1. What is a Force?
2. Is force a scalar or a vector?
3. When we talk of force acting on a body, do we mean unbalanced force or balanced force?
4. Name the unbalanced force that stops a ball rolling on the ground.
5. A rubber ball is pressed. Which force : balanced or unbalanced, is applied?
6. Name the various effects of force.
7. When a carpet is beaten with a stick, dust comes out of it. Explain.
8. What is the SI unit of force?
9. The masses of two objects are 2 kg and 20 kg. Which has greater inertia?
10. When a branch of a tree is shaken, its fruits fall down. Why?
11. Name the physical quantity whose unit is kg ms^{-1}.
12. Why do you fall in the forward direction when a moving bus brakes to a stop and fall backwards when it accelerates from rest?
13. Why is it advised to tie any luggage kept on the roof of a bus with a rope?
14. An automobile vehicle has a mass of 1500 kg. What must be the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of 1.7 ms^{-2}?
15. Mass of a body is doubled. What happens to its acceleration under a given force?
16. 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?
17. A truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 400 m in 20 s. Find its acceleration. Find the force acting on it if its mass is 7 metric tonnes (Hint. 1 metric tonne = 1000 kg.)
18. A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice?
19. A 8000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40000 N and the track offers a frictional force of 5000 N, then calculate:

    (a) the net accelerating force;

    (b) the acceleration of the train; and

    (c) the force of wagon 1 on wagon 2.
20. When two bodies A and B interact with each other, A exerts a force of 10 N on B, towards east. What is the force exerted by B on A?
21. Do action-reaction forces produce the same magnitude of acceleration.
22. What is the total momentum of the bullet and the gun before firing?
23. What is the total momentum of the bullet and the gun after firing?

24. Two objects, each of mass 1.5 kg, are moving in the same straight line but in opposite directions. The velocity of each object is 2.5 ms^{-1} before the collision during which they stick together. What will be the velocity of the combined object after collision?

25. According to the third law of motion, when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move.

26. A hockey ball of mass 200 g travelling at 10 ms^{-1} is struck by a hockey stick so as to return it along its original path with a velocity of 5 ms^{-1}. Calculate the change in momentum of the hockey ball by the force applied by the hockey stick.

27. A bullet of mass 10 g travelling horizontally with a velocity of 150 ms^{-1} strikes a stationary wooden block and comes to rest in 0.03 s. Calculate the distance of penetration of the bullet into the block. Also calculate the magnitude of the force exerted by the wooden block on the bullet.

28. If action is always equal to the reaction, explain how a horse can pull a cart.

29. Two objects of masses 100 g and 200 g are moving along the same line and direction with velocities of 2 ms^{-1} and 1 ms^{-1}, respectively. They collide and after the collision, the first object moves at a velocity of 1.67 ms^{-1}. Determine the velocity of the second object.

30. A large truck and a car, both moving with a velocity of magnitude v, have a head-on collision and both of them come to a halt after that. If the collision lasts for 1 s :

    (a) Which vehicle experiences the greater force of impact?

    (b) Which vehicle experiences the greater change in momentum?

    (c) Which vehicle experiences the greater acceleration?

    (d) Why is the car likely to suffer move damage than the truck?