PARAGON CONVENT SCHOOL

SECTOR : 24 B, CHANDIGARH

LESSON - 11

FORCE AND PRESSURE

Summary:

- Force is defined as the push or pull on an object.
- A force has both magnitude and direction. Force can change the speed of an object, the direction of an object's motion or the shape of an object.
- When multiple forces act on a body in the same direction, they get added up.
- When multiple forces act on a body from opposite directions, they get subtracted and the net force is in the direction of the larger force.
- Contact forces are exerted when two surfaces touch each other.
- Friction is a contact force that opposes motion.
- Muscular force is a contact force that moves things.
- Non-contact force is produced when two objects are near each other but not touching.
- Magnetic force is a non-contact force in which iron and nickel items are attracted by a magnet.
- Electrostatic force is the non-contact force of attraction between two oppositely charged bodies.
- Gravity is a non-contact force due to which an object attracts all other objects around it. Gravity of the Earth is high in magnitude due to its large mass and pulls every object towards its centre.
- Pressure is the force acting on a unit area.
- Pressure exerted by air is called atmospheric pressure. It decreases as we move up in the air.
- Pressure exerted by liquids increase with the depth.

Multiple Choice Questions (Page No. 155)

1. (d) 2. (c) 3 (c) 4. (a) 5. (a)

Multiple Choice Questions (Page No. 160)

1. (a) 2. (a) 3 (c) 4. (c) 5. (b)

SECTION A

Oral questions

Q1.- Name the five effects of force.

Ans.- The five effects of force are:

(i) It can cause motion in a stationary object.

(ii) It can stop a moving object.

(iii) It can change the direction of motion of a moving object.

(iv) It can change the speed of a moving object.

(v) It can change the shape and size of an object.

Q2.- What is frictional force? Give two examples of frictional force.

Ans.- The force acting along two surfaces in contact which opposes the motion of one object over the other is called the force of friction or frictional force.
Examples of frictional force:

(i) A moving or rolling ball stops after some time.

(ii) A bicycle comes to rest, when we stop pedalling.

Q3.- Define pressure. What is the SI unit of pressure?

Ans.- Force acting on a unit area of an object is known as pressure.

Pressure (P) = Force (F) / Area (A)

The SI unit of pressure is N/m^2 or pascal.

Science Quiz

Q1.- Name the instrument used to measure the atmospheric pressure.

Ans.- Barometer

Q2.- What are the two parameters that define pressure?

Ans.- Force and area

Q3.- Name one force that can act from a distance.

Ans.- Electrostatic force / gravitational force

WORKSHEET

Tick (√) the correct options

1. (c) 2. (c) 3. (a) 4. (c) 5. (d)

Circle the odd ones. Give reasons for your choice

1. Magnetic force Gravitational force Muscular force Electostatic force

Ans.- Muscular force - It is a type of contact force, whereas others are the types of non-contact forces.

2. Spacesuit Drinking straw Lubricants Syringe

Ans.- Lubricant - It is used to reduce friction, whereas others are applications of atmospheric pressure.

Fill in the blanks

1. greater pressure 2. equal

2. atmospheric pressure 4. gravitational

SECTION B

Multiple Choice Questions

1. (d) 2. (c) 3. (c)

Very Short Answer Questions

Q1.- What is the resultant force when two equal forces act on an object in same direction?

Ans.- The resultant force will be the sum of both the forces.

Q2.- What is the SI unit for measuring pressure?

Ans.- N/m^2 or pascal

Q3.- What happens, when a plastic comb rubbed several times in dry hair,is brought near a heap of pieces of paper?

Ans.- The small pieces of paper get attracted to the plastic comb and stick to it because of the electrostatic force.

Short Answer Type-I Questions

Q1.- How can you feel one newton force?

Ans.- We can feel force of 1 N by placing 100 g weight on our palm.

Q2.- Explain why an apple dropped from a height always falls down on the earth.

Ans.- An apple dropped from a height always falls on the earth because of force of gravity. This force is due to the attraction between the earth and the object.

