CHAPTER - 2

FORCE AND PRESSURE :

MOTION

A Choose the correct answer :-

1 The wall of your classroom is in a state of

(a) motion (b) rest
(c) neither rest nor motion (d) none of these

2 Translatory motion is of

(a) one type (b) two type (c) three type
(d) four type

3 The motion of a pendulum is an example of

(a) translatory motion (b) rotatory motion
(c) Oscillatory motion (d) curvilinear motion

4 Velocity is a

(a) Scalar quantity (b) Vector quantity
(c) normal quantity (d) none of these

5. Distance is a

(a) Scalar quantity (b) Vector quantity
(c) normal quantity (d) none of these

6. A moving vehicle on a straight road is an example of

(a) rotatory motion (b) Vibratory motion
(c) periodic motion (d) rectilinear motion

7. The motion of a dust particle in air is an example of

(a) rectilinear motion (b) curvilinear motion
(c) Oscillatory motion (d) random motion

8. Force is a physical cause that

(a) changes the shape of a body
(b) brings a body to rest
(c) sets a body into motion
(d) all of these

9. Weight of a body.

(a) remains same everywhere on the earth
(b) will same on the moon

(c) is the pressure exerted by it
(d) is measured by spring balance

B Fill in the blanks :-

1 A book lying on a table is in a state of rest.
2 All oscillatory motions are periodic.
3 The value of acceleration due to gravity is maximum at the poles.
4 An apple falling from a tree is an example of rectilinear motion.
5 Displacement is a Vector quantity.
6 When the earth completes one revolution, the displacement of the earth is zero.
7 The time taken by the bob of a pendulum to complete one oscillation is called its Time period.
8 A potter's wheel has rotatory motion.
9 Force is a vector quantity.
10 Weight of a body becomes minimum on top of high mountain.

C. Write True (T) or False (F) against the following statement :

1. A spinning top has a rectilinear motion. False
2. When a body covers equal distances in equal interval of time in the same straight line, the body is said to be in a uniform motion. True
3. The rate of change of displacement with time is called speed. False
4. Displacement is a scalar quantity. False
5. Speed can be positive, zero or negative. False
6. Rotation of the earth is a periodic motion. True
7. Fruits falling from a tree is an example of random motion. False
8. Weight of a body remains the same if the mass of the body increases. False
9. Force of friction between two bodies increases the speed of a moving body. True

D Match the following

Column A	Direct Answer
1 A bouncing ball	- Multiple motion
2 A spinning top	- Rotatory motion
3 A swing in motion	- Oscillatory motion
4 A plucked string of a musical instrument	- Vibratory motion
5 A ball rolling on the ground	- Rectilinear motion
6 Velocity	- Metre per second
7 Distance	- Metre
8 Speed	- Distance ÷ Time
9 Time	- Second
10 Force	- Vector

E With proper reasoning choose the odd one out :-

1 Bouncing ball, Spinning top, oscillating pendulum, study table

Odd :- study table

Reason :- It is in a rest position and others are in motion

2. Displacement, Velocity, speed, average speed

Odd :- Displacement

Reason :- The SI unit of displacement is metre (m) & others SI unit is metre per second (m/s)

3. A falling stone, a child sliding down a slope, firing a bullet from a gun, a girl swinging on a swing.

Odd :- A girl swinging on a swing

Reason :- It is an oscillatory motion and others are translatory motion.

4. Motion of an electric drill, a rolling ball, wheels of a moving car, oscillating pendulum of a wall clock.

Odd :- Oscillating pendulum of a wall clock.

Reason :- It is an oscillatory motion and others are multiple motion

F Answer the following questions :-

1 What do you mean by a body at rest ?

Ans. A body is said to be at rest when its position does not change with time with respect to its surroundings.

2 What do you mean by translatory motion? Give one example.

Ans. The motion in which every point on the moving body moves through the same distance in the same interval of time is called translatory motion.

Eg :- A car taking a turn on a road.

3 What is meant by circular motion ? Give an example.

Ans When a body moves about a fixed axis (or a fixed point) without changing its position, the body is said to have a rotatory motion.

Eg :- Spinning wheel or chankha,
A spinning top.

4. Why are rest and motion are called relative terms ?

Ans. We can say that a body can be in motion for one set of objects and at the same time, it can be at rest for another set of objects. Therefore, rest and motion are considered to be relative terms.

