Chapter 2
Friction

Exercise 2(A) Fill in the Blanks and MCQ

Question 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 carrom board ..... friction.

(e) Sliding friction is ..... than the static friction.

Answer

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

(b) Friction depends on the nature of surfaces.

(c) Friction produces heat.

(d) Sprinkling of powder on the carrom board reduces friction.

(e) Sliding friction is smaller than the static friction.

Question 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

Answer

c) static, sliding, rolling

Reason —

Static friction is usually the highest among the three types because it's the force required to overcome the initial inertia and get an object moving from rest.

Once the object is in motion, the contact points on the object do not get enough time to lock into the contact points of the other surface. So, the sliding friction is slightly smaller than the static friction.

Rolling friction is least as rolling motion reduces the contact area between the object and the surface, thus reducing the friction. Hence, the decreasing order of friction is static > sliding > rolling.

Question 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

Answer

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

Reason — The force of friction depends on several factors, including the roughness of the surfaces and presence of moisture.

Movement on towel offers high friction because its surface is usually rough, providing significant resistance to motion.

Newspaper is smoother than a towel but still provides some resistance due to its texture.

Dry marble is smoother than newspaper, so it has less friction compared to the previous two surfaces.

Wet marble has the least friction among the listed surfaces because water acts as a lubricant, reducing the friction between the car's tires and the surface of the wet marble.

Hence, the order of increasing friction will be : wet marble floor < dry marble floor < newspaper < towel.

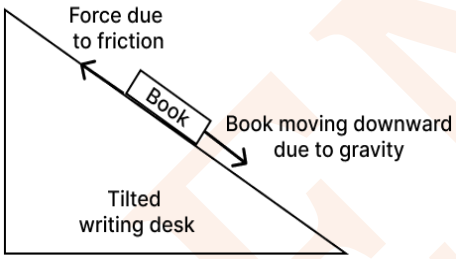
Exercise 2(B) Short and Long type Question

Question 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.

Answer

When the book slides down on the desk, the frictional force acts opposite to the direction of motion of book (i.e., it acts in the upward direction).



Question 5

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

Spilling soapy water on a marble floor would make it more difficult to walk on the floor. When we push the floor in the backward direction with our feet, the force of friction pushes it in the forward direction and allows us to walk. The soap in the water creates a slippery surface, reducing friction between our feet and the marble floor. As a result, walking becomes more difficult on the slippery marble floor.

Question 6

Explain why sportsmen use shoes with spikes.

Answer

Sportsmen use shoes with spikes to run faster, improve their stability and avoid injury. By digging into the ground, the spikes increase the surface area contacting the playing surface, leading to greater friction. This increased friction enables faster running and reduces the risk of slipping.

Question 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?

Answer

Seema has to apply greater force than Iqbal because her box is heavier and heavier object will have greater frictional force with the surface of contact. This happens because friction is caused by the interlocking of irregularities in the two surfaces. The force of friction will increase if the two surfaces are pressed harder. Hence, more force is required to push the heavier box.

Question 8

Explain why sliding friction is less than static friction.

Answer

Static friction is the force required to overcome the initial inertia and get an object moving from rest. Sliding friction comes into action when the object is in motion. Here, the contact points on the object do not get enough time to lock into the contact points of the other surface. So, the sliding friction is smaller than the static friction.

Question 9

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

Answer

Friction as a friend:

1. We are able to walk on floor due to friction between floor and our feet.
2. We are able to write due to friction between pen and paper.
3. An object in motion will never stop if there is no friction.
4. Without friction between tyres of automobiles and roads, they could not be started, stopped or turned to change direction of motion.
5. Friction helps us to tie a knot.

Friction as a foe:

1. It wears out the materials like screws, ball bearing or soles of shoes.
2. Friction produces heat and so the jar of mixer becomes hot when it runs for a few minutes.
3. Friction slows down moving objects, hence, more force is required.
4. Due to friction blades of scissors or knives become blunt.
5. Due to increased friction between tire and the road surface, when the tire deflates, it becomes difficult to move the vehicle.

Question 10

Explain why objects moving in fluids must have special shapes.

Answer

Objects moving through fluids experience drag, a frictional force exerted by the fluids. Special shapes, such as streamlined designs, are essential to minimize drag. These shapes reduce disturbance and redirect fluid flow around the object, improving efficiency and helping the object overcome resistance as it moves through the fluid.

Exercise 2(C) Short and Long type Question (H.W)

1. Write some harms of friction.
2. What is sliding friction?
3. Why we fall down when we stop on banana peel?
4. In which direction frictional force acts on a moving object.
5. What is easier- rolling or sliding?
6. What is drag?
7. Hoes does the friction get affected by the nature of surface?
8. What happens, if the floor we walk on is friction less?
9. The sole of shoes get worn after some time. Explain why?
10. What happens when there is no friction between the chalk and the blackboard.
11. Write on harm of friction.
12. Why do kabaddi players rub their hands with soil?

