

## Unit 12(Friction)

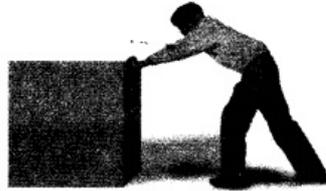
### Multiple Choice Questions

Question. 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 solids, liquids or gases

Answer. (d) Force of friction acts in solids, liquids and gases and opposes the motion with respect to each other.

Question. 2 In figure, 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 (i)
- (d) vertically upwards (T)

Answer. (b) The force of friction will be from left to right (-<) because the friction force always acts in opposite direction to the motion.

Question. 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

Answer. (a) Stone will be most suitable because it will exert greater reaction and hence greater friction force which sharpens the blade of a knife easily by rubbing.

Question. 5 If we apply oil on door hinges, the friction will

- (a) increase
- (b) decrease
- (c) disappear altogether
- (d) will remain unchanged

Answer. (b) The friction will decrease because oil acts as a lubricant which reduce friction.

Question. 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

Answer. (d) Friction will act in case of ball moving through air always.

Question. 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

Answer. (c) Talcum powder reduces friction force and the ball will cover longer distance.

Question. 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

Answer. (d) She should use gravel surface path because only in this path. She will have sufficient friction force to walk easily.

### Very Short Answer Type Questions

Question. 9 Two blocks of iron of different masses are kept on a cemented floor as shown in the figure. Which one of them would require a larger force to move it from the rest position?



Answer. The block having mass 2 units will require larger force to move it from the rest position because friction force increases as the mass of object increases and hence larger mass require a larger force to move from the rest position.

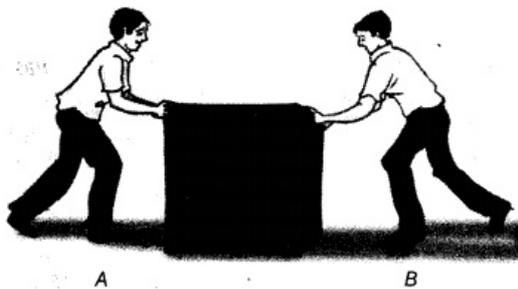
**Question. 10** Will force of friction come into play when a rain drop rolls down a glass window pane?

**Answer.** Yes, friction comes into play when two surfaces are in contact, e.g. glass and water in this case..

**Question. 11** Two boys are riding their bicycles on the same concrete road. One has new tyres on his bicycle while the other has tyres that are old and used. Which of them is more likely to slip while moving through a patch of the road which has lubricating oil spilled over it?

**Answer.** The boy having the tyres which are old and used is most likely to slip because these tyres will experience less friction force which is insufficient to move on the oily road.

**Question. 12** Figure shows two boys applying force on a box. If the magnitude of the force applied by each is equal, will the box experience any force of friction?



**Answer.**No, the force applied by both boys is equal.

So, net force will be zero and hence friction force will not come into play.

**Question. 13** Imagine that an object is falling through a long straight glass tube held vertical, air has been removed completely from the tube. The object does not touch the walls of the tube. Will the object experience any force of friction?

**Answer.** No, the object will not experience any frictional force because to experience the force of friction, two surfaces must be there and there is only one surface in this case.

### Short Answer Type Questions

**Question. 14** You might have noticed that when used for a long time, slippers with rubber soles become slippery. Explain the reason.

**Answer.** It is due to continuous rubbing of soles with the ground, the spikes on the sole get damaged slowly and the soles become slippery.

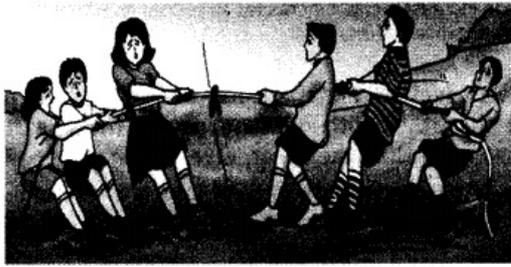
**Question. 15** Is there a force of friction between the wheels of a moving train and iron rails? If yes, name the type of friction. If an air cushion can be introduced between the wheel and the rail, what effect will it have on the friction?

**Answer.** Yes, there is always a force of friction between the wheels of a moving train and iron rails. The name of this friction is rolling friction, since the wheels are rolling on the track. On introducing air cushion, the frictional force becomes less, since there is no contact between rails and wheels.

