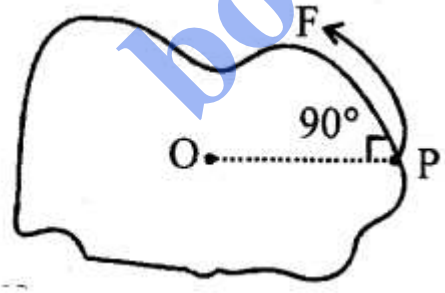
3. Force and Pressure

- **FORCE** : “Is the cause which changes the state of a body (rest or state of motion) or it changes the size or shape of a body”.

Weight of a body → The force with which a body is attracted towards the centre of earth
mg = force of gravity.

- A force does not change the mass of the body that is why mass of a body on earth and moon in same but weight → force exerted on body is different.
- Force cannot be seen but it is felt.
- → represents force, length of arrow gives magnitude and arrow points the direction.
- S.I. unit of force is Newton (N).
- Newton: “Is that much force, which when acting on a body of mass 1 kg produces in it (increases) a speed of 1 M s^{-1} in the direction of its motion.
- 1 kgf = 9.8 N = 10 N (nearly)
- RIGID body: “When a force is applied on a body and inter-spacing between its constituent particles do not change is called RIGID body” force can cause only the motion in it.
- NON-RIGID body: “When force applied changes inter-spacing.” Force causes both change in its size (shape) and the motion in body.
- TURNING EFFECT: “When force is applied on a pivoted (at a point) body, it can turn it and turning of body about point of rotation is called TURNING EFFECT.” or Moment of force.
  This is measured as:
  TURNING EFFECT = MOMENT OF FORCE
  Force x perpendicular distance from point of rotation.



  Moment of force = F x OP
  S.I. unit of moment of force=N × m=Nm
- THRUST: “Force acting normally on a surface.” Smaller the area of surface, larger is thrust.
- PRESSURE : “Thrust per unit area.p = Thrust/area = F/A S.I unit of area A pressure is Nm^{-2} or pascal (Pa)
- If Thrust is measured in kgf and area in Cm^2, then pressure is expressed as kgf Cm^{-2}.

ATMOSPHERIC Pressure: 1 atm = 76 cm of mercury column 1 atm = 1.013 x 10^5 Pa

- FACTORS AFFECTING THE PRESSURE : P = F/A
  (i) Area: Greater the area, lesser is pressure and lesser area, greater is pressure.
  (ii) Magnitude of thrust acting: greater thrust, greater pressure.
- Factors Affecting LIQUID PRESSURE = hdg
  (i) High of liquid column: increases with height
  (ii) Density of liquid: increases with density of liquid.
  (iii) Gravity constant.
- ATMOSPHERIC PRESSURE : "Pressure exerted by the air of atmosphere around us."

STANDARD ATMOSPHERIC PRESSURE 1 Atm = 76 cm of Hg column = 1.013 x 10^5 Pa

Test yourself

A. Objective Questions

1. Write true or false for each statement

(a) The S.I. unit of force is kgf.
Answer. False.
The S.I. unit of force is newton.

(b) A force always produces both the linear and turning motions.
Answer. False.

(c) Moment of force = force × perpendicular distance of force – from the pivoted point.
Answer. True.

(d) Less force is needed when applied at a farther distance from the pivoted point.
Answer. True.

(e) For a given thrust, pressure is more on a surface of large j area.
Answer. False.
For a given thrust, pressure is less on a surface of large area.

(f) The pressure on a surface increases with an increase in the thrust on the surface.
Answer. True.

(g) A man exerts same pressure on the ground whether he is standing or he is lying.
Answer. False.
A man exerts different pressure on the ground whether he is standing or he is lying.

(h) It is easier to hammer a blunt nail into a piece of wood than a sharply pointed nail.
Answer. False.
It is not easier to hammer a blunt nail into a piece of wood than a sharply pointed nail.

(i) The S.I. unit of pressure is pascal.
Answer. True.

(j) Water in a lake exerts pressure only at its bottom.
Answer. False.

(k) A liquid exerts pressure in all directions.
Answer. True.

(l) Gases exert pressure in all directions.
Answer. True.

(m) The atmospheric pressure is nearly 10^5 Pa.
Answer. True.

(n) Higher we go, greater is the air pressure.
Answer. False.

