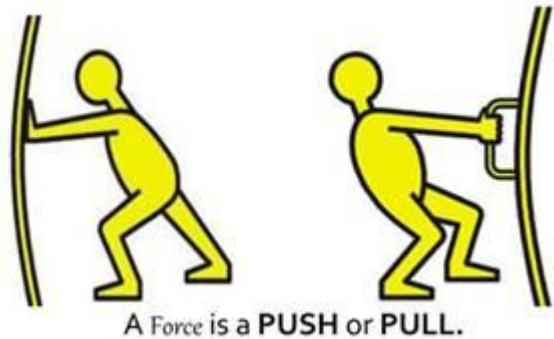


Force & Pressure

Check point 1

Q. 1. Explain the term force with the help of some suitable examples.

Answer: Force refers to a push or a pull that changes the state of rest or uniform motion of an object or changes the direction or shape of the object. For example: kicking a football, lifting a book.



Q. 2. Mention the necessary conditions for a force to come into play.

Answer: Interaction between two objects is required for a force to come into play. The interaction of one object with other results in a force between two objects but no physical contact is necessary.

Q. 3. Explain in brief, what happens when two force act in opposite direction on an object.

Answer: If the magnitudes of the two forces acting in opposite direction on an object are equal then the object will not move at all. On the other hand, if the magnitudes of the two forces are unequal then the net force acting on the object is the difference between the two forces and the object will moves towards the direction of the larger force applied.



Balanced Forces in Opposite Directions

When two equal forces act in opposite directions, they cancel each other out. The box doesn't move.



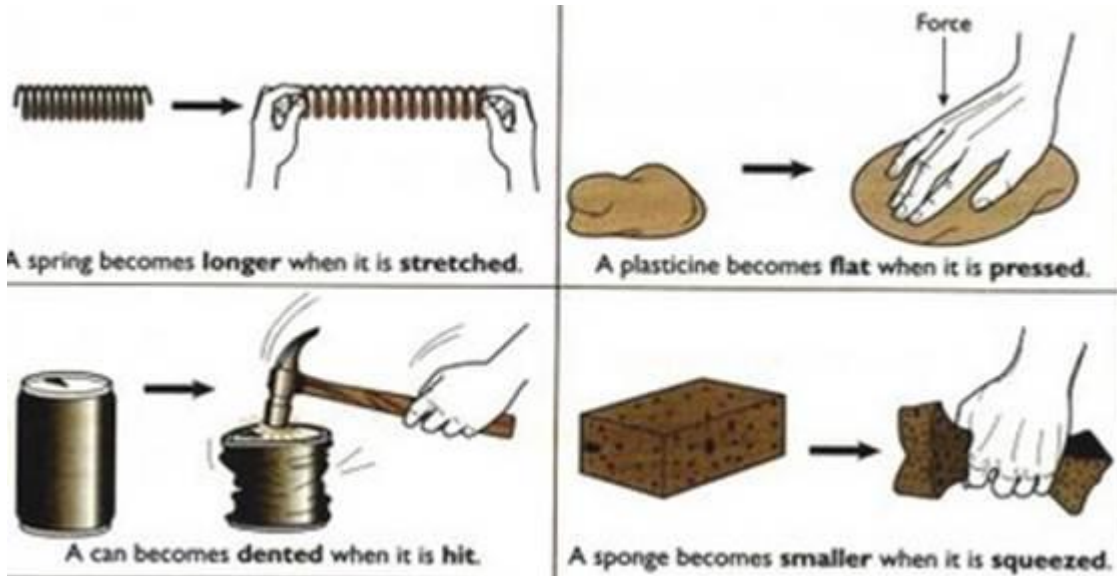
Check point 2

Q. 1. In brief manner, explain the change in the state of motion.

Answer: When a force is applied to an object at rest or in motion, it changes the speed and direction of motion of the object resulting in the object coming to rest or in motion in other direction with some different speed than the initial one. Therefore, a change in the speed of the object and the direction of motion of the object is referred as change in the state of the object.

