

02. FRICTION

Questions and Answers

1. Give examples to show that friction is both good and evil?

A. Friction is both good and evil.

Friction is good to human beings.

Due to existence of friction in the world

- (i) We can walk.
- (ii) We can write
- (iii) We can hold things
- (iv) We can cook
- (v) We can eat
- (vi) We can drive vehicles
- (vii) We can sharpen the knife
- (viii) Many works on the earth can be done due to friction.

Friction is evil to human beings.

Due to existence of friction in the world

- (i) It can tear the surfaces
- (ii) It causes the waste of energy
- (iii) It can stop the moving vehicles
- (iv) It can produce heat and damages machine parts
- (v) It causes tearing clothes
- (vi) A person can slip down over a banana peel due to less friction
- (vii) A bicycle can not roll due to more friction between chain and wheel
- (viii) Many works on the earth can not be done due to friction.

2. Explain why sportsmen use shoes with spikes?

A. Spikes increase the friction with the ground and they give more grip while walking or running. They reduce slipping on the ground. Hence sportsmen use shoes with spikes.

3. You spill a bucket of soapy water on a marble floor accidentally. Would it be easier or more difficult for you to walk on the floor? Why?

A. We are able to walk because of friction between our feet and the ground. Soapy water on the floor creates very less friction than normal floor. We can slip on floor with soapy water. Hence it is very difficult to walk on the floor with soapy water.

4. What ways do you know to reduce friction?

A. There are several ways to reduce friction.

They are

- (i) by using grease, oils or any lubricants
- (ii) by using smooth surfaces
- (iii) by using fluids than solid surfaces
- (iv) by using rollers, wheels or ball bearings
- (v) by using different shapes which reduce friction

5. What conditions are needed for static friction to come into play?

A. Static friction comes to play in the following conditions.

- (i) When the two surfaces of objects are at rest with respect to each other.
- (ii) Until the applied force is more than the limit of the static friction.

(Static friction is a self adjusting force.)

6. Give examples of practical application of static friction.

A. Examples of practical application of Static friction:

- (i) We are able to stand on the floor due to static friction between our foot and the ground.
- (ii) We are able to hold objects with our hands due to static friction between surfaces of our hands and objects.
- (iii) All vehicles are stand by on roads due to static friction.
- (iv) The books on table do not move due to static friction.

7. Give examples of showing the existence of sliding friction?

A. Examples of showing the existence of sliding friction:

- (i) We are able to write with a pen on the paper due to sliding friction.
- (ii) We can skate on the snow due to sliding friction.
- (iii) The vehicles move on the road due to sliding friction.
- (iv) We can cut vegetables due to sliding friction.

8. How can you measure frictional force?

A. Tie a string around the brick which is at rest. Attach the second end of the string to the hook of a spring balance. Pull the spring balance to make a move in the brick. Note down the reading in the spring balance when the brick just begins to move. This give the value of frictional force between the brick and the floor.

9. How does lubrication affect friction? Explain.

A. When oil, grease or any other lubricants are applied between the moving parts of a machine, a thin layer is formed between the moving surfaces. Hence they do not directly rub against each other. Interlocking of irregularities is avoided to a great extent by the application of lubricants. Hence movement becomes smooth. So lubricants are used to reduce friction.

10. What kinds of friction do you know?

A. There are four kinds of frictions.
(i) Static friction (ii) Sliding friction
(iii) Rolling friction (iv) Fluid friction

11. Explain why sliding friction is less than static friction?

A. If there is static friction in between two objects, a greater force is required to break the interlocking between two surfaces.

When there is motion, a smaller force is required to keep the object in motion. There is no need to break interlocking when they are in motion.

Hence the sliding friction is less than the static friction.

12. How is friction responsible for energy wastages? Give suggestions to reduce energy wastages by friction.

A. Friction reduces the speed of a body in motion. If there is rough surface the friction is more. To move a vehicle on rough surface we have to use more energy. It means more fuel is utilized. So friction causes energy wastage.

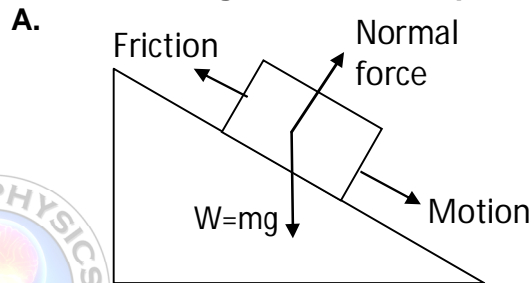
To reduce energy wastage by friction and to save fuel we adopt various methods like using lubricants, grease, oils and ball bearings. Also making surfaces smooth is useful to reduce energy wastages.

13. “Reducing friction to the lowest possible level in machine tools solves the problem of energy crisis and conserve biodiversity”. How do you support the statement? Explain.

A. If friction is more in machine tools, more fuel is consumed. This leads to wastage of energy sources and causes energy crisis. If energy crisis occurred then bio diversity may be damaged.

So reducing friction to the lowest possible level in machine tools solves the problem of energy crisis and conserve bio diversity.

15. Draw a free body diagram (FBD) to show various forces acting on a body which is sliding on an inclined plane.



16. Seetha is observing a moving bus with the luggage on its top. As the bus is moving slowly there is change in the state of luggage on its top. But when the bus speeds up and starts moving fast, she noticed that the luggage on the top of the bus fell to the back of the bus. This raised many doubts in her mind regarding to the effect of frictional force acting on the luggage as well as on the tyres of the bus. Can you guess the questions raised in her mind? Write them.

A. The following questions may be raised by seetha:

- (i) What is the effect of frictional force acting on luggage?
- (ii) Which friction acts between luggage and bus when it is moving slowly?
- (iii) Why the luggage fell to back when the bus move fastly?
- (iv) What is the effect of friction on the tyres of the bus?