2. Fill in the blanks

(a) 1 kgf = **10 N** (nearly).
(b) Moment of force = **force** × distance of force from the point of turning
(c) In a door, handle is provided **farthest** from the hinges.
(d) The unit of thrust is **newton .**
(e) Thrust is the **normal** force acting on a surface.
(f) Pressure is the thrust acting on a surface of **unit** area.
(g) The unit of pressure is **pascal**
(h) Pressure is reduced if **area of surface** increases.
(i) Pressure in a liquid **increases** with the depth.
(j) The atmospheric pressure on earth surface is nearly **10^5 Pa.**

3. Match the following

Column A	Column B
(a) Camel	**(i) broad and deep foundation**
(b) Truck	**(ii) broad feet**
(c) Knife	**(iii) six or eight tyres**
(d) High building	**(iv) sharp cutting edge**
(e) Thrust	**(v) atm**
(f) Moment of force	**(vi) N**
(g) Atmospheric pressure	**(vii) N m**

Column A	Column B
(a) Camel	(ii) broad feet
(b) Truck	(iii) six or eight tyres
(c) Knife	(iv) sharp cutting edge
(d) High building	(i) broad and deep foundation
(e) Thrust	(vi) N
(f) Moment of force	(vii) N m
(g) Atmospheric pressure	(v) atm

4. Select the correct alternative

(a) SI. unit of moment of force is

1. N
2. N cm
3. kgfm
4. **N m**

(b) To obtain a given moment of force for turning a body, the force needed can be decreased by

1. applying the force at the pivoted point
2. applying the force very close to the pivoted point
3. **applying the force farthest from the pivoted point**
4. none of the above

(c) The unit of thrust is

1. **kgf**

2. kg
3. g
4. m s^{-1}

(d) The unit of pressure is

1. N × m
2. kgf
3. **N m^{-2}**
4. kgf m^2

(e) The pressure and thrust are related as

1. Pressure = Thrust
2. Pressure = Thrust x Area
3. **Pressure = Thrust / Area,**
4. Pressure = Area / Thrust

(f) A body weighing 5 kgf, placed on a surface of area 0.1 m2, exerts a thrust on the surface equal to

1. 50 kgf
2. **5 kgf**
3. 50 kgf m^{-2}
4. 5 kgf m^{-2}

P.Q. A body weighing 5 kgf, placed on a surface of area 0.1 m2, exerts a pressure on the surface equal to

1. 50 kgf
2. 5 kgf
3. **50 kgf m^{-2}**
4. 5 kgf m^{-2}

(g) The feet of lizards act like

1. moving pads
2. drilling pads
3. **suction pads**
4. none of the above

(h) Pressure exerted by a liquid is due to its

1. **weight**

2. mass
3. volume
4. area

(i) Pressure inside a liquid increases with :

1. **increase in depth**
2. decrease in depth
3. decrease in density
4. none of the above

(j) The atmospheric pressure at sea level is nearly

1. 10 Pa
2. **100,000 Pa**
3. 100 Pa
4. 10,000 Pa

(k) Nose bleeding may occur at a high altitude because

1. **the atmospheric pressure decreases**
2. the oxygen content of atmosphere decreases
3. the atmospheric pressure increasess
4. there are strong air currents at the high altitude

B. Short/Long Answer Questions

Question 1.
Define force. State its S.I. unit.
Answer:
Force : Force is a physical cause that changes or may tend to j change the state of rest or the state of motion of an object.
The S.I. unit of force is Newton.

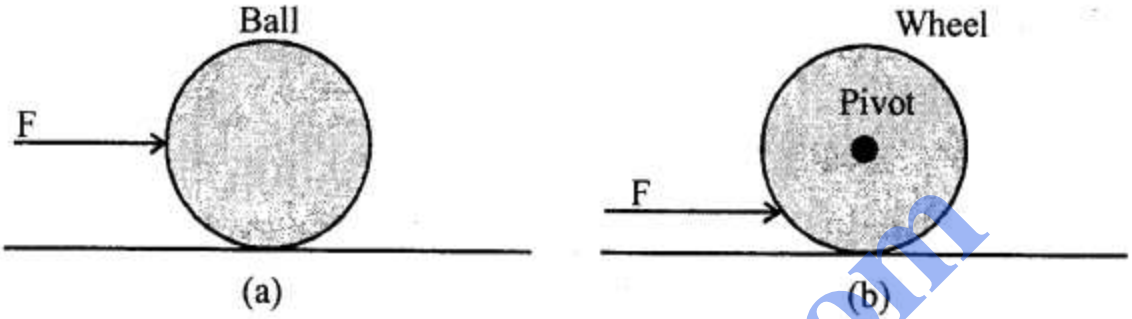
Question 2.
State two effects of a force when applied on a body.
Answer:
Two EFFECTS OF APPLIED FORCE :
(i) It can change the state of body.
i.e. It can stop a moving object and also a force can move a stationary object.
(ii) A force can change the shap & (and size) of an object.

Question 3.
How does the effect of force differ when it is applied on

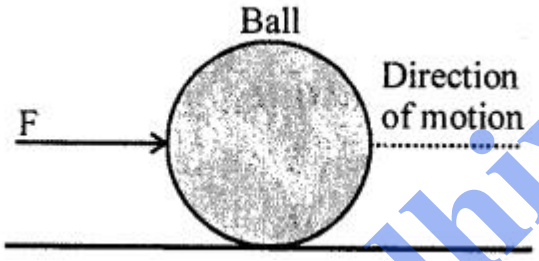
(i) a I rigid body, and (ii) a non-rigid body ?

