PHYSICS

BOOKS - VGS BRILLIANT PHYSICS (TELUGU ENGLISH)

WORK AND ENERGY

IMPROVE YOUR LEARNING - CONCEPTUAL UNDERSTANDING

1. Identify the wrong statement among the following. Rewrite them by making necessary corrections.

Work and energy have different units.

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2. Identify the wrong statement among the following. Rewrite them by making necessary corrections.

When an aeroplane takes off, the work done by its weight is positive.

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3. Identify the wrong statement among the following. Rewrite them by making necessary corrections.

The potential energy of spring increases when it is extended and decreases when it is compressed.

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4. Identify the wrong statement among the following. Rewrite them by making necessary corrections.

If the work done by the external forces on a system is negative then the energy of the system decreases.

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5. Identify the wrong statement among the following. Rewrite them by making necessary

corrections.

When a body is falling freely from a height, its kinetic energy remains constant.

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6. The unit of power is .....

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7. In which of the following cases is the work done positive or zero or negative ?

Work done by the porter on a suitcase in lifting it from the platform on to his head.

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8. In which of the following cases is the work done positive or zero or negative ?

Work done by the force of gravity on suitcase as the suitcase falls from porter's head.

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9. Work done by a porter standing with luggage on his head is .....

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10. In which of the following cases is the work done positive or zero or negative ?

Work done by force of gravity on a ball thrown up vertically up into the sky.

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11. Work done by force applied by hands of a man swimming in a pond is .....

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12. What is kinetic energy ? Derive an expressions for the kinetic energy of a body of mass 'm' moving at a speed 'v'.

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13. A man carrying a bag of total mass 25 kg climbs up to a height of 10 m in 50 seconds. Calculating the power delivered by him on the bag.

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14. Calculate the work done by a person in lifting a load of 20 kg from the ground and placing it 1m high on a table.

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15. Find the mass of a body which has 5 J of kinetic energy while moving at a speed of 2 m/s.

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16. When speed of the ball is doubled its kinetic energy is

A. Remains same

B. Gets doubled

C. Becomes half

D. Becomes 4 times

Answer: D

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17. Two bodies of unequal masses are dropped from the top of a building. Which of the following remains constant for both bodies at any instant ?

A. Speed

B. Force of gravity

C. Potential energy

D. Kinetic energy

Answer: B

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18. A man with a box on his head is climbing up a ladder. The work done by the man on the box is .....

A. Positive

B. Negative

C. Zero

D. Undefined

Answer: A

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19. A porter with a suitcase on his head is climbing up steps with uniform speed. The

work done by the "weight of the suitcase" on the suitcase is .....

A. Positive

B. Negative

C. Zero

D. Undefined

Answer: B

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IMPROVE YOUR LEARNING - COMMUNICATION THROUGH DRAWING, MODEL MAKING

1. Draw a diagram to show conservation of mechanical energy in case of free falling body.

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IMPROVE YOUR LEARNING - APPLICATION TO DAILY LIFE, CONCERN TO BIODIVERSITY

1. When you push your bicycle up an incline, the potential energy of the bicylce and yourself increase. Where does this energy come from ?

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2. Why does a person standing for a long time get tired when he does not appear to be doing any work ?

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TRY THESE

1. One person says that potential energy of a particular book kept in an almirah is 20 J and other says it is 30 J. Is one of them necessarily wrong ? Give reasons.

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2. A 10 kg ball is dropped from a height of 10 m. Find (a) the initial potential energy of the

ball, (b) the kinetic energy just before it reaches the ground and (c) the speed just before it reaches the ground.

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3. Let us assume that you have lifted a suitcase and kept it on a table. On which of the following does the work done by you depend or not dependtd? Why ?

a) The path taken by the suitcase

b) The time taken by you in

doing so

c) The weight of the suitcase

d) Your weight

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4. Collect pictures showing various situation where potential energy possessed by an object depends on its shape and position. Prepare a scrap book.

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5. How would you assess or appreciate the role of energy conversion occuring naturally in maintaining ecological balance of nature ?

