



PHYSICS

BOOKS - KUMAR PRAKASHAN KENDRA

PHYSICS (GUJRATI ENGLISH)

WORK AND ENERGY

Activity 11 1

1. We come across various activities which we normally consider to be work in day-to-day life.

for each of these activities, ask the following questions and answer them :

What is the work being done on?



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2. We come across various activities which we normally consider to be work in day-to-day life.

for each of these activities, ask the following questions and answer them :

What is happening to the object?



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3. We come across various activities which we normally consider to be work in day-to-day life.

for each of these activities, ask the following questions and answer them :

Who (What) is doing work?



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4. We come across various activities which we normally consider to be work in day-to-day life.

for each of these activities, ask the following

questions and answer them :

What is the work being done on?



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5. We come across various activities which we normally consider to be work in day-to-day life.

for each of these activities, ask the following questions and answer them :

What is happening to the object?



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6. We come across various activities which we normally consider to be work in day-to-day life. for each of these activities, ask the following questions and answer them :

Who (What) is doing work?



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Activity 11 3

1. Think of situation when the object is not displaced in spite of a force acting on it.



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2. Think of situation when an object gets displaced in the absence of a force acting on it.



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3. Think of situation when the object is not displaced in spite of a force acting on it.



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4. Think of situation when an object gets displaced in the absence of a force acting on it.



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Activity 11 4

1. Lift an object up. Work is done by the force exerted by you on the object. The object moves upwards. The force you exerted is in the

direction of displacement. However, there is the force of gravity acting on the object.

Which one of these forces is doing positive work? Give reason.



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2. Lift an object up. Work is done by the force exerted by you on the object. The object moves upwards. The force you exerted is in the direction of displacement. However, there is the force of gravity acting on the object.

Which one is doing negative work? Give reason.



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3. Lift an object up. Work is done by the force exerted by you on the object. The object moves upwards. The force you exerted is in the direction of displacement. However, there is the force of gravity acting on the object.

Which one of these forces is doing positive work? Give reason.



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4. Lift an object up. Work is done by the force exerted by you on the object. The object moves upwards. The force you exerted is in the direction of displacement. However, there is the force of gravity acting on the object.

Which one is doing negative work? Give reason.

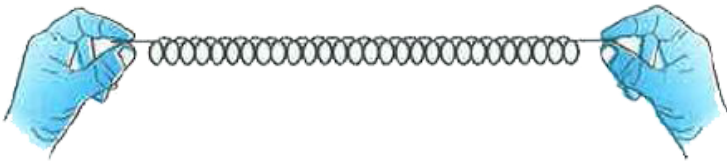


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Activity 11 9

1. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



A slinky

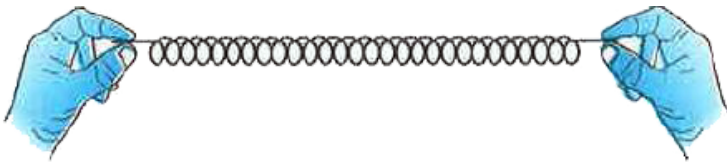
What happened?



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2. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



A slinky

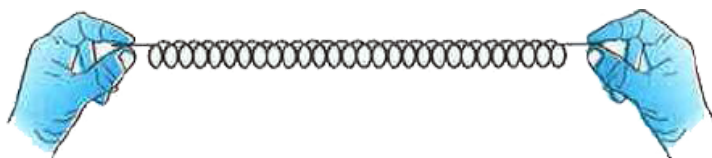
How did the slinky acquire energy when stretched?



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3. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



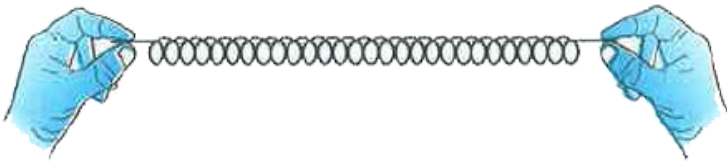
Would the slinky acquire energy when it is compressed?



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4. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



A slinky

What happened?



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5. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



A slinky

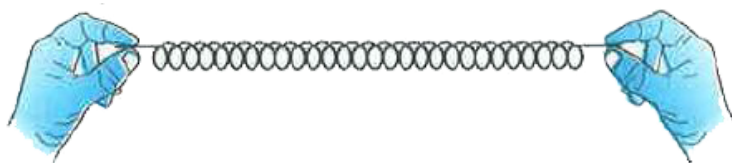
What happened?



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6. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold the other end and move away from your friend. Now you release the slinky.



A slinky

What happened?



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1. Take a toy car. Wind it using its key. Place the car on the ground.

Did it move ?



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2. Take a toy car. Wind it using its key. Place the car on the ground.

From where did it acquire energy?



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3. Take a toy car. Wind it using its key. Place the car on the ground.

Does the energy acquired depend on the number of windings? How can you test this?



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4. Take a toy car. Wind it using its key. Place the car on the ground.

Did it move ?



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6. Take a toy car. Wind it using its key. Place the car on the ground.

Does the energy acquired depend on the number of windings? How can you test this?



