CLASS VIII, SUBJECT – PHYSICS
CHAPTER – FORCE AND PRESSURE
SUMMARY

1) **Motion can be classified in different types. Out of these two are: Translatory motion and Rotatory motion.**

2) **Translatory motion:** The **motion** in which all the particles of a body move through the same distance at the same time is called **translatory motion**. There are two types of **translatory motions**: rectilinear **motion**; curvilinear **motion**. Some of the **examples** for **translatory motion** are: Man running. Other **examples**: Bus moving. Boat sailing.

3) **Rotational motion:** In simple terms, **rotatory motion** can be defined as the **movement** of any object about an axis. A common example of rotatory motion can be the fans of the helicopter moving about a pivot. Another **example** could be or the **movement** of a merry go round.

4) **Moment of force:** A **force** or system of **forces** may cause an object to turn. A **moment** is the turning effect of a **force**. **Moments** act about a point in a clockwise or anticlockwise direction. The point chosen could be any point on the object, but the pivot - also known as the fulcrum - is usually chosen.

5) **Torque:** **Torque** is the twisting force that tends to cause rotation. The point where the object rotates is known as the axis of rotation. Mathematically, **torque** can be written as **T = F × r**, where F is the magnitude of either force and r is the perpendicular distance of the line of action of the force from the axis of rotation. It has S.I unit of Newton-meters.

6) **Examples of torque in everyday life:**

- **Hinged Doors** are common **examples** of force. The opening of a **door** and its **hinges** is caused by **torque**, and the **hinges** are the **pivot** point. If you try to open a **door** by pushing on the **door** near its **hinges**, it most likely will not open because there is not enough **torque** to force it to do so.
- The upper circular stone of a hand flour grinder is provided with a handle near its rim (i.e. maximum distance from the center) so that it can easily be rotated about the iron pivot at its centre by applying a small force at the handle.
- For turning a steering wheel, a force is applied tangentially on the rim of the wheel.
- In a bicycle, to turn the wheel anticlockwise, a small force is applied on the pedal of a toothed wheel.
- **Dams and tall buildings are** made **broader at the bottom** because if the area is small then a larger pressure will be exerted, and the foundation of the **building** may also break. to make sure the foundation of the **tall buildings** and **dams are** strong, they **are** built **with** a **broader** basement.

7) **Factors affecting torque:** the size of the force and the shortest distance between the force line and the pivot (the axis of rotation).

8) **Thrust and Pressure.** **Thrust**: Force exerted by an object perpendicular to the surface is called **thrust**. **Pressure**: Force exerted by any object per unit area is called **pressure**. **Pressure = thrust/area**

9) **Units of pressure are:** The SI unit for pressure is the **pascal** (**Pa**), equal to one newton per square **metre** (N/m^2, or kg. m. s^{-2}).

10) **Applications of the concept of pressure in everyday life:**

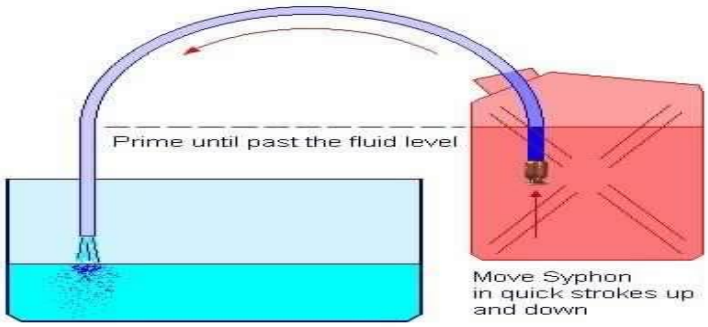
- Army tanks run on a steel track rather than on wheels. The steel tracks reduce the pressure on the ground.
- **School bags** are provided with large **wide straps** to carry them because it increases the surface area in contact with the shoulder and reduce the pressure of the shoulder of the student's shoulder.
- A sharp **knife** cut objects better because due to its **very thin edge**, the force of our hand falls over a small area of the object producing a large pressure and this large pressure cuts the object easily. While a blunt **knife** has a thicker **edge**.
- The **trucks and buses have wider tyres** with respect to the property that " more the area, less the pressure". As the area is more the pressure will decrease, so there will be less need for applying more pressure to handle the vehicle.

