



## PHYSICS

### BOOKS - BEIITIANS

### ENERGY AND WORK

#### Formative Worksheet

1. Calculate the amount of work done, when a force of 25 N displaces a body through 10 m, in its own its direction.

A. 125 J

B. 250 J

C. 375 J

D. 500 J

**Answer:**



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2. Renatta Gass is out with her friends. Misfortune occurs and Renatta and her friends, find themselves getting a workout. They apply a cumulative force of 1080 N to push the car 218 m to the nearest fuel station. Determine the work done on the car.

A.  $2.35 \times 10^5$  J

B.  $2.35 \times 10^6$  J

C.  $2.35 \times 10^7$  J

D.  $2.35 \times 10^8$  J

**Answer:**



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3. A fork lift moves 34 m carrying a 1023 N box across the warehouse floor. How much work is done by the fork lift.

A. 3478 J

B. 78234 J

C. 435720 J

D. 34782 J

**Answer:**



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4. How much work is done by a person who uses a force of 27.5 N to move a grocery buggy 12.3 m ?

A. 1014.75 J

B. 676.5 J

C. 338.25 J

D. 169.125 J

**Answer:**



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5. 55,000 J of work is done to move a rock 25 m. How much force was applied ?

A. 1100 N

B. 2200 N

C. 3300 N

D. 4400 N

**Answer:**



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6. A person of mass 50 kg climbs a tower of height 72 metre. The work done is

$$[g = 9.8m / s^2]$$

A. 35280 J

B. 32580 J

C. 52380 J

D. 58320 J

**Answer:**



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7. How much is the mass of a man if he has to do 2500 joule of work in climbing a tree 5m tall ?

$$(g = 10m / s^2)$$

A. 30 kg

B. 40 kg

C. 50 kg

D. 45 kg

**Answer:**



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**8.** An object of 100 kg is lifted to a height of 10 m vertically. What will be the work done ?

$$[g = 9.8m / s^2]$$

A. 9800 J

B. 9008 J

C. 9.8 J

D. 8.9 J



**Answer:**



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9. A box of mass 2kg is pushed along a floor through 2m against a force of friction 5N. The same box is lifted up through a height of 2m. What will be the work done in both cases respectively

$$(g = 9.8m / s^2)$$

A. 10 J, 39.2 J

B. 15 J, 36.2 J

C. 12 J, 39.2 J

D. 10 J, 32.9 J

**Answer:**

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**10.** A coolie lifts a box of 15 kg from the ground to a height of 2.0 m. The work done by the coolie on the box is

(Given  $g = 9.8 \text{ m} / \text{s}^2$ )

A. 250 J

B. 294 J

C. 300 J

D. 350 J

**Answer:**



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**11.** A work of 4900 J is done on a load of mass 50 kg to lift it to a certain height. What is the height through which the load is lifted ?

A. 12 m

B. 14 m

C. 10 m

D. 18 m

**Answer:**



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**12.** Calculate the kinetic energy of a body of mass 2 kg moving with a velocity of 0.1 meter per second.

A. 0.1 J

B. 0.01 J

C. 0.001 J

D. 1 J

**Answer:**





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13. Two bodies of equal masses move with uniform velocities  $v$  and  $3v$  respectively. Find the ratio of their kinetic energies.

A. 9 : 1

B. 2 : 9

C. 1 : 9

D. 1 : 1

**Answer:**



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14. A 1kg mass has a kinetic energy of 1 Joule when its velocity is

A. 0.45 m/s

B. 1 m/s

C. 1.4 m/s

D. 4.4 m/s

**Answer:**



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15. An object of mass 1 kg has a potential energy of 1 J relative to the ground, when it is at a height of

$$[g = 10\text{ m/s}^2]$$

A. 0.1 m

B. 1 m

C. 9.8 m

D. 32 m

**Answer:**



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16. When you cook food in pressure cooker by placing it over stove, the\_\_\_\_\_energy changes water to steam.

A. Electrical

B. Magnetic

C. Chemical

D. Heat

**Answer:**



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17. Which of the following is capable of doing work ?

A. Sound energy

B. Light energy

C. Heat energy

D. All

**Answer:**



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18. Which energy makes an electric motor to work ?



