PHYSICS

BOOKS - TARGET PUBLICATION

WORK AND ENERGY

Exercise

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1. 1 erg us equivalent to _____.

  A. $1dy \neq \times 1metre$

B. $1dy \neq \times 1centimetre$

C. $1 \neq w \rightarrow n \times 1metre$

D. $1 \neq w \rightarrow n \times 1centimetre$

Answer: B

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2. What a person tries to stop a moving car by applying a backward force, the work done by the person is _____.

A. positive

B. zero

C. negative

D. positive or negative

Answer: C

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3. A bOdy sliding across a surface does _____

A. no

B. positve

C. negative

D. positive or negative

Answer: B

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4. Energy is the _____to do work.

A. power

B. skill

C. capacity

D. tendency

Answer: C

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5. Kinetic energy comes into picture only when

_____is taking place.

A. motion

B. chemical reaction

C. uniform acceleration

D. storage of energy

Answer: A

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6. If kinetic energy of a man of mass 40kg while running is 500J, then his velocity is _____-

A. $23\dfrac{m}{s}$

B. $5\dfrac{m}{s}$

C. $2.5\dfrac{m}{s}$

D. $12.5\dfrac{m}{s}$

Answer: B

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7. A 40kg man possesses a potential energy of 2000J when he stands at the top of a wall. The height of the wall will be

A. 4.2 m

B. 6.8 m

C. 5.1 m

D. 9.8m

Answer: C

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8. A freely fallimg body conserve its _____

A. kinetic energy

B. potential energy

C. total energy

D. all of the above

Answer: C

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9. Choose one or more alternatives:

Which of the forces involved in dragging a heavy object on a smooth, horizontal surface, have the same magnitude?

A. the horizontal applied force

B. gravitational force

C. reaction force in vertical direction

D. force of friction

Answer: A::B::C::D

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10. Choose one or more alternatives:

While dragging or lifting an objectm negative

work is done by........

A. the applied force

B. gravitational force

C. frictional force

D. reaction force

Answer: A::B::C::D

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11. Joule is the unit of _____

A. force

B. work

C. power

D. energy

Answer: A::B::D

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12. Choose one or more alternatives:

For work to be performed, energy must be ......

A. transferred from one place to another

B. concentrated

C. transformed from one type to another

D. destroyed

A. transferred from one place to anther

B. concentrated

C. transformed from one type to another

D. destroyed

Answer: A::C::D

13. Choose one or more alternatives:

Power is a measure of the ....

A. rapdily with which work id done

B. amount of energy required to perform

the work

C. slowness with which work is performed

D. length of time

Answer: A::C::D

14. The work done on an object does not depend on.....

A. displacement

B. applied force

C. initial velocity of the object

D. the angle between force and displacement

Answer: C

15. The potential energy of your body isleast when you are......

A. sitting on a chair

B. sitting on the ground

C. sleeping on the ground

D. standing on the ground

Answer: C

16. The total energy of an object falling freely towards the ground................

A. decreases

B. remains unchanged

C. increases

D. increases in the beginning and then decreases

Answer: B

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17. If we increase the velocity of a car moving on a flat surface to 4 times its original speed, its potential energy.....

A. will be twice its original energy

B. will not change

C. will be 4 times its original energy

D. will be 16 times its original energy

Answer: B

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18. Complete the paragraph

Select the appropriate options and complete the following paragraph.

(slower, work, displacement, force, potential energy, kinetic energy, energy, faster, power, upward) A moving object can do work. An object moving___ does more work than an identical object moving relatively_____ . Work can be defined as the product of force and _____ Work is a form of _____ A speeding

car " Possesses _____ While energy stored in winding the key of a toy car is _____.

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19. Name the folowing

The CGS unit of work

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20. Name the folowing

Type of energy that depends upon the height

of an object.

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21. Name the folowing

Energy which cannot be negative

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22. Name the folowing

The sum of the potential energy and the kinetic energy

23. Name the folowing

Type of output energy given by loudspeaker

24. True or False.

The work done is zero if there is no displacement

25. True or False.

Work done on an object depends on time.

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26. True or False.

Like humans, machines also require energy to

do work.

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27. True or False.