Answer:
(i) When a force applied on a rigid object does not change 1 interspacing of constituent molecules and does not change dimensions and can cause motion in it.
(ii) When a force applied on a non-rigid object change interspacing between its constituent particle and cause a change in its dimensions and can produce motion in it.

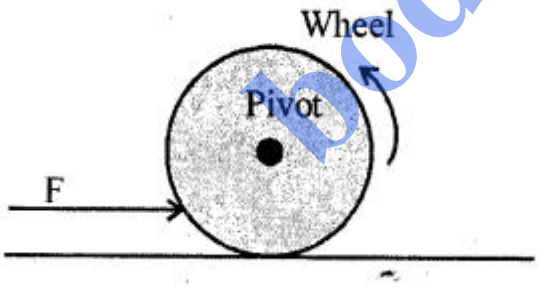
Question 4.
State the effect of force F in each of the following diagram



Answer:
(a) Ball moves in the direction of force (pushed) on applying force F.



(b) Wheel turns about the axis of rotation i.e. about pivot on applying force.



Question 5.
Define the term moment of force.

Answer:
Movement of force — The turning effect of force acting on a body about an axis is called the moment of force.

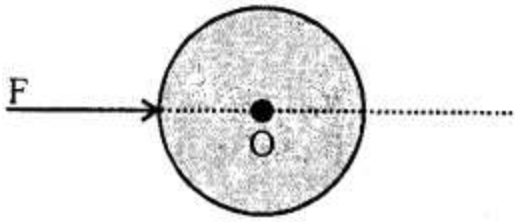
Question 6.
State the S.I. unit of moment of force.

Answer:
S.I. units : N m (Newton meter)

Question 7.
State two factors on which affect moment of force.

Answer:
Factors on which moment of force depends
(i) The magnitude of the force applied.
(ii) The distance of line of action of the force from the axis of rotation.

Question 8.
In Fig. a force F is applied in a direction passing through the pivoted point O of the body. Will the body rotate ? Give reason to support your answer.



Answer:
No, the body will not rotate as
Turning effect = Force x ⊥ of the force from the pivoted point.
= Fx 0 = 0
⊥ distance = O or force is parallel to the point of application of force.

Question 9.
Write the expression for the moment of force about a given axis of rotation.

Answer:
Moment of force (O) = F x Perpendicular distance of force from point O.
i.e. Moment of force = F x OP

Question 10.
State one way to decrease the moment of a given force about a given axis of rotation.

Answer:
Either decrease the force or decrease the perpendicular distance of force from axis of rotation.

Question 11.
State one way to obtain greater moment of a given force about a given axis of rotation.

Answer:
Increase the perpendicular distance of force from axis of rotation.

Question 12.
What do you mean by the clockwise and anti-clockwise moment of force ?
Answer:
Clockwise moment of force—When the moment of force is in the clock wise direction.
Anticlockwise moment — When the moment of force acts in anticlockwise direction.

Question 13.
Explain the following:
(a) The spanner (or wrench) has a long handle.
(b) The steering wheel of a vehicle is of large diameter.
(c) The hand flour grinder is provided with a handle near the rim.
(d) It is easier to open the door by pushing it at its free end.
(e) A potter turns his wheel by applying a force through the stick near the rim of wheel.
Answer:
(a) Spanner has a long handle to produce larger turning moment and small force is applied at the end of handles.
(b) The hand of large diameter has a large perpendicular distance. The moment of force depends upon perpendicular distance.
(c) In order to increase of moment of force, handle is provided near its arm. Small force is applied at the handle.
(d) Moment of force is product of force and perpendicular distance. It is easier to open the door applying force at the free end.
(e) A Polter's wheel has a wheel pivoted at the centre. The potter turns the wheel by means of a stick at the rim of the wheel. He increases the perpendicular distance.

Question 14.
What is thrust ?
Answer:
THRUST : "Force acting normally on the surface is called THRUST."

Question 15.
State the unit of thrust
Answer:
S.I. unit is newton [N].

Question 16.
On what factors does the effect of thrust on a surface depend?
Answer:
The effect of thrust depends on the area of the surface on which it acts. Smaller the area of the surface on which a thrust acts, larger is its effect. But the effect of a thrust is less on a larger area.

Question 17.
Define the term 'pressure' and state its unit.
Answer:
PRESSURE : "The thrust on unit area of the surface is called PRESSURE."
Pressure = Thrust / Area
S.I. unit = Nm^{-2}

Question 18.
How is the thrust related to pressure ?
Answer:
Pressure is directly proportional to thrust P μ Thrust
i.e. greater the thrust, greater is the pressure and smaller the thrust, smaller is the pressure.

