

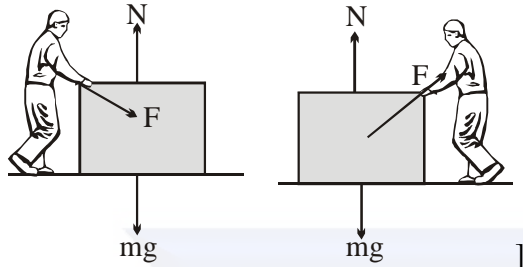
Chapter 6 Friction

1. For most of the surfaces used in daily life, the friction coefficient is less than 1. Is it always necessary that the friction coefficient is less than 1?

Ans: No

2. Why is it easier to push a heavy block from behind than to press it on the top and push?

Ans: Pressing increase the normal reaction, thus increasing the friction.



3. What is the average friction force when a person has a usual 1 km walk?

[Sol. zero. As $\langle \vec{a} \rangle = \frac{\vec{v}_f - \vec{v}_i}{t} = \vec{0}$ as men starts with zero velocity and ends with zero velocity.]

4. Why is it difficult to walk on solid ice?

[Sol. friction coefficient is very less so he can slip on surface.]

5. Can you accelerate a car on a frictionless horizontal road by putting more petrol in the engine? Can you stop a car going on a frictionless horizontal road by applying brakes?

Ans: No. since road is frictionless, car won't move.

6. Spring fitted doors close by themselves when released. You want to keep the door open for a long time, say for an hour. If you put a half kg stone in front of the open door, it does not help. The stone slides with the door and the door gets closed. However, if you sandwich a 20 g piece of wood in the small gap between the door and the floor, the door stays open. Explain why a much lighter piece of wood is able to keep the door open while the heavy stone fails.

[Sol. In the initial case normal is equal to weight of body but in the second case as body is pressed so normal increases hence more normal more will be frictional force.]

7. A classroom demonstration of Newton's first law is as follows: A glass is covered with a plastic card and a coin is placed on the card. The card is given a quick strike and the coin falls in the glass.

(a) Should the friction coefficient between the card and the coin be small or large?

(b) Should the coin be light or heavy?

(c) Why does the experiment fail if the card is gently pushed?

[Sol. (a) small (b) heavy

(c) If the card is pushed gently for more time frictional force will act on coin and it may gain more velocity and fall out.]

8. Can a tug of war be ever won on a frictionless surface?

[Sol. No, because on both team tension will be same and as there is no friction so one will win.]

9. Why do tyres have a better grip of the road while going on a level road than while going on an incline?

[Sol. Normal on ground is mg but on incline it is $mg \cos \theta$ so on the incline μ_N will be less and hence less gripping.]

10. You are standing with your bag in your hands, on tilt ice in the middle of a pond. The ice is so slippery that it can offer no friction. How can you come out of the ice?

[Sol. Throw the bag in opposite direction of lakeside from momentum conservation. You will gain velocity towards lakeside.]

11. When two surfaces are polished, the friction coefficient between them decreases. But the friction coefficient increases and becomes very large if the surfaces are made highly smooth. Explain.

[Sol. Because the number of bonds increases greatly between two surface if the surface is highly smooth.]