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 **DELHI PUBLIC SCHOOL, GODHRA**

**Worksheet - 7**

 **STD: IX**

 **Sub : Science Date : 22/10/2019**

 **Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Roll No : \_\_\_\_\_**

1) The kinetic energy of an object of mass `m’ moving with a velocity of 5 ms-2is 25 J. Calculate its kinetic energy when its velocity is doubled.

2) When is the work done by a force said to be negative? Give one situation in which one of the forces acting on the object is doing positive work and the other is doing negative work.

3) Define one Joule of work. Calculate the work done in lifting a box weighting 150 kg through a vertical height of 7 meters (take g=10 ms-2)

4) (i) An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground.

 The initial and the final points of the path of the object lie on the same horizontal line. What is the total

 workdone against the force of gravity and by the force of gravity on the object ? Explain with proper

 mathematical expressions.

 (ii) Certain force acting on a 20kg mass changes its velocity from 5ms-1 to 2ms-1 calculate the work done by

 the force.

5) (i) Define kinetic energy. Derive an expression for the kinetic energy of an object.

 (ii)The power of a motor pump is 5kW. How much water per minute the pump can raise to height of 20m?

 Take g=10 ms-2 is

6) List two conditions which need to be satisfied for the work to be done on an object ?

7) Define 1 Watt of power. A lamp consumes 1000 J of electrical energy in 10s. Calculate its power.

8) (i) A light and a heavy object have the same momentum. What is the ratio of their kinetic energies ? Which

 one has a larger kinetic energy ?

 (ii) A ball is dropped from a height of 10m. If the energy of the ball reduces by 40% after striking the ground,

 how much high can the ball bounce back ?(g = 10ms-2)

9) (i) State the law of conservation of energy.

 (ii) Show that the energy of a freely falling body is conserved.

10) Define energy. Name and define its SI unit.

11) A child of mass 35kg is sitting on a trolley of mass 5 kg. The trolley is given a push by applying a force so

 that begins to move with a speed of 4m/s. The trolley comes to rest after covering a distance of 16 m.

 Find (i) the work done on the trolley (ii) the work done by the trolley before coming the nest.

12) (a) An object of mass ‘m’ is moving with a velocity ‘v’ on a level ground. State the amount of work done by

 a person who wants to stop the object. Justify your answer.

 (b) A satellite of mass ‘m’ is moving round

 the earth with a speed ‘v’. State the work done by the force of gravity on the satellite. Justify your

 answer.

13) When is work said to be done against the force of gravity ? State and define SI unit of work.

14) The kinetic energy of an object moving with a velocity of 5 m/s is 25J. Find the mass of the object. What

 will be its kinetic energy when its velocity is made (i) two times (ii) three times ? Justify your answers.

15) Define commercial unit of energy. Derive relationship between this unit of energy and SI unit of energy. An

 electrical device of 500 W is used daily in a household for 10 hours. Calculate the energy consumed in the

 month of April.

16) What is meant by power of a machine ? Name and define its SI unit. How is kilowatt different from kilowatt

 hour ? From a 20m high fall nearly 25 metric tonnes of water fall per second. Calculate the equivalent

 power if all this energy is utilized. (g = 10 m/s2)

17) (a) Define potential energy. Derive an expression for the gravitational potential energy of a body of

 mass „m‟ raised to a height „h‟ above the ground.

 (b) State the energy transformation in the following : (i) heat engine (ii) electric motor

18) A box of about 10kg is placed at a point A on a horizontal surface. It is moved to a point B which is at a

 distance of 2m from A. If the line joining A and B is horizontal find the work done by the gravitational force

 on the box. Justify your answer. (g = 10 m/s2)

19) A body of mass 5 kg is thrown vertically upwards with a speed of 10 m/s. What is its kinetic energy when it

 is thrown ? Find its potential energy when it reaches at the highest point. Also find the maximum height

 attained by the body. (g = 10 m/s2)

20) (a) Define power. Two boys A and B do the same work in 5 minutes and 6 minutes respectively. Which of

 the two has more power and why ?

 (b) Derive an expression for the kinetic energy of a moving object.

21) How is work done by a force measured ? A porter lifts a luggage of 20 kg from the ground and puts it on his

 head 1.7 m above the ground. Find the work done by the porter on the luggage. (g = 10 m/s2)

22) A force is applied on a car of mass 1500 kg, so that its speed increases from 54 km/h to 72 km/h. Find the

 work done by the force on the car.

23) (a) State the law of conservation of mechanical energy.

 (b) Explain the conservation of energy in the case of a freely falling object.

 (c) Find the velocity of a body of mass 2 kg having kinetic energy of 100 J.

24) (a) Name the physical quantity defined by rate of doing work. Define its SI unit.

 (b) Why is concept of average power useful ? How is it determined ?

 (c) A boy of mass 45 kg runs up a staircase of 45 steps in 9 s. If the height of each step is 15 cm, find his

 power. (g = 10 m/s2)

25) (a) Define one joule of energy.

 (b) Two cars X and Y of masses m1 and m2 accelerate from rest in linear direction. The mass of Y is twice

 of X. The acceleration due to car X is 1ms-2. After a time of t seconds it is noticed that the Kinetic

 energy of X is twice of Kinetic energy of Y. Calculate the acceleration produced by the car Y.

26) (a) A bus starts from rest accelerates against friction due to road from t = 0 sec to t = 10 sec. Then it is

 allowed to decelerate from t = 11 sec to t = 30 sec. Comment about the nature of work done in these

 different time intervals.

 (b) What is the work done by the force of gravity on a satellite while moving around the earth ? Justify your

 answer.

27) (a) State and prove law of conservation of energy for a freely falling body.

 (b) What is the power expended by the engine of the car mass 1.5 tonnes which increases the velocity of the

 car from 36 km/hr to 72 km/hr in 20 seconds.