PHYSICS

BOOKS - CHETANA PUBLICATION

WORK AND ENERGY

Example

1. What are different types of forces? Give examples.

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2. Minakshee wants to displace a wooden block from point A to point B along the surface of a table as shown. She has used force F for the purpose.

Has all the energy she spent been used to

produce acceleration in the block?

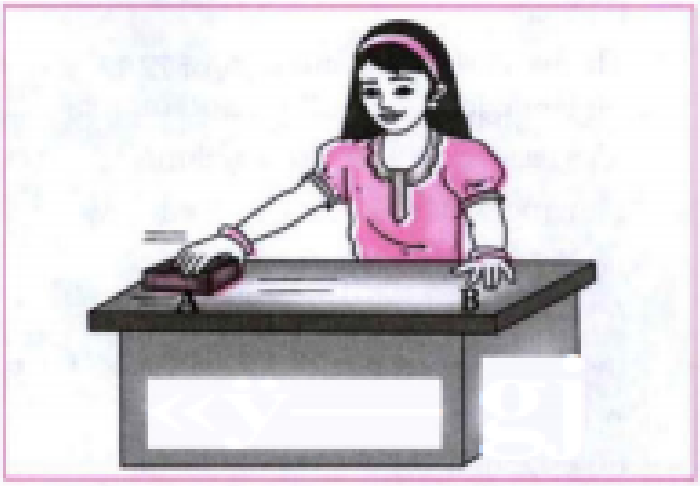

Fig. 2.1 : Displacement of an object

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3. Minakshee wants to displace a wooden block from point A to point B along the surface of a table as shown. She has used

force F for the purpose.

Has all the energy she spent been used to produce acceleration in the block?

Fig. 2.1 : Displacement of an object

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4. Minakshee wants to displace a wooden block from point A to point B along the surface of a table as shown. She has used force F for the purpose.

Which forces have been overcome using that energy?

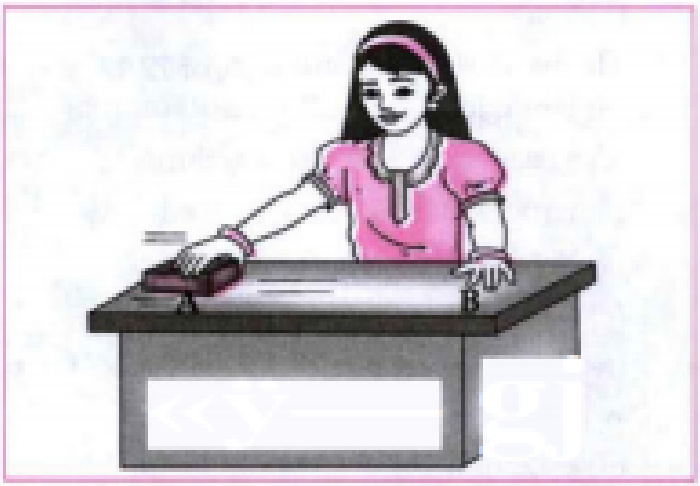

Fig. 2.1 : Displacement of an object

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5. Forces are of ..... types

A. 2

B. 3

C. 4

D. 5

Answer:

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6. Example of Contact force is_____

A. Gravitational Force

B. magnetic force

C. Electrostatic Force

D. Muscular Force

Answer:

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7. Example of Non-contact force is_____

A. Mechanical Force

B. Frictional Force

C. Muscular Force

D. Electrostatic Force

Answer:

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8. Work is said to be done on a body when is applied on object causes a..... displacement of the object

A. Direction

B. Area

C. Volume

D. Force

Answer:

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9. W =_____

A. mgh

B. mdh

C. mv^2

D. mfe

Answer:

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10. The energy stored in the dry cell is in the form of.... energy

A. Light

B. Chemical

C. Solar

D. Kinetic

Answer:

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11. The work done is zero if there is no .....

A. Direction

B. Displacement

C. Mass

D. Angle

Answer:

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12. Flowing water has....energy.