Question 19.
Name two factors on which the pressure on a surface depends.
Answer:
FACTORS AFFECTING THE PRESSURE:
(i) The surface area (A) on which thrust acts. More area, lesser is pressure.
(ii) The magnitude of thrust (F) acting on the surface

$\because \quad P = \frac{\text{Thrust}}{\text{Area}} = \frac{F}{A}$ More Thrust, more is pressure

Question 20.
When does a man exert more pressure on the floor : while standing or while walking ?
Answer:
While standing, the area touching the floor is less, the pressure exerted will be more.
While walking, area touching the floor is more and pressure exerted will be less.

Question 21.
Why do camels or elephants have broad feet ?
Answer:
Camels have to walk on sand. To walk fast, the feet should not sink in sand, the feet area broad i.e. increase in area. Hence, lesser pressure, to sink less, the camels have broad feet.
Elephants have broad feet in proportion to their size. Because of their weight and size, elephants need to distribute the weight better.

Question 22.
A sharp pin works better than a blunt pin. Explain the reason.
Answer:
A sharp tip is provided at the end of a pin so that pressure (FORCE / AREA) exerted by it is maximum when it is pressed by a given force.

Question 23.
Why is the bottom part of the foundation of a building made wider ?
Answer:
$P \propto 1/A$ i.e. pressure is inversely proportional to surface Area
Greater the area, lesser is the pressure.
In order that building should exert less pressure, the foundation of building should have more area or be wider. So that building should not sink into the earth.

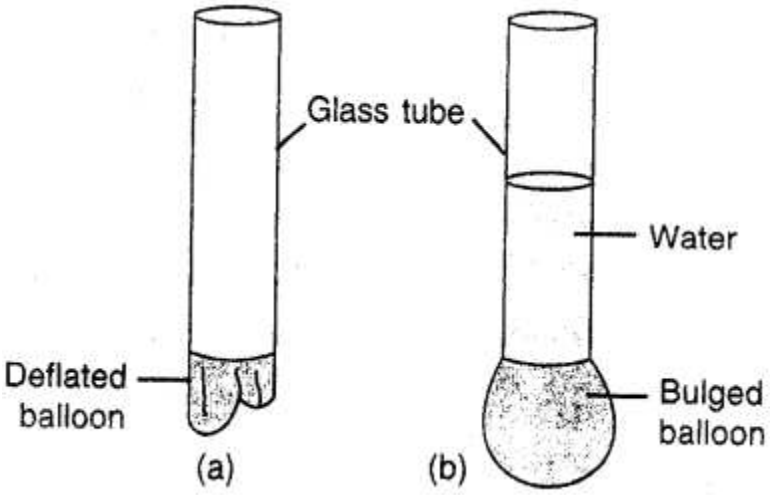
Question 24.
It is easier to cut with a sharp knife than with a blunt one. Explain.
Answer:
It is easier to cut with a sharp knife than with a blunt one because for the same applied force, the pressure exerted (force/area) is more in the case of sharp knife than in the case of a blunt one.

Question 25.
A gum bottle rests on its base. If it is placed upside down, how does the (i) thrust, (ii) pressure change ?
Answer:
A gum bottle has narrow neck and wider base when placed upside down
(i) Surface area is less, larger is the effect of thrust.

(ii) Lesser area, larger is the pressure.

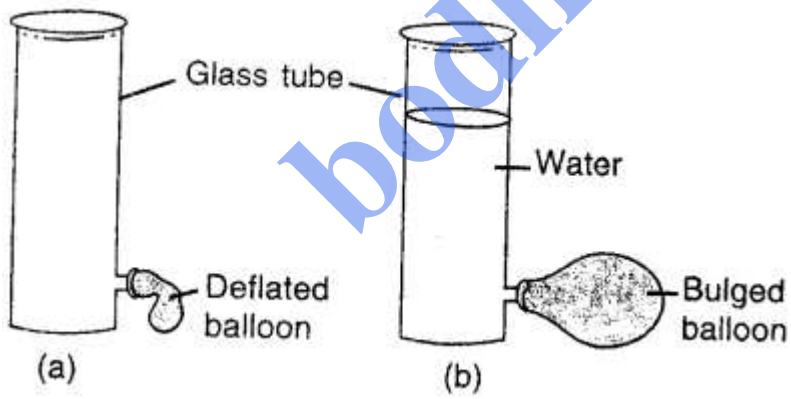
Question 26.
Explain the following:
(a) Sleepers are used below the rails.
(b) A tall building has wide foundations.
Answer:
(a) Sleepers are laid below the rails to reduce pressure (force/area) on the ground.
∴ Sleepers increase the area.
(b) Foundation of buildings are kept wide so that the weight of the building may act on larger area. As a result it will exert less pressure on the ground. This avoids sinking of building into the earth.