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6. When you lift a box from the floor and put it on an almirah the potential energy of the box increases but there is no change in its kinetic energy. Is it violation of conservation of energy. Explain.

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7. When an apple falls from a tree what happens to its gravitational potential energy just as it reaches the ground ? After it strikes the ground ?

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8. How will the increasing energy needs and conservation of energy influence international peace, cooperation and security ? Discuss.

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ACTIVITIES

1. Read Examples : 1, 2, 3 and 4 from page 162 and 163 . Now fill the following table.

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2. Explain the relation between work done on an object and energy of the object with an

activity.

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3. Explain the energy of moving objects with an activity.

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4. Explain potential energy with the help of a bow.

Watch Video Solution

5. Write an activity to show the energy in stretched rubber band.

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6. Show that the object at some height possesses energy.

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7. List out the energy conservasion in our day to day life.

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8. Write an acitvity which shows the conservation of mechanical energy.

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9. Calculate the total energy of free-fall at different heights.

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10. Is the mechanical energy conserved in the system ?

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THINK & DISCUSS

1. A wooden chair is dragged on the level floor and brought to the same place. Let the distance covered by 's' and frictional force acted on the chair by the floor be 'f'. What is the work done by the frictional force ?

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2. Lift an object up from the ground. Work done by the force exerted by you on the object moves it in upward direction. Thus the force applied iis in the direction of displacement.

However there exists a force gravitational in the object at the same time

- Which one of these forces is doing positive work ?
- Which one is doing negative work ?
- Give reasons.

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3. What would happen if nature does not allow the transfer of energy ? Discuss with few examples.

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4. A person starts from rest and begins to run. The runner puts a certain momentum into himself. What is the momentum of ground ? And the runner puts a certain amount of kinetic energy into himself. What is the kinetic energy of the ground ?

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5. Does the international space station have gravitational potential energy ?

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6. Someone wanting to sell you a super ball claims that it will bounce to a height greater than the height from which it is dropped. Would you buy this ball ? If yes explain, if not explain.

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7. A ball, initially at the top of the inclined hill, is allowed to roll down. At the bottom its speed is 4 m/s. Next the ball is again rolled down the hill, but this time it does not start from rest. It has an initial speed of 3 m/s. How fast is it going when it gets to the bottom ?

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8. The work done by a force F_1 is larger than the work done by another force F_2. Is it

necessary that power delivered by F_1 is also than that of F_2 ? Why ?

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QUESTIONS GIVEN IN THE LESSON

1. How are these works (washing machine - cleaning the cloth, vaccum cleaner - cleaning the house) being done ?

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2. What do you need to do these works ?

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3. Where does the energy spent go ultimately ?

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4. Is there any transfer of energy while work is being done ?

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5. Can we do any work without transfer of energy ?

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6. What is work ?

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7. Why is there difference between general view of work and scientific view of work ?

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8. Observe the following examples.

Are all the people mentioned in the above examples doing work ?

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9. Observe the following examples.

How do you define work ?

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10. What would be the work done when the force on the object is zero ?

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11. What would be the work done when the displacement of the object is zero ?

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12. Can you give some examples, where the displacement of the object is zero ?

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13. What happens to the speed of a ball while it moves up with an initial velocity ?

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14. When a ball is moving up with an initial velocity, what will be its speed at its maximum height ?

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15. What happens to the speed of the ball during its downward motion ?

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16. What is energy ?

Watch Video Solution

17. How can we decide that an object possess energy or not ?

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18. What will happens to the plate ? Why ?

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19. What changes do you notice ? Why ?

View Text Solution

20. What could be the reason ?

View Text Solution

21. Where does this energy go ?

View Text Solution

22. Is there any energy transfer between the object doing the work and the object on which work has been done ?

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23. Can we do any work without transfer of energy ?

Watch Video Solution

24. Where do we get energy from ?

Watch Video Solution

25. Can you think of other sources of energy ?

Watch Video Solution

26. Are there sources of energy which are not dependent on the sun ?

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27. Do you know why a person gets tired standing at a place for a long time ?

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28. How do green plant get their food ?

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29. How are fuels like coal and petroleum formed ?