A. Potential

B. Chemical

C. Solar

D. Kinetic

Answer:

Watch Video Solution

13. By stretching the rubber strings of a catapult, we store.... energy in it.

A. Potential

B. Chemical

C. Electric

D. Kinetic

Answer:

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14. ..... Is unit of forces.

A. Both B and C

B. Newton

C. Dyne

D. Volts

Answer:

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15. For a freely falling body, kinetic energy is..... of the ground level.

A. MaIXmum

B. Minimum

C. Neutral

D. Reversed

Answer:

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16. Energy can neither be...nor.....

A. Destroyed

B. Created

C. Saved

D. Both A and B

Answer:

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17. Work and....have the same unit.

A. Energy

B. Electricity

C. Force

D. Both B and C

Answer:

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18. S.I. unit of energy is....

A. Joule

B. Ergs

C. $m / s2$

D. Both A and B

Answer:

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19. Work is the product of

A. force and distance

B. displacement and velocity

C.) kinetic and potential energy

D. force and displacement

Answer:

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20. S.I. unit of work is....

A. dyne

B. newton-metre or erg

C. N/m2 or joule

D. newton-metre or joule

Answer:

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21. .....is the capacity to do work.

A. Energy

B. Force

C. Power

D. Momentum

Answer:

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22. Kinetic energy of a body (KE) =

A. 1/2mv2

B. mv2

C. mgh

D. Fs

Answer:

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23. Potential energy of a body is given by (P.E.) =.....

A. Fs

B. mgh

C. ma

D. mv2

Answer:

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24. 1hp =.....

A. 470watts

B. 476 watts

C. 674 watts

D. 764 watts

Answer:

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25. is the commercial unit of power.

A. iskilowatt second

B. dyne

C. kilowatt

D. erg

Answer:

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26. 1 kWh =.....joules..

A. 3.6×103

B. 3.6×106

C. 6.3×106

D. 6.3×103

Answer:

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27. The work done by a force is said to be .....when the applied force does not produce displacement.

A. positive

B. negative

C. zero

D. none of these

Answer:

28. When some unstable atoms break up, they release tremendous amount of .....energy

A. chemical

B. potential

C. nuclear

D. mechanical

Answer:

29. 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:

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

A. decreases

B. remains unchanged

C. increases

D. increasesin thebeginningand then decreases

Answer:

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31. 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:

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32. 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:

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33. Name the following

Unit of energy used for commercial purpose.

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34. Name the following

Unit used in industry to measure power.

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35. Name the following

SI unit of energy

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36. Name the following

Two types of mfechanical energy.

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37. Name the following

An exmple where fprce acting on an object does not do any work.

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38. Name the following

The relationship between 1 joule and 1erg .

Watch Video Solution

39. Name the following

Various forms of energy .

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40. State whtether the following statement are true or false.

The potential energy of a body of mass 1kg kept at height 1 m is 1J.

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41. State whtether the following statement are true or false.

Water stored at some height has potential energy.

Watch Video Solution

42. State whtether the following statement are true or false.

Unit of power is joule.

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43. State whtether the following statement are true or false.

Mecanical energy can be covered into electrical energy.

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44. State whether the following statements are true or false:

Work is a vector quantity.

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45. State whtether the following statement are true or false.

Power is a vector quantity.

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46. State whether the following statements are true or false:

The kilowatt.hour is a unit of energy.

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47. State whether the following statements are true or false:

The CGS unit of energy is the dyne.

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48. State whether the following statements are true or false:

The. SI unit of work is the newton

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49. State whether the following statements are true or false:

The kinetic energy of a body of mass, , moving with velocity v is $\frac{1}{2}mv^2$.

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50. Find the odd man out.

Work, Energy, Power, Force.

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51. Find the odd man out.

A stretched spring, A body placed in at some height, A bullet fired from gun.

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52. Find the odd man out.

A stretched spring, A rock rolling downhill, A bullet fired from gun.

