



PHYSICS

BOOKS - MCGROW HILL EDUCATION

PHYSICS (HINGLISH)

WORK AND ENERGY

Elementary Questions

1. Work done upon a body is

A. a vector quantity

B. a scalar quantity

C. always positive

D. always negative

Answer: B



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2. In the SI system, the unit of P.E. is

A. erg

B. dyne-cm

C. J

D. none of these

Answer: C



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3. Kilowatt hour (kWh) represents the unit of

A. power

B. impulse

C. momentum

D. none of these

Answer: D



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4. Two unequal masses possess the same K.E.

Then, the heavier mass has

A. greater momentum

B. smaller momentum

C. the same momentum as the lighter mass

D. greater speed

Answer: A



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5. Two unequal masses possess the same momentum, then the kinetic energy of the heavier mass is ___ the kinetic energy of the lighter mass.

A. same as

B. greater than

C. smaller than

D. much greater than

Answer: C



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6. The speed of a motor car becomes six times,
then the kinetic energy becomes

A. 6 times

B. 36 times

C. 12 times

D. 24 times

Answer: B



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7. The number of joules contained in 1 kWh is

A. 36×10^2

B. 36×10^3

C. 36×10^4

D. 3.6×10^6

Answer: D



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8. A body moves through a distance of 3 m in the following different ways. In which case is the maximum work done?

A. When pushed over an inclined plane

B. When lifted vertically upward

C. When pushed over smooth rollers

D. When pushed on a plane horizontal
surface

Answer: B



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9. In the above example, the work done is minimum when the body is

- A. pushed over an inclined plane
- B. lifted vertically upward
- C. pushed over the smooth rollers
- D. pushed on a plane horizontal surface

Answer: C



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10. A truck and a car are moving on a smooth, level road such that the K.E. associated with them is same. Brakes are applied to both of them simultaneously. Which one will cover a greater distance before it stops?

A. Car

B. Truck

C. Both will cover the same distance

D. Nothing can be decided

Answer: C





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11. In a winding (spring) watch, the energy is stored in the form of :

- A. mechanical
- B. kinetic
- C. potential
- D. kinetic and potential

Answer: C



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12. Two bullets P and Q, masses 10 and 20 g, are moving in the same direction towards a target with velocities of 20 and 10 m/s respectively. Which one of the bullets will pierce a greater distance through the target?

A. p

B. Q

C. Both will cover the same distance

D. Nothing can be decided

Answer: A



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13. When the time taken to complete a given amount of work increases, then,

- A. power increases
- B. power decreases
- C. energy increases
- D. energy decreases

Answer: B



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14. When the force applied and the displacement of the body are inclined at 90° with each other, the work done is

A. infinite

B. maximum

C. zero

D. unity

Answer: C



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15. A car is moving along a straight level road with constant speed. Then

- A. the work done on the car is infinite
- B. the work done on the car is zero
- C. the work done on the car is a measure of the gravitational potential energy

D. the work done on the car cannot be found

Answer: B



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16. $\text{kg m}^2 \text{s}^{-2}$ represents the unit of

- A. kinetic energy only
- B. work done only
- C. potential energy only

D. all the above

Answer: D



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17. The moon revolves around the earth because the earth exerts a radial force on the moon. Does the earth perform work on the moon?

A. No

B. Yes, sometimes

C. Yes, always

D. Cannot be decided

Answer: A



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18. The K.E. of a body is increased most by doubling its

A. mass

B. weight

C. speed

D. density

Answer: C



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19. A body is dropped from a certain height from the ground. When it is halfway down, it possesses,

A. only K.E.

B. both K.E. and P.E.

C. only P.E.

D. zero energy

Answer: B



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20. A body of mass 20 kg is dropped from a height of 2 m. If g is taken to be equal to 10 m/

s^2 , the kinetic energy of the body, just before striking the ground, will be

A. 400 J

B. 4 J

C. 40 J

D. none of these

Answer: A



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21. The energy required to raise a given volume of water from a well can be

A. mega watts

B. mega newton

C. megajoules

D. kilo watts

Answer: C



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22. Two spherical balls of the same radius but of different masses, are dropped at the same time from the top of a tower 19.6 m high. When they are 1.6 m above the ground, the balls will possess the same

A. K.E.

B. P.E

C. momentum

D. total energy

Answer: D





23. Asha lifts a doll from the floor and places it on a table. If the weight of the doll is known, what else does one need to know in order to calculate the work Asha has done on the doll?