5. What is the difference between rectilinear motion and curvilinear motion.

Rectilinear motion	Curvilinear motion
→ If the motion of a body is along a straight line, its motion is called rectilinear motion.	→ If the motion of a body is along a curved path, its motion is called curvilinear motion
→ Eg :- A Vehicle moving on a straight road	→ Eg :- A car taking a turn on a road.

6 An Oscillatory motion is always periodic, but a periodic motion is not always oscillatory. Explain the statement with an example.

Ans. All oscillatory motion are periodic because each oscillations gets completed in a definite interval of time. Ex. :- Revolution of planets arround the sun is a periodic motion but not an oscillatory motion. Ex :- On being pulled & then released, a load attached to a spring execules oscillatory motion on the other hand, all periodic motion may not be oscillatory.

7 State the body which is at rest & the body which is in motion in the following situations ..

(i) You are travelling in a train

You → Rest

train → Motion

(ii) The revolution of the Earth around the Sun.

Earth → Motion

Sun → Rest

8. Name the type/types of motion in the following.

1. A car moving on a straight road → Rectilinear motion.

2. A basketball thrown in a basket → Curvilinear motion

3. A girl skipping a rope → Non periodic motion

4. Earth moving around the sun → periodic motion

5. Smoke particles moving upwards from a chimney → Random motion

6. A swing in motion → Oscillatory motion

7. Blade of a moving electric fan → Rotatory motion

8. The wheels of a moving vehicle → multiples motion

9. Spinning charkha → Rotatory motion

10 Motion of a piston of a car → Oscillatory motion

11 Motion of a potter's wheel → Circular motion

12 A flying mosquito → Random motion.

Q. Define the following :-

1 Translatory motion :-

The motion in which every point on the moving body moves through the same distance in the same interval of time is called translatory motion.

2 Force :-

Force is that physical cause that tends to change the shape or size of set a body into motion to brings a body to rest.

3 Oscillatory motion :-

A motion in which a body moves 'to and fro' or 'back & forth' about its mean position is called oscillatory motion.

4. Weight of a body :-

Weight of a body is that force which pulls the body towards the Earth.

5. Periodic motion :-

Any motion that repeats itself at regular intervals of time is known as periodic motion.

6. Displacement :-

The shortest distance covered in a particular direction by a body while moving from one point to another is called its displacement.

7. Velocity :- Velocity of a moving body is the rate of change of its position with time in a particular direction.

8. Time period of a Pendulum :-

Time taken by a pendulum to complete one oscillation is called its time period.

4 Differentiate between :-

1 Rest & Motion

Rest	Motion
→ A body is said to be at rest when its position does not change with time with respect to its surroundings.	→ When the position of a body changes with time with respect to its immediate surroundings, it is said to be in motion.
→ Eg :- houses, trees, stone, table, chair.	→ Eg :- flying bird, people walking, rain drops.

2 Rectilinear Motion

→ If the motion of a body is along a straight line, its motion is called rectilinear motion.

→ Eg :- A vehicle moving on a straight road, firing a bullet from a gun.

Curvilinear Motion

→ If the motion of a body is along with a curved path, its motion is called curvilinear motion

→ Eg :- A car taking a turn on road, a basket ball being thrown into a basket.

3. Uniform Motion	Non Uniform Motion
→ When a body covers equal distances in equal intervals of time along a straight line then the motion of the body is said to be uniform.	→ When a body covers unequal distances in equal intervals of time along a straight line then the motion of the body is termed as non-uniform.
→ Eg :- if a car travels 80 km every hours or 40 km in every half an hour in a particular direction, then the motion of the car is said to be uniform.	→ Eg :- When a body is rolled on a ground or when the breaks are applied on a fast moving car, it describes a motion that is non-uniform.
4. Mass	Weight
→ Amount of matter in a substance	→ The force of gravity acting on a body.
→ SI unit of mass is kilogram (kg).	→ The SI unit of weight is newton (N).

5

Speed	Velocity
→ Distance travelled by a body per unit time is called speed.	→ Distance travelled by a body per unit time in a given direction is called velocity.
→ It is a scalar quantity.	→ It is a vector quantity

6

Distance	Displacement
→ The actual length of the path covered by a moving body in a certain interval of time is called the distance travelled by the body.	→ The shortest distance covered by a body in a particular direction while moving from one point to another is called its displacement.
→ Distance is always positive.	→ Displacement can be both positive & negative.