Units of energy and work are the same.

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28. True or False.

More energy is required for throwing a stone upwards than throwing it downwards.

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29. True or False.

Kinetic energy is inversely proportional to the

square of velocity.

30. True or False.

A body at rest may possess energy.

31. True or False.

Potential energy of an object is independent of height of an object.

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32. True or False.

Equivalent of | horse power in watt is 1000

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33. True or False.

Steam engine was invented by James Watt.

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34. Odd one out

A raised hammer, water at a height, a moving ball, a stretched rubber band.

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35. Odd one out

dyne-cm, kilowatt, joule, erg.

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36. Complete the analogy

Work done is positive : $\theta = 0°$ :: work done is

negative :_____

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37. Complete the analogy

10^7 erg : 1 joule :: 1 kwh: _____

38. Complete the analogy

Flowing water : kinetic energy :: stored water:

_____

39. Complete the analogy

work : joule :: joule :_____

40. What is the difference between work and energy?

41. Explain different types of work with examples.

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42. What is the difference between positive work and negative work?

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43. If the displacement is not in the direction of the applied force, how do we calculate the amount of work done?

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44. Discuss the directions of force and of displacement in each of the following cases. Pushing a stalled vehicle.

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45. Discuss the directions of force and of displacement in each of the following cases: Catching the ball which your friend has thrown towards you.

46. Discuss the directions of force and of displacement in each of the following cases: Tying a stone to one end of a string and swinging it round and round by the other end of the string.

47. Discuss the directions of force and of displacement in each of the following cases: Walking up and down a staircase, climbing a tree.

48. Discuss the directions of force and of displacement in each of the following cases:

Stopping a moving car by applying brakes.

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49. What is energy? What is its unit?

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50. If a pot having a plant is kept in the dark, the plant languishes

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51. On increasing the volume of a music system or TV beyond a limit, the vesselsin the house start vibrating.

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52. Collecting sunlight on a paper with the help of a convex lens bums the paper.

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53. What will happen in the following case

A fast cricket ball strikes the stumps.

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54. What will happen in the following case

The striker hits a coin on the carrom board.

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55. What will happen in the following case

One marble strikes another in a game of marbles.

56. Answer the following questions:

Derive the formula for the kinetic energy of an object of mass m moving with velocity v.

57. Use your Brain Power!

If the mass of a moving body is doubled, how many times will be kinetic energy increase?

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58. What is potential energy? Explain with suitable examples.

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59. What are the different forms of energy?

60. Answer the following questions:

State the law of conservation of energy.

61. Answer the following questions:

If an object has 0 momentum, does it have

kinetic energy? Explain your answer.

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62. What are the various energy transformations that occur when you are running?

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63. What is the difference between generator and electric motor?

64. Answer the following questions:

Prove that the kinetic energy of a freely falling object on reaching the ground is nothing but the transformation of its initial potential energy.

65. Show that the mechanical energy of a freely falling body is conserved.

66. The potential energy of a freely decreases progressively, Is this against the law of conservation of energy?

67. Use your Brain Power!

Can your father climb stairs as fast as you can?

68. Use your Brain Power!

Will you fill the overhead water tank with the help of a bucket or an electric motor?

69. Suppose Rajashree, Yash and Ranjeet have to reach the top of a small hill. Rajashree went by car. Yash went cycling while Ranjeet went walking. If all of them choose the same path, who will reach first and who will reach last?

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70. What is power? What is its unit?

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71. Show that $kWh = 3.6 \times 10^5 J$

72. What is the difference between power and work?

73. Read the statements given below. Identify and write the concept upon which the given

statement is based.

2 year old Reema is pulling string of her toy cart and moving it around the home. Name the physical quantity Reema is doing.

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74. Read the statements given below. Identify and write the concept upon which the given statement is based.

If a ball is thrown with higher velocity write

the associated energy type that will also increase.

75. Read the statements given below. Identify and write the concept upon which the given statement is based.

Madhu is standing in the terrace of his building. What energy does he possess?

76. Read the statements given below. Identify and write the concept upon which the given statement is based.

When an electric fan is switched on, it rotates and circulates air. Write the name of the concept which makes it possible.

