

QB365

Important Questions - Force and Laws of Motion

9th Standard CBSE

Science

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

Section-A

- 1) If a bus starts suddenly, the passengers in the bus will tend to fall 1
 - (a) in the direction opposite to the direction of motion of the bus
 - (b) in the same direction as the direction of motion of the bus
 - (c) sideways
 - (d) none of the above
- 2) The above problem can be explained on the basis of the property of 1
 - (a) inertia
 - (b) force
 - (c) torque
 - (d) momentum
- 3) The combined effect of mass and velocity is taken into account by a physical quantity called 1
 - (a) torque
 - (b) momentum
 - (c) moment of force
 - (d) moment of momentum
- 4) SI unit of force is 1
 - (a) kg-m/s
 - (b) newton
 - (c) dyne
 - (d) kg-wt
- 5) On applying a constant force to a body, it moves with uniform 1
 - (a) momentum
 - (b) speed
 - (c) acceleration
 - (d) velocity
- 6) $kg - m/s^2$ is the unit of 1
 - (a) momentum
 - (b) speed
 - (c) acceleration
 - (d) force
- 7) A and B are two objects with masses 6 kg and 34 respectively 1
 - (a) A has more inertia than B
 - (b) B has more inertia than A
 - (c) A and B are of the same inertia
 - (d) Both A and B possible
- 8) A cannon after firing recoils due to 1
 - (a) conservation of energy
 - (b) backward thrust of gases
 - (c) Newton's third law of motion
 - (d) Newton's first law of motion
- 9) A man is standing in a boat in still water. If he tries to walk towards the shore, the boat will 1
 - (a) move away from the shore
 - (b) remain stationary
 - (c) sink
 - (d) move towards the shore
- 10) What is the momentum of an object of mass m , moving with a velocity v ? 1
 - (a) $(mv)^2$
 - (b) mv^2
 - (c) $\frac{1}{2}mv^2$
 - (d) mv .

Section-B

- 11) Define the term force. 2
- 12) State the various effects produced by a force. 2
- 13) Give an illustration to show that a force can change the speed of an object. 2
- 14) Give an illustrate to show that a force can change the direction of motion of an object. 2

- 15) Define resultant force. 2
- 16) What are unbalanced forces? Give examples. 2
- 17) A ball is moving over a horizontal smooth surface with a constant velocity. What type of forces are acting on the ball? 2
- 18) name the forces (type of forces) when their resultant force acting on a body is not zero. 2
- 19) Can the velocity of a body change when no unbalanced force is acting on it? 2
- 20) State Newton's three laws of motion. 2

Section-C

- 21) Define inertia of direction. Give some examples of inertia of direction. 5
- 22) Explain the law of inertia. 5
- 23) What are all cars provided with seat belts? 5
- 24) Two persons manage to push a motorcar of mass 1,200 kg at a uniform velocity along a level road. The same motorcar can be pushed by three persons to produce an acceleration of $0.2m\ s^{-1}$ With what force does each person push the motorcar? (Assume that all persons push the motorcar with the same muscular effort.) 5

Section-A

- 1) (a) in the direction opposite to the direction of motion of the bus 1
- 2) (a) inertia 1
- 3) (a) torque 1
- 4) (b) newton 1
- 5) (c) acceleration 1
- 6) (d) force 1
- 7) (b) B has more inertia than A 1
- 8) (c) Newton's third law of motion 1
- 9) (a) move away from the shore 1
- 10) (d) mv. 1

Section-B

- 11) 2
 Force may be defined as a push or a pull which or tends to change the state of rest of uniform motion or direction of motion of a body. The force exerted by the engine makes the train to move from its actual position of rest while the force exerted by the brakes slows down or stops the moving train. The force exerted on the steering wheel of a car changes its direction of motion.
- 12) 2
Effects produced by a force. A force applied on object can do three things: (i) It can changes the speed of the object. (ii) It can change the direction of motion of the object. (iii) It can change the shape of the object.

13) 2

a horse by exerting a force on a cart, pulls it from rest and subsequently exerting larger force, the horse makes the cart move with larger speed. A player can stop a moving ball by exerting force on the ball in the opposite direction of its motion. Thus, a force can change the speed of the object making it move slower or faster.

14) 2

When a ball at the end of a string is rotated in a circle, the hand exerts a force radially towards the center of the circular path. This force continuously changes the direction of motion of the ball and thus keeps the ball moving along a circular path. Also in a football game, we can change the direction of a moving ball by kicking it.

15) 2

The resultant force or resultant of several forces acting simultaneously on a body is that single force which produces the same effect on a body as all these forces together produce.

16) 2

Unbalanced forces. If the resultant of the several forces acting on a body is not zero, the forces are said to be unbalanced forces. Unbalanced forces produce a change in the state of rest or uniform motion of a body.

Examples:

(i) In a tug-of-war, when one of the two teams pulls the rope with a larger force, it is able to pull the weaker team towards it. Here the two forces are not balanced. Therefore, it results in the motion of the weaker team towards the larger force along the rope.

(ii) When we stop pedaling a bicycle, it begins to slow down the road has small cracks and bumps. The bicycle has to overcome these imperfections, which slow down it. Forces which slow down the moving objects in this way are called forces of friction.

so we can say that objects continue to move, with the same velocity unless acted upon by unbalanced forces.

17) Balanced forces. 2

18) Unbalanced forces. 2

19) No. 2

20) 2

Newton's Laws of motion. Sir Issac Newton further studied the ideas of Galileo's on force and motion.

He arrived at three laws of motion which are called Newton's laws of motion. These laws may be stated as follows:

First Law. A body at rest or in uniform motion will remain at rest in uniform motion unless an unbalanced force acts upon it.

Second Law. The rate of change of momentum of a body is directly proportional to the applied unbalanced force and the change takes place in the direction of the force.

Third Law. Action and reaction are equal and opposite and they act on different bodies.

Section-C

21)

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Inertia of Direction. The inability of a body to change by itself its direction of motion is called 'inertia of direction'.

Examples:

(i) When a dog chases a hare, the hare runs along a zig-zag path. It becomes more difficult for the dog to catch hare because dog has more inertia of direction than that of the hare.

(ii) As a bicycle moves, the water drops sticking to its tire start leaving it tangentially.

22)

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Law of Inertia. The Newton's first law of motion is, in fact, the law of inertia. According to this law, a body continues in its state of rest or of uniform motion unless an external force acts on it to change that state. A table lying on the floor will remain in its position unless an external force acts on it remove it from that position.

23)

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A sudden movement of the vehicle results in the sudden change in the state of motion of the vehicle and of our feet in contact with it. But the rest of our body oppose this change due to its inertia and tends to remain where it was. Seat belts are provided to protect the passengers from falling backward or forward during such situations.

24)

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Here, $m = 1,200 \text{ kg}$, $a = 0.2 \text{ m s}^{-1}$

Clearly, the unbalanced force is exerted when the third person applies the force.

$$\therefore \text{Force applied by the third person} = ma = 1,200 \times 0.2 \\ = 240 \text{ N}$$

As all the three persons push the motorcar with the same muscular effort, force exerted by each person = 240 N.