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53. Write the formula of the following.

Kinetic Write the formula of the following.energy

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54. Write the formula of the following

.Potential energy

Watch Video Solution

55. Write the formula of the following

Work

 Watch Video Solution

56. Write the formula of the following.

Force

 Watch Video Solution

57. Write the formula of the following

.Power

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58. When is work done said to be zero?

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59. Which quantities are measured in ergs?

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60. What is the relationship between newton. Meter and joule.

 Watch Video Solution

61. What is Energy?

 Watch Video Solution

62. Which device converts electrical energy into heat?

Watch Video Solution

63. What is the relationship between second, horsepower and joule?

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64. Mention the type of energy used in the following examples.

Stretched rubber string.

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65. Mention the type of energy used in the following examples.

Fast moving car.

Watch Video Solution

66. Mention the type of energy used in the following examples.

The whistling of a cooker due to steam.

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67. Mention the type of energy used in the following examples.

Drawing out pieces of iron from garbage, using a magnet

Watch Video Solution

68. Mention the type of energy used in the following examples.

The drackers exploded in Diwali.

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69. Person moving along circle from A to B.

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70. Find whether work is positive, negative or Zero.

Person completing one circle and returns to position A

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71. Find whether work is positive, negative or Zero.

Person pushing a car in the forward direction

Watch Video Solution

72. Find whether work is positive, negative or Zero.

A car coming downhill even after pushing it in the opposite uphill direction.

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73. Motion of the clock pendulum.

Watch Video Solution

74. Give Scientific reasons:

A moving ball hits a stationary ball and displaces it

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75. Flowing water from some height can rotate turbine.

Watch Video Solution

76. A stretched rubber band when released regainsits original length

Watch Video Solution

77. Wind can move the blades of a windmill

Watch Video Solution

78. An exploding firecracker lights up as well as makes a sound.

Watch Video Solution

79. Work done on an artificial satellite by gravity is zero while moving around the earth.

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80. Differentiate between OR difference between:

Kinetic energy and Potential energy.

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81. Difference between

Work and Power:

Watch Video Solution

82. Difference between

WorkandEnergy:

Watch Video Solution

83. 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 displacement of the object?

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84. 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?

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85. A force of 50 N acts on an object and displaces it by 2 m. If the force acts at an angle of 60^{o} to the direction of its displacement, find the work done.

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86. Raj applied a force of 20 N and moved a book 40 cm in the direction of the force. How much was the work done by Raj?

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87. 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?

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88. 500 kg water isstored in the overhead tank of a 10 m high building.Calculate the amount of potential energy stored in the water.

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89. Solve the following examples:

The velocity of a car increases from $54km/h$ to $72km/h$. If the mass of the car is 1500 kg, find the work done to increase the velocity.

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90. Calculate the work done to take an object of mass 20 kg to a height of 10 m. (g = 9.8 m/s2)

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91. A body of 0.5 kg thrown upwards reaches a maximum height of 5 m. Calculate the work done by the force of gravity during this vertical displacement.

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92. 1 kg mass has a kinetic energy of 2 joule. Calculate its velocity

Watch Video Solution

93. A rocket of mass100 tonnesis propelled with a vertical velocity 1 km/s. Calculate kinetic energy

Watch Video Solution

94. 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?

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95. Swaralee takes 20 sto carry a bag weighing 20 kg to a height of 5 m. How much power hasshe used?

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96. 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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97. Derive an expression for potential energy.

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98. When can you say that the work done is either positive, negative or zero?

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99. Explain the relation between, the commercial and SI unit of energy.

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100. Answer the following questions:

If an object has 0 momentum, does it have

kinetic energy? Explain your answer.

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

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102. 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.

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103. How is work calculated if the direction of force and the displacement are inclined to each other?