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30. What kind of energy conversion sustain the water cycle in nature ?

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31. Do all of us do the work at the same rate ?

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32. Is the energy spent by the force doing work the same every time ?

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33. Do the machines consume or transfer energy at same rate every time while doing a particular work ?

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34. Whose argument is correct ?

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35. Is work done in two cases same ?

View Text Solution

36. Why is there a change in rate of doing work ?

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PREVIOUS SUMMATIVE ASSESSMENTS QUESTIONS

1. According to the scientific concept of the work, two conditions need to be satisfied in

order to say that work has been done.

I. A force should act on the object.

II. The object must be displaced or there must be change in position of the object.

Now complete the table given below.

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2. a) Write the differences between potential energy and kinetic energy.

Compare and differentiate between political energy and kinetic energy.

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ESSENTIAL MATERIAL FOR EXAMINATION PURPOSE

1. What is the meaning of one joule ?

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2. What happens to the speed of a ball while it moves up with an initial velocity ?

Watch Video Solution

3. What happens to the speed of the ball during its downward motion ?

Watch Video Solution

4. Do you know why a person gets tired standing at a place for a long time ?

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5. Define potential energy.

View Text Solution

6. Write a formula to calculate potential energy.

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7. What is conservation of energy ?

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

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

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10. A person holds a bundle of hay over zero his head of 30 minutes and get tired. Has he done some work or not ? Justify your answer.

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11. Expland OTE.

Watch Video Solution

12. Expand OTEC.

Watch Video Solution

13. What is biomass?

Watch Video Solution

14. What is Nuclear reaction ?

Watch Video Solution

15. What is Nuclear Energy ?

Watch Video Solution

16. Define power and mention its units.

Watch Video Solution

17. What is the meaning of one joule ?

Watch Video Solution

18. What is the meaning of one watt ?

Watch Video Solution

19. Explain work through a diagram.

Watch Video Solution

20. Certain force acting on a 20 kg mass changes it velocity from $5ms^{-1}$ to $2ms^{-1}$. Calculate the work done by the force ?

Watch Video Solution

21. The potential energy of a freely falling object decreases progressively. Does the violate the law of conservation of energy ? Why ?

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22. Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 km/hr.

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23. 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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24. In each of the following a force, F is a acting on an object of mass, m. The direction o displacement is from west ot east shown by the long arrow. Observe the diagrams carefully and state whether the work done by the forece is negative, positive or zero.

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25. What is nuclear fission ? Given an example to illustrate it.

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26. What is nuclear fusion ? Write the conditions for nuclear fusion to occur.

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27. What is Ocean Thermal Energy ?

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28. Explain negative value of work done.

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29. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

Suma is swimming in a pond.

Watch Video Solution

30. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

A donkey is carrying a load on its back.

Watch Video Solution

31. Look at the acivities listed below. Reason out whether or not, work is done in the light

of your understanding of the term work.

A wind-mill lifting water from a well.

Watch Video Solution

32. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

A green plant is carrying out photosynthesis.

Watch Video Solution

33. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

An engine is pulling a train.

Watch Video Solution

34. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

Food grains are getting dried in the sun.

Watch Video Solution

35. Look at the acivities listed below. Reason out whether or not, work is done in the light of your understanding of the term work.

A sail boat is moving due to wind energy.

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36. An object of mass 4 kg is raised to 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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PREVIOUS SUMMATIVE ASSESSEMENTS BITS

1. Work' has

A. Only direction, no magnitude

B. Only magnitude, no direction

C. Both magnitude and direction

D. No magnitude, no direction

Answer: B

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2. Power is defined as

P) rate of doing work

Q) rate of transfer of energy

R) sum of kinetic and potential energy

A. P only

B. Q and R

C. P and Q

D. P, Q and R

Answer: C

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3. When speed of the ball is doubled its kinetic energy is

A. Remains same

B. Gets doubled

C. Becomes half

D. Becomes 4 times

Answer: D

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4. Chaitanya performs 300 J of work in 5 minutes. The power delivered by her is

A. 60 W

B. $\frac{1}{60}$ W

C. 1 W

D. 0 W

Answer: C

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CONCEPTUAL UNDERSTANDING - OBJECTIVE TYPE QUESTIONS

1. The conditions need to be satisfied in order to say that work has been done are

A. a force should act on the object

B. the object must be displaced

C. both A and B

D. no condition is required

Answer: C

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2. Work is ..... quantity.

