Chapter-9

FORCE AND LAWS OF MOTION

Sub-Topic Name:

- Force and its effects
- Balanced Force
- Unbalanced Force
- Newton's First Law of Motion
- Inertia
- Momentum
- Newton's Second Law of Motion
- Mathematical formulation of Newton's Second Law of Motion
- Applications of Newton's 2nd Law of Motion
- Newton's Third Law of Motion
- Applications of Newton's Third Law of Motion
- Law of Conservation of Momentum

VERY VERY SHORT ANSWER TYPE

1. Define balance and unbalance force.
2. What is the usual name of force which can't produce the motion but only change inshape?
3. What is the total moment of bullet and gun before firing?
4. Why are road accidents at high speed very much worse than accidents at low speed?
5. A body of mass 25 kg has a momentum of 125 kg m/s. calculate the velocity of the body.
6. Define 1N force.
7. Write the relationship b/w force and acceleration.
8. A gun man gets a jerk on firing a bullet why?

9.State the law of conservation of momentum.

10. Explain the case of hose pipe.

11. Which of the following has more inertia ?

(a) A rubber ball and a stone of the same size?

(b) A bicycle and a train?

(c) A five-rupees coin and a one-rupee coin?

12. Write the relation connecting momentum and force.

13. What is momentum. Give its S. I. unit.

14. Why does a gun recoil?

15. Give two ways to reduce friction.

VERY SHORT ANSWER TYPE

1. A bullet of mass 10 gm moving with a velocity of 400 m/sec gets embedded in a freely suspended wooden block of mass 900 gm. Calculate the velocity of wooden block acquired.

2. If action is always equal to reaction, explain why a cart pulled by a horse can be moved.

3. A truck started from rest and rolls down a hill with constant acceleration it travels a distance of 400 m in 20 sec. find its acceleration and force acting on it if the mass of the truck is 1 metric tones.

4. Explain the Newton's second law of motion.

5. Why we use seat belts in car?

6. How much force is needed to accelerate a trolley of mass 20g through 1 m/s^2.

7. A force of 100N acts on a mass of 25 kg for 5 s. What velocity does it generate?

8. Why are passengers through in forward direction when a running bus stops suddenly?

9. Why do passengers tend to fall sideways when the bus takes a sharp u turn?

10. Why should a passenger hold on to prevent himself from swaying in a turning bus?
11. Why do passengers tend to fall back when it starts suddenly?
12. Why do passengers jumping out of a rapidly moving bus fall forward with his facedownwards, if he does not run forward?
13. Why does a passenger jumping out of a rapidly moving bus fall forward with his facedownwards?
14. Why can dust be removed by shaking it, or beating it by a carpet?
15. Why does a bullet when fired against a glass window pane make a hole in it, and theglass pane will smash it?
16. What do you mean by law of conservation of momentum?
17. Why do roads on mountains have inward inclination at sharp turns?

SHORT ANSWER TYPE

1. A bullet leaves a rifle with a velocity of 100m/s and the rifle of mass 2.5 kg recoils witha velocity of 1m/s. Find the mass of the bullet?
2. A certain force acting on a mass of 15kg for 3s, gives it a velocity of 2m/s. Findthe magnitude of force.
3. A cricket ball of mass 0.15 kg is moving with a velocity of 1.2m/s . Find the impulse onthe ball and average force applied by the player if he is able to stop the ball in 0.18s.
4. A motor car of mass 200kg is moving with a certain velocity . It is brought to rest by the application of brakes, within a distance o f 20m when the average resistance being offered to it is 500N.What was the velocity of the motor car?
5. A body of mass 0.5kg undergoes a change of velocity of 4cm/s in 4s

What is theforce acting on it?

6. A force of 8N acting on an 8kg mass for 4s provides its some velocity. Calculate the velocity

7. What would be the weight of a body of mass 50kg on the surface of the moon, where g =1.6m/s^2. what would be its mass?

8. A boy jumps a distance of 2m on the surface of the earth. What distance will he jump onthe surface of the moon where g is 1/6th of the value on the surface of the earth?

9. Two bodies of mass 1kg and 2 kg moving in the direction opposite to each other with aspeed 5m/s collide. Calculate the total momentum of the system before collision.

10. A bullet of mass 15g leaves the barrel of a gun with a velocity of 120m/s.The gun recoilswith a velocity of 1m/s. Find the mass of the gun.

11. A force of 3N acts on a mass of 0.5kg at rest for 10s. Find the final velocity and themomentum of the body after 10s.

12. A force of 80N acting on a certain mass for 3s gives it a velocity of 6m/s. find the mass ofthe body if the body was initially at rest.

LONG ANSWER TYPE

1. A man throws a ball weighing 500 gm vertically upwards with the speed of 10 m/sec find:

(a) What will be its initial momentum?

(b)What would its momentum at the highest point?

2. The velocity of a body of mass 10 kg increases form 4 m/sec to 8 m/sec When

a force acton it for 2 sec. find

(a) What is the momentum before the force act?

(b)What is the momentum after the force act?

(c) What is the momentum gain in momentum per sec.

(d) What is the value of force?

3. Explain the case of hose pipe.

4. State Newton's three laws of motion. Calculate the magnitude of force required toproduce an acceleration of 2 m/s in a body of mass 12.5 kg.

5. Define inertia. Does it depend on the mass of the body ? How will you use this inertia to

(i) dust a carpet

(ii)remove water drops from wet cloth? Explain

6. Explain how momentum gets conserved in collision of two bodies?

7.How are Newton's three laws of motion related?

8.Explain inertia and momentum in detail.

HOTS

1. State two effects of force.

2. Scientist who first conducted experiment to form the base for Newton's first law of motion.

3. If first law of motion holds true, why does a ball rolling on ground stop on its own?

4. What would happen if there was no friction on the Earth?

5. What would happen if gravitational force of the Sun suddenly vanishes?

6. What did Galileo observe by placing two inclined planes facing each other and rolling down a marble ball from top end of one of them?

7. What is the negative effect of friction on your shoe soles?

8. You are applying force on the pan of single pan weighing balance and the pointer points to 100 g. What is the force in newtons applied by you?

9. An athlete always runs some distance before taking a jump. Why?

10. A cricket ball of mass 70 g moving with a velocity of 0.5 m/s is stopped by a player in 0.5 s. What is the force applied by the player to stop the ball?

11. In a cricket match, why does a player lower his hands slightly while catching the ball?

12. Two cars having masses in the ratio 4 : 5, accelerate in the ratio 2:3. Find the ratio o forces exerted by each of them.