



## Exercise Questions

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### 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.

### Soln:

- (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 **lesser** than the static friction.

### 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
- Soln:

The answer is (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
- Soln:

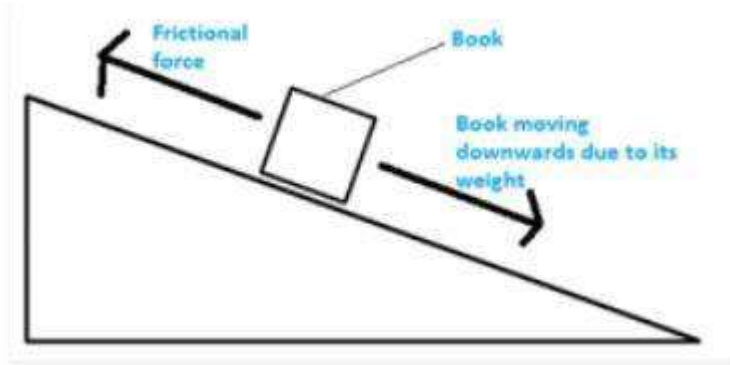
The answer is (a) wet marble floor, dry marble floor, newspaper and towel.

### 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.

### Soln:



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.



**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?**

**Soln:**

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.

**6. Explain why sportsmen use shoes with spikes.**

**Soln:**

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.

**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?**

**Soln:**

Due to the interlocking of the irregularities on the two surfaces in contact, the force of friction arises. On the floor when a heavy object is placed, the interlocking of irregularities on the surface of the box and floor become strong. This is because the two surfaces in contact are pressed harder. Hence, more force is required to overcome the interlocking. Thus, to push the heavier box, Seema has to apply greater force than Iqbal.

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

**Soln:**



When irregularities present in the surfaces of two objects in contact get interlocked with each other, friction comes into play. The time given in sliding for interlocking is very small. Thus, interlocking is not strong. Therefore, less force is required to overcome this interlocking. Due to this reason, sliding friction is less than static friction.

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

**Soln:**

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.

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

**Soln:**

When a body moves through a fluid, it experiences an opposing force which tries to oppose its motion through the fluid. This opposing force is known as the drag force, and the frictional force depends on the shape of the body. By giving the objects a special shape, the force of friction acting on it can be minimised. Hence, it becomes easier for a body to move through the fluid.