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19. Chemical energy is kind of

- A. Kinetic energy
- B. Potential Energy
- C. Both
- D. None

**Answer:**



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20. In fossil fuels, \_\_\_\_\_ energy changes to heat energy.



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21. When the nucleus of a heavy atom such as uranium or plutonium is smashed, it releases



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22. In which of the following mechanical energy is converted to heat energy

A. Drilling

B. Striking of stones

C. Water fall

D. None

**Answer:**



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23. When the turbine is coupled to an electric generator, \_\_\_\_\_energy of the turbine changes into \_\_\_\_\_energy.

A. electric, mechanical

B. mechanical, electric

C. sound, light

D. electric, magnetic

**Answer:**



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**24.** When light energy falls on silver salts coated on photographic plate, it changes into \_\_\_\_\_ energy.

A. Electrical

B. Heat

C. Chemical

D. None

**Answer:**



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25. In an electric kettle, \_\_\_\_\_ energy is changed \_\_\_\_\_ energy ?

A. electric, magnetic

B. mechanical, electric

C. electric, heat

D. electric, light

**Answer:**



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## Conceptive Worksheet

1. The ability to do work is called

A. Power

B. Energy

C. Charge

D. None

**Answer:**



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2. The factors on which work depends is

A. Force

B. Displacement

C. Both

D. Non

**Answer:**





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3. The CGS unit of work is

A. erg

B. joule

C. watt

D. metre

**Answer:**



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4. Name and define SI unit of work.

A. erg

B. joule

C. watt

D. metre

**Answer:**



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5. What is the work done by a coolie of mass 80 kg, standing with a rice bag of 50 kg on his shoulder ?

A. 130 J

B. 50 J

C. 80 J

D. Zero

**Answer:**



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**6.** Calculate the amount of work done when moving a 567 N crate a distance of 20 meters.

A. 10340 J

B. 11340 J

C. 12340 J

D. 13440 J

**Answer:**



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7. If it took a bulldozer 567.6 joules of work to push a mound of dirt 30.5 meters, how much force did the bulldozer have to apply ?

A. 9.3 N

B. 10.6 N

C. 18.6 N

D. 37.2 N

**Answer:**



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**8.** On what factors does the kinetic energy of a body depend ?

A. on its mass only

B. on its velocity only

C. on its mass as well as on its velocity

D. neither on its mass nor on its velocity

**Answer:**



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9. Water stored in a dam possesses

A. only kinetic energy

B. only potential energy

C. both kinetic and potential energy

D. neither kinetic energy nor potential energy

**Answer:**



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10. Strong wind can turn the blades of a wind mill because it possesses

- A. kinetic energy
- B. potential energy
- C. both kinetic and potential energy
- D. none of these

**Answer:**



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11. When the speed of a moving object is doubled, its

A. kinetic energy halved

B. kinetic energy decreases

C. kinetic energy is doubled

D. kinetic energy increases four times

**Answer:**



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12. A flying aeroplane has



- A. only kinetic energy
- B. only potential energy
- C. both kinetic and potential energy
- D. none of these

**Answer:**



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**13.** If the velocity an object increases 4 times, its kinetic energy increases

- A. 4 times

B. 8 times

C. 16 times

D. 32 times

**Answer:**



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**14.** A body of mass 1 kg is lifted through a height of 1m, then its work done is

A. 8.9 J

B. 9.8 J

C. 98 J

D. 89 J

**Answer:**



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**15.** A man lifts a brick of mass 5 kg from the floor to a shelf 2 m high. How much work is done ?

$$(g = 9.8m / s^2)$$

A. 8.9 J

B. 9.8 J

C. 98 J

D. 89 J

**Answer:**

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**16.** A ball of mass 1 kg is thrown up. It reaches a maximum height of 5m. What is the work done by the force of gravity during motion

$$[g = 9.8m / s^2]$$

A. 9 J

B. 6.9 J

C. 49 J

D. 9.8 J

**Answer:**



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17. A load of 100 kg is pulled upwards by 5 m.

Calculate the work done.

$$[g = 9.8m / s^2]$$

A. 4900 J

B. 9400 J

C. 9 J

D. 94.0 J

**Answer:**



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**18.** If acceleration due to gravity is  $10m / s^2$ , what will be the potential energy of a body of mass 1 kg kept at a height of 5 m?

