WORKSHEET 1

CHAPTER 2 – FORCE AND LAWS OF MOTION

A. Tick (✓) the correct option.

1. Which of the following has more inertia?
   a. Cotton ball b. Iron ball c. Woolen ball d. Plastic ball
2. A person of mass m moving with velocity $2v$ has momentum equal to
   a. mv. b. $2mv$. c. $3mv$. d. none of these.
3. SI unit of impulse is
   a. kg m/s. b. g m/s. c. kg cm/s. d. g m/min.
4. Two balls of masses $3m$ and $4m$ are in motion with velocities $6v$ and $8v$ respectively. Their momentum is in the ratio
   a. 16 : 9. b. 16 : 3. c. 9 : 16. d. 3 : 16.
5. The momentum of a 3 kg ball moving with a velocity of 4 m/s is
   a. 16 kg m/s. b. 24 kg m/s. c. 40 kg m/s. d. 12 kg m/s.

B. Fill in the blanks.

1. The effort needed to push or pull or change the shape of a body is known as _____
2. The momentum of a body of mass m travelling with velocity v is defined as the product of its _____ and _____
3. The forces which act on bodies for short time are called _____
4. According to Newton's third law of motion, every action has an _____ and _____ reaction.
5. In absence of an internal force the total momentum of all bodies of a system remains _____

C. State whether the given statements are true or false.

1. The study of motion of a body under the action of a force is called dynamics.
2. When the resultant of all the forces acting on a body is zero, the forces are called unbalanced.
3. Action and reaction forces act in the same direction.
4. SI unit of momentum and impulse is same.
5. A passenger in a bus tends to fall backwards when it starts suddenly.

D. Match the following.

1. Force applied for short time	kg m/s
2. SI unit of impulse	$m \times v$
3. Momentum	$m \times a$
4. Impulse	impulse
5. Force	$F \times t$

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Class: IX Date: .....

E. Answer the following questions.

Very Short Answer Questions

1. Define dynamics.
2. Name the types of Inertia.

Short Answer Questions

1. State Newton's first law of motion.
2. Why are shockers provided in vehicles?

Long Answer Questions

1. A body of mass 6 kg retards uniformly from 40 m/s to 10 m/s in 10 s. Find the retarding force.
2. Why car passengers are advised to wear seat belts?

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

1. b 2. b 3. a 4. c 5. d

B. Fill in the blanks.

1. force
2. mass, velocity
3. impulsive forces
4. equal, opposite
5. constant

C. State whether the given statements are true or false.

1. T 2. F 3. F 4. T 5. T

D. Match the following.

1. Force applied for a short time	impulse
2. SI unit of impulse	kg m/s
3. Momentum	$m \times v$
4. Impulse	$F \times t$
5. Force	$m \times a$

E. Answer the following questions.

Very Short Answer Questions

1. The study of causes of motion or changes in motion is called dynamics.
2. Inertia of a body is of the following types:
   - Inertia of rest
   - Inertia of motion
   - Inertia of direction.

Short Answer Questions

1. A body continues to be in the state of rest or of uniform motion in a straight line unless it is compelled by some external applied force.
2. Shockers are provided in vehicles to decrease the rates of change of momentum by reducing the time interval, hence reducing the impact force during jerks.

Long Answer Questions

1. $m = 6$ kg

   $u = 40$ m/s

   $v = 10$ m/s

   $t = 10$ s

   Initial momentum = $mu = 240$ kg m/s

   Final momentum = $mv = 60$ kg m/s

   Rate of change in momentum = Unbalanced force applied

   $$\frac{mv - mu}{t} = F$$

   $$F = \frac{60 - 240}{10} = -18 \text{ N}$$

   Hence, the retarding force is equal to 18 N.

2. Car passengers are advised to wear seat belts because, when a car suddenly stops, the seat belts worn by the passenger of the car prevent them from falling forward. This enables the momentum of the passengers to be reduced to zero in a long time interval.