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77. Read the statements given below. Identify and write the concept upon which the given statement is based.

An object is falling solely under the influence of gravitational force. How is this process of falling termed?

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78. Read the statements given below. Identify and write the concept upon which the given statement is based.

Name the unit used to measure power consumed by big machines in the industrial sector.

79. Work done by gravitational force on an artificial satellite moving around the earth in circular orbit is zero.

80. Why is the work done on an object moving with uniform circular motion zero?

81. Kinetic energy of a body can never be negative.

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82. A fast bowler takes a run -up before bowling a ball.

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83. Explain the difference between potentail energy and kinetic energy.

84. Questions based on paragraph

A man pulls a cart on a horizontal road of 2 m by applying a force of 200 N. Later the road gets inclined at an angle of 60º with horizontal and man starts pulling his cart from base of the inclined road to the top. The

length of the inclined portion of road is 4 m. Based on the given information answer the following questions.

What will be the work done by the man to pull the cart along the inclined part of the road?

85. Questions based on paragraph

A man pulls a cart on a horizontal road of 2 m by applying a force of 200 N. Later the road gets inclined at an angle of $60°$ with

horizontal and man starts pulling his cart from base of the inclined road to the top. The length of the inclined portion of road is 4 m. Based on the given information answer the following questions.

What will be the height of inclined surface?

86. Questions based on paragraph

Study the following activity and answer the questions.

Take two aluminium channels of different lengths.

Place the lower ends of the channels on the floor and hold their upper ends at the same height.

Now take two balls of the same size and weight and release them from the top end of the channels. They will roll down and cover the same distance.

At the moment of releasing the balls, which energy do the balls have?

87. Questions based on paragraph

Study the following activity and answer the questions.

Take two aluminium channels of different lengths.

Place the lower ends of the channels on the floor and hold their upper ends at the same height.

Now take two balls of the same size and weight and release them from the top end of the channels. They will roll down and cover the same distance.

As the balls roll down which energy is converted into which other form of energy?

88. Questions based on paragraph

Study the following activity and answer the questions.

Take two aluminium channels of different lengths.

Place the lower ends of the channels on the floor and hold their upper ends at the same

height.

Now take two balls of the same size and weight and release them from the top end of the channels. They will roll down and cover the same distance.

Why do the balls cover the same distance on rolling down?

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89. Questions based on paragraph

Study the following activity and answer the

questions.

Take two aluminium channels of different lengths.

Place the lower ends of the channels on the floor and hold their upper ends at the same height.

Now take two balls of the same size and weight and release them from the top end of the channels. They will roll down and cover the same distance.

What is the form of the eventual total energy of the balls?

90. Questions based on paragraph

Study the following activity and answer the questions.

Take two aluminium channels of different lengths.

Place the lower ends of the channels on the floor and hold their upper ends at the same height.

Now take two balls of the same size and weight and release them from the top end of the channels. They will roll down and cover the

same distance.

Which law related to energy does the above activity demonstrate? Explain.

91. Solve the following examples:

Ravi applied a force of 10 N and moved a book 30 cm in the direction of the force. How much was the work done by Ravi?

92. Calculate the work done to take an object of mass 20 kg to a height of 10 m.

93. Answer the following questions:

Determine the amount of work done when an object is displaced at an angle of $30°$ with respect to the direction of the applied force.

94. Pravin has applied a force of 100 N on an object, at an angle of $60°$ to the horizontal. The object gets displaced in the horizontal direction and 400 J work is done. What is the disptacement of the object? $\left(\cos 60° = \dfrac{1}{2} \right)$

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95. A stone having a mass of 250 gm is falling from a height. How much kinetic energy does it have at the moment when its velocity is 2 m/s?

96. Two bodies of same mass have their kinetic Ie energies in the ratio $9:4$. What will be the ratio of their velocities?

97. A train approaching a station reduces its speed from 180 km/hr to 90 km/hr. If the mass

of the train is about 20,000 kg then how much

is the work done by the train?

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98. The velocity of a car increases from 54

km/hr to 72 km/hr. How much is the work done

if the mass of the car is 1500 kg?

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99. 500 kg water isstored in the overhead tank of a 10 m high building.Calculate the amount of potential energy stored in the water.

