

Class 8 Science Chapter 12 Important Questions

Class 8 Science Chapter 12 Important Questions Set – 1

What do you mean by “friction”?

The force which always opposes the motion of one object over another object in contact with it, is called friction. Friction occurs between the two surfaces which are in contact with each other. As an example, when we push a heavy box kept on floor, the force of friction occurs between the surface of floor and bottom of the box.

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?

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.

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.

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.

With the help of an activity, show that the force of friction acts in a direction opposite to the direction of motion of an object.

Gently push a book on a table. It stops after moving for some distance. We saw that if you apply the force along the left, friction acts along the right. If you apply the force along the right, the friction acts along the left direction. In both cases the force opposes the motion of the book. The force of friction always opposes the applied force. This force is called the force of friction.

From the above activity, we can say that the force of friction acts in a direction opposite to the direction of motion of an object.

How can you say that the force of friction is greater if a rough surface is involved?

Friction is caused by the irregularities on the two surfaces in contact. Even those surfaces which appear very smooth have a large number of minute irregularities on them. Irregularities on the two surfaces lock into one another. When we attempt to move any surface, we have to apply a force to overcome interlocking. On rough surfaces, there are a larger number of irregularities. So, the force of friction is greater if a rough surface is involved.

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What do you mean by static friction, sliding friction and rolling friction?

Static friction is a kind of starting friction because an object just tends to start moving, it does not actually move. The maximum frictional force present between any two objects when one object just tends to move or slip over the surface of the other object, is called static friction.

The frictional force present when one object moves slowly or slides over the surface of another object, is known as sliding friction.

When an object rolls over the surface of another object, the resistance to its motion is called rolling friction.

How can you prove that sliding friction is smaller than the static friction?

Make an inclined plane on a smooth floor, or on a table. You may use a wooden board supported by bricks, or books. Put a mark with a pen at any point A on the inclined plane. Now let a pencil cell move down from this point. Observe how far it moves on the table before coming to rest. Note down the distance. Now spread a piece of cloth over the table. Make sure that there are no wrinkles in the cloth. Again, a pencil cell moves down from this point. Observe the distance. We will find that the pencil cell covers much more distance in sliding friction whereas the distance is much less in static friction. That means force of sliding friction is smaller than the static friction. Remember, small friction covers more distance whereas much friction covers less distance or movement of the objects.

How can you prove that rolling friction is much less than the sliding friction?

Keep a book on a table. Now, push the book with your hand. You will find that it is not very easy to push the book lying on the table. Because when the book lying directly on the surface of table, it moves very less because sliding friction comes into contact.

Now, take three or four round pencils, place the round pencils parallel to one another on the table. Place, the same book over the round pencils. Now push the book with your hand. We have to apply a very small amount of force to make the book move when it is

placed on round pencils. It is much more-easy to move the book place on the rollers then to slide it directly over the surface of table. It is much easier to move an object keeps on rollers than to slide it, because rolling friction is much less than sliding friction.

With the help of an activity show that friction depends on the nature of two surfaces.

Place a brick on the floor. Tie a string around the brick and connected it to the hook of spring balance. Now, apply a pulling force. The brick just begins to slide on the floor. Note the reading. This reading of spring balance will give us the magnitude of force of friction between floor and the brick (both surfaces).

Now, wrap a piece of polythene around the brick and repeat the activity. We will find that the reading of spring balance is smaller than the first reading of spring balance indicating that the force of friction has decreased this time.

Now, wrap a jute cloth around the brick. And do this activity once again. We will find that the reading of spring balance is greater than the first reading of spring balance when nothing was wrapped around.

From this activity, we learn that when the surface of brick is made more smooth by wrapping polythene sheet the friction with floor decreases and when the surface of brick is made more rough by wrapping a jute cloth, then the friction with floor increases. Thus, the friction depends on the nature of the two surfaces i.e., the smoothness or roughness of the objects.

With the help of an activity show that the friction between two surfaces depends on the force with which the two surfaces are pressed together.

Two boxes of the same size but one box is light and another is heavy. If we push both boxes, you will find that we have to apply only a small force to make the lighter box move on and a much larger force has to be applied to make the heavier box move on the floor. There is less friction between the light box and the floor but much more friction between the heavy box and the floor. Because of its smaller weight the lightbox presses on the floor with less force. In another side, greater weight of the box presses on the floor with a great force.

This greater force of friction does not allow the heavy box to be moved on the floor by applying a small force. A much larger force of our push has to be applied to make the heavy box move on the floor.

From the above activity we conclude that the friction between two surfaces depends on the force with which the two surfaces are pressed together.

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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?

It would be difficult to walk on the floor. Soapy water fills the floor irregularities, thus reduces the friction considerably. Feet do not make necessary grip with the floor surface, thus increasing the chances of falling.

How does lubricants increase the efficiency of objects? Discuss with examples.

We generally noticed that when a few drops of oil are poured on the hinges of a door, the door moves smoothly. A bicycle and a motor mechanic use grease between the moving parts of these machines. In all the above cases, we want to reduce friction in order to increase efficiency. When oil, grease or graphite is applied between the moving part of a machine, a thin layer is formed there and moving surfaces do not directly rub against each other. Interlocking of irregularities is avoided to a great extent. Therefore, movement becomes smooth and the friction are reduced by lubricants. Thus, lubricants increase the efficiency of working objects.

Note: In some machines, it may not be advisable to use oil as lubricant.