A. 20 J

B. 30 J

C. 40 J

D. 50 J

**Answer:**



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**19.** Heat is a form of \_\_\_\_\_



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**20.** When we strike a match, the \_\_\_\_\_ energy on the match head changes into \_\_\_\_\_ energy.

A. sound, chemical

B. chemical, light

C. chemical, heat

D. chemical, electrical

**Answer:**



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**21.** In electric cells or electric batteries, \_\_\_\_\_ energy changes into \_\_\_\_\_ energy.

A. sound, chemical

B. chemical, light

C. chemical, heat



D. chemical, electrical

**Answer:**



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**22.** When two stones are struck against each other sharply, mechanical energy is converted to

A. Electrical energy

B. Light energy

C. Sound energy

D. Both B and C

**Answer:**



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23. When hands are rubbed, \_\_\_\_\_ energy is changes into \_\_\_\_\_ energy.

- A. electric, mechanical
- B. mechanical, thermal
- C. sound, light
- D. electric, magnetic

**Answer:**





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24. During which of the following, light energy is converted to chemical energy ?

A. Photosynthesis

B. Combustion

C. Both

D. None

**Answer:**



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25. In which of the following, the electric energy changes into mechanical energy ?

A. Electric motors

B. Fans

C. Grinders

D. All

**Answer:**



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**Summative Worksheet**

1. Ability to do work is called \_\_\_\_\_.



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2. When a force causes \_\_\_\_\_ in its own direction, the work is said to be done.



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3. Work done by a body is the product of \_\_\_\_\_ and displacement.



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4. One joule is the product of force of 1N and displacement of \_\_\_\_\_.



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5. Energy possessed by a body by virtue of its \_\_\_\_\_ is called potential energy.



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6. Energy possessed by a body by virtue of its \_\_\_\_\_ is called kinetic energy.



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7. In hydroelectric dams the \_\_\_\_\_ energy of flowing water is transformed into electric energy.

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8. When we speak in front of a microphone, the sound energy changes into \_\_\_\_\_ energy.

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9. During photosynthesis, the \_\_\_\_\_ energy changes to chemical energy.



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**10.** Work is done when we hold a pile of books in our hands.



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**11.** Work done by a body is the product of pressure and displacement.



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**12.** When electric current flows through a bulb, the electric energy first changes into light energy and then heat energy.



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**13.** When we speak in front of a microphone the electric energy changes into sound energy.



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**14.** During photosynthesis heat energy changes into chemical energy.



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**15.** In charging a car battery, the chemical energy changes into electric energy.



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**16.** Nuclear energy is released in the form of light energy.



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17. When a stone is projected vertically upwards its kinetic energy changes into potential energy.

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18. Kinetic energy of a body decreases with the increase in mass.

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19. Unit of energy in SI system is

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**20.** A stretched bow and arrow system has kinetic energy.



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**21.** The energy possessed by an electric cell is chemical energy.



**Watch Video Solution**

**22.** During photosynthesis, the light energy changes into chemical energy.



**Watch Video Solution**

Watch Video Solution

**23.** An electric bulb converts electric energy into heat energy.



**Watch Video Solution**

**24.** The source of energy in a nuclear bomb is chemical energy.



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**25.** A freely falling stone possesses K.E and P.E.





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**26.** In hydroelectric stations, the potential energy of flowing water changes into electric energy.



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**27.** The work done by a body is the product of force and :

A. distance

B. speed

C. displacement

D. velocity

**Answer:**



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**28.** Name and define SI unit of work.

A. newton

B. pascal

C. joule

D. newton-metre

**Answer:**



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29. Burning of paper is an example of conversion of :

- A. chemical energy into heat energy
- B. chemical energy into heat and light energy
- C. chemical energy into light energy
- D. heat energy into light energy

**Answer:**



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**30.** Water stored in a tank on the top of roof has :

A. potential energy

B. kinetic energy

C. potential as well as kinetic energy

D. solar energy

**Answer:**



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**31.** Work is said to be done when :

A. force acts upon a body, but the body does not  
move

B. force acts upon a body and moves it in the  
direction of force

C. force acts upon a body, but the body does not  
move in the direction of applied force

D. none of these

**Answer:**



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32. It two boys push a table in opposite direction with equal force, then

- A. work is said to done
- B. no work is done
- C. double work is done
- D. none of these

**Answer:**



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33. Which energy possessed by a speeding train.