Question 27.
Describe an experiment to show that a liquid exerts pressure at the bottom of the container in which it is kept.
Answer:
A LIQUID EXERTS PRESSURE AT THE BOTTOM OF ITS CONTAINER:



Take a balloon and tie it at the lower end of a glass tube and hold vertically as in fig. (a) pour some water in the tube, balloon bulges out as in
(b) because water column exerts pressure (∴ liquid has weight) at its bottom. Force on balloon is equal to the weight of Thrust water column which is called the thrust P = Thrust / Area
This shows that a liquid exerts pressure at the bottom of container in which it is kept.

Question 28.
Describe a suitable experiment to demonstrate that a liquid exerts pressure sideways also ?
Answer:
A LIQUID EXERTS PRESSURE SIDE WAYS :
Set up the apparatus as shown in fig. (a)



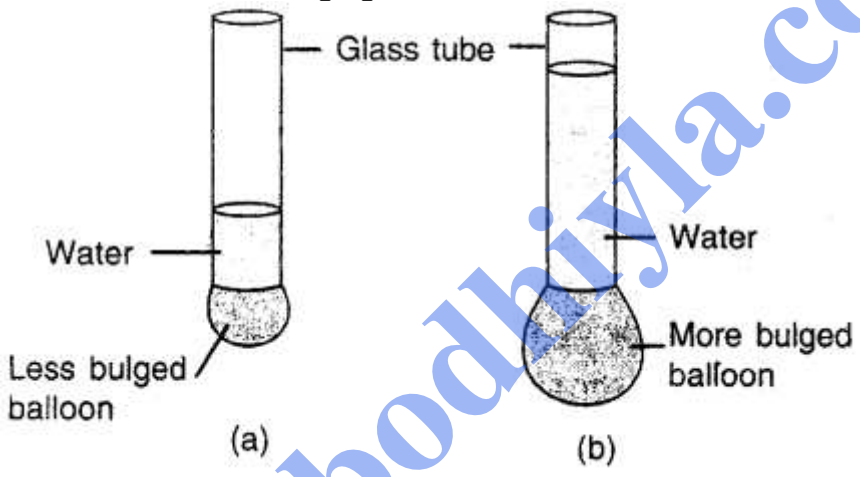
A deflated balloon is tide on the side tube of container opened at one side. Now fill water in the container, balloon connected inflats due to pressure of liquid exerted side ways. This shows that liquids exerts pressure sideways also.

Question 29.
Describe a simple experiment to show that at a given depth, a liquid exerts same pressure in all directions.
Answer:

Experiment: We have often seen children playing with polythene bag filled with water and having small holes at various places on this bag and sprinkling water on others. This is because water enclosed in bag exerts pressure in all directions.

Question 30.
State two factors on which the pressure at a point in a liquid depends.
Answer:
FACTORS are : (hdg)
(i) h — Depth of the point below free surface.
(ii) d — Density of liquid.
(iii) g — Acceleration due to gravity, (constant)

Question 31.
Describe an experiment to show that the liquid pressure at a point increases with the increase in height of the liquid column above that point.
Answer:
Experiment: Tie a balloon at one end of a glass tube opened at both ends. Pour some water and note the bulging of balloon as in

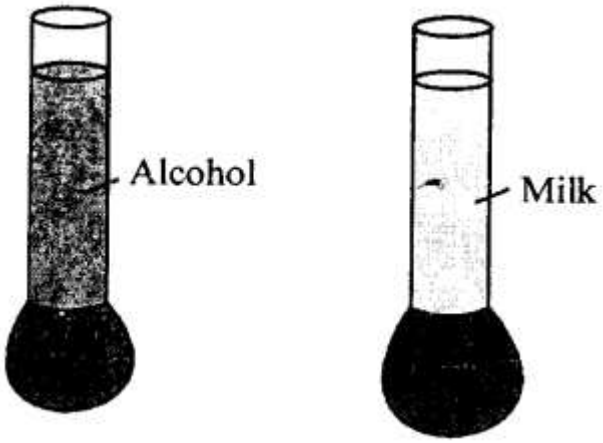


(a). Now add more of water in the tube bulging also increases. Add still more water bulging also increases further as liquid pressure at a point increases with increase in height of the liquid column above that point.

Question 32.
Which fact about liquid pressure does the diagram in fig. illustrate.
Answer:
The figure shows that THE LIQUID PRESSURE INCREASES WITH THE HEIGHT OF THE LIQUID COLUMN ABOVE IT.

Question 33.
Describe an experiment to show that liquid pressure depends on the density of liquid.
Answer:
LIQUID PRESSURE DEPENDS ON THE 'DENSITY OF LIQUID : Take two identical

balloons attached to one end of each of two identical glass tubes opened at both ends.