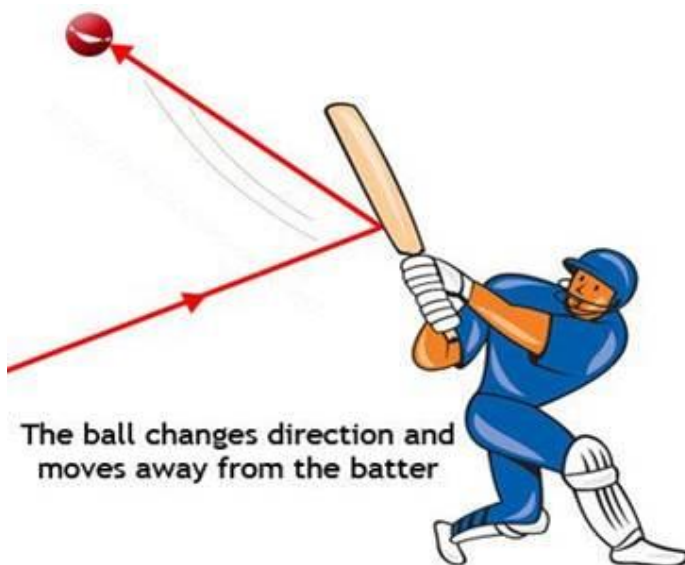
Q. 2. Briefly mention the effect of force on the shape on an object.

Answer: Shape of an object generally gets deformed or reformed when a force of sufficient magnitude is applied. For example: When we hit the wall with our hands, the wall will not get deformed but if we hit it with a hammer, it will break down.



Q. 3. State the effect on the direction of moving ball when it is hit by a batsman.

Answer: A bowler throws a ball with a certain force in a certain direction. As soon as the batsman hits the ball with the bat, the speed and direction of ball changes. The force applied by the batsman will determine the distance covered by the ball. If he strikes the ball with greater force then it will be a boundary and if he applies force of lesser magnitude then he may get one or two runs.



Q. 4. If two pushing force acting on a body in opposite direction, then what will be the net force on an object.

Answer: If the magnitudes of the two forces are unequal then the net force acting on the object is the difference between the two forces and the object will moves towards the direction of the larger force applied.

Check point 3

Q. 1. Name two broad categories of forces.

Answer: The two broad categories of forces are:

•Contact force: It is a force where physical contact between two objects is required. For example: Muscular force, friction.



applied force



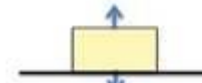
spring force



drag force



frictional force



normal force

•Non-contact force: This force does not require any physical contact between the objects. For example: gravitational force, magnetic force.



magnetic force



electric force



gravitational force

Q. 2. Explain brief about muscular force along with the help of an example.

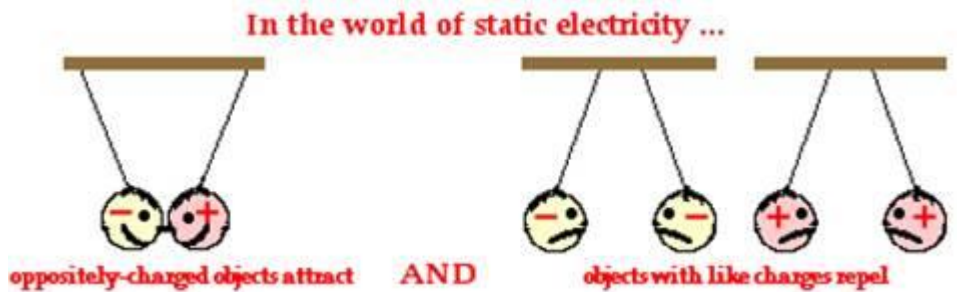
Answer: The force exerted by the muscles of arms or legs or any other body part in order to do some work is called muscular force.

Kicking a football, pushing a car are some examples.



Q. 3. Explain the situation when does the repulsion occur for two charges.

Answer: When two like charges come in close vicinity of one another then they will repel each other. There are two types of charges positive and negative charges. When two positives or two negative charges come close to one another, they repel.