- A. The time required
- B. Height of the table
- C. Mass of the ball
- D. Cost of the doll or the table

Answer: B



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24. One kilowatt is approximately equal to

A. 1.34 hp

B. 1.56 hp

C. 2.50 hp

D. 1.83 hp

Answer: A



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25. The work done in lifting a mass of 1 kg to a height of 9.8 m is

A. 1 J

B. $(9.8)^2$ J

C. 9.8 J

D. none of these

Answer: B



26. Two bodies of equal weight are kept at heights of h and $1.5h$ respectively. The ratio of their P.E. is

A. 3 : 2

B. 2 : 3

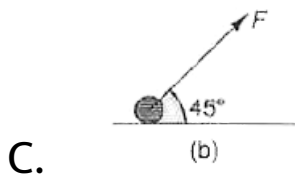
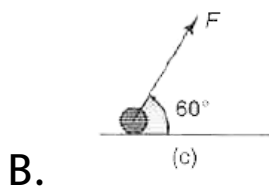
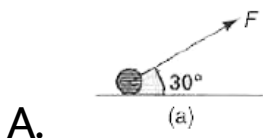
C. 1 : 1

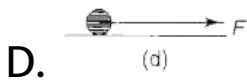
D. none of these

Answer: B



27. In which of the following cases will the work done be maximum? The body is moved through a distance S on the ground





Answer: D



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28. One of the rectangular components of a force of 50 N is 30 N. The other rectangular component will be

A. 40 N

B. 30 N

C. 35 N

D. 45 N

Answer: A



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29. Why is the work done by a centripetal force equal to zero?

A. increases by decreasing the radius of the circle

B. decreases by increasing the radius of the
circle

C. increases by increasing the mass of the
body

D. is always zero

Answer: D



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30. The unit N-s is equivalent to

A. J

B. $kg - m - s^{-1}$

C. $kg - m - s^{-2}$

D. N-m-s

Answer: B



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31. Certain weight is attached with a spring. It is pulled down and then released. It oscillates up and down. Its K.E. will be

A. maximum in the middle of the movement

B. maximum at the bottom

C. maximum just before it is released

D. constant

Answer: A



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32. A photocell converts light energy into

A. chemical energy

B. electrical energy

C. heat energy

D. mechanical energy

Answer: B



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33. kWh represents the unit for

A. force

B. power

C. time

D. energy

Answer: D



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34. Watt sec represents the unit for

A. energy

B. power

C. force

D. none of these

Answer: A



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35. Energy cannot be measured in

A. Js

B. Ws

C. kWh

D. erg

Answer: A



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36. A flying aeroplane has

A. only potential energy

B. only kinetic energy

C. both potential and kinetic energy

D. none of these

Answer: C



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37. A steam engine converts

- A. heat energy into sound energy
- B. heat energy into mechanical energy
- C. mechanical energy into heat energy
- D. electrical energy into sound energy

Answer: B



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38. Mechanically work done is equal to
(symbols have their usual meanings)

A. $W = F/S$

B. $W = FS$

C. $W = F + S$

D. $W = F - S$

Answer: B



39. A body at rest may have

A. speed

B. energy

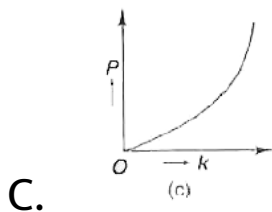
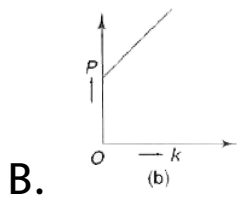
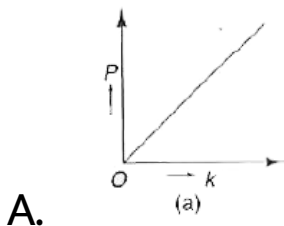
C. momentum

D. velocity

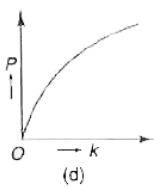
Answer: B



40. Which of the following graphs represents the graphical relation between momentum (p) and kinetic energy (K) for a body in motion?



