ÉCOLE GLOBALE
INTERNATIONAL GIRLS SCHOOL
Dehradun

HOLIDAY HOMEWORK - CLASS IX B Physics

Assignment -1

Unit: Gravitation

1. The weight of any person on the moon is about 1/6 times that on the earth. He can lift a mass of 15 kg on the earth. What will be the maximum mass, which can be lifted by the same force applied by the person on the moon?

2. Is uniform circular motion taking place at a constant speed or constant velocity? Justify your answer.

3. Name the force which is required to maintain a body in uniform circular motion?

4. A ball is projected vertically upwards with an initial velocity of u goes to a maximum height h before coming to ground. What is the value of h?

5. Is value of 'g' same everywhere?

6. What is the relationship between 'g' and 'G'

7. During a free-fall what is the weight of a body. Give reason for the answer.

8. A stone and feather are thrown from a tower, both the objects should reach the ground at same time but it does not. Why?

9. What is the value of 'G', universal gravitational constant?

10. What is the mass of a body whose weight is 50 newtons. (take g=10 m/s^2)

11. We know that weight of a body on the moon= $1/6^{th}$ of its weight on the Earth. If the body weighs 6 N on the Earth, what will be its weight on the moon? (take g=10 m/s^2)

12. An object has a mass of 20 kg on earth. What will be its (i) mass on the moon (ii) weight on the moon.?

13. Identical packets are dropped from two aeroplanes, one above the equator and the other above the

north pole, both at height h. Assuming all conditions are identical, will those packets take same time to reach the surface of earth. Justify your answer.

14.What is the value of relative density for water?

15. An object floats in kerosene of density 800 kg/ m^3 up to a certain mark. If the same object is placed in water of densiy 1000 kg/ m^3 , will it sink more or less? Give reason for your answer.

16. Encircle the correct option. Justify the answers chosen for parts (i, ii, vii,x, xi)

(i) The value of acceleration due to gravity

(a) is same on equator and poles (b) is least on poles (c) is least on equator

(ii) The gravitational force between two objects is F. If masses of both objects are halved without changing distance between them, then the gravitational force would become:
(a) F/4 (b) F/2 (c) F (d) 2 F

(iii) A boy is whirling a stone tied with a string in an horizontal circular path. If the string breaks, the stone.
(a) will continue to move in the circular path
(b) will move along a straight line towards the centre of the circular path
(c) will move along a straight line tangential to the circular path
(d) will move along a straight line perpendicular to the circular path away from the boy

(iv) In the relation F = G M m/d 2 , the quantity G
(a) depends on the value of g at the place of observation
(b) is used only when the earth is one of the two masses
(c) is greatest at the surface of the earth (d) is universal constant of nature

(v) Law of gravitation gives the gravitational force between
(a) the earth and a point mass only (b) the earth and Sun only
(c) any two bodies having some mass (d) two charged bodies only

(vi) The value of quantity G in the law of gravitation
(a) depends on mass of earth only (b) depends on radius of earth only
(c) depends on both mass and radius of earth (d) is independent of mass and radius of the earth

(vii) Two particles are placed at some distance. If the mass of each of the two particles is doubled, keeping the distance between them unchanged, the value of gravitational force between them will be:
(a) ¼ times (b) 4 times (c)1/2times (d) unchanged

(viii) The atmosphere is held to the earth by
(a) gravity (b) wind (c) clouds (d) earth's magnetic field

(ix) The force of attraction between two unit point masses separated by a unit distance is called
(a) gravitational potential (b) acceleration due to gravity

(c) gravitational field (d) universal gravitational constant

(x) An object weighs 10 N in air. When immersed fully in water, it weighs only 8 N. The weight of the Liquid displaced by the object will be

(a) 2 N (b) 8 N (c) 10 N (d) 12 N

(xi) A girl stands on a box having 60 cm length, 40 cm breadth and 20 cm width in three ways. In which of the following cases, pressure exerted by the brick will be

(a) maximum when length and breadth form the base (b) maximum when breadth and width form the base(c) maximum when width and length form the base (d) the same in all the above three cases

(xii) An apple falls from a tree because of gravitational attraction between the earth and apple. If F1 is the magnitude of force exerted by the earth on the apple and F2 is the magnitude of force exerted by apple on earth, then

(a) F1 is very much greater than F2 (b) F2 is very much greater than F1

(c) F1 is only a little greater than F2 (d) F1 and F2 are equal

Assignment – 2 (Unit: Work And Energy)

Q1.Fill in the blanks :

1. The SI unit of energy is .....

2. Kilowatt hour is a unit of .....

3. Kilowatt is a unit of .....

4. ..... is the SI unit of work.

