CLASS IX CHAPTER 9 Force and Laws of Motion

ACTIVITY

TOPIC :How are the directions of action and reaction forces related?

What is required?

Syringe, sleeve (thin flexible tube), aluminium wire about 5 cm long and a beaker.

How will you proceed?

(a) 1. Take a syringe and fit a sleeve (thin flexibles tube) of about 15 cm length to its nozzle. 2. Insert the aluminium wire into the sleeve and bend it into a 900 arc of a circle.
(b) 3. Dip the sleeve in water kept in a beaker and pull out the piston of the syringe so that the syringe is filled with water. You inevitably pull in some air bubbles too. Push the bubbles out and once more completely fill the syringe with water.
(c) 4. Take the sleeve out of water. Hold it stable horizontally against the edge of a table, with bent wire pointing to side.
(d) 5. Push the piston inwards.
(e)6. Observe in which direction the stream of water comes out of the sleeve?

7. Also observe simultaneously, what happens to the sleeve? It moves opposite to water stream. Is there any force acting on the sleeve? What is the direction of this force? Repeat Steps 3 to 7 several times and conclude from your observations. Fig. 9.9.1(a)

(f) Arrangement to show the action and reaction forces
(g) Sleev bends when water is freed out Aluminium wire

(h) **What have you learnt?**

(i) As the stream of water comes out from the sleeve, the sleeve moves in opposite direction. This shows that moving out of water is due to force of the action. Movement of the sleeve is due to force of reaction. The action and reaction forces act in the opposite directions. Extension Repeat this activity by pressing the piston slowly and quickly. Do you find any effect of it on the motion of sleeve in backwards direction? Alternatively, the above relationship between directions of action and reaction forces can be learnt by the following activity also

Activity 2

TOPIC : Law of conservation of momentum

What is required?

A balloon, a straw, thread, a pair of scissors and an adhesive tape

How will you proceed?

1. Pass a thread of about 4 m to 5m length through a straw and tie it across the length or breadth of the room.

2. Take a big balloon. Inflate it fully and hold its neck so that air does not come out. Move the straw near one end of the thread, and keep the inflated balloon under the straw in contact with it, the neck of the balloon facing the wall as shown in [Fig. 9.9.1(b)]. Fig. 9.9.1(b) Arrangement to show the direction of reaction forces

3. Let your friend stick the balloon under the straw by atleast two pieces of sticking tape

. 4. Now release the balloon. What happens to the balloon? In what direction does it move? In which direction does air escape from the balloon? Window Straw Adhesive tape Thread Balloon Window

What have you learnt?

The balloon and the air escaping from the balloon move in opposite directions. Thus, action and reaction forces act in the opposite directions. Extension Hold the thread vertically with the balloon at the lower end and its mouth facing the ground. Also repeat the activity using balloons of different sizes

ACTIVITY 3

TOPIC: To study the effect of force on an object

Material: Coins, cups, cards (large enough to cover the mouth of the cup)

Steps:

• Take a tumbler and cover it with a stiff piece of playing card.
• Place a 5 rupee coin at the centre of the card.
• Give the card a sharp horizontal flick with a finger.
• If the student does it fast, then the card shoots away, allowing the coin to fall.
vertically into the glass tumbler due to its inertia.
• The inertia of the coin tries to maintain its state of rest even when the card flies off.
Conclusion:
state of rest. If it is at rest, it tends to remain at rest. This property of an object is called inertia.

Similarly, when the branch of a tree is shaken vigorously, all the leaves fall; only the carom coin at the bottom of the pile is removed when a fast moving striker hits it; when a carpet is beaten, all the dust particles fall due to the inertia.
This examples illustrate that there is a resistance offered by any stationary object to change its
state