

Chapter - 12

FRICTION

Q1. What is force of friction or friction?

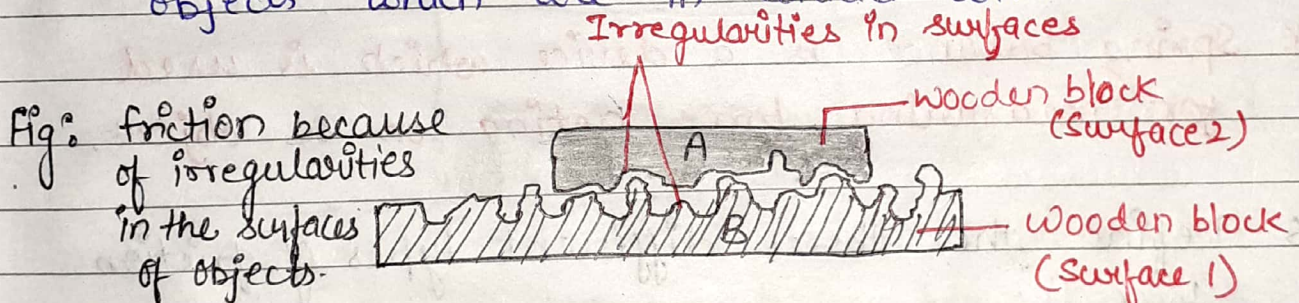
Ans- The force which always opposes the motion of one object over another object in contact with it, is called force of friction or friction.

Q2. What is the direction of force of friction acting on a moving object?

Ans- The force of friction acts in a direction opposite to the direction in which an object moves.

Q3. What is the cause of friction?

Ans- Friction is caused by the interlocking of irregularities on the surfaces of the two objects which are in contact with each other.



Q4. Explain the two factors which affect friction.

Ans: Factors affecting friction are -

(a) Nature of the two surfaces in contact:

Friction depends on the smoothness or roughness of the two surfaces which are in contact with each other.

- Friction can be increased by making a surface rough.
- Friction can be reduced by making a surface smooth.



(b) The force with which two surfaces are pressed together:

Greater the weight of an object which moves over another surface, greater will be the friction between them.

Example - Moving a heavy box is difficult as compared to moving a light object on the same surface. Friction is higher in case of a heavy box.

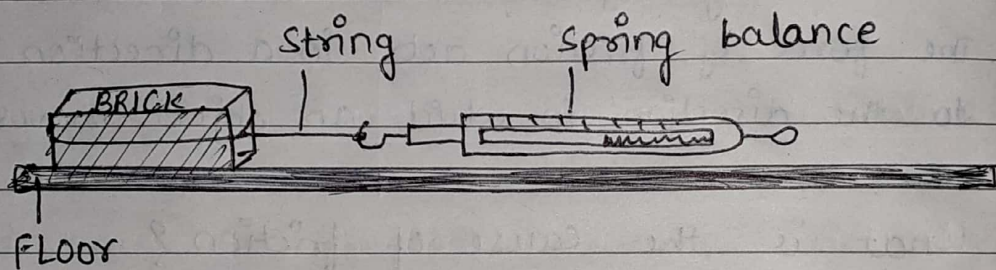


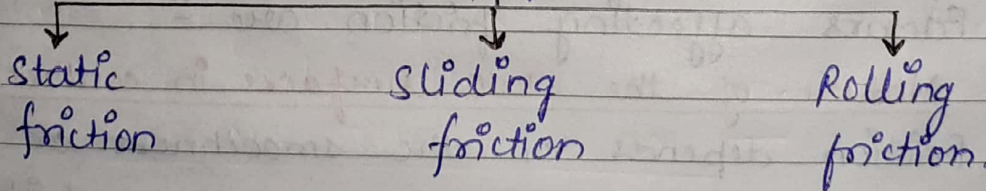
Fig: To show the dependence of friction on the nature of surfaces.

* Spring balance is a device which is used for measuring force acting on an object.

Q5. Define the three different types of friction force.

Ans-

Types of friction



1. STATIC FRICTION

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.

2. SLIDING FRICTION

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

3. ROLLING FRICTION

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

* Rolling reduces friction

Eg - Heavy machines can be easily moved from one place to another by placing round logs of wood under them and then pushing with the force of hands.