Fill tube (a) with milk and tube (b) with alcohol to the same height.
We notice that balloon attached to tube (a) bulged more than balloon attached to tube (b). This shows that the same height of milk exerts more pressure than alcohol. Since density of milk (1.03) is more than density alcohol (0.8).

Question 34.
A dam has broader walls at the bottom than at the top. Give a reason.
Answer:
To withstand the greater pressure of water which increases with increase in depth.

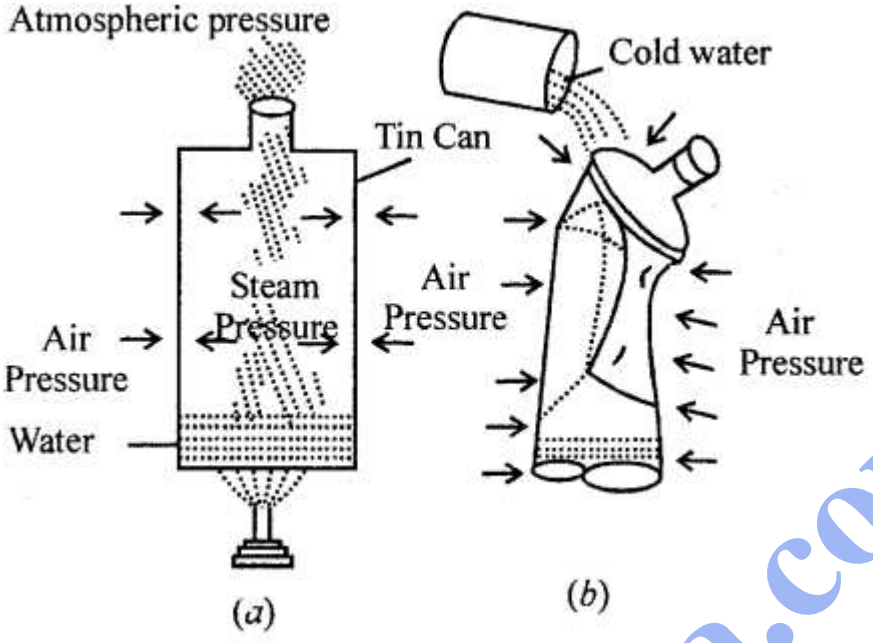
Question 35.
What do you mean by atmospheric pressure ?
Answer:
ATMOSPHERIC PRESSURE: "The thrust due to atmospheric air on unit area" is called ATMOSPHERIC PRESSURE.

Question 36.
Write the numerical value of the atmospheric pressure on the earth surface in pascal.
Answer:
It is about 105 Pa.

Question 37.
We do not feel uneasy even under the enormous atmospheric pressure. Give a reason.
Answer:
Blood in our body exerts BLOOD PRESSURE which is slightly more than atmospheric pressure and we do not feel uneasy.

Question 38.
Describe a simple experiment to illustrate that air exerts pressure.
Answer:
EXPERIMENT : Take a tin-can having air tight cap (screw cap). Remove cap and boil

some water in it, so that steam comes out and in this way air from inside goes out. While boiling replace the cap and allow it to cool. Vapours inside condense and form water creating vacuum above them. We see the can crumbles due to air pressure from outside. This proves that air exerts pressure.



Question 39.

bescribe the crushing tin can experiment. What do you conclude from this experiment ?

Answer:

EXPERIMENT : Take a tin-can having air tight cap (screw cap). Remove cap and boil somowater in it, so that steam comes out and in this way air from inside goes out. While boiling replace the cap and allow it to cool. Vapours inside condense and form water creating vacuum above them. We see the can crumbles due to air pressure from outside. This proves that air exerts pressure.

Question 40.

Give reasons for the following :

(a) A balloon collapses when air is removed from it.

(b) Water does not run out of a dropper unless its rubber bulb is pressed.

(c) Two holes are made in a sealed oil tin to take out oil from it.

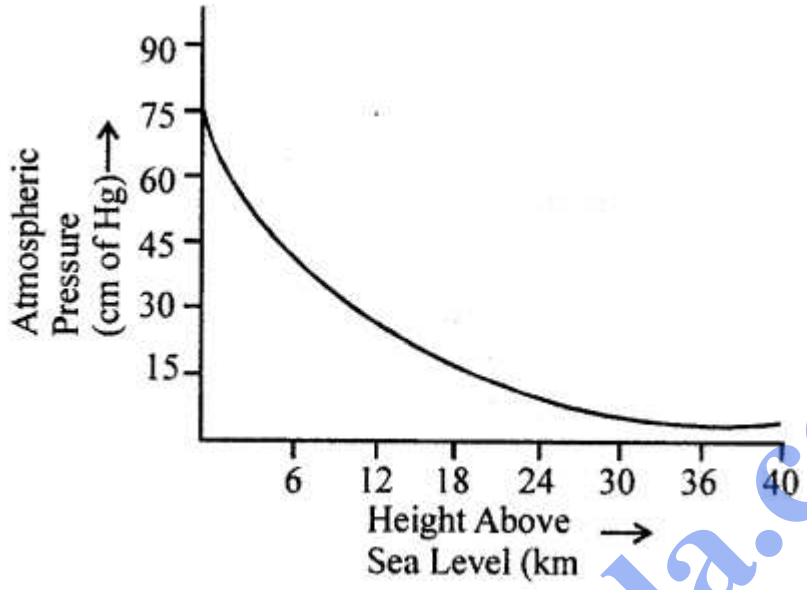
Answer:

(a) Atmospheric pressure which is more than inside pressure of balloon causes balloon to collapse.