11) **Gases and liquids exert pressure.**

12) **Atmospheric pressure**, also called **barometric pressure**, is force per unit area exerted by an atmospheric column (that is, the entire body of air above the specified area). Atmospheric pressure can be measured with a mercury barometer (hence the commonly used synonym *barometric pressure*), which indicates the height of a column of mercury that exactly balances the weight of the column of atmosphere over the barometer. Atmospheric pressure is also measured using an aneroid barometer.

13) **Few applications of Atmospheric pressure:**

- **Drinking Straw:** When drinking with a straw, one has to suck the straw. This causes the pressure in the straw to decrease. The external atmospheric pressure, which is greater, will then act on the surface of the water in the glass, causing it to rise through the straw.
- **Rubber Sucker**: When the rubber sucker is put onto a smooth surface, usually a glass or tiled surface, the air in the rubber sucker is forced out. This causes the space between the surface and the sucker to have low pressure. The contact between the rubber sucker and the smooth surface is airtight. The external atmospheric pressure, which is much higher, acts on the rubber sucker, pressing it securely against the wall.
- **Nosebleeds** can be **caused** by being up in an extremely high **altitude**. As you climb **higher**, the amount of oxygen in the air decreases. This **makes the** air thinner and dryer, which can in turn **cause** the inside of your **nose** to crack and **bleed**.
- **Siphon:** A rubber tube can be used to siphon liquid from a container at a higher level to another at a lower level. For example, we can remove petrol from the petrol tank of a vehicle or dirty water from aquarium.



WORKSHEET III

A. Objective Questions

1.Write true or false for each statement

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

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

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

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

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

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

(g) A man exerts the same 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.

(i) The S.L. unit of pressure is pascal.

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

(k) A liquid exerts pressure in all directions.

(l) Gases exert pressure in all directions.

(m) The atmospheric pressure is nearly Pa.

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

Question 2. Fill in the blanks:

(a) 1 kgf = ---------

(b) Moment of force = --------- × distance of force from the point of turning

(c) In a door, handle is provided ---------- from the hinges.

(d) The unit of thrust is ----------.

(e) Thrust is the ---------- force acting on a surface.

(f) Pressure is the thrust acting on a surface of ------- area.

(g) The unit of pressure is ---------.

(h) Pressure is reduced if ---------- increases.

(i) Pressure in a ---------- with the depth.

(j) The atmospheric pressure on earth's surface is nearly --------.

Question 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

Question 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 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. ms^{-1}

(d) The unit of pressure is

1. Nm. 2. Kgf 3. N 4. kgf

(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 m^2 exerts a thrust on the surface equal to

1. 50 kgf 2. 5 kgf 3. 50 kgf 4. 5 kgf

(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 increase 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 increases

4. there are strong air currents at the high altitude

Question 5. The base of a container measures 15cm×20cm. It is placed on a tabletop. If the weight of the container in 60 N. What is the pressure exerted by the container on the tabletop?
Question 6. A spanner of length 10cm is used to open a nut by applying a minimum force of 5.0N. Calculate the moment of force required.

Question 7. A force of 200 N acts on an area of .02m^2, find the pressure in pascal.

Question 8. What force will exert a pressure of 50000 Pa on an area of 0.5 m^2?

Question 9. Find the area of a body which experiences a pressure of 500 Pa by a force of 100 N.

Question 10. Calculate the pressure exerted by a force of 300 N acting on an area of 30 cm^2.

Question 11. What will be the force required to exert a pressure of 20000 Pa on an area of 1 cm^2?

Question 12. Give reasons for the followings:

a) Dams and tall buildings are made broader at the bottom.
b) Fountain pens leak at high altitude.
c) Nose start bleeding on high mountains.