Q. 4. Is it compulsory that non-contact forces are having both the properties, i.e., attraction and repulsion?

Answer: Yes, it is compulsory that non-contact forces are having both the properties, i.e., attraction and repulsion as both these properties depend on the charge or pole of the object. The object having positive charge will attract a negatively charged object and the same object with positive charge will repel another positively charged object. Thus both attraction and repulsion are there in the same object.

Q. 5. Write the force with which the earth attracts the objects towards it.

Answer: Force of gravity or gravitational force is the force with which the earth attracts the objects towards it. This force ensures every object gets attracted towards the earth's surface. For example: when a ball is thrown upwards, after reaching a certain height it starts to fall down. Sir Isaac Newton introduced the gravitational force.



Check point 4

Q. 1. Explain, how pressure can be defined along with some suitable examples.

Answer: Pressure is defined as force per unit area. Its SI unit is Pascal. For example: In an inflated balloon, the air exerts pressure on the walls of the balloon, filling a syringe, atmospheric pressure.

Q. 2. A sharp axe cuts the long earlier than a blunt axe. Explain why.

Answer: A sharp axe has a sharp edge which means edge has a minimum area as compared to the rest of the axe. As the area is small, the pressure is large and thus easier to cut trees. Whereas blunt axe has larger edge thus exerting less pressure and hence it takes time to cut trees.

Q. 3. The pressure exerted by liquid depends on what factor?

Answer: Pressure exerted by the liquid depends on the depth and amount of the liquid in a tube and acceleration due to gravity.

Check point 5

Q. 1. Name the device used to measure atmospheric pressure.

Answer: Barometer is the device used to measure atmospheric pressure. It consists of a long tube containing mercury which is dipped upside down into a container of mercury.

A figure is given below:

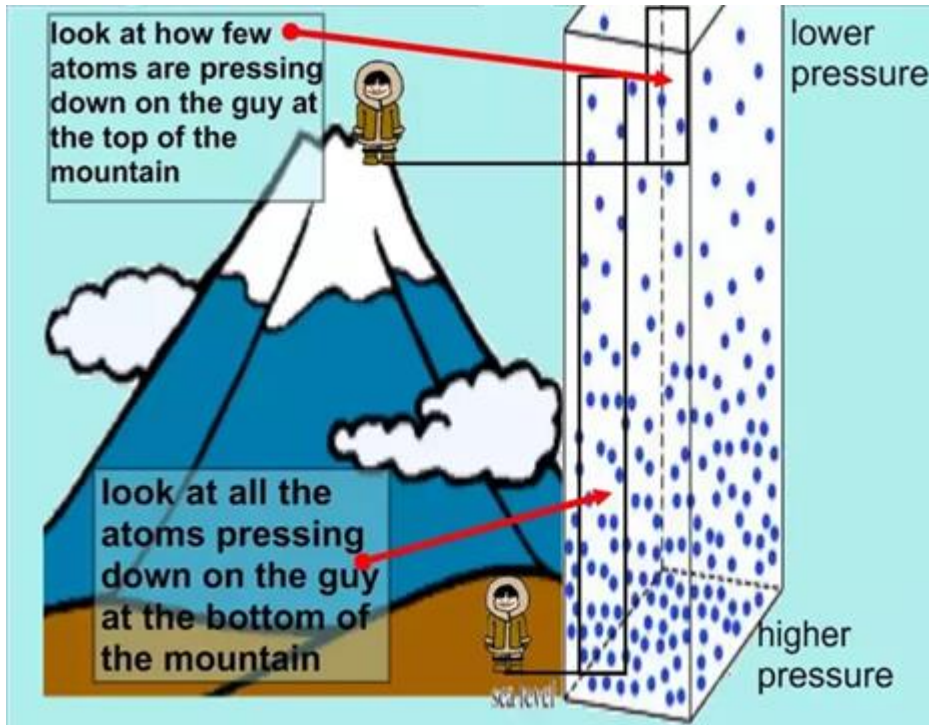


Q. 2. Give the numerical value of atmospheric pressure at sea level.

Answer: The pressure exerted by the air in the atmosphere is called atmospheric pressure. The numerical value of atmospheric pressure at sea level is 1.01325 bar or 101325 Pascal.