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**34.** Which energy possessed by a flying bird



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**35.** Energy conversion in burning of coal:



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**Hots Worksheet**

1. Which of the following quantities is a vector quantity ?

A. Displacement

B. Distance

C. Energy

D. Work

**Answer:**



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2. Which of the following conditions is correct for non-zero work done ?

A. Force acting on the body is zero.

B. Displacement of the body is zero.

C. Displacement of body is perpendicular to the force.

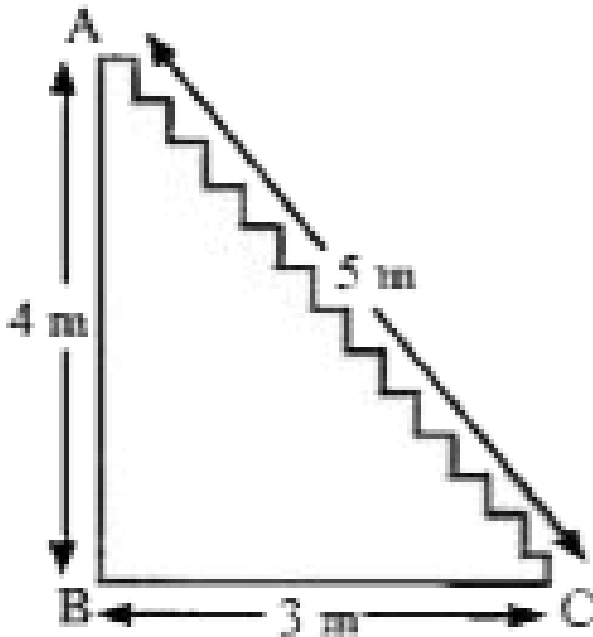
D. Displacement produced by force is in opposite direction to the force.

**Answer:**



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3. A boy carries a 10 kg load from point C to A along the path CA as shown in the figure. What is the work done by the boy against the gravitational pull of the earth ?



A. 190 J

B. 289 J

C. 392 J

D. 490 J

**Answer:**



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4. 50 J of work is done against the force of gravity in lifting a stone to a certain height. What will be the potential energy of the stone at that height ?

A. 200 J

B. 100 J



C. 50 J

D. 30 J

**Answer:**



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5. The ability of a body to do some work is known as :

A. force

B. energy

C. power

D. momentum

**Answer:**



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6. 20 J of work is done against the force of gravity in lifting a stone to a certain height. What will be the potential energy of the stone at that height ?

A. 200 J

B. 100 J

C. 20 J

D. 10 J

**Answer:**



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7. Cars I and II, having masses  $m$  and  $2m$  respectively, are moving with velocities

$2v$  and  $v$  respectively. They are brought to rest by the application of breaks. The cars take the same time and cover the same distance before coming to rest.

What is the ratio of change in kinetic energy of car I to that of car II ?

A. 1 : 2

B. 2 : 1

C. 1:4

D. 4:1

**Answer:**



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**8.** A car of mass 1200 kg starts from rest and acquires a uniform velocity of 18 m/s. What is the kinetic energy of the car ?

A. 184400 J

B. 188400 J

C. 194400 J

D. 198400 J

**Answer:**

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9. Which of the following statements is correct for hydro power plants ?

A. Chemical energy is converted into electrical energy.

B. Electrical energy is converted into chemical energy.

C. Mechanical energy is converted into electrical energy.

D. Electrical energy is converted into mechanical energy.

**Answer:**



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**10.** Which arrow diagram correctly represents the steps in energy conversion in hydropower plants ?

A. Heat energy  $\rightarrow$  Kinetic energy  $\rightarrow$  Electric energy

B. Kinetic energy  $\rightarrow$  Heat energy  $\rightarrow$  Electric energy

C. Kinetic energy  $\rightarrow$  Potential energy  $\rightarrow$  Electric energy

D. Potential energy  $\rightarrow$  Kinetic energy  $\rightarrow$  Electric energy

**Answer:**



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1. You and 3 friends apply a combined force of 489.5 N to push a piano. The amount of work done is 1762.2 J. What distance did the piano move ?