D.



Answer: D



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41. When the momentum of a body increases by 10%, its K.E. increases by

A. 0.2

B. 0.4

C. 0.44

D. none of these

Answer: D



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42. When the momentum of a body decreases by 10%, its K.E. decreases by

A. 0.2

B. 0.4

C. 0.36

D. none of these

Answer: D



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43. When the momentum of a body increases by 100%, its K.E. increases by :

A. 0.2

B. 0.4

C. 1

D. 3

Answer: D



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44. Which of the following physical quantities is different from others?

A. Work

B. Kinetic energy

C. Force

D. Potential energy

Answer: C



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45. No work is said to have been done when an object moves at an angle of _____ with the direction of the force.

A. 0°

B. 90°

C. 180°

D. between 90° and 180°

Answer: B



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46. A force of 20 N acts on a body and the body moves through 1 m at an angle of 45° in the direction of the force. The work done by the force is

A. $10\sqrt{2} \text{ J}$

B. $\frac{10}{\sqrt{2}} \text{ J}$

C. $-10\sqrt{2} \text{ J}$

D. $\frac{-10}{\sqrt{2}} \text{ J}$

Answer: A



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47. When a body is whirled in a circle, the work done on it is

A. positive

B. negative

C. zero

D. infinite

Answer: C



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48. The flowing water of a river possesses _____ energy.

A. gravitational

B. potential

C. electrical

D. kinetic

Answer: D



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49. The unit of power is :

A. watt per second

B. joule

C. kilo joule

D. watt

Answer: D



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50. The mass of an object P is double the mass of Q. If both move with the same velocity, then the ratio of K.E. of P to Q is

A. 1 : 2

B. 2 : 1

C. 1 : 4

D. 4 : 1

Answer: B



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51. 1 hp is equal to

A. 0.746 kW

B. 7.46 kW

C. 74.6 kW

D. 746 kW

Answer: A



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52. A bird flying in the sky has

A. K.E. only

B. P.E. only

C. neither K.E. nor P.E.

D. both K.E. and P.E.

Answer: D



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53. A body rolling down a hill has

A. K.E. only

B. P.E. only

C. neither K.E. nor P.E.

D. both K.E. and P.E.

Answer: D



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54. An object of mass 1 kg has a P.E. of 1 J relative to the ground when it is at a height of about

A. 0.102 m

B. 1 m

C. 9.8 m

D. 32 m

Answer: A



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55. A total of 4900 joule was expended in lifting a 50 kg mass. The mass was raised to a height of

A. 98 m

B. 960 m

C. 245 m

D. 10 m

Answer: D



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56. A raised hammer possesses

A. K.E. only

B. gravitational P.E.

C. electrical energy

D. sound energy

Answer: B



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57. A ball of mass 200 g falls from a height 5 metres. What is its kinetic energy when it just reaches the ground ? ($g = 9.8m / s^2$).

A. 9.8 J

B. 98 J

C. 980 J

D. none of these

Answer: A



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58. Find the momentum of a body of mass 100 g having a kinetic energy of 20 J.

A. 2kgms^{-1}

B. $\frac{1}{2} \text{kgms}^{-1}$

C. 2g cm s^{-1}

D. none of these

Answer: A



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59. A stretched spring possesses _____ energy.

A. kinetic

B. elastic potential

C. electric

D. magnetic

Answer: B



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Higher Order Thinking Questions

1. Which of the following units is different from others ?

A. MeV

B. KWh

C. mJ

D. W

Answer: D



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2. If θ is smaller angle between force vector \vec{F} and velocity vector \vec{v} then $Fv \cos \theta$ represents

A. work

B. power

C. kinetic energy

D. centripetal force

Answer: B



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3. If p and E represent linear momentum and kinetic energy respectively, then the graph between E and p is correctly shown by

A.



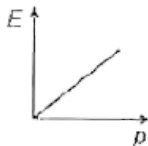
B.



C.



D.