Q. 3. As we go to high altitude the atmospheric pressure goes on decreasing. Give the reason.

Answer: At higher altitude, the number of air molecules per unit area decreases. As a result, the force exerted by the air molecules decreases resulting in low pressure at higher altitudes.



Chapter Test

Q. 1. If you are pushing an object, then what actually it means?

Answer: When we are pushing an object, our hands apply muscular force on the object which results in movement of the object. Thus it means that we are applying force on the object.

Q. 2. Explain the concept of muscular force.

Answer: The force which occurs due to the action of muscles is called muscular force. To apply muscular force, there should be physical contact between both the objects. For example: when a bullock pulls a cart, its muscles apply the force on the cart. This happens only if the cart is bounded to the bullock.

Q. 3. How many types of non-contact forces are available? Give the names.

Answer: Non-contact force does not require any physical contact between the objects. There are three types of non-contact forces. They are:

- Gravitational force: It is a force with which the earth pulls every object towards it.
- Electrostatic Force: It is the force exerted by one stationary object having an electric charge on other stationary object having an electric charge. If the charge on both the

objects is same, they will repel and if the charge on both the objects is different then they will attract each other.

•Magnetic Force: It is the force present between two magnets caused by the interaction of their magnetic fields. This force causes the magnet to attract or repel each other.

Q. 4. Briefly state where will the atmospheric pressure be greater at ground level or at the top of the high mountain.

Answer: Atmospheric pressure refers to the number of air molecules per unit area. As we go to higher altitude, the number of air molecules decreases which results in a decrease in the magnitude of force exerted by them. So the atmospheric pressure will be greater at ground level.

Q. 5. How can you define pressure?

Answer: Pressure is the amount of force applied perpendicular to the surface of an object per unit area.

Q. 6. Write the SI unit of pressure.

Answer: SI unit of pressure is Pascal. Pascal is defined as the force of one Newton exerted on one square meter.

Q. 7. Why is it difficult to walk on ice?

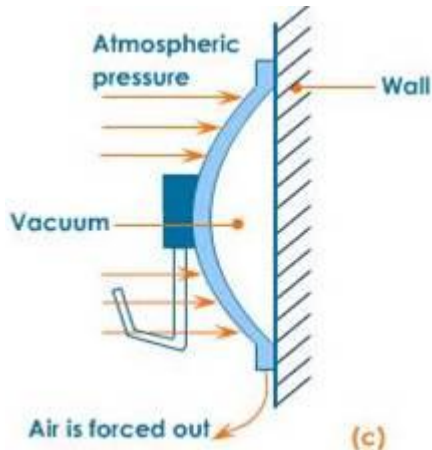
Answer: We are able to walk because friction acts between our feet and the ground in the opposite direction. Friction helps to get the grip without slipping. More the friction more is the grip. As the surface ice is smooth, friction is less resulting in the lesser grip. Therefore it is difficult to walk on ice.

Q. 8. What is the total normal force acting on a surface?

Answer: The normal force on the object is equal but in opposite direction to the gravitational force applied on the object (or the weight of the object), that is, where m is mass, and g is the gravitational field strength (about 9.81 m/s^2 on Earth).

Q. 9. Mention the type of pressure is involved in rubber sucker.

Answer: Air pressure is involved in rubber sucker. When we stick the rubber sucker to a surface, most of the air between the rubber and the surface escape thus the atmospheric pressure acts on it. To remove the rubber sucker, we have to apply a force equal to the atmospheric pressure.



Q. 10. Explain in brief why our head does not get crushed with atmospheric pressure.

Answer: The pressure inside our body is equal to the atmospheric pressure. Thus pressure inside cancels the pressure outside and preventing the head from being crushed.