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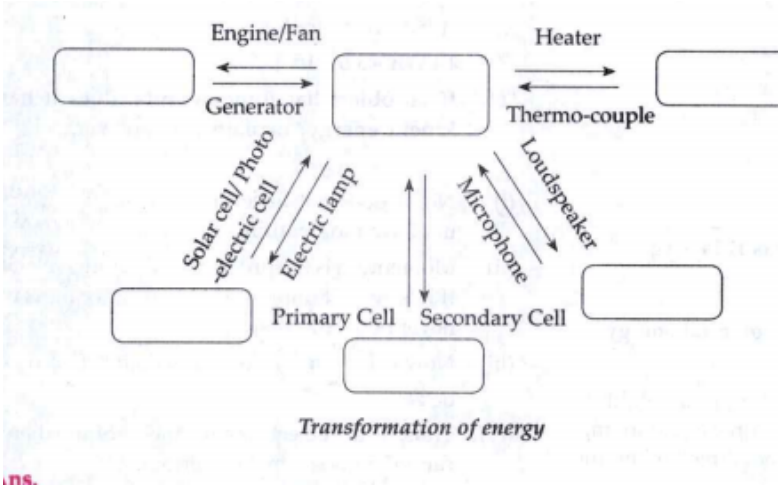
104. Complete the flow chart

Transformation of energy



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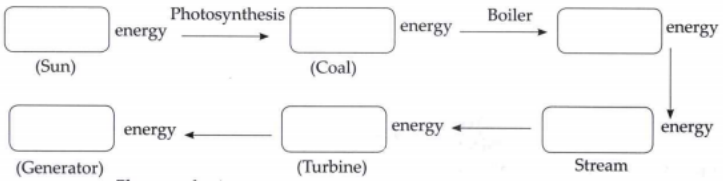
105. Transformation of solar energy



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106. Write effects of the following with examples. Force

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107. Give two examples of the below :

Potential energy

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108. Give two examples of the below :

Kinetic energy

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109. Give two examples of the below :

Chemical energy

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110. Give two examples of the below :

Zero work done

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111. Give two examples of the below :

Negative work done

Watch Video Solution

112. Give two examples of the below :

Positive work done

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113. You have learnt how to calculate the work done on an object when the displacement is in the direction of the applied force. But 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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114. If a pot having a plant is kept in the dark, the plant languishes

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

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

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117. What will happen in the following case

A fast cricket ball strikes the stumps.

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118. What will happen in the following case

The striker hits a coin on the carrom board.

Watch Video Solution

119. What will happen in the following case

One marble strikes another in a game of marbles.

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120. 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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121. A ball isthrown vertically upwards, what will be its velocity when it reaches the maIXmum height?

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122. A girl is walking on a horizontal levelled road, the work done by the gravitational force on her will be?

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

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125. If a TV of rating 100 W is operated for 6 hrs per day,find the number of units consumed in a leap year .

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126. Complete the paragraph. □ is the measure of energy trasfer when a forece (F) moves and object through a □ (d). So when □ is done, energy has been transferred from one enrgy store to another, and so: energy

transferred= ☐ done. Energy transferred and work done are both meassured in ☐ (J).

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127. complete the paragraph: ☐ energy and ☐ done are the same thing as much as ☐ energy and work doen are the same thing. Potential energy is a state of the system, a way of ☐ energy as a virtue of its configuration or motion, while ☐ done in most cases is a way

of channelling this energy from one body to another.

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128. Complete the paragraph: in physics, □ is the rate of doing work or, i.e., the amouth of energy trasferred or converted per unit time. In the international system of Units, the unit of power is the □, equal to one □ per second. Power is a □ quantity that requires both a change in the physical system and a

specified tiem interval in which the change occurs. But more □ is needed when the work is done in a shorter amount of time.

