PHYSICS

BOOKS - ICSE

WORK AND ENERGY

Solved Examples

1. Find the work done if a force of 1000 N is applied on a load and the load moves through a distance of 50 cm.

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2. If the work done in pushing a trolley by applying a force of 850 N is 1275 J. calculate the distance moved by the trolley.

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3. Rahul pushed a toy car and it moved a distance of 5 m. If the work done by Rahul is

1500 J, how much force did he apply through the push?

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4. What is the kinetic energy of a 45 kg rickshaw moving at 10 m/s?

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5. Calculate the kinetic energy of a 20 kg wooden cart moving with a speed of 5 m/s.

Calculate the kinetic energy again when the speed is doubled.

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6. Suppose a car has 4000 J of kinetic energy. What will be its kinetic energy if the speed is doubled? What if the speed is tripled?

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7. The kinetic energy of a car is calculated to be 1250000 J. If the car has a mass of 1000 kg, with what speed is it moving?

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8. A boy has a mass of 55 kg. He climbs 10 m up a tree. What is his gravitational potential energy?

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9. An owl has a mass of 3 kg. It dives to catch a mouse on the ground losing 900 J of potential energy. How high was the bird to begin with?

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10. A box of books weighing 80 kg is on a table 75 cm high. What is its potential energy relative to the floor?

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Questions Write T For True And F For False Correct The False Statements

1. In Physics, reading a book and pushing a wall are considered to be work.

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2. When a force is applied on an object and if the body moves in the direction of applied force, work is said to be done.

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3. Work done = Force/Distance

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4. Nm is also called joules.

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5. 1 joule of work is said to be done when a force of 1 N acting on an object moves it by 1

metre in the direction of force.

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Questions Choose The Correct Option To Fill In The Blank

1. If the mass of the object is more, its kinetic energy will be ..... (less/more)

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2. A rock on a cliff has more energy than a rock resting on the ground.

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3. The pendulum has .. .. (minimum/maximum) speed at the mean position.

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4. In a roller-coaster ride, the energy at the start is all ..... (potential energy/kinetic energy) as the cart is at the maximum height.

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5. The kinetic energy of flowing water is converted into ..... (potential/electrical) energy of the turbine as flowing water rotates the blades of turbine.

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Exercises Name The Following

1. When force applied on an object causes it to moves in the direction of force

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2. SI unit of work

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3. Ability of a body to do work

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4. SI unit of energy

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5. The energy that an object has due to its state of motion

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6. The energy that an object has due to its position, shape, or state

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7. The energy stored in an object as the result of its vertical position or height

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8. Work done per unit time

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Exercises Choose The Correct Option

1. Which of the following is an example of work not being done?

A. Climbing stairs

B. Walking

C. Thinking a lot

D. Squeezing a balloon

Answer:

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2. The formula for KE is .....

A. mgh

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

C. $2mv^2$

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

Answer:

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3. When the height at which an object is placed is more, the PE .....

A. will be more

B. will be less

C. remains constant

D. will be halved

Answer:

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4. An object can have elastic PE when it is .....

A. stretched

B. bent

C. compressed

D. All of these

Answer:

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5. For a simple pendulum bob, the point at which KE becomes muximum is .....

A. at extreme left

B. at extreme right

C. at the mean position

D. in between extreme position and mean position

Answer:

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6. Solar panel converts .....

A. electrical energy to light energy

B. heat energy to light energy

C. light to electrical energy

D. electrical energy to sunlight

Answer:

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Exercises Write T For True And F For False Correct The False Statements

1. The more is the speed, the more is the kinetic energy of the object in motion.

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2. Kinetic energy is also called stored energy.

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3. Elastic potential energy is due to stretching or bending.

4. When the speed is doubled, KE also gets doubled.

5. In an oscillating simple pendulum, at any point, the sum of KE and PE is a constant.

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6. A 25 W bulb converts 25 J of energy in one hour.

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Exercises Choose The Correct Option To Fill In The Blank

1. ..... (Work/No work) is done while standing at a place and holding a heavy load.

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2. Whenever work is done, there is always a .....(stoppage/transfer) of energy.

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3. Water stored at a height has .... (gravitational potential energy/kinetic energy).

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4. At what positions of the simple pendulum its (i) P.E. is maximum (ii) K.E. is zero ?

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5. When the water falls from a height, ... (PE of water gets converted into KE/KE of water gets converted into PE).

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Exercises Section Ii Give Reasons For The Following

1. In Physics, work is not done when you push a wall.

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2. If a truck and a car are moving with similar speed, truck will have more energy.

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3. When speed is doubled, KE becomes 4 times.

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4. A rock on a cliff has more energy than a rock resting on the ground.

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5. A rock of higher mass resting on a cliff has more energy than the one which has less mass at the same height.

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6. A 60 W bulb glows better than a 25 W bulb.

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Exercises Section Ii Distinguish Between The Following

1. Give Relation between Force and work.

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2. Differentiate between Kinetic energy and potential energy.

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3. Mechanical energy and kinetic energy

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4. Elastic PE and gravitational PE

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Exercises Section Ii Short Answer Questions

1. How do you measure work done?

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2. Define 1 joule of work.

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3. Define mechanical energy. Can a body have energy even if it is not in motion?

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4. On what factors does gravitational potential energy depend on?

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5. Name any two examples for conversions of energies between KE and PE.

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6. Define the law of conservation of energy.

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7. Write the energy conversion in a steam engine and wind turbine.