A. 3.6 m

B. 4.7 m

C. 5.8 m

D. 6.9 m

**Answer:**



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2. If a weight lifter raises a barbell with a mass of 125.7 grams doing 5,023 joules of work, what distance did he move the barbells ? Remember that you need a force, not a mass. You must first calculate the force in order to complete your solution. HINT : Weight is a force. Weight on earth is determined by multiplying an object's mass times earth's gravitational pull ( $9.8 \text{ m} / \text{s}^2$ ).

A. 2032.2 m

B. 3253.6 m

C. 4083.7 m

D. 5465.8 m

**Answer:**



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**3.** A frontend loader needed to apply 137 newtons of force to lift a rock. A total of 223 joules of work was done. How far was the rock lifted ?

A. 1.627 m

B. 2.6225 m

C. 3.2564 m

D. 4.2545 m

**Answer:**



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4. A young boy applied a force of 2,550 newtons on his St. Bernard dog who is sitting on the boy's tennis shoes. He was unable to move the dog. How much work did he do trying to push the dog ?

A. 10 J

B. 20 J

C. 30 J

D. none

**Answer:**



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5. What will be the velocity of a body of mass 100 g having a kinetic energy of 20 J ?

A. 20 m/s

B. 15 m/s

C. 10 m/s

D. 25 m/s

**Answer:**





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6. The kinetic energy of an object of mass 'm' moving with a velocity of 5 m/s is 25 J. What will be its K.E when its velocity is increased three times ?

A. 225 J

B. 200 J

C. 150 J

D. 100 J

**Answer:**



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7. A car is moving with a uniform velocity of 54 km/h.

What is the K.E of a boy of mass 40 kg sitting in his car ?

A. 4500 J

B. 4000 J

C. 3500 J

D. 3000 J

**Answer:**



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8. What will be the height through which a body of mass 0.5 kg should be lifted, if the energy spent for doing so is 1.0 joule ? ( $g = 10\text{m} / \text{s}^2$ )

A. 0.1 m

B. 2 m

C. 1 m

D. 0.2 m

**Answer:**



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9. During electrolysis, electrical energy is changed to \_\_\_\_\_ energy.

A. Light

B. Sound

C. Chemical

D. Gravitational

**Answer:**



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10. During burning, chemical energy is changed to \_\_\_\_\_ energy.

A. heat

B. light

C. both

D. none

**Answer:**



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11. In which of the following, chemical energy is changed to electrical energy ?

A. Burning

B. dry cells

C. electric kettle

D. Solar cooker

**Answer:**



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12. In explosive devices, such as fire crackers, bombs, etc., the chemical energy changes into\_\_\_\_\_ energy.

A. heat

B. light

C. Sound

D. All

**Answer:**



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13. Which of the following is not a form of energy ?

A. Sound

B. Light

C. Heat

D. momentum

**Answer:**



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**14.** When the nucleus of a heavy atom is smashed, it releases

A. nuclear energy

B. heat energy

C. electrical energy

D. light energy

**Answer:**



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**15.** Heat energy is converted to mechanical energy in



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**16.** The electric energy changes into mechanical energy in

A. Electric motors

B. Fans

C. Grinders

D. Microphone

**Answer:**



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17. Mathematically, work is defined as the product of force and displacement through which force acts. If  $F$  is the applied force, ' $S$ ' is the displacement in the direction of applied force and  $W$  is the work done, then : Work done = Force  $\times$  Displacement through which force acts.

$$W = F \times S$$

The SI unit of work is Joule (J) and cgs unit is erg.  $1 \text{ J} = 10^7 \text{ erg}$ .

How much work is done by a person who uses a force of 50 N to move a grocery buggy 10 m ?



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**18.** Mathematically, work is defined as the product of force and displacement through which force acts. If  $F$  is the applied force, ' $S$ ' is the displacement in the direction of applied force and  $W$  is the work done, then : Work done = Force  $\times$  Displacement through which force acts.

$$W = F \times S$$

The SI unit of work is Joule (J) and cgs unit is erg.  $1 \text{ J} = 10^7 \text{ erg}$ .

