Friction

Q.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.

Sol:

(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 **less** than the static friction.

Q.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

Sol: (c) static, sliding, rolling

Q.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

(f) wet marble floor, dry marble floor, newspaper and towel.
(g) newspaper, towel, dry marble floor, wet marble floor.
(h) towel, newspaper, dry marble floor, wet marble floor
(i) wet marble floor, dry marble floor, towel, newspaper

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

Q.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.

Sol: When a book slides down on a table, the direction of frictional force is upward which is opposite to the direction of its motion and along the incline.

Q.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?

Sol: It would be very difficult to walk on the floor if we spill a bucket of soapy water on the floor because layer of soap makes the floor smooth which reduces the friction between the ground and feet.

Q.6 Explain why sportsmen use shoes with spikes.

Sol: Shoes with spikes provide better grip and increase the friction between the ground and shoes while running. That' why sportsmen use shoes with spikes.

Q.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?

Sol: Seema have to apply larger force to push the heavier box because the interlocking of irregularities between the surface of box and the floor is much more compared to the lighter box. This produces more friction. So, more force required to overcome the interlocking.

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

Sol: Friction force comes between the two surfaces when irregularities present in the surfaces in contact and get interlocked with each other. When an object is in motion, the sliding object gets less time to interlock into the contact points on the floor. While an object at rest has enough time to interlock the irregularities between the surfaces. Thus, sliding friction is less than static friction.

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

Sol: Friction as a friend:

(i) Friction allows us to walk on floor.
(ii) Due to friction is present between the tip of pen and a paper we can write on note book.
(iii) It allows us to catch any object.

Friction as foe:

(i) It causes wear and tear of shoes
(ii) It causes heat is produced in heavy machines, can damage the parts.
(iii) It causes reduces the speed of moving object.

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

Sol: When an object moves in any fluid, fluid friction acts on it and opposes the motion. So, to reduce this friction, the object is given special shape known as streamlined shape. E.g. boat and areophane.