

Force & Pressure**Short Notes****Keywords**

Force: A push or a pull

Moment: The turning effect of force around a fixed point called pivot

Moment of force: The product of the force and the perpendicular distance to the line of action of the force from the axis of rotation is known as the moment of force around the axis

Balancing moments: Moments opposite to each other are balanced when the sum of the clockwise moments is equal to the sum of the anticlockwise moments

Pressure: The force applied perpendicular to the surface of an object per unit area over which that force is distributed

Atmospheric pressure: The pressure exerted by the weight of the atmosphere

One newton metre: It is the torque resulting from a force of one newton applied perpendicularly to the end of a moment arm that is one metre long.

Chapter at Glance

- Force is due to an interaction between at least two or more objects.
- The moment of force is a measure of its tendency to cause a body to rotate about a specific point or axis.
Moment of force (M) = Force (F) x Moment arm (d).
- Pressure is the force acting on a unit area.
Pressure = Force/Area
- Pressure depends on two factors —
- Force applied and area over which force acts
- Liquids exert pressure in all directions
- According to Pascal's Law any force applied to a confined liquid is transmitted uniformly in all directions throughout the liquid regardless of the shape of the container.
- Pressure of a liquid increases with depth.
- Air pressure is due to the motion of molecules of gas present in air which is enclosed in a container.
- Atmospheric pressure is due to the weight of air present in the atmosphere above us.
- Formula for the Pressure exerted by a liquid = Force/Area

Where,

Force = Weight of the liquid

Area = Area of the base

Force & Pressure**DPP - 1**

Tick the correct answer.

1. The perpendicular distance between the Line of action of the force and the center of moment is called (lever arm, fulcrum arm).
2. The longer the moment arm, (smaller, larger) will the torque be.
3. One kPa is equal to (thousand, ten thousand) Pa.
4. Smatter the area of surface, (larger, smaller) will be the pressure produced by the same.
5. The weight (force) of liquid pushes down on the base of the vessel producing a (pressure, energy)
6. The pressure in a liquid is (same, not same) at all depths.
7. Atmospheric pressure acts (in all directions, downwards).

Fill in the blanks.

8. Force is a or a
9. A force between two objects is due to an of one object with another.
10. Moment of force is due to a force not having an and force directly along its line of action.
11. The force will cause a turning effect only if the line of action has some component to the pivot.
12. The sideways pressure of a Liquid is almost zero at its and is maximum near the of the vessel.
13. Automobile brakes use to stop the car.
14. Gases and liquids exert pressure in directions.
15. Air pressure arise due to the constant of the tiny of the gas present in air with the walls of the in which it is enclosed.
16. Atmospheric pressure is due to the of air present in the atmosphere above us.

Write T for true and F for false statement. Correct the false statement.

17. A force arises due to interaction of one object with another.
18. The weight of a body is a force which acts in the upward direction.
19. Pressure at any point in a liquid acts downwards and sideways only.
20. The atmospheric pressure on the surface of the Earth is 101.3 kilopascal.
21. Atmospheric pressure goes on increasing as we go up from the surface of Earth.

Force & Pressure**DPP - 2**

Name the following.

1. Another term used for moment of force
2. Any two applications of moment of force in our daily lives
3. The standard unit of moment of force
4. Formula for calculating pressure
5. The SI unit of pressure other than Newton per square metre
6. Two factors that affect pressure
7. A device used to measure pressure exerted by liquids
8. Two examples that gases like air exert pressure
9. Instrument used for measurement of atmospheric pressure
10. Three devices that work on the existence of atmospheric pressure

Complete the given table.

Example	Surface area less or more	Increase or decrease in pressure and the resulting advantage or disadvantage
Straps of a shoulder bag		
Thin edge of sharp knife		
Tip of a sewing needle		
Person standing on cushion		
Broad tyres of tractors		
Wide steel belt over the wheels of army tanks		
Person lying on cushion		
Wooden or concrete sleepers kept below the railway line		
Snow shoes have large flat soles		
Walking on sand with flat shoes		
Walking on sand with heels		
Skiers use flat and broad ski to ski upon ice or snow.		

Force & Pressure**DPP - 3**

Define the following.

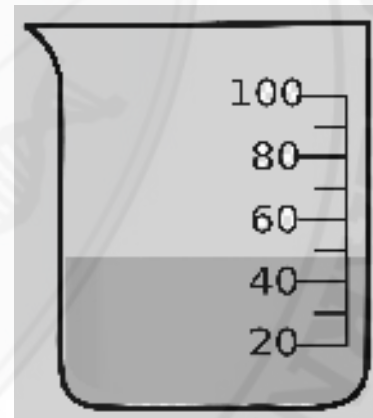
1. Moment of force
2. Pressure
3. One newton metre
4. Atmospheric pressure

Give reason for the following.

5. Camels can walk easily on sand but we are not able to do so. Our feet tend to sink into the sand.
6. The same force can produce different pressures.
7. Porters place a thick, round piece of cloth on their head when they have to carry heavy loads.
8. Foundations of high rise buildings are not only deep but wide.
9. The wall, of a dam is made thicker at the bottom than at the top.
10. The atmospheric pressure is maximum at sea-level.

Picture based questions.

11. Look at the beaker shown below. Where would the pressure from the liquid be maximum and where would it be minimum? State the reason for your answer.



Solve the following numericals.

12. A girl of mass 40 kg wears heels with an area of 1cm^2 in contact with the ground. What would the pressure on the ground be?
13. Two liquids A and B exert the same amount of pressure. What would be the height of column of liquid A if the density of liquid A is twice the density of liquid B and the height of column of liquid B is 10 cm?
14. A block of wood measuring 5 m long, 4 m wide and 0.5 m thick is placed on a table. Find the pressure exerted on the table due to the block if the mass of the block is 4000 kg.
15. The pressure due to the atmosphere is 2.192×10^5 Pa. Find the force exerted by the atmosphere on the top surface of a table 10 m long and 1.0 m wide.
16. A force of 5.0 N is applied on a wrench at a distance of 2.0 m from the bolt. Calculate the torque moment resulting from this force when the wrench is parallel.

17. How much torque is produced by opening a jar of pickles if the lid on the jar has a radius of 3.8 cm and the force exerted tangentially to the lid is 150 N? Assume that the force is concentrated at one point on the lid.

Answer the following.

18. How many objects are needed for a force to come into play? Illustrate using a suitable example.
19. Briefly describe how the moment of force works to fasten a nut using a wrench.
20. Give a suitable example to show that the effect of force applied by one object on another object depends on the area of contact between the two objects.
21. The pressure in a liquid changes with depth in a liquid. Explain.
22. State Pascal's law.
23. A door is a rigid body which can rotate about a fixed axis. Where is the axis of rotation located? Where the force should be applied to produce the most effective rotation?