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129. Study the pictures given below and answer the questions:

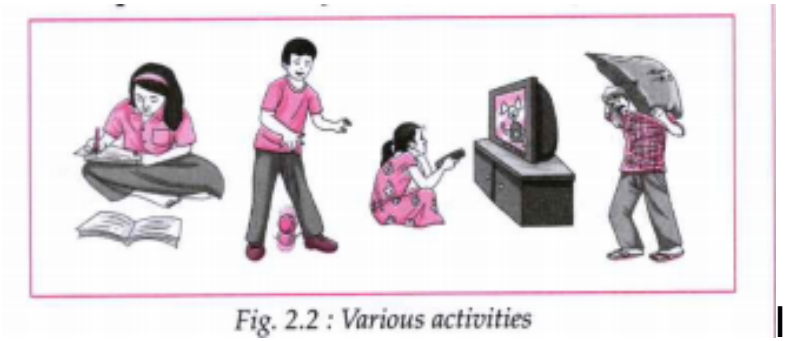

Fig. 2.2 : Various activities

In which of the pictures above has work been done?

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130. Study the pictures given below and answer the questions:

Fig. 2.2 : Various activities

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

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131. Make two pendulums of the same length with the help of thread and two nuts. Tie another thread in the horizontal position. Tie the two pendulums to the horizontal thread in such a way that they will not hit each other while swinging. Now swing one of the pendulums and observe. What do you see?

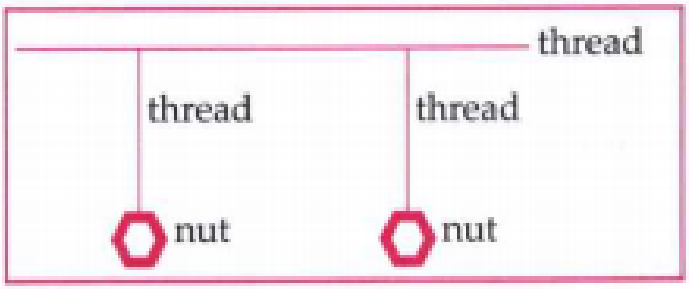

Fig. 2.3 : Coupled Pendulum

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132. Ajay and Atul have been asked to determine the potential energy of a ball of mass m kept on a table as shown in the figure. What answers will they get? Will they be different? What do you conclude from this

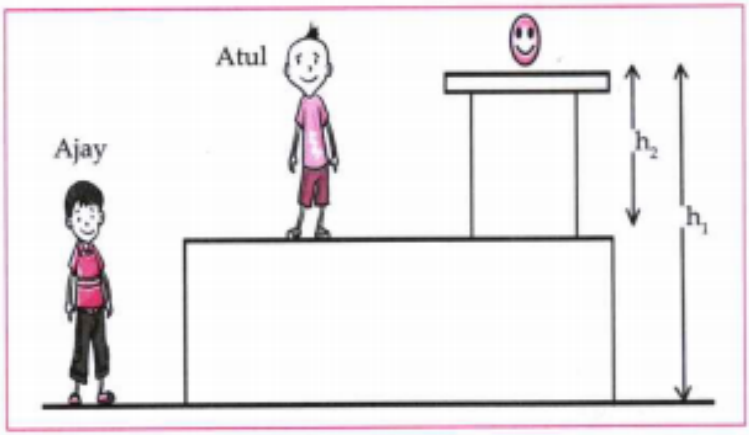

Fig. 2.4

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133. Study the following activity and answer the questions: 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.

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134. Study the following activity and answer the questions: At the moment of releasing the balls, which energy do the balls have?

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135. Study the following activity and answer the questions: As the balls roll down which energy is converted into which other form of energy?

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136. Study the following activity and answer the questions: Why do the balls cover the same distance on rolling down?

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137. Study the following activity and answer the questions: What is the form of the eventual total energy of the balls?

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

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

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140. 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.

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

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142. 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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143. An arrow is released from a stretched bow: Water kept at a high flows through a pipe into the tap below.

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144. An arrow is released from a stretched bow: A compressed spring is released.

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145. An arrow is released from a stretched bow: Which words describe the state of the object in the above examples?

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146. An arrow is released from a stretched bow: Where did the energy required to cause the motion of the objects come from?

