PHYSICS

NCERT - NCERT PHYSICS(HINGLISH)

WORK AND ENERGY

Solved Examples

1. A force of 5 N is acting on an object. The object is displaced through 2 m in the direction of the force (Fig. 11.2). If the force

acts on the object all through the displacement, then work done is $5N \times 2m = 10N$ m or $10J$.

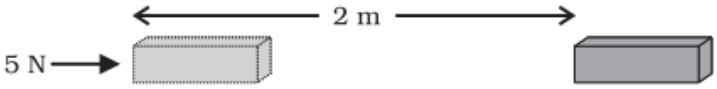

Fig. 11.2

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2. porter lifts a luggage of 15 kg from the ground and puts it on his head $1.5m$ above the ground. Calculate the work done by him on the luggage

A. $200J$

B. $225J$

C. $275J$

D. $175J$

Answer: B

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3. An object of mass 15kg is moving with a uniform velocity of 4m/s. what is the kinetic energy possessed by the object ?

A. $100J$

B. $120J$

C. $130J$

D. $140J$

Answer: B

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4. What is the work to be done to increase the velocity of a car from $30kmh^{-1}$ to $60kmh^{-1}$ if the mass of the car is $1500kg$?

A. $156200J$

B. $156250J$

C. $156275J$

D. $156300J$

Answer: B

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5. Find the energy possessed by an object of mass 10 kg when it is at a height of 6 m above the ground.Given, $g = 9.8m/s^2$

A. $488J$

B. $500J$

C. $588J$

D. $600J$

Answer: C

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6. An object of mass 12 kg is at a certain height above the gorund if the potential energy of the object is 480J find the height at which the

object is withj respect to the ground Given, $g = 10m / s^2$

A. $2m$

B. $3m$

C. $4m$

D. $5m$

Answer: C

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7. Two girls each of weigth 400N, climb up a rope through a height of 8m. We name one of the girls A and the other B. Girl A takes 20s while B takes 50s to accomplish this task. What is the power expneded by each girl.

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8. A boy of mass 50kg runs up a staricase of 45 steps in 9s. If the height of each step is 15cm, find his power. Take $g = 10m / s^2$

A. $275W$

B. $375W$

C. $475W$

D. $575W$

Answer: B

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9. An electric bulb of 60 W is used for 6 h per day. Calculate the units of energy consumed in one day by the bulb.

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Exercise

1. Look at the activities listed below. Reason out whether or not work is done in the light of your understanding of the term 'work'.

(a) Suma is swimming in a pond.

(b) A donkey is carrying a load on its back.

(c) A wind -mill is lifting water from a well.

(d) A green plant is carrying out photosynthesis.

(e) An engine is pulling a train. (f) Food grains are getting drired in the Sun.

(g) A saliboat is moving due to wind energy.

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2. 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 object lie on the same horizontal line. What is the work done by the force of gravity on the object ?

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3. A battery lights a bulb. Describe the energy changes involved in the process.

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4. Certain force acting on a 20 kg mass changes its velocity from $5m/s \rightarrow 2m/s$. calculate the work done by the force.

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5. A mass of 10 kg is at a point A on a table. It is moved to a point B. If the line joining A and B is horizontal, what is the work done on the object by the gravitational force ? Explain your answer.

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6. The potential energy of a freely falling object decreases progressively. Does this

violate the law of conservation of energy ? Why ?

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7. What are the various energy transformations that occur when you are riding a bicycle ?

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8. Does the transfer of energy take place when you push a huge rock with all your might and fail to move it ? Where is the energy you spend going ?

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9. A certain household has consumed 250 units of energy during a month. How much energy is this in joules ?

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10. An object of mass 40 kg is raised to a height of 5 m above the ground. What is its potential energy ? If the object is allowed to fall, find its kinetic energy when it is half - way down.

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11. What is the work done by the force of gravity on a satellite moving round the Earth ? Justify your answer.

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12. Can there be displacement of an object in the absence of any force acting on it ? Think. Discuss this question with your friends and teacher.

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13. A person holds a bundle of hay over his head for 30 minutes and gets tired. Has he

done some work or not ? Justify your answer.

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14. An electric heater is rated 1500W. How much energy does it use in 10 hours ?

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15. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side

and allow it to oscillate. Why does the bob eventually come to rest ? What happens to its energy eventually ? Is it a violation of the law of conservation of energy ?\

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16. An object of mass m is moving with a constant velocity v How much work should be done on the object in order to bring the object to rest ?

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17. calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 km//h ?

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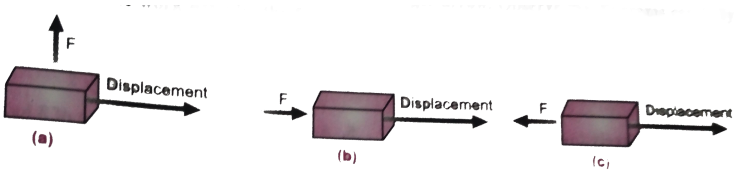
18. In each of the following, a force, F is acting on an object of mass, m. The direction of displacement is from west to east shown by the longer arrow. Observe the diagrams carefully and state whether the work done by

the force is negative, positive or zero.



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19. Soni says that the acceleration in an object could be zero even when several forces are acting on it. Do you agree with her ? Why ?

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20. find the energy in kWh consumed in 10 hours by four devices of power 500 W each.

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21. A freely falling object eventually stops on reaching the ground. What happens to its kinetic energy ?

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22. A force of 7N acts on an object. The displacement is, say 8m, in the direction of the force, Let us take it that the force acts on the object throughout the displacement. What is the work done in this case ?

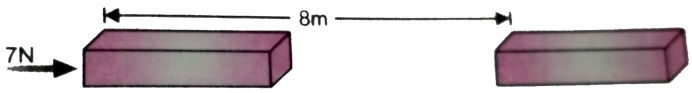

FIGURE 5.16

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23. When do we say that work is done ?

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24. Write an expression for the work done when a force is acting on an object in the direction of its displacement.

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25. Define 1 J of work.

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26. A pair of bullocks exerts a force of $140N$ on a plough. The field being ploughed is $15m$ long. How much work is done in ploughing the length of the field?

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27. What is the kinetic energy of an object ?

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28. Write an expression for kinetic energy of an object.

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29. The kinetic energy of an object of mass` m moving with a velocity of 5 m//s is 25 J. What will be its kinetic energy when its velocity is doubled ? What will be its kinetic energy - when its velocity si increased three times ?

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30. What is power ?

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31. Define 1 W of power.

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32. A lamp consumes 1000 J of electrical energy is 10 s. What is its power ?

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33. Define average power.

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