6000 J of work is done to move a rock 25 m. How much force was applied ?



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**19.** Mathematically, work is defined as the product of force and displacement through which force acts. If  $F$  is the applied force, ' $S$ ' is the displacement in the direction of applied force and  $W$  is the work done, then : Work done = Force  $\times$  Displacement through which force acts.

$$W = F \times S$$

The SI unit of work is Joule (J) and cgs unit is erg.  $1 \text{ J} = 10^7 \text{ erg}$ .

You and your friends apply a combined force of 800 N to push a stone. The amount of work done is 3200 J. What distance did the stone move ?



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20. According to law of conservation of energy.

"Energy can neither be created nor be destroyed, but can be changed from one form to another form".

The sound energy in a microphone changes into

- A. chemical energy
- B. mechanical energy
- C. electrical energy
- D. magnetic energy

**Answer:**



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21. According to law of conservation of energy.

"Energy can neither be created nor be destroyed, but can be changed from one form to another form".

The electrical energy in an electromagnet changes into

- A. light energy
- B. heat energy
- C. magnetic energy
- D. chemical energy

**Answer:**



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22. According to law of conservation of energy.

"Energy can neither be created nor be destroyed, but can be changed from one form to another form".

During charging of a battery, the electrical energy changes into

- A. magnetic energy
- B. chemical energy
- C. mechanical energy
- D. none of these

**Answer:**



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### 23. Relation between kinetic energy and momentum

Let us consider a body of mass 'm' having a velocity 'v', then

momentum of the body  $P = \text{mass} \times \text{velocity}$

$$P = m \times v \Rightarrow v = \frac{P}{m} \quad \dots(1)$$

From definition, kinetic energy (K.E) of the body

$$K. E = \frac{1}{2}mv^2 \quad \dots(2)$$

Now putting the value of (1) in (2) we have

$$K. E = \frac{1}{2}m \left( \frac{P}{m} \right)^2$$

$$K. E. = \frac{1}{2}m \frac{P^2}{m^2} = \frac{1}{2} \frac{P^2}{m} = \frac{P^2}{2m} \quad \dots(3)$$

Thus we can write

$$P^2 = 2m \times K. E$$

$$\Rightarrow P = \sqrt{2m \times K.E}$$

Thus momentum =  $\sqrt{2 \times \text{mass} \times \text{kinetic energy}}$

What will be the momentum of a body of mass 100 g having kinetic energy of 20 J ?

A. 2 kg m/s

B. 4 kg m/s

C. 5 kg m/s

D. 6 kg m/s

**Answer:**



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## 24. Relation between kinetic energy and momentum

Let us consider a body of mass 'm' having a velocity 'v', then

momentum of the body  $P = \text{mass} \times \text{velocity}$

$$P = m \times v \Rightarrow v = \frac{P}{m} \quad \dots(1)$$

From definition, kinetic energy (K.E) of the body

$$K. E = \frac{1}{2}mv^2 \quad \dots(2)$$

Now putting the value of (1) in (2) we have

$$K. E = \frac{1}{2}m \left( \frac{P}{m} \right)^2$$
$$K. E. = \frac{1}{2}m \frac{P^2}{m^2} = \frac{1}{2} \frac{P^2}{m} = \frac{P^2}{2m} \quad \dots(3)$$

Thus we can write

$$P^2 = 2m \times K. E$$

$$\Rightarrow P = \sqrt{2m \times K. E}$$

Thus momentum =  $\sqrt{2 \times \text{mass} \times \text{kinetic energy}}$

Two bodies of mass 1 kg and 4 kg possess equal momentum. The ratio of their kinetic energies is

A. 4:1

B. 1:4

C. 2:1

D. 1:2

**Answer:**



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## 25. Relation between kinetic energy and momentum

Let us consider a body of mass 'm' having a velocity 'v', then

momentum of the body  $P = \text{mass} \times \text{velocity}$

$$P = m \times v \Rightarrow v = \frac{P}{m} \quad \dots(1)$$

From definition, kinetic energy (K.E) of the body

$$K. E = \frac{1}{2}mv^2 \quad \dots(2)$$

Now putting the value of (1) in (2) we have

$$K. E = \frac{1}{2}m \left( \frac{P}{m} \right)^2$$
$$K. E. = \frac{1}{2}m \frac{P^2}{m^2} = \frac{1}{2} \frac{P^2}{m} = \frac{P^2}{2m} \quad \dots(3)$$

