AECS2, Mumbai-400094.

Subject: Science Chapter 12: FRICTION Class VIII

HAND OUT – MODULE 1 of 4

1. FRICTION – In everyday life

- You might have seen a driver of a car or a truck slowing down the vehicle at a traffic signal.
- If we stop pedalling a bicycle, it gradually slows down and comes to a stop due to force of friction between the wheel & the road.
- Normally, any object, moving over the surface of another object slows down when no external force is applied on it and finally stops.

Force of friction is the force which opposes the motion of an object over surface.

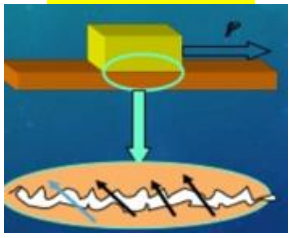
- The force of friction acts between the object & the surface.
- Eg: If you roll a ball along the floor or ground, it will gradually slow down and stop even if no apparent force is being applied to it. The ball slows down and stops because of friction between the ball & the ground.
- Friction slows down a moving object. Friction occurs when two objects rub against each other and it depends on both of the surfaces in contact.

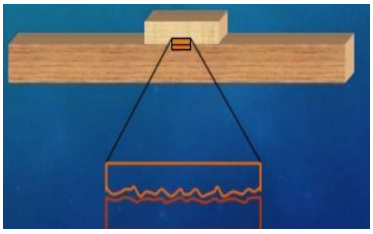
2. What is FRICTION?

A frictional force arises when two substances contact each other.
Friction is a force that resists the motion of objects or surfaces.
Friction always works in the direction opposite from the direction the object is moving or trying to move.
It always slows a moving object down.
FRICTION is caused due to the interlocking of irregularities between the two surfaces in contact.

i. Smooth surfaces: have minimum irregularities between the two surfaces.
ii. Rough surfaces: have larger irregularities between the two surfaces.

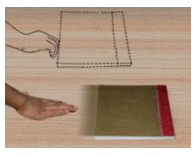
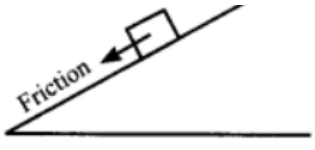
So forces of Friction is MORE if the surfaces are ROUGH.

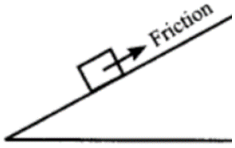


3. FRICTION – How does it acts?

- If we try to push a book on a table, a force must be acting on the book opposing its motion? This force is called the force of friction.
- 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.
- Hence when we move up the slope, the frictional forces acts downwards, while when we move downwards it acts in the upwards direction.
- Friction opposes relative motion between the surfaces of the book and the table



4. HOW FRICTION AFFECTS MOTION? - FRICTION –Depends on?

- A Car moving on a rough road slows down due to friction. However on a levelled smooth road, it travels fast.
- A smooth surface has very few bump sands hollows. There is less friction on a smooth surface. A running object can glide or move continuously with very little force.
- In ice hockey, when the ball / puck slides on ice, a thin layer of water between the rubber and the ice and allows the ball / puck to slide easily.

5. FACTORS AFFECTING FRICTION

FRICTION depends on a material's properties such as roughness, how clean the surfaces are, and other factors.

Two Main Factors are:

i. Nature of the surfaces in contact. (the smoothness of the surfaces).

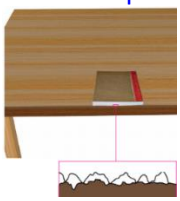
ii. How hard the surfaces are pressed together.

FRICTION is caused by the interlocking of irregularities in the two surfaces.

Friction is LESS on smooth surface, hence the roller travels a greater distance on smooth surface compared with the rough surface.

6. FACTORS AFFECTING FRICTION…… Cont'd

- 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.
- Since friction opposes relative motion between the surfaces of the book and the table, on a wooden table the weight suspended from a string will not be able to pull the book down because of the friction between the book & the wooden table. But If we place a glass on top of the table, then the smoothness increases, and the load will be able to pull the book down.



7. SPRING BALANCE

- Spring balance is a device used for measuring the force acting on an object. It consists of a coiled spring which gets stretched when a force is applied to it. *Here we are using it to measure the magnitude of the frictional forces.*
- Stretching of the spring is measured by a pointer moving on a graduated scale. The reading on the scale gives the magnitude of the force.
- When the Load is trying to pull the spring down, the spring is trying to pull it back to its original position (Internal energy of spring).
- F=mg, (m= mass, g= 9.81m/s2), and F= -kx, (k=elasticity of spring material, x= elongation / stretch).

8. FRICTION A NECESSARY EVIL-FRICTION SOMETIMES IS UNDESIRABLE

The tyres of vehicles are treaded to increase the grip on the road.

- If there is a spillage of oil on the road, it makes it dangerous as oil mistaken for water, reduces friction between the road & the tyre to make it slippery to cause accident.
- The break pads of vehicles are replaced with new / rough ones (as the old ones becomes slippery).
- Steps of staircases and hand rails on foot over bridges at railway stations wear out due to friction. (causing injury to passengers because of slipping)
- Knives & razors lose their sharp edges due to friction.
- Gymnasts apply some coarse substance on their hands for a better grip.

9. EVILs of Friction-FRICTION SOMETIMES IS UNDESIRABLE

shoes wear out

Slippery Staircase

Blunt Knives

10. End of MODULE 1 of 4, Thank You