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Activity 11 13

1. How do green plants produce food?



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2. Where do they get their energy from?



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3. Why does the air move from place to place?



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4. How are fuels, such as coal and petroleum formed?



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5. What kind of energy conversions sustain the water cycle?



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6. How do green plants produce food?



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7. Where do plants get their energy from?



Watch Video Solution

8. Why does the air move from place to place?



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9. How are fuels, such as coal and petroleum formed?



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10. What kind of energy conversions sustain the water cycle?



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Intext Questions And Answers

1. A force of 7 N acts on an object. The displacement is, say 8 m, in the direction of the force. Let us take it that the force acts on the object through the displacement. What is the work done in this case?



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2. When do we say that work is done?



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3. Write an expression for the work done when a force is acting on an object in the direction of its displacement.



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4. Define 1 J of work.



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5. A pair of bullocks exerts a force of $140N$ on a plough. The field being ploughed is $15m$ long. How much work is done in ploughing the length of the field?



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6. What is the kinetic energy of an object?



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7. Write the expression for the kinetic energy of an object.



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8. The kinetic energy of an object of mass m moving with a velocity of $5ms^{-1}$ is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?



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9. What is power?



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10. Define 1 watt of power.



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11. A lamp consumes 1000 J of electrical energy in 10s. What is its power?



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12. Define average power.



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13. A force of 7 N acts on an object. The displacement is, say 8 m, in the direction of the force. Let us take it that the force acts on the object through the displacement. What is

the work done in this case?



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14. When do we say that work is done?



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15. Write an expression for the work done when a force is acting on an object in the

direction of its displacement.



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16. Define 1 J of work.



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17. A pair of bullocks exerts a force of 140 N on the plough. The field being ploughed is 15 m long. How much work is done in ploughing the length of the field?



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18. What is the kinetic energy of an object?



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19. Write the expression for the kinetic energy of an object.



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20. The kinetic energy of an object of mass, m moving with a velocity of $5ms^{-1}$ is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?



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21. What is power?



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22. Define 1 watt of power.



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23. A lamp consumes 1000 J of electrical energy in 10s. What is its power?



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24. Define average power.



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Question Answer Answer The Following Questions In Very Short

1. Define work



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2. What is the unit of work?



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3. Is work a scalar or a vector quantity?



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4. Why is the work done against gravity considered negative?



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5. State two conditions needed for work to be done.



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6. When is the work done by a force zero?



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7. A porter is standing with a suitcase over his head. What is the work done by him?



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8. What is energy?



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9. What is the unit of energy?



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10. What is mechanical energy?



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11. What is potential energy?



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12. If the work done on an object is 10 J and the object is displaced through 2 m, then what is the force applied?



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13. Name the type of energy possessed by a stretched rubber band.



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14. A car and a truck are moving with the same speed of $12ms^{-1}$. If their masses are in the ratio 1 : 5, find the ratio of their kinetic energy.



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15. What is the commercial unit of energy?



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16. Find the velocity of a body of mass 100 g having kinetic energy 20 J.



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17. State the law of conservation of energy.



[Watch Video Solution](#)

18. Define work



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25. What is energy?



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26. What is the unit of energy?



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27. What is mechanical energy?



[Watch Video Solution](#)

28. What is potential energy?



[Watch Video Solution](#)

29. If the work done on an object is 10 J and the object is displaced through 2 m, then what is the force applied?



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30. Which energy is stored in a stretched rubber band?



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31. A car and a truck are moving with the same speed of 12ms^{-1} . If their masses are in the ratio 1 : 5, find the ratio of their kinetic energy.



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32. What is the commercial unit of energy?



Watch Video Solution

33. Find the velocity of a body of mass 100 g having kinetic energy 20 J.



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34. State the law of conservation of energy.



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Question Answer Choose The Correct Option From Those Given Below Each Question

1. What is necessary for work to be done?

Choose the correct statement.

(1) Action of force is necessary.

(2) Displacement is necessary.

(3) Displacement in the direction of force is necessary.

A. Statement 1

B. Statement 2

C. Statement 3

D. Statement 1 and 3

Answer: A::C::D



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2. A body of mass 10kg performs motion along a circle of radius 5m with speed of $10ms^{-1}$.

Work done during one revolution isJ.

A. 2000π

B. 1000π

C. 500π

D. zero

Answer:



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3. Which one among kinetic energy, potential energy and mechanical energy cannot be negative?

- A. kinetic energy
- B. potential energy
- C. mechanical energy
- D. Both 'B' and 'C'

Answer: C



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4. Work done on a body is equal to change in its.....

- A. kinetic energy only
- B. potential energy only
- C. mechanical energy only
- D. energy

Answer: A



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5. Mass of a man is 60kg. He climbs up 20m height with a bucket having water of mass 15kg. So, work done is kJ. ($g = 9.8ms^{-2}$)

A. 15

B. 20

C. 150

D. 1.5

Answer: A



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6. A box of 20kg mass is pulled by force F with constant velocity on a horizontal surface. If force of friction is 49 N , work done during displacement of 10m is.....J.