Q. 11. Give an activity to show that pressure in a liquid increases with depth.

Answer: Activity: To show that pressure in a liquid increases with depth

Theory: Pressure is force per unit area.

$P = gh$, where

Ø P is the water pressure at a particular depth

Ø g is the acceleration due to gravity

Ø h is the depth of the water at that point

Materials Required: A plastic bottle, hammer, and nail, ruler

Experiment:

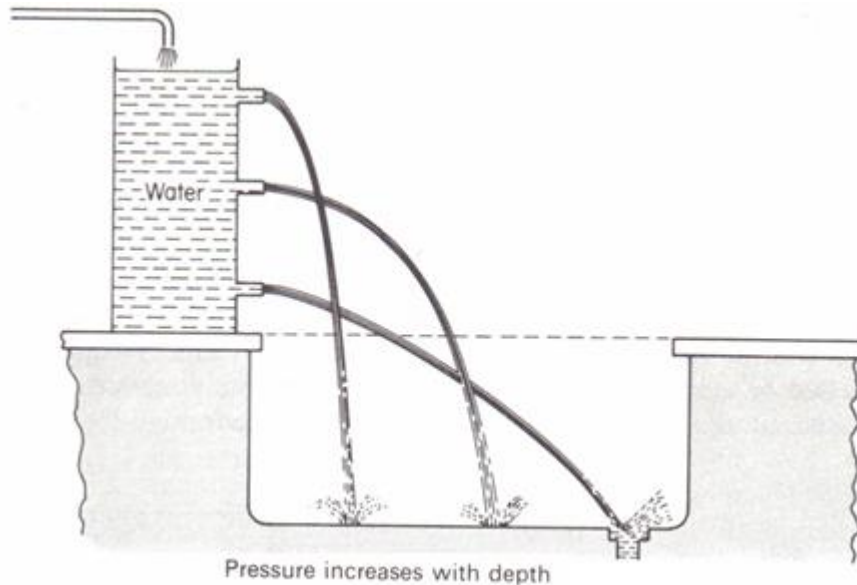
Ø Make holes of the same size on the bottle with the help of hammer and nail.

Ø Measure the distance of holes from the bottom with the help of a ruler.

Ø Now fill the bottle with water.

Ø Measure the distance from the bottle to the distance up to which the water comes out.

Conclusion: We will notice that greater the depth, greater is the force with which water comes out of the bottle that is the water coming out will travel more distance if the depth is increased.



Q. 12. The tip of the needle is sharp. Explain why.

Answer: Pressure is force per unit area. As the area decreases, the pressure will increase. The tip of the needle is sharp that is it has a minimum surface area than the rest of the needle. So when it is used in sewing, more pressure will be applied at the tip which helps in sewing through thick clothes.

Q. 13. Why can a camel walk in deserts easily?

Answer: Camels have padded feet that imply that its feet have more area. So when they walk on the sand, their body exerts less pressure on the sand which prevents them from sinking and thus helps them to walk.

Q. 14. The rear wheels of a tractor are very wide. Explain with reason.

Answer: Heavy vehicles have broad tyres because broad tyres have a large area of contact and thus exert less pressure on the ground. Because of this, heavy vehicles can move even on soft roads and fields without sinking.

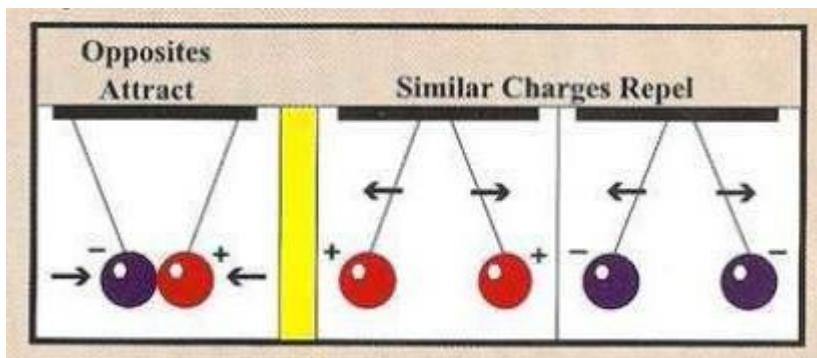
Q. 15. What will happen if we press a rubber ball placed on a table? Write your observation.