Can we reduce friction to zero by polishing surfaces or using large amount of lubricants?

Friction can never be entirely eliminated. No surface is perfectly smooth. Some irregularities are always there.

Frictional force is harmful to us and considered an evil. Why?

Frictional force is harmful to us and considered an evil because:

- i) It wears out the materials whether they are screws, ball bearings or any materials.
- ii) Friction produces heat which may damage the machines.
- iii) Friction wears out steps of staircases in buildings and foot over bridge
- iv) Friction wear out the brake pads of vehicle gradually.
- v) Friction wears away the tyres of vehicle and soles of our shoes.
- vi) In fact, when a machine is operated, heat generated causes much wastage of energy.

Write any four methods which can we increase the friction.

In some cases, friction is useful to us. In such cases, we even want to increase friction to make it more useful to us or you can say make the surface of an object as a rough for creating better friction or grip:

1. Grooves are made in the soles of shoes to increase friction and prevent slipping.
2. Treads are made in the tyres of vehicles to increase friction and prevent skidding of vehicles on wet roads.
3. Spikes are provided in the shoes of players and athletes to increase friction and prevent slipping.
4. Kabaddi players rub their hands with soil for a better grip of their opponents.
5. Gymnasts apply some coarse substance on their hands to increase friction for better grip.

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Friction enables us to light a matchstick. How?

When we rub a matchstick against the rough side of a matchbox, then friction between the head of matchstick and rough side of matchbox produces heat. This heat burns the chemicals present on the head of matchstick due to which the matchstick lights up. So, the match stick catches fire and starts burning. It is difficult to light a matchstick by striking it if there is a smooth surface then enough friction is not provided by a smooth surface to produce sufficient heat.

Write short note on “fluid friction”.

We know that air is very light and thin. Yet it exerts frictional force on objects moving through it. Similarly, water and other liquids exert force of friction when objects move through them. In science, the common name of gases and liquids is fluids. So, we can say that fluids exert force of friction on objects in motion through them. The frictional force

on an object in a fluid depends on its speed with respect to the fluid. The frictional force also depends on the shape of the object and the nature of the fluid. It is obvious that when objects move through fluids, they have to overcome friction acting on them. In this process they lose energy. Efforts are, therefore, made to minimize friction. So, objects are given special shapes.

How do the scientists reduce the fluid friction in different objects? Discuss with examples.

The scientists get hints for special shapes from nature. Birds and fishes have to move about in fluids all the time. Their bodies must have evolved to shapes which would make them not to lose much energy in overcoming friction. The fluid friction can be reduced or minimized by using a special shape called “streamlined shape” to the object which move through fluids (like air or water).

For example, car is built with streamlined body shape to reduce air resistance caused by air. That car with a streamlined shape moves through the air easily and hence consumes less petrol than other car which has another shape.

An aeroplane and rocket have a streamlined shape to reduce air friction that they encounters when flying at high speed through the sky.

Write any four methods which can we decrease the friction.

In some cases, friction is harmful to us. In such cases, we even don't want to increase friction so as to make it less harmful to us:

- i) Friction can be reduced by making the surface is smooth by polishing.
- ii) Friction can be reduced by applying lubricants or oil or grease to the rubbing surfaces.
- iii) Friction can be reduced by using wheels to move objects.
- iv) Friction can be reduced by using ball bearings between the moving parts of machines.

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.

While rubbing the 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.

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

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.

There is more drag on an object when it moves through water than when it moves through air. Explain with the reason.

As the fluid friction, depends on the viscosity or thickness of fluid, so higher the viscosity of fluid, greater will be the frictional force acting on an object moving through it. As we know that water is much more viscous than air, so there will be much more frictional force on an object when it moves through water than when it moves through air.

How do we write on paper with a pen?

When we write with a pen, the particles of ink rub off from the pen's refill due to friction with paper, stick on the paper and leave marks of writing on paper. If there were no friction between the pencil or pen and paper, writing and drawing on paper would not have been possible.

Remember, we cannot write with a pencil on a glass sheet because the glass surface is very smooth due to which the friction between the tip of pencil and glass surface is much less.

Discuss the working methods of spring balance? Explain.

The spring balance is a device which is used for measuring force acting on an object. The spring balance contains a coiled spring which gets stretched when a force is applied to its free end or having a hook. The extent by which the spring gets stretched is a measure of the force applied. Larger the stretching of spring, greater will be the magnitude of force applied. The stretching of spring or magnitude of force is indicated by a pointer attached to the spring which moves on a graduated scale. The reading on the scale of spring balance gives us the magnitude of force. When the spring balance is held vertically, it is said to measure the weight of an object hung from its hook because weight of an object is also a force. And when the spring balance is held horizontally (attached to an object and pulled), it can be used to measure the force being applied to pull the object on the horizontal surface.

Write any four advantages of friction.

Friction is necessary because it helps us in performing many of our daily life activities:

- i) We are able to walk on ground because friction between the sole of our shoes and ground prevents us from slipping over the ground.

- ii) If an object started moving, it would never stop if there were no friction. If there been no friction between the tyres of the automobiles and the road, they could not be started or stoped or turned to change the direction of motion.
- iii) We are able to write and make drawing on paper because there is friction between the tip of pencil and paper.
- iv) We can hold a glass tumbler (or any object) in our hand because of friction between the glass tumbler (any objects) and our hands.
- v) We could not fix a nail in the wall or tie a knot.
- vi) Without friction no building could be constructed.

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