PHYSICS

BOOKS - PEARSON IIT JEE FOUNDATION

WORK AND ENERGY

Example

1. What is the work done by a horse in displacing a cart through 15 m in the direction of the force , if the force applied by the horse is 10 N ?

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2. Find the work done of move an object of mass 3 kg to a height of 20 m from the ground (Take g $= 10 ms^{-2}$).

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3. Calculated the amount of force (in N) respuird to displace an object by 2 m in the direction of force. Work done in this process is 5kJ.

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4. A boy lifted a small carton of 2 kg mass from the ground and placed it on his head. If the height of the boy is (1.5m), then calculate the work done $\left(\text{Take } g = 10m/s^2\right)$.

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5. When a force of 4N is applied on the object placed at one end of the table such that it reaches the other end of the table as shown in the figure, work done in this process is 3.92 Joules, then calculate the length of the table.

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6. What is the work done by a horse in displacing a cart through 15 m in the direction of the force , if the force applied by the horse is 10 N ?

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done $\left(\text{Take g} = 10m/s^2\right).$

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Very Short Answer Type Questions Fill In The Blanks

1. The product of force and displacement is _____.

2. As the height of a body increases , its _____ also increases .

3. If we comb our hair on a dry day and bring the comb near small pieces

of paper, the comb attracts the pieces, why?

4. In the universe _____ and _____ are conserved .

5. When one newton of force displaces a body through a distance of 1 m ,

then the energy spent on it is _____.

6. Choose the correct one from the following .

A. Biogas is a mixture of methane (65%) , carbon dioxide and hydrogen .

B. An apple on a tree has only potential energy.

C. A compressed spring has an elastic potential energy.

D. All the above

Answer: D

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7. Pick out the incorrect one from the following .

A. The chemical energy in fossil fuels is not a form of potential energy.

B. Sun , wind and water come under renewable sources .

C. Burning of candle converts wax into light .

D. Photosynthesis converts solar energy into chemical energy of food.

Answer: C

8. Find out an example from the following that transforms sound energy into electrical energy .

A. Microphone

B. Door bell

C. Photosynthesis

D. Loud speaker

Answer: A

9. The ultimate source of energy in an ecosystem is:

A. Bio-gas

B. Solar energy

C. Fossil fuels

D. All of these

Answer: B

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10. According to the Law of Conservation of Energy , as energy changes from one form to another form , the total energy of that system

A. Keeps increasing

B. Keeps decreasing

C. Increases for some time then remains constant .

D. None of these

Answer: D

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1. Define the following

A. Work

B. Energy

C. Potential energy

D. Kinetic energy

Answer:

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2. Explain the types of potential energy with an example .

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3. Explain briefly about the types of energy in action.

4. Discuss briefly about the types of energies in stored form .

5. Give any five ways on how to save the energy ?

6. Give any five examples that show transformation of electrical energy into various forms of energy .

7. Aladdin is climbing a tree . Explain how his energy varies ?

8. Jasmine is running away from a monster with a speed of $5ms^{-1}$. If her weight is 100N , then find out the energy spent by Jasmine to escape the monster.

(Take g = $10ms^{-2}$, energy possessed by a body in motion = 1/2 mv^2 where m = mass of the body , v = velocity)

9. Calculate the work done and energy spent in the following two cases .

(a) Smitha has been reading a book since 1 hour .

(b) A child is pushing a car and the car's displacement is zero.

10. The work done by a boy in lifting his bag up to a height of 2 m is 200 J . Find the mass of his bag

(Take g = 10 ms^{-2}).

11. A person of mass 40 kg picked up a bag of mangoes and climbed ten steps . If the bag contains ten mangoes , each of mass 0.5 kg and the height of each step is 10 cm , then find the work done by the person in carrying that till tenth step (Take g = $10ms^{-2}$).

12. Can we draw 100% work from the energy spent on an event ? If not , give the reason.

13. A rice bag of 100 kg is lifted up by four workers to a height of 10 m from the groud . Find the work done by each worker (Assume that four workers muscular energies are equal).

14. A man fell into a manhole of depth 1 m . If his mass is 65 kg , then what should be the work done by him to come out of it (Take g = $10ms^{-2}$) .

15. Find the energy possessed by a bird of 5 kg moving at a constant height of 10 m from the ground with a speed of 2 m s^{-1}. (Take $g = 10ms^{-2}$)

16. What is the difference between potential energy and kinetic energy ?

17. Explain the types of potential energy with an example .

18. Check the sentence true or false:- While climbing a tree Allauddin's height increases from the ground . The potential energy is directly proportional to height of the body from the ground . Therefore , potential energy of Allauddin increases gradually.

