing surfaces e.g., soles of shoes wear out.
- Friction reduces the speed of the body and increases the consumption of energy.

Q7: Give examples to show that friction is both a friend and a foe.

Answer:

1. Friction is a friend in the following ways — it helps us to walk, to write on the blackboard and to apply the brakes of a car.
2. Friction is a foe in the following ways — it causes wear and tear of machinery and shoes, it produces heat in the machinery.

Q8: Four children were asked to arrange forces due to rolling, static and sliding frictions in 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

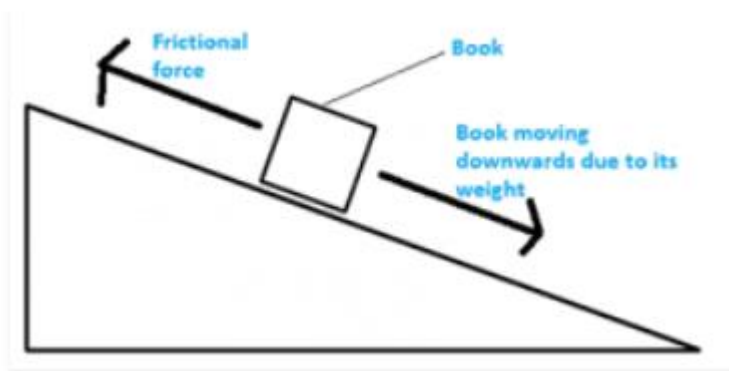
Answer: (c) static, sliding, rolling

5 Mark Questions

Q1: 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.

Answer:

When book slides down on the desk, a frictional force acts between the book and the surface of the desk. The direction of the friction force on the book is opposite to the direction of its motion and acts in an upward direction. It is shown in the diagram below.



Q2: Give examples to show that friction is both a friend and a foe.

Answer:

Advantages of friction

- a) Due to friction, we are able to walk.
- b) We are able to write because of the friction between the tip of the pen and the paper.

Disadvantages of friction

- a) Because of friction, the tires and soles of shoes wear out.
- b) Friction produces heat between different parts of the machines. This can damage the machines.

Q3: What is meant by “streamlined shape”? Where and why is this shape used? To whom has nature provided streamlined body?

Answer: Streamlined shape means they are narrow in front and broader at the back. The bodies of aeroplanes, missiles and rockets are streamlined to reduce friction with air. Ships and boats have a streamlined shape to reduce friction with air. Nature has given birds and fish streamlined bodies.

Q4: Give five examples to show that friction is increased deliberately.

Answer:

1. Athletes wear spiked shoes to help them run fast.
2. Mountaineers wear spiked shoes while walking on snow.
3. The tyres of vehicles are grooved.
4. The roads are made rough.
5. The blackboard is made rough.

Q5: Why are heat resistant tiles laid along the surface of spaceships?

Answer:

The spaceships are sent into the space from the rockets with a very high speed. This creates a very high frictional force between the air and spaceship. As result, the spaceship gets heated to red hot. The heat resistant tiles save the spaceship from burning

Q6: You spill a bucket of soapy water on a marble floor accidentally. Would it make it easier or more difficult for you to walk on the floor? Why?

Answer: It is possible to walk on the floor because of the friction present between our feet and the ground. For walking, we push the ground in a backward direction with our feet. The force of friction pushes it in the forward direction and allows us to walk. The force of friction decreases between the ground and the feet when there is soapy water spilt on the floor. Hence, it becomes difficult to walk on the soapy floor.

Fill in the blank

1. Friction opposes the _____ between the surfaces in contact with each other.

Answer: relative motion

2. Friction depends on the _____ of surfaces.

Answer: smoothness (or irregularities or nature)

3. Friction produces _____

Answer: heat

4. The sprinkling of powder on the carom board _____ friction.

Answer: reduces

5. Sliding friction is _____ than the static friction.

Answer: less

6. SI unit of friction force is _____.

Answer: Newton

7. _____ is a device used for measuring the force acting on an object.

Answer: Spring balance

8. Direction of force of friction is always _____ to the direction of motion.

Answer: opposite

9. Substance called _____ are used to reduce friction

Answer: Lubricants

Multiple Choice Questions

1. Friction that exists between two surfaces in contact, when there is no relative motion between them is called

- (a) Sliding friction
- (b) static friction
- (c) viscous drag
- (d) rolling friction

Answer: (b) static friction

2. The energy required to overcome friction is mainly converted into

- (a) Sound energy
- (b) heat energy
- (c) light energy
- (d) chemical energy

Answer: (b) heat energy

3. Out of the following, the better lubricant to be used in the moving parts of a machine,

- (a) Water
- (b) air
- (c) chalk powder
- (d) turpentine oil

Answer: (d) turpentine oil

4. Force of friction is more in

- (a) Marble tiles
- (b) wooden floor
- (c) playground
- (d) glass table

Answer: (c) playground

5. Once a body starts moving on table, the friction which comes into play is

- (a) Static friction

- (b) sliding friction
- (c) limiting friction
- (d) none of these

Answer: (b) sliding friction

6. Tyres have cut grooves in them

- (a) To increase friction
- (b) to decrease friction.
- (c) To make them look attractive
- (d) to save rubber

Answer: (a) to increase friction

SUMMARY

- Friction is essentially the resistance that any object encounters when travelling across or through a surface or medium. It depends on the mass of the body, surface's nature, as smooth surfaces have fewer irregularities and thus less friction.
- Static friction comes into play when we try to move an object at rest
- Sliding friction can be defined as the friction that acts when two surfaces slide over each other
- Rolling friction can be defined as the force that opposes the motion when an object rolls over another object
- The S.I unit in which frictional force is measured is, Newton
- Substances like oil or grease polish on the surface of machines to reduce friction and the process of applying lubricants to machines is known as lubrication