KALPAVRUKSHA MODEL SCHOOL

Class: VIII **Sub: Physics** **Date: 2.09.2021**

Topic: Force and friction

FORCE AND FRICTION

I.Define the following:

1. **Force:** A force is a push or pulls acting on an object which changes or tends to change the state of the object.
2. **Non-contact force:** Forces which can act without physical contact between objects, i.e. those that can act from a distance, are called non-contact forces or field forces.
3. **Contact force:** Forces which act only when there is physical contact between two interacting objects are known as Contact forces.
4. **Fluid friction:** When a solid object is in contact with a fluid and a force is applied to either the object or to the fluid, there is a friction force that resists the motion it is called fluid friction.

A. Short answer questions:

1. **Write down any two effects of force.**

Ans: The two effects of force are

a. Force can change the shape and size of an object.
b. Force can change the direction of a moving object.

2. **Name any two non-contact forces.**

Ans: Magnetic force and gravitational force are non-contact forces.

3. **Give two examples of contact forces.**

Ans: i. While kicking a ball, the player applies force over the ball using his leg muscles.
ii. A moving football stops after going to a certain distance. This happens because of force of friction between the surface of ground and the surface of football.

4. **Why do tiny bits of paper get attracted when brought close to plastic pen or comb, which have recently been rubbed?**

Ans: If we rub a plastic pen or comb with our hair and bring it close to tiny bits of paper, the bits of paper get attracted to the plastic object. This is due to electrostatic force. Rubbing vigorously makes the dry comb electrically charged and due to the presence of charge the comb attracts tiny bits of paper.

5. **Give two methods of reducing friction.**

Ans: Methods of minimizing friction are

a) By using a suitable lubricant, like oil (for light machinery) or grease (for heavy machinery). This

Helps because fluid friction is less than solid friction.

b) By using wheels and ball bearings

6.Give two methods of increasing friction.

Ans: Methods of increasing friction are

a) By making the moving surfaces rough, e.g. tyres have designs and patterns with grooves on the surface to increase resistance with the road. This prevents slipping of the tyres on a wet road.

b) Sand and gravel is strewn on slippery ground during the rainy season to increase friction. It is then easier to walk on the ground.

7. **When a heavy piece of furniture is to be pulled across a room, it becomes easier to do so if we put a large piece of cloth like bed sheet underneath it and pull the cloth, rather than just pull the furniture. Explain why.**

Ans: We cannot pull because roughness increases between two surfaces and we have to use ball bearings in between to pull easily.

8. **Whether you run, walk, stand still, sit, or lie down , there is a force acting on your body all the time. Name that force.**

Ans: Gravitational force

B. <u>Long answer questions:</u>

1. **Write a note on the types of contact and non-contact forces.**

Ans: Types of contact forces:

Muscular Force: -Force caused by the action of muscles is called muscular force. In other words, force resulting because of action of muscle is called muscular force. Muscular force is applied only after interaction with the object. Hence it is a type of contact force.

Example : – a) While kicking a ball, the player applies force over the ball using his leg muscles.

b) While opening a drawer, you pull the drawer holding it by hand. In this action, muscles of your hand apply the force.

c) While pulling a cart, the horse or the ox applies the force of its muscles.

Friction: Force acting between the surfaces of two objects is called the force of friction. Force of friction always acts in the opposite direction of the movement of object. Force of friction is acting over all the moving objects.

Example – a) A moving football stops after going to a certain distance. This happens because of force of friction between the surface of ground and the surface of football.

b) A moving boat stops after some distance because of friction between the surface of water and the surface of boat.

Since force of friction comes into action only after interaction between two objects, thus, it is a type of contact force.

Types of non-contact forces:

Magnetic Force: Force exerted by a magnet on another magnet or on magnetic substances is called magnetic force. A magnet can exert force even without coming in contact, thus it is a non-contact force.

Example – A magnet attracts the opposite pole of another magnet and repels the similar pole of another magnet.

Electrostatic Force: Force exerted by a charged body is called electrostatic force. A charged body attracts an uncharged body. A positively charged body attracts a negatively charged body and repels a positively charged body without coming in contact, thus it is a non-contact force.

Gravitational Force: Force exerted by earth, moon, sun and other planets is called gravitational force. Earth attracts all objects towards it. Similarly, all other planets along with moon attract all objects towards them. Since, earth attracts all objects even without coming in contact, thus gravitational force is a non-contact force.

Example –

When anything is released from a height, it falls over the ground because of gravitational pull of earth.

2. **Differentiate between rolling and sliding friction.**

Ans: Rolling friction: The resistive force that slows the wheel's motion on the other solid surface. Much of rolling friction is caused by adhesion between the surfaces.

Sliding friction: When two solid objects are in contact and a force is applied to slide one object against the other it is called sliding friction. Sliding friction force resists the motion. The causes of sliding friction are molecular attraction or adhesion between the materials, surface roughness of the materials, and deformation resistance in the case of soft materials.

3. **What are the advantages and disadvantages of friction?**

Ans: <u>Advantages of friction</u>

Friction plays an important role in our daily life.

a. Without friction we would slip and fall every time we attempt to walk or run. There is very little friction on a wet polished floor. That is why it is easy to slip on such a floor.
b. Friction causes nails and screws to hold on to walls.
c. It would not be possible to light a matchstick without friction between its head and the side of the matchbox.
d. Cars and buses are able to run on roads because of friction between the tyres and the road.
e. Without friction writing on paper would be impossible as the tip of the pen will slip on paper.
f. It is because of friction between the brake ‘shoes’ and wheels that bicycles and automobiles stop when brakes are applied.

Disadvantages of friction

Friction is a nuisance in some circumstances.

a. The heat produced in the moving parts of machinery due to friction results in wear and tear of the parts.
b. Forest fires are caused due to friction between branches of trees rubbing against each other.
c. Tyres of vehicles and soles of footwear wear out because of friction.
d. Energy is wasted in overcoming the force of friction.

4. **Explain why ball bearings are used and how they are helpful.**

Ans: Ball bearings are used to reduce friction. Ball bearings change sliding friction to rolling friction. This is a very useful thing to do since rolling friction is much smaller than sliding friction. Ball bearings are used in most mechanical structures which have moving parts. Small metal balls made of stainless steel, brass ceramic etc., are placed between moving surfaces to reduce friction.

5. **What do you mean by 'streamlined shape'? How does it help in the motion of vehicles?**

Ans: Streamline shape: A shape which is narrow in front and broader in the middle offers minimum friction when moving through air or water. When cars and aero planes move at very high speeds, their motion is opposed by friction offered by the air molecules surrounding them. The friction of air produces what is called drag, which opposes the motion of the vehicle. The same applies to ships and boats. To reduce drag, automobiles, ships and aero planes are given a special shape, called a streamlined shape. An automobile with a streamline body experiences minimum resistance when travelling through air. Even sea creatures like fish and shark have streamline bodies, which make it easier for them to move with great speed in water.