A. vector

B. scalar

C. unit less

D. can't say

Answer: B

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3. The formula W = Fs is used in only ..... motion of the object.

A. circular

B. oscillatory

C. translatory

D. tranjectory

Answer: C

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4. If positive work is done on a system, its energy

A. decreases

B. increases

C. becomes zero

D. remains same

Answer: B

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5. The kinetic energy of an object depends on

A. mass

B. speed

C. gravitational force

D. none

Answer: C

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6. The potential energy of an object increases with its

A. height or position

B. mass

C. velocity

D. none

Answer: A

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7. The sum of kinetic energy and the potential energy of an object is called its

A. total energy

B. mechanical energy

C. system of energy

D. energy conservation

Answer: B

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8. Ratio of doing work or rate of transfer of energy is defined as .....

A. work

B. energy

C. power

D. time

Answer: C

Watch Video Solution

9. The measure of speed of the work done is

A. power

B. energy

C. work

D. time

Answer: A

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10. The capacity to do work is called .....

A. energy

B. power

C. work

D. strength

Answer: A

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11. Work is equal to the product of ..... and .....

A. force, time

B. force, displacement

C. force, velocity

D. force, acceleration

Answer: B

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12. Among these which is a scalar quantity .....

A. velocity

B. acceleration

C. momentum

D. work

Answer: D

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13. S.I. Unit of work is .....

A. Erg

B. Joule

C. Newton

D. Pascal

Answer: B

Watch Video Solution

14. 1 N - m is equal to .....

A. Erg

B. Newton

C. Pascal

D. Joule

Answer: D

Watch Video Solution

15. In case of a vertically up thrown body, the speed of the body while moving up .....

A. increases

B. decreases

C. no change

D. both A & B

Answer: B

Watch Video Solution

16. If work has positive value, the body on which the work has been done would ..... energy.

A. gain

B. lose

C. no change in

D. none of these

Answer: A

 Watch Video Solution

17. If work has negative value, the body on which the work has been done would ..... energy.

A. gain

B. lose

C. without change

D. none of these

Answer: B

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18. The capacity of doing work by an object depends on ..... and ..... of the object which is doing work.

A. position, state

B. length, breadth

C. area, volume

D. pressure, density

Answer: A

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19. When work is done, energy will be ..... from one object to other.

A. transferred

B. lost

C. gained

D. none of these

Answer: A

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20. The biggest natural and primary source of energy for us is the .....

A. Moon

B. Jupiter

C. Sun

D. Mars

Answer: C

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21. The energy possessed by an object due to its motion is called ..... energy.

A. potential

B. kinetic

C. mechanical

D. electrical

Answer: B

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22. The numerical expression for kinetic energy is K.E. = ...

A. $\frac{1}{2}mv$

B. $\frac{1}{2}mv^2$

C. $\frac{mv^2}{t}$

D. $\frac{1}{2}m^2v$

Answer: B

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23. P.E. = ...

A. $\frac{1}{2}mv^2$

B. $\frac{1}{2}mv$

C. mgh

D. $\frac{mg}{h}$

Answer: C

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24. In an iron box ..... energy converts into .....energy.

A. electrical, sound

B. electrical, magnetic

C. electrical, heat

D. electrical, light

Answer: C

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25. Power = ...

A. $\frac{\text{Work}}{\text{Time}}$

B. $\frac{\text{Time}}{\text{Work}}$

C. $\text{Work} \times \text{Time}$

D. none of these

Answer: A

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26. The unit of power is .....

A. Erg

B. Joule/sec

C. Watt

D. Both B & C

Answer: D

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27. kinetic energy of an object increases with its .....

A. acceleration

B. speed

C. volume

D. density

Answer: B

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28. If the displacement of the object is in the direction opposite to the direction of force applied, then the work done is .....

