

Board –CBSE

Class –8TH

Topic – Force and Pressure

1. What is Force?

Ans: A force is a push or pulls acting on an object that changes or tends to change the object's state.

2. What are the units of force?

Ans: In the international system of units (SI System), the unit of force is Newton (N), named after Sir Isaac Newton. There are also other units like dyne, a kilogram weight and pounds.

3. What are the actions and effects of force?

(a) can change the state of rest or motion (b) can change the shape of the object
(c) can change the speed of a body (d) can change the direction of motion

Ans A force

4. What are contact and non-contact forces?

Ans: Forces that act only when physical contact between two interacting objects are known as Contact forces. Forces that can act without physical contact between objects, i.e. those that can act from a distance, are called non-contact forces or field forces.

5. What is the definition of balanced and unbalanced force?

Ans: When two equal forces act on an object in opposite directions, called balanced force. When something does not move, the forces are balanced, e.g. Gravity pulls a table down, but the floor pushes up that table or the ground it stands on, so it doesn't move.

An Unbalanced force is needed for something to change movement or direction, e.g. a seesaw moving up and down because the forces are not equal.

6. What are the different types of forces?

Ans: (1) Muscular force: This is the force we can exert with our bodies by using our muscles, e.g. pull, push, kick etc. These are contact forces

(2) Magnetic force: Magnets exert forces of attraction or repulsion on other magnets. An important feature of magnetic force is that it can act from a distance and is, therefore, a non-contact force.

(3) Electrostatic force: The force exerted by a charged body on another charged or uncharged body is known as electrostatic force. The electrostatic force is used to separate solid pollutant particles from smoke given out from factories.

(4) Gravitational force: All objects in the universe exert a force on all other objects. This is called gravitational force. The gravitational force exerted by the Earth on all the bodies on its surface is called Gravity.

(5) Frictional force: The fact that the rolling ball comes to rest after some time shows that there must be a force acting on it that tends to slow it down. This force seems to be more on rough surfaces than on smooth surfaces. The force acting against the relative motion of surfaces in contact is called frictional force or friction.

(6) Tension Force: Strings, ropes and chains can only pull on things. The force of pull supplied by strings, ropes or chains is called the tension force. The tension force is always directed along the length of the thing doing the pulling (string, rope, chain).

(7) Spring force: is the force exerted by a compressed or stretched spring upon any object attached to it.

(8) Applied Force: An applied force is a force that is applied to an object by a person or another object. Suppose a person is pushing a desk across the room, the applied force acting upon the object. The applied force is the force exerted on the desk by the person.

7. Differentiate between mass and weight?

Ans: The mass of an object is the amount of matter contained by the object; the weight of an object is the force of gravity acting upon that object. The mass of an object (measured in kg) by Pan Balance and will be the same no matter where in the universe that object is located. On the other hand, the weight of an object (measured

in Newton) by Spring balance will vary according to where the object is in the universe.

8. Why do mountaineers suffer from nose bleeds at high altitudes?

Ans: At high altitudes, the atmospheric pressure is low, and as altitude increases, pressure decreases. So if the pressure of the atmosphere changes suddenly, the blood vessels on our body will burst due to the pressure of the blood and other fluids inside.

9. Why is it easier to hammer a sharp nail into the wood than a blunt one?

Ans: It is easier to hammer a sharp nail as the pressure increases with a decrease in area. Due to large pressure, the nail is easily hammered into the wall.

10. An elephant weighing 50,000 Newton stands on one foot of area 1000 cm². What is the pressure exerted on the ground?

Ans: Pressure = force/area, $F = 50,000 \text{ N}$ and $A = 0.1 \text{ m}^2$ Pressure, $P = 5000 \text{ Pa}$

11. Why does a balloon that has been rubbed stick to the wall?

Ans: It has electrostatic cells that form when repeatedly rubbed, which creates friction ending with attraction to the item of your choice. When you rub the balloon, you create a positive static charge, and the attraction that makes it stick to the wall is because the wall has a negative charge and like poles attract.

12. Why do deep-sea divers have special diving suits?

Ans: The pressure is GREATLY increased while going deeper underwater. The Suits are specially designed so that the divers don't crumble at such high pressures.

13. Define pressure?

Ans: Pressure is defined as the force acting on a unit area. Pressure = Force/ Area If the force increases, the pressure increases. If the area over which the force acts decreases, the pressure increases

14. What are the units of pressure?

Ans: Unit of pressure is the pascal (Pa). It is the pressure exerted by a force of 1 N acting over an area of 1 m². Thus $1\text{Pa} = 1\text{N}/\text{m}^2$

15. A liquid gives the force of 100N over an area of 2m^2 . What is the pressure?

Ans: Force = 100 N and Area = 2m^2 Pressure = $100\text{N} / 2\text{m}^2 = 50 \text{ N/m}^2$

16. A liquid's force is acting over an area of 4m^2 . If the pressure is 25 N/m^2 , what is the force?

Ans: $F = P \times A = 25 \text{ N/m}^2$
 $25 \times 4 = 100 \text{ N}$

17. What is atmospheric pressure?

Ans: The Earth is surrounded by air, and this covering of air is known as the atmosphere. The atmospheric air exists to a height of about 1000 km. But beyond 100 km, the air is very thin. The force exerted by the atmosphere on the unit area is called atmospheric pressure.

18. Name the force used in removing iron scrap from a heap of mixed scrap.

Ans: Magnetic force is used to remove iron scrap from a heap of mixed scrap.

19. When is the pressure on the ground more – when a man is lying or when a man is standing? Explain.

Ans: The pressure is more when the man is standing on the ground. This is because the pressure is inversely proportional to the area when the force is the same. Standing means less contact area hence, more pressure.

20. Why can you fill a bucket from a downstairs tap quicker than from an upstairs tap?

Ans: You can do this because it takes more pressure from the pipe to flow water to the upstairs tap than the amount of pressure it takes to flow water to the downstairs tap. This is clear in Bernoulli's Equation.

21. In a tug of war, the three members of team A pull with a force of 100 N, 120 N, and 135N. The three members of team B pull with a force of 130 N, 105 N, and 120 N. Which team will win?

Sol. Force exerted by team A = $100 \text{ N} + 120 \text{ N} + 135 \text{ N} = 355 \text{ N}$.

Force exerted by team B = $130 \text{ N} + 105 \text{ N} + 120 \text{ N} = 355 \text{ N}$.

Teams are pulling with the same force
The resultant force is zero. Neither team will win.

22. A force of 20 N acts over an area of 4 m². What is the pressure?

Sol. Given : F = 20 N, A = 4 m², pressure?

We know that pressure = $\frac{\text{Force}}{\text{Area}} = \frac{20}{4} = 5 \text{ N/m}^2$ or 5 Pa.

23. A pressure of 50 N/m² acts on an area of 5 m². Calculate the total force.

Sol. Given: P = 50 N/m², A = 5 m², force?

We know that pressure = $\frac{\text{Force}}{\text{Area}}$

Force = Area × pressure = 5m² × 50 N/m² = F = 250 N (Ans.)

24. A force of 800 N exerts a pressure of 40 N/m². What area is in action?

Sol. Given: F = 800 N, P = 40 N/m², Area?

We know that pressure = $\frac{\text{Force}}{\text{Area}}$

∴ Area = $\frac{\text{Force}}{\text{Area}} = \frac{800}{40} = 20 \text{ m}^2$