Exercise 2(D) MCQ (H.W)

1. Complete the sentence. Friction always _____
   a. helps the motion
   b. opposes the motion
   c. both of these
   d. none of these
2. Which one of these characteristics does a smooth surface has?
   a. Less frictional force
   b. More frictional force
   c. Sometimes less and sometimes more force
   d. All of above
3. Friction is a _____
   a. Contact force
   b. Non-contact force
   c. Magnetic force
   d. None of these
4. What kind of substances are known as lubricants
   a. Increase friction
   b. Decrease friction
   c. Increase or decrease friction
   d. None of these
5. Fluid are____
   a. Gases
   b. Liquids
   c. Gases and liquids both
   d. None of these
6. On what force of friction depends?
   a. Smoothness of surface

b. Roughness of surface
c. Inclination of surface
d. Al of above

7. Friction is a /an_____
   a. Evil
   b. Foe
   c. Both (a) and (b)
   d. None
8. Lubricants _____
   a. Increase friction
   b. Reduce friction
   c. Both (a) and (b)
   d. None
9. Rolling friction is smaller than?
   a. Sliding friction
   b. Static friction
   c. Fluid friction
   d. All of the above
10. The shape of the airplane is like a
    a. Bird
    b. Car
    c. Dog
    d. All

Answers

1. B
2. A
3. A
4. B
5. C
6. D
7. C
8. B
9. D
10. A

Exercise 2(E) Short and Long type Question (H.W)

1. Does friction depend on the nature of objects?
2. Which type of surface produces more friction?
3. Which type of surface produces less friction?
4. Which is less sliding friction or static friction?
5. Why is it difficult to move on a wet marble floor?
6. What would happen when an object starts moving if there is no friction?

7. Give two examples where friction is undesirable?
8. Our hands become warm when we rub them. Why?
9. Why do we shape aero planes like that of bird?
10. Write some methods to reduce friction?
11. Write various types of friction.
12. What is a fluid friction? Write the factors on which fluid friction depends.

Exercise 2(F) Short and Long type Question (H.W)

1. Which is easy to drag- a heavy box or light box? (1)
2. Why do we spray powder on carom? (1)
3. What does frictional force produce? (1)
4. Write some factors that affect the friction? (3)
5. How is friction sometimes desirable? (2)
6. Define different types of friction with examples. (4)
7. What is spring balance? Write its construction and working with the help of diagram. (4)
8. Write advantages and disadvantages of friction. (4)

Exercise 2(G) MCQ (H.W)

1. Whenever the surfaces in contact tend to move or move with respect to each other, the force of friction comes into play
(a) Only if the objects are solid.
(b) Only if one of the two objects is liquid.
(c) Only if one of the two objects is gaseous.
(d) Irrespective of whether the objects are solid, liquid or gaseous.

Fig. 12.1

2. In Fig.12.1, a boy is shown pushing the box from right to left.
The force of friction will act on the box
(a) From right to left (←)
(b) From left to right (→)
(c) Vertically downwards (↓)
(d) Vertically upwards (↑)

3. To sharpen the blade of a knife by rubbing it against a surface, which of the following will be most suitable?
(a) Stone
(b) Plastic block
(c) Wooden block
(d) Glass block

4. A toy car released with the same initial speed will travel farthest on
(a) Muddy surface
(b) Polished marble surface
(c) Cemented surface
(d) Brick surface

5. If we apply oil on door hinges, the friction will
(a) Increase
(b) Decrease
(c) Disappear altogether
(d) Will remain unchanged

6. Which of the following statements is incorrect?
(a) Friction acts on a ball rolling along the ground.
(b) Friction acts on a boat moving on water.
(c) Friction acts on a bicycle moving on a smooth road.
(d) Friction does not act on a ball moving through air.

7. A boy rolls a rubber ball on a wooden surface. The ball travels a short distance before coming to rest. To make the same ball travel longer distance before coming to rest, he may
(a) Spread a carpet on the wooden surface.
(b) Cover the ball with a piece of cloth.
(c) Sprinkle talcum powder on the wooden surface.
(d) Sprinkle sand on the wooden surface.

8. In a large commercial complex there are four ways to reach the main road. One of the path has loose soil, the second is laid with polished marble, the third is laid with bricks and the fourth has gravel surface. It is raining heavily and Paheli wishes to reach the main road. The path on which she is least likely to slip is
(a) Loose soil.
(b) Polished marble.
(c) Bricks.
(d) Gravel.

Answers

1. d 2. b 3. A 4. C 5. b 6. d 7. c 8. d