WORKSHEET ①

A. Tick (✓) the correct option.

1. Newton's first law of motion is also called
   - a. Law of Inertia.
   - b. Law of Momentum.
   - c. Law of Action and Reaction.
   - d. None of these.

2. If the friction acting on the body is more, the body will move
   - a. more speedily.
   - b. less speedily.
   - c. same speed.
   - d. none of these.

3. Inertia of an object depends on its
   - a. mass.
   - b. mass and velocity.
   - c. acceleration.
   - d. distance.

4. What force will change the velocity of an object of mass 2.5 kg from $5 \, m \, s^{-1}$ to $10 \, m \, s^{-1}$ in 5 s?
   - a. 2.5 N
   - b. 5 N
   - c. 10 N
   - d. 15 N

5. On which law does a rocket work?
   - a. Newton's first law of motion
   - b. Newton's second law of motion
   - c. Newton's third law of motion
   - d. Newton's law of gravitation

B. Fill in the blanks.

1. The force exerted by a surface on an object placed over it is called the _____

2. In equilibrium state, tension in a string is equal to _____

3. When a bus driver suddenly applies brakes, the passengers experience a _____

4. Force of action and reaction do not cancel each other because they are _____

5. *newton* is the unit of _____

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

1. A force is a cause which changes or tends to change the state of rest or uniform motion of a body.

2. A constant force is needed to maintain an object in its state of uniform linear motion.

3. Inertia of an object depends on its size, shape and mass.

4. Pushing the piston of a syringe by a doctor is an example of contact force.

5. Force can change the direction of motion of an object.

D. Match the following.

1. Pushing a wheelbarrow	non-contact force
2. Gravitational force	contact force
3. Squeezing a gum tube to extract the gum	non-contact force
4. Electrostatic force	contact force
5. Pulling of a cart by a horse	non-contact force

Name: .... Teacher's signature: ....

Class: .... IX .... Date: ....

E. Answer the following questions.

Very short answer questions

1. State the SI unit of momentum.

2. State two factors which determine momentum of a body.

Short answer questions

1. State Newton's first and third laws of motion.

2. What is meant by linear momentum of a body?

Long answer questions

1. Two men pull in opposite directions on a cart resting on an icy road. The mass of the cart is 200 kg. One man exerts a force of 105 N towards right and the other man exerts a force of 95 N to the left, both in the horizontal directions. Calculate (i) the net force on the cart (ii) the acceleration of the cart.

2. A car of mass 600 kg is travelling with a speed of 10 m s^{-1} while a scooter of mass 80 kg is travelling with a speed of 50 m s^{-1}. Compare their momentums. Which vehicle will require more force to stop it?

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

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

B. Fill in the blanks.

1. normal reaction force
2. weight of the object suspended from it
3. forward push
4. acting on two different objects
5. force

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

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

D. Match the following.

1. Pushing a wheelbarrow   contact force
2. Gravitational force   non-contact force
3. Squeezing a gum tube to extract the gum   contact force
4. Electrostatic force   non-contact force
5. Pulling of a cart by a horse   contact force

E. Answer the following questions.

Very short answer questions

1. The SI unit of momentum is kg m s^{-1}.
2. The mass and the velocity of a body determine the momentum of a body. It is measured as the product of mass (m) and velocity (v).

Short answer questions

1. Newton's first law of motion : A body continues to be in its state of rest or uniform motion unless an external force acts on it.

   Newton's third law of motion : To every action, there is always an equal and opposite reaction.

   This law illustrates that force always exists in pair. For a book kept on a table, the weight of the book acting on the surface of table is action, while the surface of table supports it and exerts an equal and opposite force on the book, is reaction. The action and reaction do not act on same body.

2. When Force needed to stop a moving body depends not only on its velocity by also on its mass. The linear momentum of a body is the product of its mass and velocity. For a body of mass m and moving with velocity v, the linear momentum $P = mv$.

   It is a vector quantity. It is in the same direction as the direction of velocity. The SI unit of momentum is kg m s^{-1}.

Long answer questions

1. $$\text{Force towards right} = 105 \text{ N}$$
    $$\text{Force towards left} = 95 \text{ N}$$
    $$\text{Net force} = 105 - 95 = 10 \text{ N towards right}$$
    $$\text{Acceleration of the cart} = \frac{\text{Force}}{\text{Mass}}$$
    $$a = \frac{10}{200} = \frac{1}{20} = 0.05 \text{ m s}^{-2}$$

2. $$\text{Mass of car } (m_1) = 600 \text{ kg}$$
    $$\text{Velocity of car } (v_1) = 10 \text{ m s}^{-1}$$
    $$\text{Mass of scooter } (m_2) = 80 \text{ kg}$$
    $$\text{Velocity of scooter } (v_2) = 50 \text{ m s}^{-1}$$
    $$\text{Momentum of car } (P_1) = m_1 v_1$$
    $$= 600 \times 10 = 6000 \text{ kg m s}^{-1}$$
    $$\text{Momentum of scooter } (P_2) = m_2 v_2$$
    $$= 80 \times 50 = 4000 \text{ kg m s}^{-1}$$
    $$\frac{p_1}{p_2} = \frac{6000}{4000} = 3 : 2$$

Momentum of car is more. Hence, it will require more force to stop it.