Answer: If we press the rubber ball placed on the table, it will get deformed. The extent of deformation depends on the force applied to the ball and the elasticity of the ball.

Moreover, the muscular force applied will impart potential energy to the ball which will rebound if force is released suddenly.

Q. 16. Explain and demonstrate the effect of electrostatic force.

Answer: Electrostatic force is the force exerted by one stationary object having an electric charge on another stationary object having an electric charge. If the charge on both the objects is the same, they will repel and if the charge on both the objects is different then they will attract each other. There are mainly two types of charges: positive and negative.



Here the balls acquire a charge from other negatively or positively charged bodies.

Q. 17. Describe an activity to show that a liquid exerts equal pressure in all the direction at a given depth.

Answer: Activity: To show that liquid exerts equal pressure in all the direction at a given depth.

Theory: Pressure is force per unit area. At any point in a fluid, the pressure is the same in all directions.

$P = gh$, where

Ø P is the water pressure at a particular depth

Ø g is the acceleration due to gravity

Ø h is the depth of the water at that point

Materials Required: A plastic bottle, hammer, and nail, ruler

Experiment:

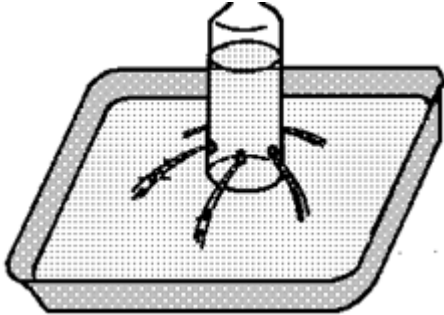
Ø Make holes of the same size on the bottle with the help of hammer and nail.

Ø Make sure that the holes should be at the same distance from the bottom surface.

Ø Now fill the bottle with water.

Ø Measure the distance from the bottle to the distance up to which the water comes out.

Conclusion: We will notice that the distance covered by the water coming out of the holes is equal. This implies that the pressure of the liquid at given depth is the same.



Q. 18. Define muscular force and mechanical force with examples.

Answer: The force exerted by the muscles of arms or legs or any other body part in order to do some work is called muscular force.

Kicking a football, pushing a car are some examples.

Mechanical force is a force between two objects which require physical contact with each other. It is the force created by the movement of an object over a distance. It requires a medium to travel. Force used by tractor or bulldozers, pushing a door are some examples.

Q. 19. Gravitational force is related to weight. List some points to justify this statement.

Answer: •Gravitational force is proportional to the product of the mass of the two objects.

•So more the mass/weight of the object, more is the gravitational force.

•When we drop a stone from a multi-storey building, gravitational force acts on it and the stone gets attracted towards earth very quickly.

•But when we drop a feather from the same building, it will take time to reach the earth's surface as its mass is negligible as compared to the stone. So the magnitude of gravitational force acting on feather is less.

Q. 20. Electric force attracts tiny bits of paper. Explain by an activity and write your observations.

Answer: Activity: To show tiny bits of paper gets attracted to electric force.

Theory: Electrostatic force is the force exerted by one stationary object having electric charge on other stationary object having electric charge. If the charge on both the objects is same, they will repel and if the charge on both the objects is different then they will attract each other. There are mainly two types of charges: positive and negative.

Materials required: tiny bits of paper, plastic ruler/comb

Experiment:

- Rub the plastic ruler/comb with a sheet of paper.
- This process will ensure that the ruler/comb gets charged.
- Now immediately bring the ruler/comb towards the bits of paper.

Conclusion: We will observe that the bits of paper will be attracted towards the ruler/comb. This happens because the charge acquired by the ruler/comb exerts a force on the paper and thus attracts it.