19. $v = 5ms^{-1}$

W = mg = 100 N

m = 10 kg

Kinetic energy ??

20. W = 200 J

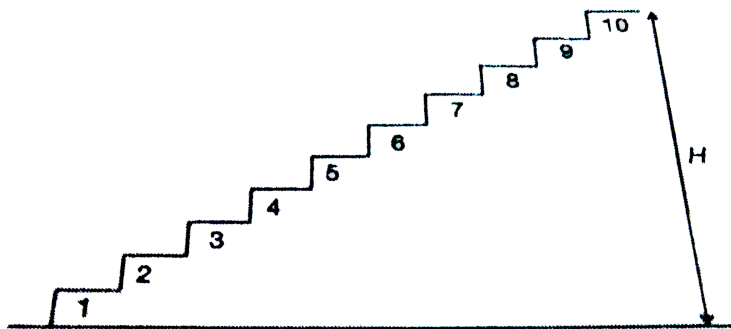h = 2m

W = mgh = $m \times 10 \times 2$

??

21.

if each step is of 1cm then find the total work done to put a box of mass 5kg by a man of mass 40kg at height 'H'.

22. Can we draw 100% work from the energy spent on an event ? If not , give the reason.

23. A man fell into a manhole of depth 1 m . If his mass is 65 kg , then what should be the work done by him to come out of it (Take g = $10ms^{-2}$) .

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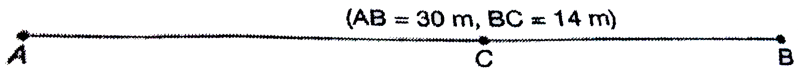**Concept Application**

1. A horse pulled a cart from position A to position B through C and came back to position C as shown in figure . What is the work done by the

horse , if the force applied by the horse is 100 N ?

(AB = 30 m, BC ≈ 14 m)

A ————————————————————•——————————————• B
                                      C

A. 4400 J

B. 3000 J

C. 1400 J

D. 1600 J

Answer: A

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2. Prakash bought an electric bulb which is rated as 70 W . He knows the fact that a 70 W bulb consumes 70 joules of electrical energy per second . The energy consumed by it per second is _____ergs.

A. 700

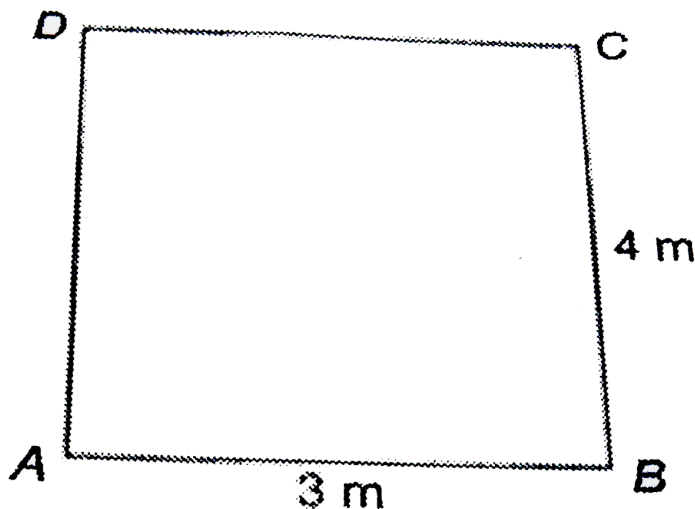B. 70×10^7

C. 7×10^7

D. 70×10^5

Answer: B

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3. Ramu is rolling a gas cylinder from A to C though B as shown in the adjoining figure by applying a force of 100 N . Calculate the total work done by him .
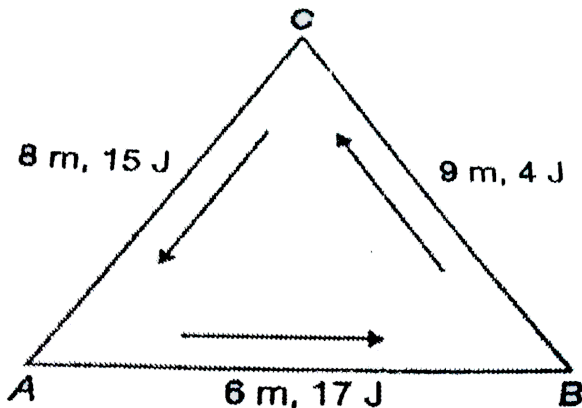

A. 700 J

B. 400 J

C. 500 J

D. 300 J

Answer: A

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4. A body is moved along the sides of a triangle ABC once in anticlockwise direction by applying different forces along different sides as represented in the figure . The total displacement of the body and work done by the forces are _____ and " _ _ _ _ respectively.

