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Answers Key:

Short Answer

1. **(i) Newton's First law of motion:** Every body continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force
   (ii) Newton's Second law of motion: The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of force. This law helps us to measure the amount of force. So it is called as "law of force"
   (iii) Newton's Third law of motion: For every action there is an equal and opposite reaction. They always act on two different bodies
2. **Newton's Second Law of motion:**
   "The force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force."
   (i) Let"m" be the mass of a moving body, moving along a straight line with an initial speed'u'.
   (ii) After a time interval of 't second, the velocity of the body changes to 'v due to the impact of an unbalanced external force F
   (iii) Initial momentum of the body P_1 = mu
   (iv) Final momentum of the body P_1= mv
   (v) Change in momentum $\triangle p = P_1 - P_1 = mv - mu$
   By Newton's second law of motion
   Force, F $\propto$ rate of change of momentum
   F $\propto$ change in momentum /time
   $F \propto (mv - mu)/t$
   $F = km(v - u)t$
   Here, k is the proportionality constant
   k= 1 in all system of units. Hence
   $F = \frac{m(v-u)}{t}$
   Since, acceleration = change in velocity / time
   a= (v-u) /t.
   (vi) Hence, we have F= m x a
   Force = mass x acceleration
3. (i) Dimensions of the heavenly bodies can be measured using gravitation law.
   (ii) Eg. Mass of the Earth, radius of the Earth, acceleration due to gravity etc. can be calculated with a higher accuracy.
   (iii) Helps in discovering new stars and planets.
   (iv) One of the irregularities in the motion of stars is called "Wobble" lead to the disturbance in the motion of planet nearby.
   (v) Here mass of the star can be calculated using law of gravitation.
   (vi) Helps to explain germination of roots due to the property of geotropism.
   (vii) Helps to predict the path of the astronomical bodies

Very Short Answer

4. The inherent property of a body to resist any change in its state of rest or the state of uniform motion, unless it is influenced upon by an external unbalanced force, is known as 'inertia.
   (i) Inertia of rest
   (ii) Inertia of motion
   (iii) Inertial of direction
5.

No	Mass	Weight
(i)	It is the quantity of matter contained in the body.	It is the gravitational force exerted on' a body due to the gravity.
(ii)	It is a scalar quantity	is a vector quantity.
(iii)	SI unit is kg (kilogram)	SI unit is N (newton)
(iv)	Mass of a body remains the same at any point on the Earth	Weight of a body varies from one place to another place on the Earth.
(v)	Measured using a physical balance	Measured using a spring balance.

6. (i) According to Newton's second law, "the force acting on a body is directly proportional to the rate of change of linear momentum of the body and the change in momentum takes place in the direction of the force"
   (ii) F= m xa (Force = mass x acceleration)
7. (i) The turning effect of a body depends upon the distance of the line of action of the applied force from the axis of rotation
   (ii) Larger the perpendicular distance, lesser is the force required to turn the body. So spanner with long handle is preferred
8. When the fielder pulls back his hands he experiences a smaller force for a longer interval of time leading to less damage to his hands
9.

Astronauts are not floating but falling freely around the Earth due to their huge orbital velocity. Since space station and astronauts have equal acceleration, they are under free fall condition. (R =0 refer case 4 in Table 1.2). Hence, both the astronauts and the space station are in the state of weightlessness

Choose the correct answer

10. (c) mass of the object
11. (c) change of momentum
12. (c) both a & b
13. (c) cycling
14. (d) M

Fill in the blanks

15. force/unbalanced force
16. inertia of motion
17. Gear or Torque
18. 980 N

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