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147. An arrow is released from a stretched bow: If the objects were not brought in those states, would they have moved?

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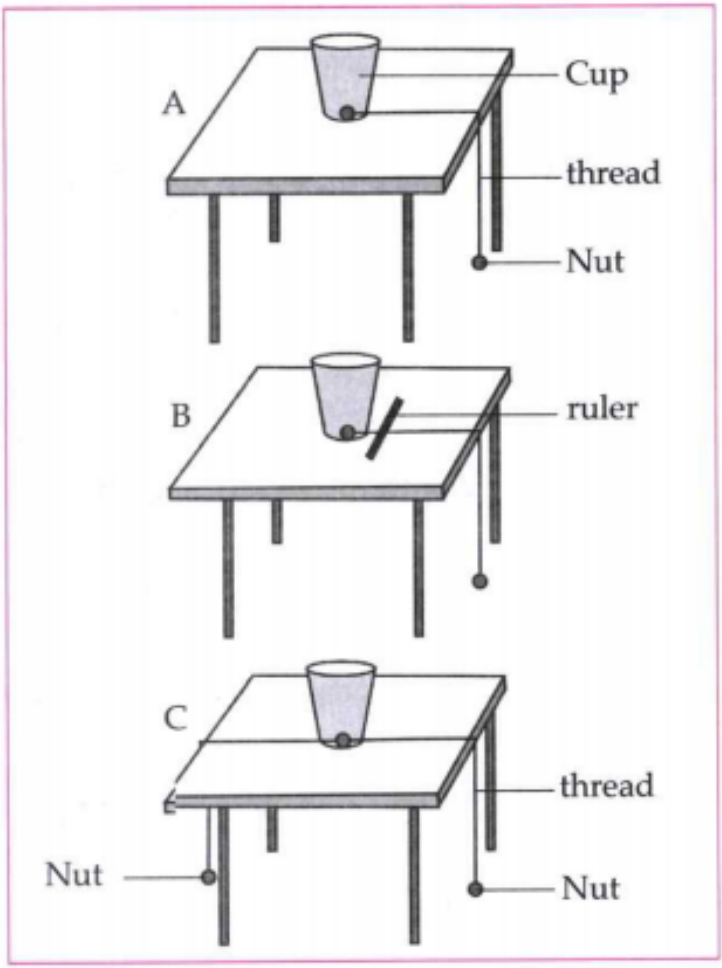
148. Studt the activity and answer the following questions: Figure A - Why does the cup get pulled



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149. Studt the activity and answer the following questions: Figure B - What is the relation between the displacement of the cup and the force applied through the ruler?

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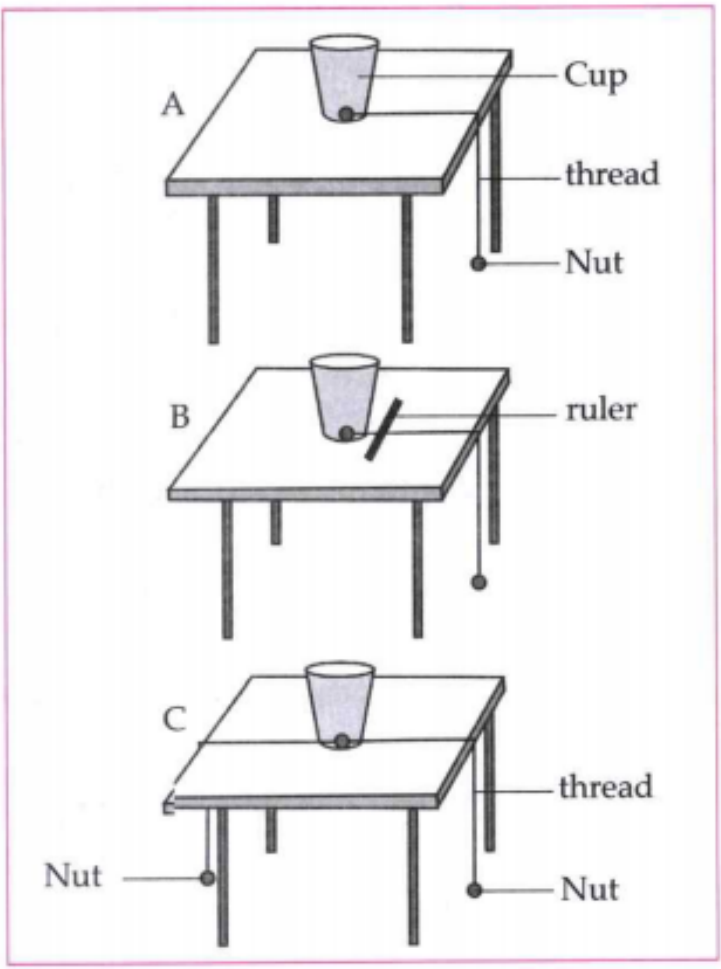
150. Studt the activity and answer the following questions: In Figure C-Why doesn't