5. Kinetic energy depends upon the ..... and the square of ..... of a body

6. 1 kwh= .....joules.

Q2.State True or False : Also correct the statement if it is false.

(i) When a body falls on the ground and stops, the principle of conservation of energy is violated.

(ii**)** When velocity is halved, its kinetic energy becomes 1/4th.

(iii) Work done by gravity on a freely falling body is an example of negative work

(iv) Work done by friction on a sliding body is a negative work

Q3. Write down the energy transformations that takes place in the following :

(i) Electric Motor (ii) loudspeaker (iii) electric bulb (iv) Photo cell

(v) television (vi) battery

Q4. Solve the numerical.

1. Calculate the work done by a person in lifting a load of 20 kg from the ground and placing it on a 1 m high table.
2. Find the mass of a body which has 5J of kinetic energy while moving at a speed of 2 m/s.
3. A ball of mass 200g falls from a height of 5 metres. What is its kinetic energy when it just reaches the ground? ($g = 9.8\ m/s^2$).
4. Find the momentum of a body of mass 100g having a kinetic energy of 20J.
5. How fast should a man of mass 50kg run so that his kinetic energy be 625J ?
6. A ball of mass 0.5 kg slows down from a speed of 5 m/s to that of 3 m/s. Calculate the change in kinetic energy of the ball.
7. A body of 2 kg falls from rest. What will be its kinetic energy during the fall at the end of 2 seconds ? (take $g= 10\ m/s^2$)
8. A 60kg person climbs stairs of total height 20m in 2min. Calculate the power delivered
9. Calculate the work done by a student in lifting 0·5 kg book from the ground and keeping it on a shelf 1·5m high.
10. A coolie carries a load of 50kg on his head and walks on a level road upto 100m. What is the work done by him?

Assignment – 3 (Forces and Laws of Motion)

1. Which of the following statement is ***not*** correct for an object moving along a straight path in an accelerated motion?
   (a) Its speed keeps changing
   (b) Its velocity always changes
   (c) It always goes away from the earth
   (d) A force is always acting on it

2. The forces of action and reaction are
   (a) always equal only
   (b) always equal and opposite
   (c) always equal but in same direction
   (d) always unequal and opposite.

3. According to the third law of motion, action and reaction
   (a) always act on the same body
   (b) always act on different bodies in opposite directions
   (c) have same magnitude and directions
   (d) act on either body at normal to each other

4. The action and reaction forces at
   (a) on different bodies always
   (b) on some body always
   (c) on same body, sometimes
   (d) on different bodies, sometimes

5. A goalkeeper in a game of football pulls his hands backwards after holding the ball shot at the goal. This enables the goal keeper to
   (a) exert larger force on the ball
   (b) reduce the force exerted by the ball on hands
   (c) increase the rate of change of momentum
   (d) decrease the rate of change of momentum

6. The inertia of an object tends to cause the object
   (a) to increase its speed
   (b) to decrease its speed
   (c) to resist any change in its state of motion
   (d) to decelerate due to friction

7. Principle of conservation of linear momentum is deduced from
   (a) Newton's first law
   (b) Newton's second law
   (c) Newton's third law
   (d) none of the above

8. The function of mud guards is based on
   (a) inertia of rest
   (b) inertia of direction

(c) inertia of motion
(d) none of the above

9. The force of action and reaction
(a) always cancel each other
(b) never cancel
(c) cancel sometimes
(d) cannot say

10. A passenger in a moving train tosses a coin which falls behind him. It means that motion of the train is
(a) accelerated
(b) uniform
(c) retarded
(d) along circular tracks

11. An object of mass 2 kg is sliding with a constant velocity of 4 m s–1 on a frictionless horizontal table. The force required to keep the object moving with the same velocity is
(a) 32 N
(b) 0 N
(c) 2 N
(d) 8 N