**Question. 16** Cartilage is present in the joints of our body which helps in their smooth movement. With advancing age, this cartilage wears off. How would this affect the movement of joints?

**Answer.** Cartilage is present in the joints of our body, reduces friction during movement of joints. But on wearing off this cartilage, the force of friction increases due to which the smoothness of movement decreases and one feels the joint pain.

**Question. 17** While playing tug of war, Preeti felt that the rope was slipping through her hands. Suggest a way out for her to prevent this.



**Answer.** To prevent slipping of the rope from hands, Preeti has to make her hands somewhat non-smooth, so she can rub her hands by introducing the sand between them.

**Question. 18** The handle of a cricket bat or a badminton racquet is usually rough. Explain the reason.

**Answer.** The handle of a cricket bat or a badminton racquet is rough, so that while playing, the bat or badminton racquet does not slip away from the hands of the player.

Roughness is responsible for the frictional force between handle of the bat or a badminton racquet and hands, without which gripping is not possible.

**Question. 19** Explain why the surface of mortar and pestle (silbatta) used for grinding is etched again after prolonged use.

**Answer.** After prolonged use, the mortar and pestle lose the roughness, due to which frictional force reduces and it does not work properly. So, we have to etch it to make it rough again.

**Question. 20** A marble is allowed to roll down an inclined plane from a fixed height. At the foot of the inclined plane, it moves on a horizontal surface (a) covered with silk cloth (b) covered with a layer of sand and (c) covered with a glass sheet. On which surface, will the marble move the shortest distance. Give reason for your answer.

**Answer.** Marble will move the shortest distance on the layer of sand because it will exert a greater force of friction on the marble and other two surfaces like silk cloth and glass sheet will exert a lesser friction force comparatively.

**Question. 21** A father and son pushed their car to bring it to the side of road as it had stalled in the middle of the road. They experienced that although they had to push with all their might initially to move the car, the push required to keep the car rolling was smaller, once the car started rolling. Explain.

**Answer.** When the car is at rest, we have to apply greater force to set the car in motion which value is more. As the car starts moving, the friction changes into the rolling friction which is always less than the previous one. . . . ,

So, we have to exert the lesser force to keep it in motion.

**Question. 22** When the cutting edge of a knife is put against a fast rotating stone to sharpen it, sparks are seen to fly. Explain the reason.

**Answer.** Due to the friction between cutting edge of a knife and stone, the temperature of the knife and hence stone increases and it increases to such a level that the sparks are produced which can be seen while sharpening it.

**Question. 23** We have two identical metal sheets. One of them is rubbed with sand paper and the other with ordinary paper. The one rubbed with sand paper shines more than the other. Give reason.

**Answer.** While rubbing with sandpaper, more frictional force is produced between the layers of metal sheet and sandpaper which causes more force on dust particles and they are removed easily, so it will shine more.

But in case of ordinary paper, the force of friction is not sufficient to remove all the dust, so it will shine less in this case.

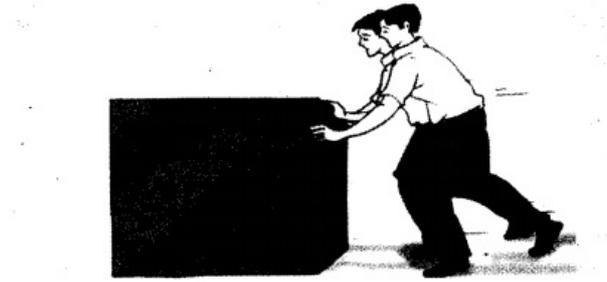
**Question. 24** While travelling on a rickshaw, you might have experienced that if the seat cover is very smooth, you tend to slip when brakes are applied suddenly. Explain.

**Answer.** If the seat cover of rickshaw is very smooth, then the friction between our body and the seat is very small.

Therefore, when the brakes are applied, we tend to slip.

### Long Answer Type Question

**Question. 25** Two friends are trying to push a heavy load as shown in the figure below. Suggest a way which will make this task easier for them.



**Answer.** They can put rollers below the heavy load. Since, the rolling friction is smaller than the sliding friction. Therefore, putting rollers below the heavy load will make this task easier for them because rolling reduces friction.