the cup get displaced



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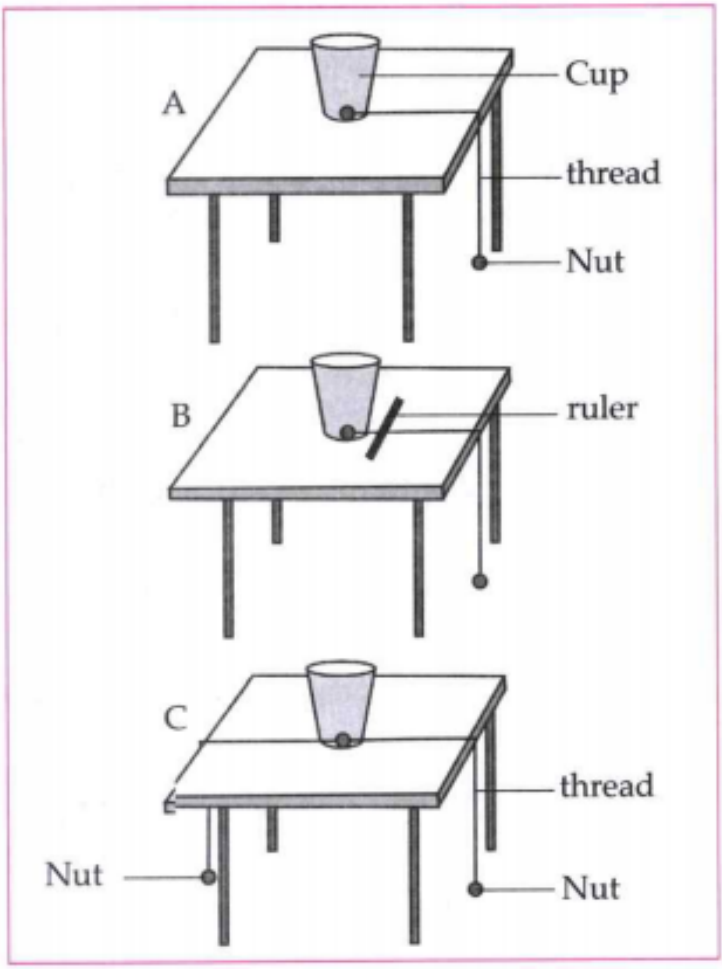
151. Studt the activity and answer the following questions: What is the type of work done in figures A, B and C