7.

Force	Weight
→ The physical cause which changes either the side or shape, or sets a body into motion or brings a body to rest is called force.	→ The force with which the earth attracts a body is called its weight.
→ The SI unit of force is newton (N).	→ The SI unit of weight is newton (N).

8.

Periodic Motion	Non Periodic Motion
→ Any motion that repeats itself at regular intervals of time is known as periodic motion.	→ A motion which does not repeat itself after a fixed interval of time is called non-periodic motion.
→ Eg :- Motion of pendulum.	→ Eg :- Motion of our lungs during breathing.

I Give Reason :-

1 Motion of the wheels of a moving car is a multiples motion.

Ans A moving car moving on a straight road shows rectilinear motion., while the wheels of the car rotate in circular motion. So motion of the ....

2 Rotation of the moon around the earth is a periodic motion.

A. ~~Rotation~~ Because it repeat after a fixed interval of time.

3 A particles rotating in a circle may have constant speed but its velocity changes continuously.

A A particle rotating in a circle may have constant speed but its velocity changes continuously as in order to move a particle in circle there must be change in direction.

4. We weight more at sea level than on top of a high mountain.

Ans. As we travel away from the earth surface our mass stays the same but weight reduce as gravitational pull increases. And as we travel near to the earth surface our mass stays the same but weight increase as gravitational pull increases. So we weight ----

* Numericals :-

1. A car travels from town A to town B that is 150 km away in 3 hours & from town B to town C which is 120 km away in 2 hours. Find the average speed of the car.

Soln :- Given that

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Distance (D_1) = 150 km
Distance (D_2) = 120 km
Time (T_1) = 3 hrs
Time (T_2) = 2 hrs
Average Speed (s) = ?

$$\text{Average Speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$= \frac{D_1 + D_2}{T_1 + T_2}$$

$$= \frac{150\text{ km} + 120\text{ km}}{3\text{ hrs} + 2\text{ hrs}}$$

$$= \frac{270}{5}\text{ km/hr}$$

$$= 54\text{ km/hr}$$

∴ Statement :- The average speed of a car is 54 km/hr.

2 Calculate the distance travelled by a man walking at speed of 5 km/hr in 18 min.

Sol^n Given that,

Speed (s) = 5 km/hr

Time (T) = 18 minutes

= 18/60 ($\because$ 1 hr = 60 min)

Distance (D) = ?

Distance = Speed × Time

$= 5 \times \frac{18}{60} \frac{\text{km}}{\text{hr}} \times \text{hr}$

$= 3/2$ km

= 1.5 km

$\therefore$ Statement :- The distance travelled by a man is 1.5 km

3. A bicyle moves at a speed of 18 km/hr. How much time it will take to cover a distance of 3 km ?

Ans, Given that,

Speed (s) = 18 km/hr

Distance (d) = 3 km

Time (t) = ?

∴ Time = $\frac{\text{Distance}}{\text{Speed}}$

$= \frac{3}{18} \frac{\text{km}}{\text{km}} \times \text{hr}$

$= 1/6 \text{ hr}$

$= \frac{60}{6} \text{ min}$ (1 hr = 60 min)

$= 10 \text{ min}$

∴ The time taken by a body is 10 minutes.

4. Calculate the weight of a body of a mass 13 kg & $g = 10 \text{ m/s}^2$.

Ans. Given that,

Mass (m) = 13 kg
gravity (g) = 10 m/s^2
Weight (w) = ?

Weight = Mass x gravity

$= 13 \times 10 \times \text{kgm/s}^2$

$= 130 \text{ N}$.

∴ Statement :- The weight of a body is 130N.

5. The value of acceleration due to gravity on moon is approximately $1.60\ m/s^2$. A body weight 320 N on moon, what is the mass of body ?

Ans

Given that,

Gravity $(g) = 1.60\ m/s^2$

Weight $(w) = 320\ N$

Mass $(m) = ?$

$$\text{Weight} = mg$$

$$\therefore \text{Mass} = \frac{\text{Weight}}{\text{gravity}}$$

$$= \frac{320\ N}{1.60\ m} \times s^2$$

$$= \frac{32000}{160}\ N/m \times s^2$$

$$= 200\ \frac{kg}{s^2} \times \frac{m}{m} \times s^2$$

$$= 200\ kg$$

∴ Statement :- The mass of a body is 200 kg