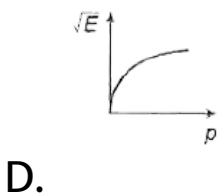
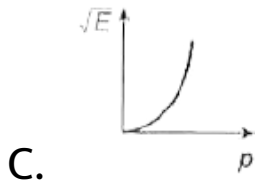
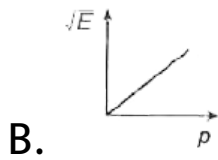
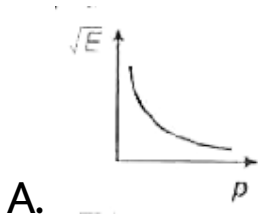


Answer: B



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4. the correct variation between \sqrt{E} and p is shown by

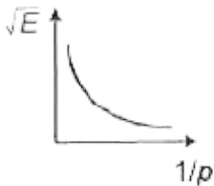


Answer: B

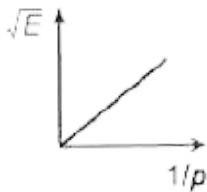


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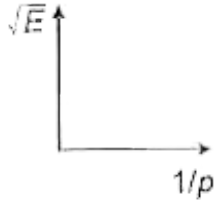
5. In question 62, the correct variation between \sqrt{E} and $\frac{1}{\sqrt{p}}$ is shown by



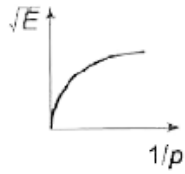
A.



B.



C.



D.

Answer: A



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6. When a body is in dynamic equilibrium, then work done is

A. positive

B. negative

C. zero

D. infinity

Answer: C



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7. The slope of work-time curve at any instant gives

A. energy

B. intensity

C. power

D. impulse

Answer: C



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8. Area under power-time curve gives

A. total work done on the body

B. total work done by the body

C. either (a) or (b)

D. neither (a) nor (b)

Answer: C



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9. The violation of any law of conservation indicates that

A. the event will surely take place

B. the event will sometime take place

C. the event will never take place

D. none of these

Answer: C



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10. When water is flowing through a pipe with a speed v , then its power is proportional to

A. v^2

B. $v^{3/2}$

C. v^3

D. \sqrt{v}

Answer: C



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11. If the momentum of a body is increased n times, its kinetic energy increases

A. $\frac{1}{n^2}$ times

B. $\frac{1}{n^2}$ times

C. n^2 times

D. n^3 times

Answer: C



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12. When speed of a vehicle becomes n times, with the application of same stopping force, its stopping distance becomes

A. n^2 times

B. n^3 times

C. $\frac{1}{n^2}$ times

D. \sqrt{n} times

Answer: A



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13. The slope of potential energy versus position graph represents

A. force

B. power

C. momentum

D. work

Answer: A



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14. A person holds a bucket of weight 80 N. He walks 8 m along the horizontal and then

climbs up a vertical distance of 5 m. The work done by the person is

A. 640 J

B. 400 J

C. 720 J

D. zero

Answer: B



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15. The amount of work done in pumping water out of a cubical vessel of height 1 m is nearly ($g = 10ms^{-2}$)

A. 10 J

B. 50 J

C. 500 J

D. 5000 J

Answer: D



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16. A body is under the action of two equal and opposite forces, each 5 N. The body is displaced by 5 m, then the work done is

A. 25 J

B. $-25J$

C. 50 J

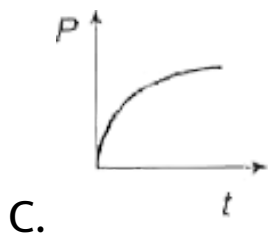
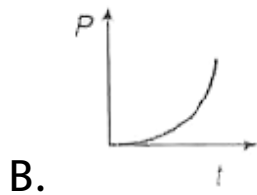
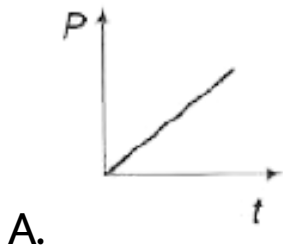
D. zero

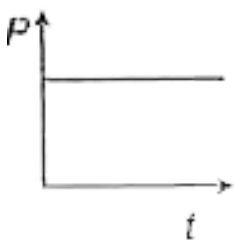
Answer: D



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17. A motor drives a body along a straight line with a constant force. The power P developed by the motor must vary with time t as





D.