A. Positive

B. Negative

C. 0

D. none of these

Answer: B

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29. Work (W) = ...

A. F/s

B. F $\times$ s

C. s/F

D. none of these

Answer: B

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30. The capacity to do work is called .....

A. power

B. work

C. energy

D. force

Answer: C

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31. Mechanical energy = ...

A. PE + KE

B. PE/KE

C. KE/PE

D. PE - KE

Answer: A

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32. 1 Watt = ...

A. 1 erg/s

B. 1 J/s

C. 1 Newton/sec

D. 1 Newton · sec

Answer: B

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33. Work done by gravitational force on a freely falling body .....

A. negative

B. 0

C. positive

D. both A & C

Answer: C

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34. Work done by friction on a body moving on plain ground .....

A. positive

B. Negative

C. 0

D. none of these

Answer: B

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35. Work done by a porter standing with luggage on his head is .....

A. positive

B. Negative

C. 0

D. none of these

Answer: C

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CONCEPTUAL UNDERSTANDING - EXPERIMENTATION AND FIELD INVESTIGATION

1. When a ball is moving on plain ground, the work done by the frictional force on the ball is

A. positive

B. Negative

C. zero

D. Undefined

Answer: B

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2. A boy pushes wall. The work done by the boy is

A. positive

B. Negative

C. zero

D. Undefined

Answer: C

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CONCEPTUAL UNDERSTANDING - AESTHETIC SENSE, VALUES AND DAILY LIFE CONCERN TO BIODIVERSITY

1. Human beings or machines need ..... to do work.

A. energy

B. food

C. petrol

D. fuel

Answer: A

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2. Work is said to be done in the following case.

A. Rangaiah is pushing a huge rock but he fail to move it

B. Seetha is pulling a toy car

C. Priyanka is working hard for her examinations

D. A porter is waiting on the platform of a railway station with luggage on his head.

Answer: B

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3. The energy possessed by a wounded spring in a toy car is

A. kinetic energy

B. spring energy

C. muscular energy

D. potential energy

Answer: D

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4. The energy possessed by a running athlete is

A. potential energy

B. kinetic energy

C. muscular energy

D. food energy

Answer: B

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5. Energy possessed by the blowing wind is ..... energy.

A. potential

B. mechanical

C. kinetic

D. magnetic

Answer: C

 Watch Video Solution

6. The energy possessed by a body due to its height or position is ..... energy.

A. potential

B. kinetic

C. mechanical

D. muscular

Answer: A

Watch Video Solution

7. The sum of kinetic energy and the potential energy of an object is called its

A. muscular

B. electric

C. magnetic

D. mechanical

Answer: D

Watch Video Solution

8. The total mechanical energy of an aeroplane at rest is .....

A. mgh

B. $\frac{1}{2}mv^2$

C. zero

D. cannot say

Answer: C

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9. In fuels like petroleum, cook, etc. ..... energy is stored in them.

A. physical

B. electrical

C. magnetical

D. chemical

Answer: D

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10. Rate of doing work or rate of transfer of energy is defined as .....

A. work

B. power

C. capacity

D. impulse

Answer: B

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11. In case of a freely falling body ..... energy is gradually converted into ..... energy at a certain height 'h'.

A. potential, kinetic

B. kinetic, potential

C. kinetic, kinetic

D. potential, potential

Answer: A

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12. The water stored in overhead tanks, possesses ..... energy.

A. mechanical

B. kinetic

C. potential

D. chemical

Answer: C

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13. ..... energy is used by plants for preparing their food.

A. Potential

B. kinetic

C. Mechanical

D. Solar

Answer: D

Watch Video Solution

14. Work done by force applied by hands of a man swimming in a pond is .....

A. negative

B. positive

C. 0

D. none of these

Answer: A

Watch Video Solution

15. Energy of running water is ..... energy.

A. potential

B. kinetic

C. mechanical

D. none of these

Answer: B

Watch Video Solution

16. Energy of a raised hammer is ..... energy.

A. potential

B. kinetic

C. mechanical

D. magnetic

Answer: A

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