Q3.- What is meant by force of gravity?

Ans.- The force of attraction exerted by the earth on the objects due to which the objects fall vertically downwards is called force of gravity.

Q4.- Explain why astronauts wear specially designed spacesuits.

Ans.- Since, there is no atmosphere outside the earth, so to maintain the normal atmospheric pressure of their body, astronauts wear special designed spacesuits.

Q5.- Where is the pressure greater, 10m or 20m below the surface of the sea? Give reason.

Ans.- The pressure is higher at 20 m below the surface of the sea because the pressure of a liquid increases with depth.

Short Answer Type-II Questions

Q1.- Explain why a wide seat belt is provided over the wheels of army tanks.

Ans.- A wide steel belt is provided over the wheels of army tanks so as to reduce pressure on the ground, otherwise the heavy wheels of tanks may sink in the ground.

Q2.- a) Why do mountaineers suffer nose bleeding at high altitudes?

b) How does atmospheric pressure help in drinking juice with straw?

Ans.- (a) The mountaineers suffer nose bleeding at high altitudes because at high altitudes, the atmospheric pressure is much less than our blood pressure. Due to this, some of the blood capillaries burst and blood comes out through the nose of the mountaineers.

(b) When we suck air at the upper end of the straw with our mouth, the pressure of the air inside the straw is reduced. But the pressure acting on the surface of the fruit juice is equal to the atmospheric pressure. So, the greater atmospheric pressure acting on the surface of the fruit juice pushes the fruit juice up into the straw to our mouth which helps to drink juice with straw.

Q3.- Nitika is cutting fruits for her grandmother as she is ill. She finds it difficult to cut the fruits. She sharpens the cutting edge of the knife and cuts the fruits easily.

a) How does sharpening the knife help in cutting the objects easily?

b) What can you learn from Nitika?

Ans.- (a) As the cutting edge is sharpened, the area of contact reduces which increases the pressure over any object and hence, knife cuts the objects easily.

(b) We learn to love, take care and to help our elders, especially grandparents.

Long Answer Questions

Q1.- Explain why : a) a heavy truck is fitted with six to fourteen tyres.

c) skiers use long flat skis to slide over snow.

c) foundations of high rise buildings are kept wide.

Ans.- (a) A heavy truck is fitted with six to fourteen tyres because these tyres increase the area of contact on which their weight acts and hence, reduce their pressure on the ground.

(b) Skiers use long, flat skis to slide over snow because the area of contact is larger and therefore, lesser is the pressure on the snow, enabling the skier to slide over the snow without sinking in the snow.

(c) Foundations of high-rise buildings are kept wide, so that they exert less pressure on the ground and do not sink in due to the extremely high pressure of the building.

Q2.- Give reasons :

a) School bags are provided with wide straps to carry them.

b) The walls of a dam are are thicker near the bottom than at the top.

Ans.- (a) A school bag has wide straps made of thick cloth, so that the weight of the bag may fall over large area of the shoulder of the child, producing less pressure on the shoulders and making it more comfortable to carry the heavy school bag.

(b) The walls of a dam are made thicker at the bottom because water pressure increases with depth and a thicker wall can withstand a greater pressure exerted by the water at greater depths.

Q3.- a) What is atmospheric pressure?

b)Why is our body not crushed by the enormous pressure exerted by the atmosphere?

c) Give one application of atmospheric pressure from everyday life.

Ans.- (a) The pressure exerted by the air due to its own weight is known as atmospheric pressure.

(b) Our body is not crushed by the large pressure exerted by the atmosphere because the pressure of the blood in the blood vessels and other fluids present in the body, balances the atmospheric pressure.

(c) Working of a syringe is based on the presence of atmospheric pressure. When we dip a syringe in a liquid and pull its piston, the pressure inside the syringe gets reduced. The atmospheric pressure acting on the surface of the liquid is more in comparison to the air pressure in the syringe and thus, it pushes the liquid up into the syringe.