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8. Define power. What is its Sl unit?

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Exercises Section Ii Long Answer Questions

1. What do you mean by KE? On what factors does it depend and how?

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2. Explain gravitational PE and derive its formula.

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3. Explain the conversion of energy in the oscillation of a simple pendulum using a diagram.

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4. Explain energy conversions in a roller-coaster ride.

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5. Explain energy conversions in a hydroelectric plant.

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6. Explain from where does the energy to run a car come.

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7. List the differences between energy and power.

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Exercises Section Ii Numerical Questions

1. Find out the work done when a force of 30 N displaces a body through 8 m in the direction

of the applied force.

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2. 3000 J of work is done by a machine by applying a force of 500 N. Calculate the distance to which it is moved.

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3. Calculate the work done by a porter holding a suitcase weighing 5 kg in his hand.

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4. How much force is applied on the body when 780 J of work is done in displacing the body through a distance of 30 m in the direction of force?

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5. A car is travelling at a velocity of 10 m/s and has a mass of 850 kg. What is its kinetic

energy?

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6. A moving body of 40 kg has 180 J of KE. Calculate the speed.

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7. 4500 J of energy is used to raise an object with a mass of 50 kg to a height h. Calculate h.

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8. A machine does 392 J of work in 4 seconds. What is the power of the machine?

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9. Calculate the time taken by a 25 W bulb to transform 3000 J of energy.

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10. An electric kettle of power 2 kW is used for 1 minute. Find the energy supplied by the kettle.

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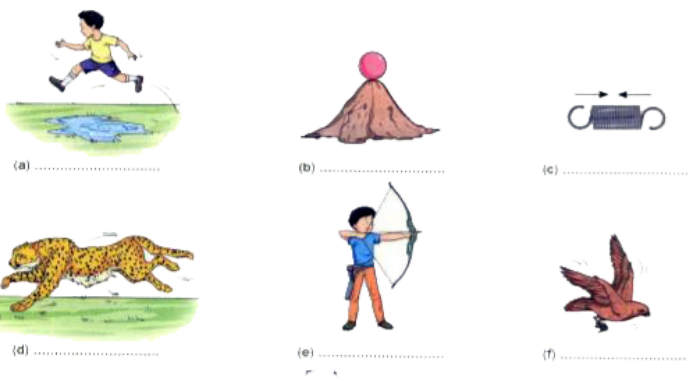
Picture Study

1. Look at Figure A. What kind of energy does each image denote?



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2. a. Look at Figure B. Match the type of energy given below with positions (1 to 5) of simple pendulum.

i. Maximum PE , ii. Maximum KE ,iii. Both PE and KE

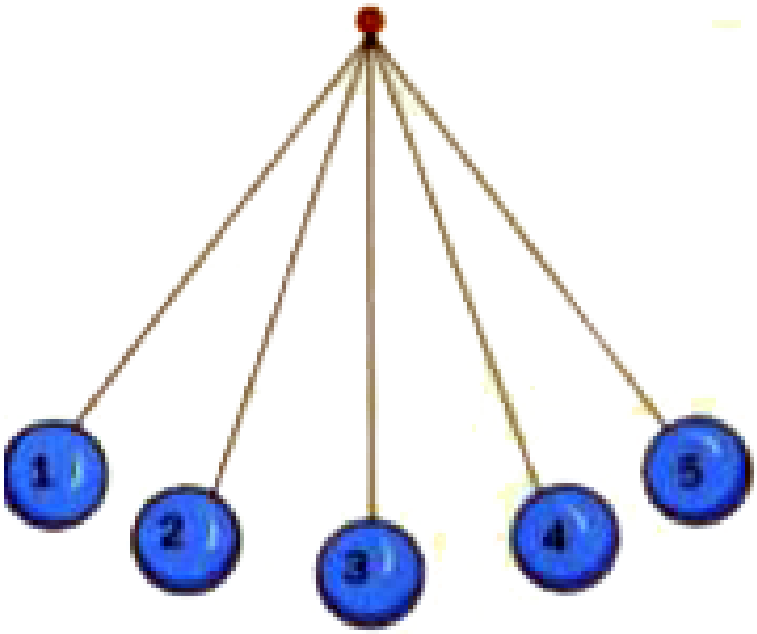
b. As the pendulum starts to leave from

position 1 and move towards position 5., which of the following statements is correct?

İ. KE will increase from 1 to 3, and from there decrease to the point 5 through 4.

ii. KE will decrease from 1 to 3, and from there

increase to the point 5 through 4.



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3. A car resting on top of a hill at point I (Fig. C) has a PE of 16000 J.

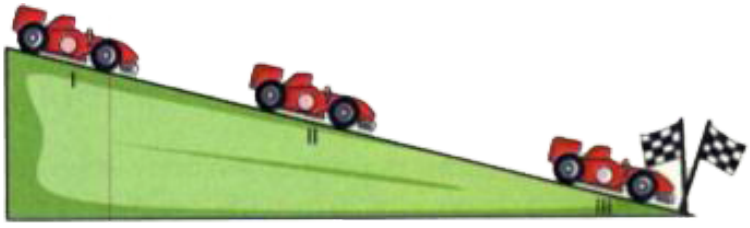
a. Calculate its kinetic energy at II, if its PE at that point is 9000 J.

b. What will be its KE as it reaches the final point lll down the hill?

c. What will be its PE at the point III?

d. What will be its mechanical energy at points I, II, and III?

e. Which law helped you to arrive at



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