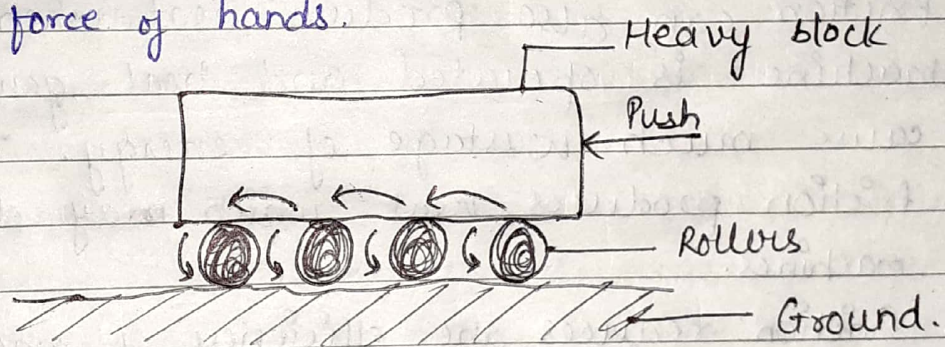


Fig: Rollers between heavy block and ground reduces friction.

Q6. Justify the statement given below.

"FRICTION IS A NECESSARY EVIL".

Ans - Friction is a necessary evil because it has both harmful and beneficial effects.

(a) Examples of friction as a friend (Advantages) -

1. friction between the tip of a pen and a paper allows us to write.



2. We can walk easily because ground offers friction.
3. Without friction no building could be constructed.
4. A nail cannot be fixed on the wall without friction.
5. Friction enables us to light a matchstick.
6. Friction enables us to pick up and hold things in our hands.
7. A moving object could never stop if there were no friction.

(b) Examples of friction as a foe (disadvantages)-

1. Friction wears away the soles of our shoes.
2. The tyres of vehicles wear out gradually due to friction.
3. Friction can also produce heat when a machine is operated and heat generated cause much wastage of energy.
4. Friction produces heat which may damage machines.
5. Friction reduces the efficiency of machines.
6. Friction slows down motion of an object.

Q7 Explain giving examples the ways used for increasing and reducing friction.

Ans- (A) INCREASING THE FRICTION —

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. Gymnasts apply some coarse substance on their hands to increase friction for better grip.
5. Brake pads of bicycles and automobiles also increase friction.
6. Kabaddi players rub their hands with soil for a better grip of their opponents to increase friction.

(B) DECREASING THE FRICTION —

1. Fine powder is sprinkled on the carrom board to reduce friction.
2. A few drops of oil are poured on the hinges of the door to decrease friction due to which the door moves freely.
3. Friction can be reduced by applying lubricants (like oil or grease) to the rubbing surfaces.

★ The substances which reduce friction are called lubricants. They make a thin layer over surface and facilitates smooth movement.

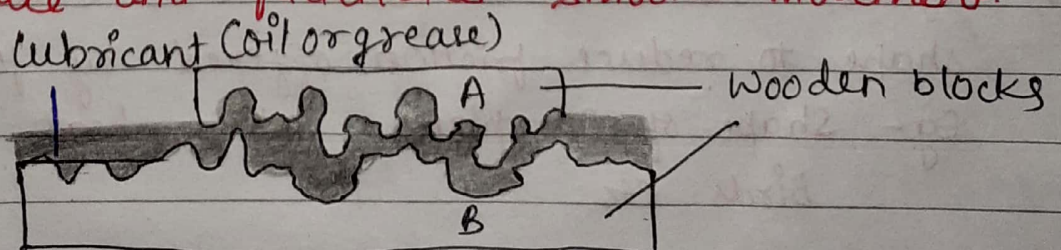
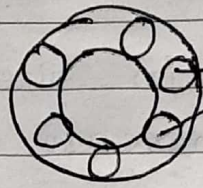


Fig : Action of lubricant.



4. In many machines friction is reduced by using ball bearings.



Ball bearings.

Q10.

Ans.

★ Sliding friction is replaced in most of the machines by rolling friction by using ball bearings.

Q8. What are fluids and fluid friction?

Ans - • Gases and liquids are generally known as fluids.

- Fluids also exert force of friction on objects in ~~move~~ motion through them.

The frictional force exerted by fluids is called drag or fluid friction.

Q9. Mention the factors on which fluid friction depends.

Ans - The frictional force on an object in a fluid depends on -

1. Its speed with respect to the fluid.
2. The shape of object
3. Nature of the fluid.

★ Objects which move in fluids have streamlined shape to reduce friction offered by fluid.

Eg - Shape of aeroplane, ship, boat, fish, birds etc.



Q10. Explain why sliding friction is less than static friction.

Ans. Friction comes into play when irregularities present on the surfaces of two objects come in contact and get interlocked with each other. The two sliding objects get less time to get interlocked against each other. Thus interlocking is not strong, and less force is required to break their interlocking. Whereas in static condition, the objects get enough time for the irregularities to get interlocked strongly. Due to this reason, sliding friction is less than static friction.

Strength of friction:

$\text{Rolling friction} < \text{Sliding friction} < \text{Static friction}$
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