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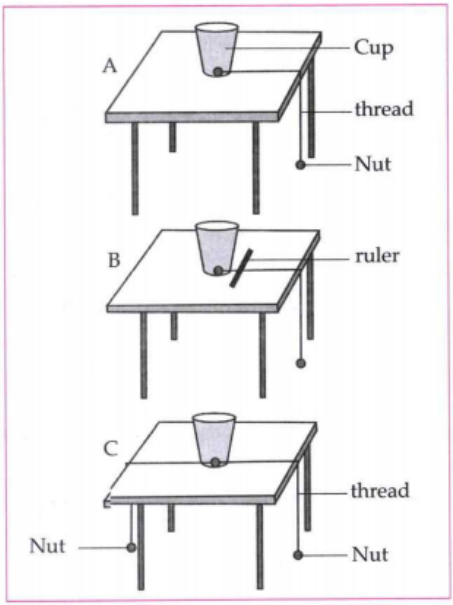
152. Studt the activity and answer the following questions: In the three actions above, what is the relationship between the applied force and the displacement



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153. From the following activities find out whether work is positive, negative or zero. Give reasons for your answers: A boy is swimming in a pond.

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154. From the following activities find out whether work is positive, negative or zero. Give

reasons for your answers: A coolie is standing with a load on his head.

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155. From the following activities find out whether work is positive, negative or zero. Give reasons for your answers: Stopping a moving car by applying brakes.

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156. From the following activities find out whether work is positive, negative or zero. Give reasons for your answers: Catching the ball which you friend has thrown towards you

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157. Use your Brain Power!

Can your father climb stairs as fast as you can?

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

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159. Use your Brain Power!

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

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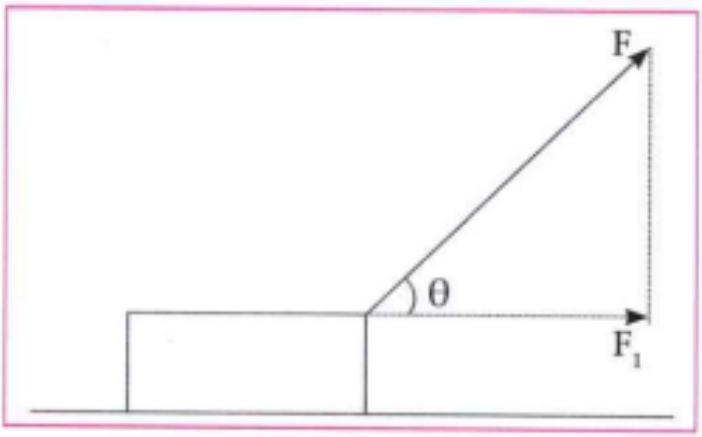
160. State the expression for work done when displacement and force makes an angle Θ OR State the expression for work done when force is applied making an angle Θ with the horizontal force



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161. Answer the following questions:

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

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162. When a body is dropped on the ground from some height its P.E is converted into K.E but when it strikes the ground and it stops, what happens to the K.E

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163. Explain the statemetn "Potential Energy is relative".

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

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Exercise

1. Forces are of ..... types

A. 2

B. 3

C. 4

D. 5

Answer:

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2. Fill in the blanks with appropriate words and writw the completed statemenrs:

By stretching the rubber strings of a catapult we store.....energy in it.

A. Potential

B. Chemical

C. Electric

D. Kinetic

Answer:

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3. S.I. unit of energy is....

A. Joule

B. Ergs

C. m/s2

D. Both A and B

Answer:

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4. .....is the capacity to do work.

A. Energy

B. Force

C. Power

D. Momentum

Answer:

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5. Name the following

SI unit of energy

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6. Name the following

The relationship between 1 joule and 1erg .

Watch Video Solution

7. State whether the following statements are true or false:

Power is a scalar quantity.

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8. State whtether the following statement are true or false.

Water stored at some height has potential energy.

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9. Wind can move the blades of a windmill

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10. A stretched rubber band when released regainsits original length

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11. An exploding fire cracker lights as well as makes a sound.

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12. 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?

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14. 1 kg mass has a kinetic energy of 2 joule. Calculate its velocity

Watch Video Solution

15. Derive an expression for potential energy.

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

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17. If a TV of rating 100 W is operated for 6 hrs per day,find the number of units consumed in a leap year .

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18. 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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19. Answer the following questions:

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

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20. State the expression for work done when displacement and force makes an angle of 0 with the horizontal force

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