A. 23 m , 26 J

B. 15 m , 21 J

C. 25 m , 32 J

D. 0 m , 258 J

Answer: D

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5. Suresh carried a bag containing 25 mangoes from the ground floor to the 5th floor by distributing 5 mangoes at each floor . If he starts distribution from the first floor and each mango weighs 200 g . Then calculate the total work done by the person.

(Height of each floor is 4 m , g = 10 ms^{-2})

A. 600 J

B. 1600 J

C. 1000 J

D. 60 J

Answer: A

> ▶ Watch Video Solution

6. Find the work done by a man to move a cart from point A to point B and then to point C.If the distance between A to B and B to C is 30m and 14m respectively.(applied force by the man on the cart is 100N)

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7. Prakash bought an electric bulb which is rated as 70 W . He knows the fact that a 70 W bulb consumes 70 joules of electrical energy per second . The energy consumed by it per second is _____ergs.

> ▶ Watch Video Solution

8. Initial displacement of the body , AB = 3 m

Subsequent displacement of the body , BC = 4 m

Force applied , F = 100 N

Work done ,

$$W = F \times (AB + BC) = 100 \times (3 + 4) = 700J$$

Hence , the correct option is (a) .

9. Initial displacement of the body , AB = 3 m

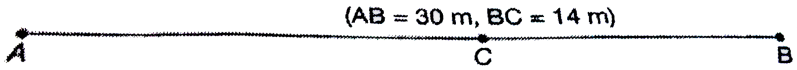Subsequent displacement of the body , BC = 4 m

Force applied , F = 100 N

Work done ,

$$W = F \times (AB + BC) = 100 \times (3 + 4) = 700J$$

Hence , the correct option is (a) .

10. A horse pulled a cart from position A to position B through C and came back to position C as shown in figure . What is the work done by the horse , if the force applied by the horse is 100 N ?

(AB = 30 m, BC = 14 m)

A. 4400 J

B. 3000 J

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B. 70×10^7
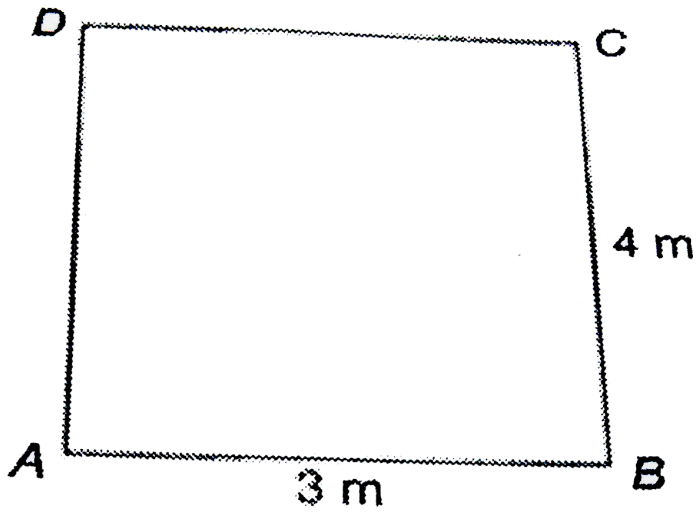
C. 7×10^7

D. 70×10^5

Answer: B

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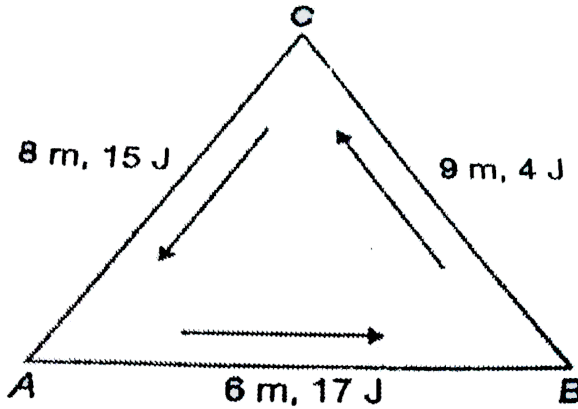
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Answer: A

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13. A body is moved along the sides of a triangle ABC once in anticlockwise direction by applying different forces along different sides as represented in the figure . The total displacement of the body and work done by the forces are _____ and " _ _ _ _ _ respectively.

