10th Std - Science
Unit - 1 - Laws of Motion

Complete Guide For Textbook Back Exercise Questions

Click / Scan QR Code to Attempt Textbook Back Questions as Practice Test Online and View the Answer with Solution Steps.

I. Choose the correct answer

1. Inertia of a body depends on ____ .

A) (a) weight of the object
C) (c) mass of the object
B) (b) acceleration due to gravity of the planet
D) Both a & b

2. Impulse is equals to ____ .

A) rate of force and time
C) rate of change of momentum
B) rate of change of mass
D) change of momentum

3. Newton's III law is applicable to.

A) (a) for a body is at rest
C) only for bodies with equal masses.
B) (b) for a body in motion
D) both a & b

4. Plotting a graph for momentum on the X-axis and time on Y-axis. slope of momentum-time graph gives: ____ .

A) Rate of force
C) Acceleration
B) Impulsive force
D) Force

5. In which of the following sport the turning of the effect of force used?

A) swimming
C) hockey
B) cycling
D) tennis

6. The unit of 'g' is ms^{-2}. It can be also expressed as .

A) Nkg^{-1}
C) cms^{-1}
B) $cm^2 s^{-2}$
D) $Nm^2 kg^{-1}$

7. One kilogram force equals to ____ .

A) 980 dyne
C) 9.8×10^4 N
B) 9.8 dyne
D) 98×10^4 dyne

8. The mass of a body is measured on planet Earth as M kg. When it is taken to a planet of radius half that of the Earth then its value will be ____ kg.

A) 4M
C) M
B) $\dfrac{M}{4}$
D) 2M

9. If the Earth shrinks to 50% of its real radius its mass remaining the same, the weight of a body on the Earth will ____ .

A) decrease by 25%
C) decrease by 50%
B) increase by 300%
D) increase by 50%

10. To project the rockets which of the following principle(s) is /(are) required?

A) (a) Newton's third law of motion
C) (c) Law of conservation of linear momentum
B) (b) Newton's law of gravitation
D) (d) Both (a) and (c)

II. Fill in the blanks

1. To produce a displacement _____ is required.
2. Passengers lean forward when the sudden brake is applied in a moving vehicle. This can be explained by _____ .
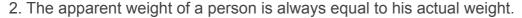3. By convention, the clockwise moments are taken as _____ and the anticlockwise moments are taken as_____
4. _____ is used to change the speed of the car.
5. A man of mass 100 *kg* has a weight of _____ at the surface of the Earth.

III. State whether the following statements are true or false. Correct the statement if it is false

1. The linear momentum of a system of particles is always conserved.
A) True   B) False

2. The apparent weight of a person is always equal to his actual weight.
A) True   B) False

3. Weight of a body is greater at the equator and less at the polar region.
A) True   B) False

4. Turning a nut with a spanner having a short handle is so easy than one with a long handle.
A) True   B) False

5. There is no gravity in the orbiting space station around the Earth. So the astronauts feel weightlessness.
A) True   B) False

IV. Match the following

1. Newton's I law	- Propulsion of a rocket
2. Newton's II law	- Stable equilibrium of a body
3. Newton's III law	- Law of force
4. Law of conservation of linear momentum	- Flying nature of bird

V. Assertion & reasoning

Mark the correct choice as,

(a) If both the assertion and the reason are true and the reason is the correct explanation of assertion.

(b) If both the assertion and the reason are true, but the reason is not the correct explanation of the assertion.

(c) Assertion is true, but the reason is false.

(d) Assertion is false, but the reason is true.

1. Assertion: The sum of the clockwise moments is equal to the sum of the anticlockwise moments.

Reason: The principle of conservation of momentum is valid if the external force on the system is zero.

2. Assertion: The value of 'g' decreases as height and depth increases from the surface of the Earth.

Reason: 'g' depends on the mass of the object and the Earth.

VI. Answer Breifly

1. Define inertia. Give its classification.

2. Classify the types of force based on their application

3. If forces F_1 = 5 N and F_2 = 15 N are acting opposite to one another. Find the resultant force and the direction of action of the resultant force.

4. Differentiate mass and weight

5. Define moment of a couple.

6. State the principle of moments.

7. State Newton's second law.

8. Why a spanner with a long handle is preferred to tighten screws in heavy vehicles?

9. While catching a cricket ball the fielder lowers his hands backwards. Why?

10. How does an astronaut float in a space shuttle?

VII. Solve the given problems

1. Two bodies have a mass ratio of 3 : 4 The force applied on the bigger mass produces an acceleration of 12 ms^{-2}. What could be the acceleration of the other body, if the same force acts on it.

2. A ball of mass 1 kg moving with a speed of 10 ms^{-1} rebounds after a perfect elastic collision with the floor. Calculate the change in linear momentum of the ball.

3. A mechanic unscrews a nut by applying a force of 140 N with a spanner of length 40 cm. What should be the length of the spanner if a force of 40 N is applied to unscrew the same nut?

4. The ratio of masses of two planets is 2 : 3 and the ratio of their radii are 4 : 7. Find the ratio of their accelerations due to gravity.

VIII. Answer in detail

1. What are the types of inertia? Give an example for each type.

2. Newton's universal law of gravitation

3. Deduce the equation of a force using Newton's second law of motion.

4. State the law of conservation of linear momentum and prove it.

5. Describe rocket propulsion

6. State the universal law of gravitation and deduce its mathematical expression

7. Give the applications of universal law gravitation.

IX. HOTS Question

1. Two blocks of masses 8 kg and 2 kg respectively lie on a smooth horizontal surface in contact with one other. They are pushed by a horizontally applied force of 15 N . Calculate the force exerted on the 2 kg mass.

2. A heavy truck and bike are moving with the same kinetic energy. If the mass of the truck is four times that of the bike, then calculate the ratio of their momenta. (Ratio of momenta = 2:1)

3. "Wearing a helmet and fastening the seat belt is highly recommended for the safe journey". Justify your answer using Newton's laws of motion.