Thus we can write

$$P^2 = 2m \times K. E$$

$$\Rightarrow P = \sqrt{2m \times K. E}$$

Thus momentum =  $\sqrt{2 \times \text{mass} \times \text{kinetic energy}}$

Two bodies masses 1 kg and 4 kg having equal kinetic energies. The ratio of their momentum is

A. 4:1

B. 1:4

C. 2:1

D. 1:2

**Answer:**



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## 26. Relation between kinetic energy and momentum

Let us consider a body of mass 'm' having a velocity 'v', then

momentum of the body  $P = \text{mass} \times \text{velocity}$

$$P = m \times v \Rightarrow v = \frac{P}{m} \quad \dots(1)$$

From definition, kinetic energy (K.E) of the body

$$K. E = \frac{1}{2}mv^2 \quad \dots(2)$$

Now putting the value of (1) in (2) we have

$$K. E = \frac{1}{2}m \left( \frac{P}{m} \right)^2$$
$$K. E. = \frac{1}{2}m \frac{P^2}{m^2} = \frac{1}{2} \frac{P^2}{m} = \frac{P^2}{2m} \quad \dots(3)$$

Thus we can write

$$P^2 = 2m \times K. E$$

$$\Rightarrow P = \sqrt{2m \times K. E}$$

Thus momentum =  $\sqrt{2 \times \text{mass} \times \text{kinetic energy}}$

Two bodies A and B of unequal masses having same momentum have masses in the ratio 1 : 2 then their K.E are in the ratio

A. 2 : 1

B. 1 : 2

C. 4 : 1

D. 1 : 4

**Answer:**



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## 27. Relation between kinetic energy and momentum

Let us consider a body of mass 'm' having a velocity 'v', then

momentum of the body  $P = \text{mass} \times \text{velocity}$

$$P = m \times v \Rightarrow v = \frac{P}{m} \quad \dots(1)$$

From definition, kinetic energy (K.E) of the body

$$K. E = \frac{1}{2}mv^2 \quad \dots(2)$$

Now putting the value of (1) in (2) we have

$$K. E = \frac{1}{2}m \left( \frac{P}{m} \right)^2$$
$$K. E. = \frac{1}{2}m \frac{P^2}{m^2} = \frac{1}{2} \frac{P^2}{m} = \frac{P^2}{2m} \quad \dots(3)$$

Thus we can write

$$P^2 = 2m \times K. E$$

$$\Rightarrow P = \sqrt{2m \times K. E}$$

Thus momentum =  $\sqrt{2 \times \text{mass} \times \text{kinetic energy}}$

The kinetic energy of a given body is doubled. Its momentum will

A. remain unchanged

B. redoubled

C. become  $\frac{1}{2}$  times

D. become  $\sqrt{2}$  times

**Answer:**



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	Column I		Column II
	(a) Work	(p)	$\frac{W}{F}$
28.	(b) Kinetic energy	(q)	$mgh$
	(c) Potential energy	(r)	$\frac{1}{2}mv^2$
	(d) Displacement	(s)	$F \times S$



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29.

	Column I		Column II
	(a) Work	(p)	Metre
	(b) Force	(q)	Joule
	(c) Displacement	(r)	Metre/second <sup>2</sup>
	(d) Acceleration due to gravity	(s)	Newton



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30.

Column I

- (a) Electric drill
- (b) Steam engine
- (c) Photosynthesis
- (d) Microphone

Column II

- (p) Heat to Mechanical
- (q) Sound to Electrical
- (r) Electrical to Mechanical
- (s) Light to Chemical



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31.

Column I

- (a) Electric Generator
- (b) Electric Motor
- (c) Burning
- (d) Hair dryer

Column II

- (p) Electric to Mechanical
- (q) Electric to Heat
- (r) Mechanical to Electric
- (s) Chemical to Heat



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**32.** How much work in Joule is done by a force of 4 N is moving a body through a distance of 2 m in its own direction ?

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**33.** The work done in pulling a load of 100 kg 4900 J.  
What is the height in metres to which it is pulled ?

$$[g = 9.8m / s^2]$$

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**34.** When mass and velocity are doubled, the kinetic energy becomes \_\_\_\_\_ times the original.



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