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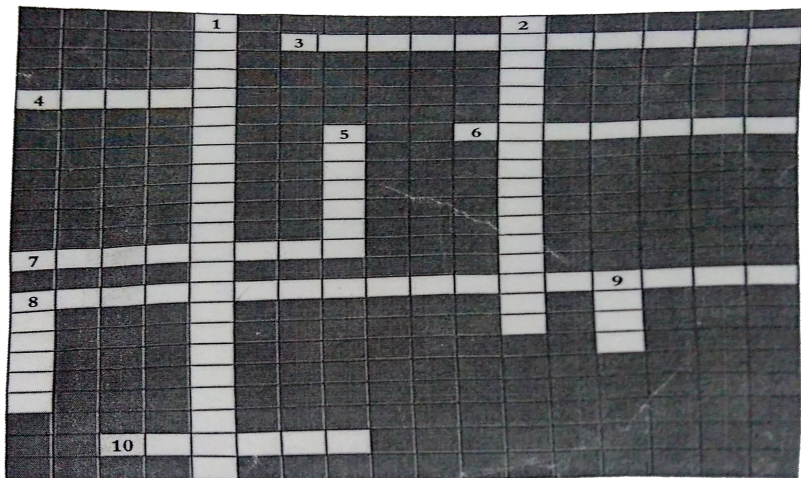
(Height of each floor is 4 m , g = 10 ms^{-2})

A. 600 J

B. 1600 J

C. 1000 J

D. 60 J

Answer: A

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Cross Word

1.

Across

3. It is a non-conventional source of energy (Two words)

4. The SI unit of work is

6. It is a form of chemical energy

7. Work done on the body if the displacement of the body is in the direction

8. Electricity produced from the stored water in a dam is called (Two word

10. This converts light energy into bio-chemical energy

Down

1. It is a domestic source of energy (Three words)

2. Energy stored in a compressed string (Two words)

5. Heat energy is measured in_____

8. Gravitational potential energy of the body depends on mass and _____

9It is a conventional source of energy

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Very Short Answer Type Question

1. Burning of thread in the candle gives light but not wax.

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2. A microphone converts

> ▶ Watch Video Solution

3. Which is the ultimate source of energy ?

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4. According to the Law of Conservation of Energy , as energy changes from one form to another form , the total energy of that system

> ▶ Watch Video Solution

1. The product of force and displacement is _____.

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2. As the height of a body increases , its _____ also increases .

▶ **Watch Video Solution**

3. Why does a plastic comb rubbed with dry hair attaract tiny pieces of paper ?

▶ **Watch Video Solution**

4. In the universe _____ and _____ are conserved .

▶ **Watch Video Solution**

5. When one newton of force displaces a body through a distance of 1 m , then the energy spent on it is _____.

> ▶ Watch Video Solution

6. Choose the correct one from the following .

    A. Biogas is a mixture of methane (65%), carbon dioxide and hydrogen.

    B. An apple on a tree has only potential energy.

    C. A compressed spring has an elastic potential energy.

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> ▶ Watch Video Solution

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B. Sun, wind and water come under renewable sources.

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Answer: C

8. Find out an example from the following that transforms sound energy into electrical energy .

A. Microphone

B. Door bell

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D. Loud speaker

Answer: A

9. The ultimate source of energy is-

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B. Keeps decreasing

C. Increases for some time then remains constant.

D. None of these

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▶ **Watch Video Solution**

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15. Find the energy possessed by a bird of 5 kg moving at a constant height of 10 m from the ground with a speed of 2 m s^{-1}. (Take $g = 10ms^{-2}$)

Assessment Test Test 1

1. What is the lowest limit of frequency range that is audible to human beings ?

2. Divyansh sat on a tree at a height of 2 metres . If he weighs 200 newtons , then what is the energy possessed by him in that situation.

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3. (a) What is mechanical energy ? (b) What is electromagnetic energy ?

> ▶ Watch Video Solution

4. Express 1250 N m in terms of Kilojoules .

> ▶ Watch Video Solution

5. Find the work done if a force of 2000 N is applied on a load and the load moves through a distance of 100 cm .

> ▶ Watch Video Solution

6. _____ sources of energy can be replenished with the passage of time .

7. Rohit pushed a toy truck and it moved a distance of 10 m . How much force did Rohit apply through the push , if the work done by him is 1000 J ?

8. Describe an energy chain giving two examples .

9. Write transformation of energy for the following appliances :

A. Telephones

B. Washing Machines

C. Solar Cells

D. Burning of Wood

Answer:

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10. What is biomass ? What can be done to obtain bio-energy using biomass ?