12. Rocket works on the principle of conservation of
(a) mass
(b) energy
(c) momentum
(d) velocity

13. A water tanker filled up to $\frac{2}{3}$ of its height is moving with a uniform speed. On sudden application of the brake, the water in the tank would
(a) move backward
(b) move forward
(c) be unaffected
(d) rise upwards

14. Inertia of a body in linear motion is measured by its
(a) mass
(b) momentum
(c) velocity
(d) none of the above

15. What mass of a body can attain an acceleration of $5 m/s^2$ under a force of 250 N?
(a) 5 kg
(b) 250 kg
(c) 50 kg
(d) 10 kg

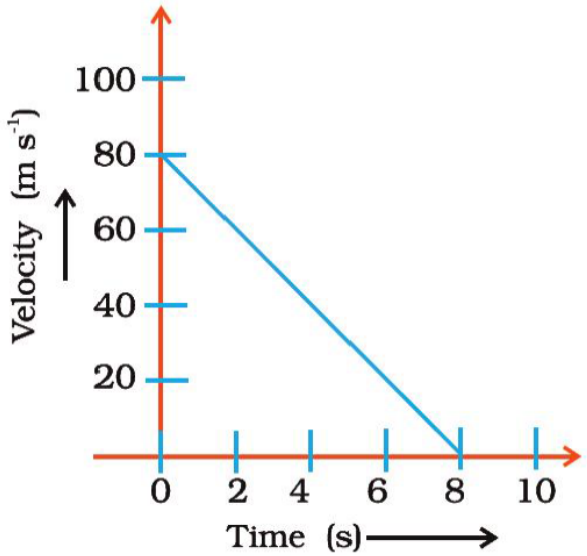
17. Two balls of the same size but of different materials, rubber and iron are kept on the smooth floor of a moving train. The brakes are applied suddenly to stop the train. Will the balls start rolling? If so, in which direction? Will they move with the same speed? Give reasons for your answer.

18. Two identical bullets are fired one by a light rifle and another by a heavy rifle with the same force. Which rifle will hurt the shoulder more and why?

19. A horse continues to apply a force in order to move a cart with a constant speed. Explain why?

20. Suppose a ball of mass *m* is thrown vertically upward with an initial speed *v,* its speed decreases continuously till it becomes zero. Thereafter, the ball begins to fall downward and attains the speed *v* again before striking the ground. It implies that the magnitude of initial and final momentums of the ball are same. Yet, it is not an example of conservation of momentum. Explain why ?

21. Velocity versus time graph of a ball of mass 50 g rolling on a concrete floor is shown in below Figure. Calculate the acceleration and frictional force of the floor on the ball.



22. A truck of mass *M* is moved under a force *F*. If the truck is then loaded with an object equal to the mass of the truck and the driving force is halved, then how does the acceleration change?

23. Why does a gun recoil on firing? Obtain an expression for recoil velocity of gun.

24. A rocket can move in air free space, but a jet plane cannot. Why?

25. Two friends on roller-skates are standing 5 m apart facing each other. One of them throws a ball of 2 kg towards the other, who catches it, How will this activity affect the position of the two? Explain your answer.

26. Water sprinkler used for grass lawns begins to rotate as soon as the water is supplied. Explain the principle on which it works.

LONG ANSWER QUESTIONS

27. Using second law of motion, derive the relation between force and acceleration. A bullet of 10 g strikes a sand-bag at a speed of 103 m/s and gets embedded after travelling 5 cm. Calculate
(i) the resistive force exerted by the sand on the bullet
(ii) the time taken by the bullet to come to rest.

28. Derive the unit of force using the second law of motion. A force of 5 N produces an acceleration of 8 m/s^2 on a mass m_1 and an acceleration of 24 m/s^2 on a mass m_2 . What acceleration would the same force provide if both the masses are tied together?

29. State and explain Newton's third law of motion. How will you prove it experimentally?

30. What is momentum? Write its SI unit. Interpret force in terms of momentum. Represent the following graphically
(a) momentum versus velocity when mass is fixed.
(b) momentum versus mass when velocity is constant.