100. A man drops a 20 kg object from the top of a 10m high building . What will be the velocity of the object when it just hits the ground?

101. An object of mass 2 kg is thrown downwards. What is the work done by he gravity during the vertical displacement of object through 3 m?

102. Solve the following examples:

If the energy of a ball falling from a height of 10 metres is reduced by 40%, how high will it rebound?

103. If a body possesses 980 joules of P.E. and 20 joules of K.E., then what is its total energy?

104. What is the power of an object which does 600 joules of work in 1 minute?

105. Swaralee takes 40 s to carry & bag weighing 20 kg to a height of 5 m. How much power has she used?

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106. Solve the following examples:

An electric pump has 2 kW power. How much water will the pump lift every minute to a height of 10m?

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107. A 25 W electric bulb is used for 10 hours every day. How much electricity doesit consume each day?

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108. Solve the following examples:

If a 1200 W electric iron is used daily for 30 minutes, how much total electricity is consumed in the month of April?

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109. An electric oven is rated 1600 W. How much energy (in kWh) does it use in 8 hours?

110. Mass of a vehicle is 1500 kg. While ascending on a road, its speed decreases from 72 km/hr to 36 km/hr. How much is the work done?

111. Megha applied a force of 50 N to move a stool from one comer of a 10 m long room to other. Calculate the work done by Megha.

112. A car moving with velocity 54 km/hr has kinetic energy 1500 J. Find its kinetic energy when its velocity is increased 3 times its initial velocity.

113. The energy required to move a body of mass 10 kg from the ground to 5 m is 490 J. Find the acceleration due to gravity on the body.

114. 5. A dam on Vaitama river stores about 60000 kg of water at a height of 80 m. Calculate the amount of potential energy stored in the water.

115. Calculate the power of pump lifting 100 kg of water and storing it in a water tank of height 9 m in 1 minute.

116. A 50 W electric bulb is used for 8 hours every day. How much electricity does it consume each day?

117. A house consumes 300 units of energy during month of June. How much energy is consumed in joules in the same month?

118. Seema takes 1 minute to carry a bag weighing 20 kg to a height of 12 m. How much power has she used?

119. From scientific point of view,when do we say that no work was done?

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120. What are the different types of force and their examples?

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121. Choose the correct alternative.

Force applied on a wall results in to

_____work.

    A. positive

    B. negative

    C. zero

    D. either positive or negative

Answer:

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122. Choose the correct alternative.

When fire crackers are exploded, the energy which gets converted into sound, light and heat is

    A. mechanical energy

    B. Chemical energy

    C. Kinetic energy

    D. Electrical energy

Answer:

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123. Choose the correct alternative.

When an object falls solely under the influence

of gravitational force, then it is said to be in

    A. free fall

    B. free motion

    C. uniform motion

    D. uniform acceleration

Answer:

124. Energy is the _____ to do work.

A. power

B. skill

C. capacity

D. tendency

Answer:

125. Answer the following

State true or false. If false, write the correct sentence.

As energy of the body increases, its power decreases.

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126. Answer the following

Name the following

The energy of a ball which becomes zero after the ball hits the ground.

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127. Answer the following

Find odd one out and justify.

Generator, thermocouple, primary cell, solar cell, steam engine

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128. Work done by gravitational force on an artificial satellite moving around the earth in circular orbit is zero.

129. Give scientific reasons.

Kinetic energy of 2 body can never be negative.

130. Answer the following

If momentum of an object is zero, does it have mechanical energy?

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131. Answer the following

If 3000 tons of water falls from 10 m high dam in one minute, then calculate the equivalent power if all its energy is utilised. (1 ton = 1000 kg)

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132. Answer the following

Explain with examples, how work done is zero even when an object is displaced.

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133. Answer the following

Define power and explain relation between different units of power.

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134. Answer the following

If a ball is dropped from a tall building, prove that the total mechanical energy of the ball under free fall is conserved.

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135. Answer the following

Draw a conceptual chart showing conversion between following types of energies and electrical energy with examples.

a) Mechanical energy

b) Heat energy

c) Light energy

d) Sound energy

e) Chemical energy

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