Answer: A

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18. An automobile engine of mass m accelerates and a constant power P is applied by the engine. The instantaneous speed of the engine will be

A. $\frac{Pt}{2m}$

B. $\frac{2Pt}{m}$

C. $\left(\frac{Pt}{2m}\right)^{\frac{1}{2}}$

D. $\left(\frac{2Pt}{m}\right)^{\frac{1}{2}}$

Answer: D

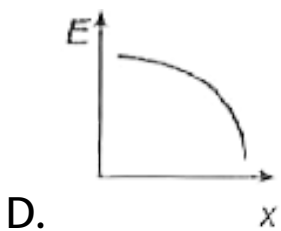
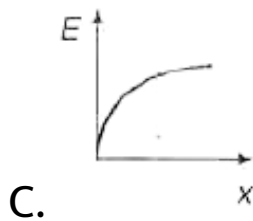
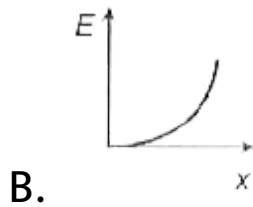
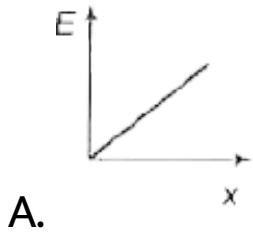


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19. A body moves from rest with a constant acceleration. Which of the following graphs

represents the variation of its kinetic energy

(E) with distance travelled (x)?

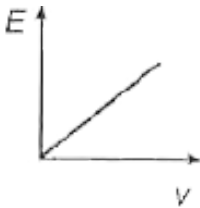


Answer: A

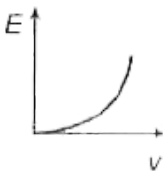


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20. The graph between kinetic energy (E) and speed (v) of the body is correctly shown by

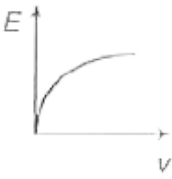


A.

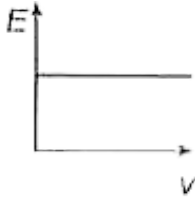


B.

C.



D.



Answer: B



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21. A person has a box of weight 20 kg. The energy of the box when he keeps the box in his hand for 5 minutes is

A. 100 J

B. 200 J

C. 60000 J

D. zero

Answer: D



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22. A person has a box of weight 20 kg. The energy of the box, when the person runs with

a constant velocity of 2 m s^{-1} along with the box behind the bus, is given as

A. 20 J

B. 40 J

C. 80 J

D. zero

Answer: B



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23. A uniform force of 4 N acts on a body of mass 40 kg for a distance of 2 m. The kinetic energy acquired by the body is

A. 460 J

B. 800 J

C. 320 J

D. 8 J

Answer: D



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24. A bomb of 12 kg explodes into two pieces of masses 4 kg and 8 kg . The velocity of 8 kg mass is 6 m / sec . The kinetic energy of the other mass is

A. 24 J

B. 32 J

C. 128 J

D. 288 J

Answer: D



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25. A car is moving along a straight horizontal road with a speed v_0 . If the coefficient of friction between the tyres and the road is μ , the shortest distance in which the car can be stopped is

A. $\frac{\mu^2}{\mu g}$

B. $\frac{2\mu^2}{\mu g}$

C. $\frac{\mu^2}{2\mu g}$

D. $\left(\frac{\mu}{\mu g}\right)^2$

Answer: C



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26. A motor of 200 H.P. moves with a uniform speed of 72 km/h. The forward thrust applied by the engine on the car is

A. 7460 N

B. 3730 N

C. 3550 N

D. none of these

Answer: A



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27. A stone of mass 1 kg falls to the earth from a height of 10 m. The kinetic energy of the stone when it is 4 m above the ground is

A. 58.8 J

B. 5.88 J

C. 588 J

D. none of these

Answer: A



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28. The KE acquired by a mass m in travelling a certain distance s , starting from rest, under the action of a constant force is directly proportional to :

A. m

B. \sqrt{m}

C. $\frac{1}{\sqrt{m}}$

D. independent of m

Answer: D



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29. If the kinetic energy of a body increases by 0.1 % the percent increase of its momentum will be

A. 0.1

B. 0.01

C. 0.001

D. 0.0005

Answer: D



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