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11. Potential energy of a body depends on :

(i) Mass of the body (m) .

(ii) Acceleration due to gravity (g) .

(iii) Height of the body with respect to ground (h).

12. Check the statement true or false: Work is said to be done only if :

(i) A force must be applied on the object .

(ii) The object should be displaced or a change in the shape or size of the object should take place .

13. The energy possessed by a body due to its state of rest or state of motion is called mechanical energy.

14. The force constant of a simple harmonic oscillator is $3 \times 10^6 N/m$, amplitude 0.02 m has a total energy of 1250 J

15. Gravitational potential energy depends on height of the body from surface of earth . Elastic potential energy depends on the nature of the spring and compressed distance .

16. Force = 2000 N

Distance = 100 cm = 100/100 m = 1 m

(conversion from centimeter to meter .)

Work done = Force × Distance

`therefore W ??

17. Work done = 1000 J

Distance = 10 m

Force applied = Work done/Distance

`therefore F ??

18. Describe an energy chain giving two examples .

19. Name the devices or machines which convert :

(a) Mechanical energy into electrical energy.

(b) Chemical energy into electrical energy.

(c) Electrical energy into heat energy.

(d) Light energy into electrical energy.

(e) Electrical energy into light energy.

20. What is the lowest limit of frequency range that is audible to human beings ?

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21. A non-conventional source of energy.

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22. (a) What is wind ? What type of energy is possessed by wind ?

(b) Explain how, wind energy can be used to generate electricity. Illustrate your answer with the help of a labelled diagram.

(c) State two advantages of using wind energy for generating electricity.

(d) Mention two limitations of wind energy for generating electricity.

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23. BIO MASS

24. Divyansh sat on a tree at a height of 2 metres . If he weighs 200 newtons , then what is the energy possessed by him in that situation.

25. What are the factors on which the potential energy depends ?

26. What is the condition for a force to do work on a body ?

27. (a) What is mechanical energy ? (b) What is electromagnetic energy ?

▶ **Watch Video Solution**

28. Express 1250 N m in terms of Kilojoules .

▶ **Watch Video Solution**

29. Gravitational Potential Energy|Elastic Potential Energy|Work Energy Theorem

▶ **Watch Video Solution**

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▶ **Watch Video Solution**

31. _____ sources of energy can be replenished with the passage of time .

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33. Describe an energy chain giving two examples .

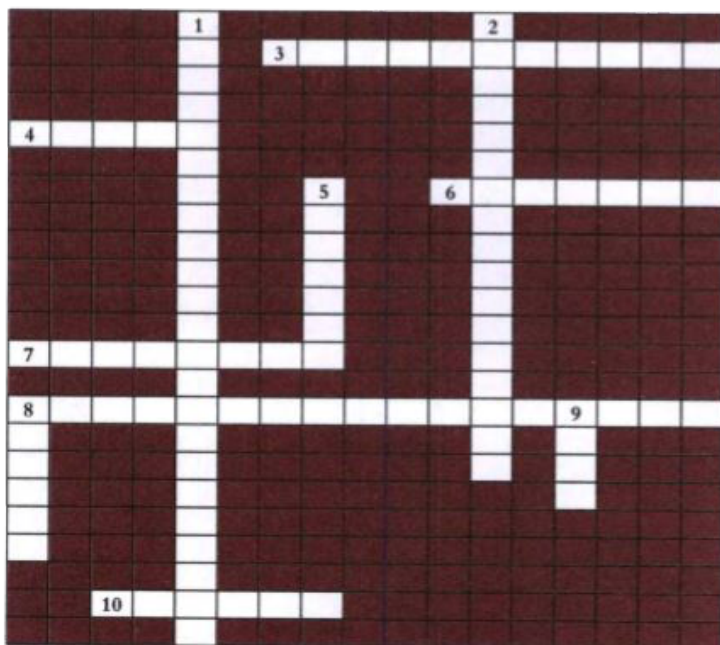**34.** Write transformation of energy for the following appliances :

(a) Telephones

(b) Washing Machines

(c) Solar Cells

(d) Burning of Wood

35.

Across

3. It is a non-conventional source of energy (Two words)
4. The SI unit of work is
6. It is a form of chemical energy
7. Work done on the body if the displacement of the body is in the direction of force applied on it
8. Electricity produced from the stored water in a dam is called (Two words)
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2. Energy stored
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8. Gravitational on mass and____
9. It is a convent

▶ View Text Solution