(b) Atmospheric pressure acting from outside the dropper balances the pressure exerted by water and water does not come out of a dropper. On pressing the dropper inside pressure of water becomes more than outside atmospheric pressure and water runs out.

(c) Two holes are made in a sealed can so that ATMOSPHERIC
AIR presses the oil at one hole and oil comes out of the second hole.

Question 41.
How does the atmospheric pressure change with altitude?
Answer:
Pressure at sea level is taken as 76 cm of MERCURY column which is one atmosphere. But his pressure varies with alitude as density of air decreases as we rise up and air becomes rarer. For every 105 m rise in height, pressure decreases by 1 cm of mercury column.



Graph shows the approximate variation of pressure with altitude.

C. Numericals

Question 1.
Find the moment of force of 20 N about an axis of rotation at distance 0.5 m from the force.
Answer:
F = 20 N ⊥ distance = 0.5 m
Moment of force = Force x perpendicular distance of force from the point of rotation
= F x ⊥ distance
= 20 N × 0.5 m
= IONm

Question 2.
The moment of a force of 25 N about a point is 2.5 N m. Find the perpendicular distance of force from that point
Answer:
Moment of force = 2.5 N m
Force applied = 25
⊥ distance from the point of rotation ?
Moment of force = Force × ⊥ distance

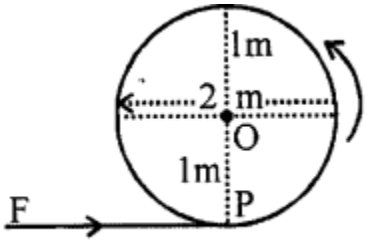
2.5 = 25 × χ

$$\therefore x = \perp \text{ distance} = \frac{2.5}{25} = \frac{1}{10} \text{ m}$$

=1/10 × 100 = 10cm

Question 3.
A spanner of length 10 cm is used to open a nut by applying a minimum force of 5.0 N. Calculate the moment of force required.
Answer:
⊥ Distance = 10cm = 10/100 = 1/10 m
Force applied on spanner 5 N
∴ Moment of force = F ×⊥ distance
= 5 × 1/10 = 0.5 nm

Question 4.
A wheel of diameter 2 in can be rotated about an axis passing through its centre by a moment of force equal to 2e0 N m. What minimum force must be applied on its rim?
Answer:
∴ Diameter = 2m
radius OP = l m
∴ ⊥ distance OP = 1 m
Moment of force = 2.0 N m



F × ⊥ distance OP = moment of force
F × 1 = 2.0
F = 2/1 = 2N

Question 5.
A normal force of 200 N acts on an area of 0.02 m^2. Find the pressure in pascal.
Answer:

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$= \frac{200\text{N}}{0.02m^2}$$

$$= \frac{200 \times 100}{2} = 10{,}000 \text{ N/m}^2 \text{ or } 10{,}000 \text{ Pascal}$$

Question 6.
Find the thrust required to exert a pressure of 50000 pascals on an area of 0.05 m^2 ?
Answer:
Pressure = Force / Area
Force = Pressure × Area
= 50,000 x 0.05 = 2,500 Newton

Question 7.
Find the area of a body which experiences a pressure of50000 Pa by a thrust of 100 N ?
Answer:
F=100N
P = 50000 Pa
A=?

$$P = \frac{F}{A} \qquad \therefore A = \frac{F}{P} = \frac{100}{50000} = \frac{10}{5000}$$

$$A = \frac{10}{5000} = \frac{10}{5 \times 10^3} = \frac{2}{10^3} = 2 \times 10^{-3}\ m^2$$

Question 8.
Calculate the pressure in pascal exerted by a force of 300 N acting normally on an area of 30 cm^2.
Answer:

F = 300 N

$$A = 30\ cm^2 = \frac{30}{100 \times 100}\ m^2 = 30 \times 10^{-4}\ m^2$$

$$P = \frac{F}{A} = \frac{300}{\frac{30}{100 \times 100}}$$

$$= \frac{300 \times 100 \times 100}{30}$$

$$= 100000 = 10^5\ Pa$$

Question 9.
How much thrust will be required to exert a pressure of 20,000 Pa on an area of 1 cm^2.
Answer:
Pressure =20,000 Pa
Area = 1 cm^2
= 10^{-4} m^2
Force = Pressure × area
=20,000 x 10^{-4} = 2 Newton

Question 10.
The base of a container measures 15 cm × 20 cm. It is placed on a table top. If the weight of the container is 60 N, what is the pressure exerted by the container on the table top ?
Answer:
Area of the base of container

$$A = 15\ cm \times 20\ cm$$

$$= \frac{15}{100}\ m \times \frac{20}{100}\ m$$

$$= \frac{300}{10000}\ m^2$$

$$Force = weight = 60\ N$$

$$Pressure\ exerted = \frac{F}{A} = \frac{60}{\frac{300}{10000}}$$

$$P = \frac{60 \times 10000}{300} = \frac{10000}{5} = 2000\ Pa$$

Question 11.
Calculate the pressure exerted on a surface of 0.5 m^2 by a thrust of 100 kgf.
Answer:
P = ?
Thrust (F) = 100 kgf
A = 0.5 m^2

$$P = \frac{Thrust}{Area} = \frac{100}{0.5} = \frac{1000}{5} = 200$$

P = 200 kgf m^{-2}

Question 12.
A boy weighing 60 kgf stands oixplatform of dimensions 2.5 cm x 0.5 cm. What pressure in pascal does he exert ?
Answer:
Force = Thrust = Weight = 60 kgf
= 60 x 10 = 600 N
Area of plat form = 2.5 cm x 0.5 cm

$$= \frac{2.5}{100}\ \text{m} \times \frac{0.5}{100}\ \text{m} = \frac{25}{1000} \times \frac{5}{1000}$$

$$= \frac{1}{40} \times \frac{1}{200} = \frac{1}{8000}\ \text{m}^2$$

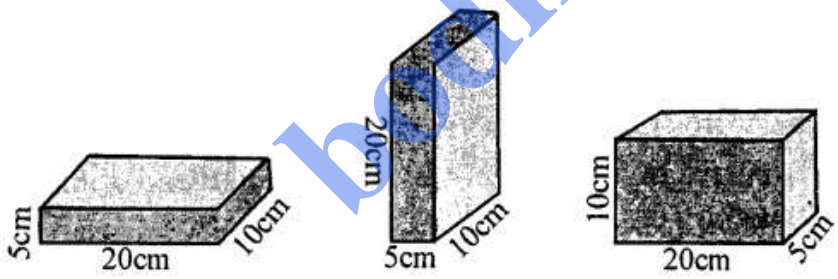
$$\text{Pressure P} = \frac{F}{A} = \frac{600\ \text{N}}{\frac{1\ \text{m}^2}{8000}} = \frac{600 \times 8000}{1}$$

$$= 4800000$$

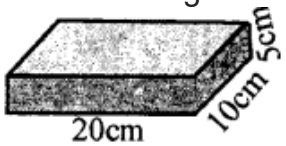
$$= \frac{4800000}{10} \times 10$$

$$= 4.8 \times 10^6\ \text{Pa}$$

Question 13.
Figure shows a brick of weight 2 kgf and dimensions 20 cm x 10 cm × 5 cm placed in three different positions on the ground. Find the pressure exerted by the brick in each case.



Answer:
Weight of brick = Thrust = F = 2 kgf



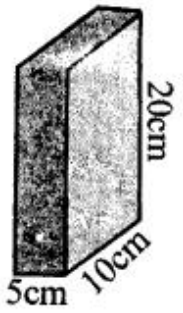
$$\text{Area of base} = \frac{20}{100} \times \frac{10}{100} = \frac{1}{50}\ \text{m}^2$$

$$\text{Pressure exerted P} = \frac{F}{A} = \frac{2\ \text{kgf}}{\frac{1}{50}\ \text{m}^2} = 100\ \text{kgf m}^{-2}$$

Or
Area of base = area of top L × B
20 Cm × 10 = 200 cm^2

$$P = \frac{\text{Thrust}}{A} = \frac{2\ \text{kgf}}{200\ \text{cm}^2} = \frac{1}{100} = 0.01\ \text{kgf cm}^{-2}$$

(b)



$$\text{Area of base} = \text{area of top}$$
$$= 5\ \text{cm} \times 10\ \text{cm} = 50\ \text{cm}^2$$

$$\text{Pressure exerted} = P = \frac{F}{A} = \frac{2\ \text{kgf}}{50\ \text{cm}^2} = 0.04$$
$$P = 0.04\ \text{kgf cm}^{-2}$$

(c) Weight of brick
F = 2 kgf
Area of base = L × B
= 20 cm × 5 cm = 100 cm^2

$$\text{Pressure exerted} = \frac{F}{A} = \frac{2}{100} = 0.02\ \text{kgf cm}^{-2}$$