A. 490

B. 245

C. 980

D. zero

Answer:



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7. Masses of two bodies are 1kg and 4kg respectively. If their kinetic energies are in 2:1 proportion, ratio of their speeds is

A. $2\sqrt{2}:1$

B. $1:\sqrt{2}$

C. 1:2

D. 2:1

Answer: A::B



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8. Engine of a car of mass 1500kg, keeps car moving with constant velocity $5ms^{-1}$. If frictional force is 1000 N, power of engine is

A. $5kW$

B. $7.5kW$

C. $15kW$

D. $75kW$

Answer:



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9. Height of water dam in hydroelectric power station is 20m. How much water, in 1 second,

should fall on turbine, so that 1 MW power is generated? ($g = 10\text{ms}^{-2}$)

A. 5000kg

B. $10,000\text{kg}$

C. 500kg

D. 7500kg

Answer:



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10. Speed of a body in motion is doubled. Its kinetic energy is now Times the original kinetic energy.

A. two

B. three

C. four

D. half

Answer:



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11. An object is thrown vertically upwards with velocity of 20ms^{-1} . At what height will its kinetic energy and potential energy be equal?

$$(g = 10\text{ms}^{-2})$$

A. 10m

B. 20m

C. 15m

D. 5m

Answer: B



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12. $1kWh =$

A. 36×10^6

B. 3.6×10^6

C. 3.6×10^7

D. 3.6×10^5

Answer: A:C



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13. When spring is compressed its potential energy

A. remains constant

B. reduces

C. increases

D. nothing can be said about it

Answer: A:C



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14. What is the unit of work in the SI system of unit?

A. newton metre⁻¹

B. joule second⁻¹

C. newton-metre

D. watt

Answer:



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15. What is power?

A. Rate of change in momentum

B. Rate of change in energy

C. A force through which an object moves

D. Rate of change of force

Answer: A::C



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16. A person of mass 55kg pushesh a wall.

Work done by this person

A. $55J$

B. $550J$

C. $5.5J$

D. zero

Answer:



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17. In momentum of the object having mass 4kg is 20kgms^{-1} , what would be its kinetic energy?

A. 25J

B. 50J

C. 75J

D. 100J

Answer: B



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18. An object of mass 2kg is thrown in the upward direction with velocity of $3ms^{-1}$. What would be the maximum potential energy of this object?

A. $18J$

B. $4.5J$

C. $9J$

D. $2.25J$

Answer: C



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19. The kinetic energy of the object

A. depends only on its mass

B. depends only on its speed

C. depends on both its mass as well as its
speed

D. depends neither on its mass nor on its
speed

Answer: C



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20. An object of mass 100g moves with speed 1ms^{-1} . Its kinetic energy would beJ.

A. 50

B. 5

C. 0.5

D. 0.05

Answer: D



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21. When the speed of a car moving with accelerated motion on a horizontal surface becomes four times than at the starting, then what is the change in its potential energy?

- A. Would not change
- B. Would be doubled
- C. Would be four times
- D. Would be sixteen times

Answer: A



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22. A bullet of mass 20g fired from a rifle is found to cover the distance of 30m in 4 s. Assuming that the speed of the bullet to be constant, find its kinetic energy.

A. $0.5625J$

B. $56.25J$

C. $30.08J$

D. $1.125J$

Answer: B



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23. A body is thrown up with a kinetic energy of 10 J. If it attains maximum height of 5 m, then find its mass. ($g = 10ms^{-2}$)

A. $2kg$

B. $20kg$

C. 0.02kg

D. 0.2kg

Answer: B



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24. If an object is falling freely from certain height towards the surface of earth, its total mechanical energy

A. decreases

B. increases

C. does not change

D. goes on increasing and decreasing

Answer: C



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25. The work done on the object is negative, then the measure of angle between force and displacement would be

A. 0°

B. 45°

C. 90°

D. 180°

Answer: A



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26. The diameter of an iron sphere of mass 10 kg is same as that of aluminium sphere of mass 3.5 kg. Both of them are made to fall

freely simultaneously from the top of a tower.

When both of them would be at 10 m above the ground, they would have same

- A. acceleration
- B. momentum
- C. potential energy
- D. kinetic energy

Answer: A:C



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27. A girl is carrying a school bag of 3 kg mass on her back and moves 200 m on a levelled road, then the work done against the gravitational force would be J (Take $g = 10\text{ms}^{-2}$)

A. 6×10^3

B. 6

C. 0.06

D. zero

Answer:



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28. Which of the following is not the unit of energy?

A. joule

B. newton metre

C. kilowatt

D. kilowatt-hour

Answer: A



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29. Work done on an object is not dependent on

A. displacement

B. force applied

C. the angle between force and displacement

D. initial velocity of the object

Answer: D



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30. Water stored in the dam

- A. does not possess energy
- B. possesses electrical energy
- C. possesses kinetic energy
- D. possesses potential energy

Answer: A



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31. A body is falling freely from a height h . When it covers distance $\frac{h}{2}$ in downward direction, at that place it possesses.

A. only potential energy

B. only kinetic energy

C. half potential energy and half kinetic energy

D. more kinetic energy and less potential energy

Answer: C



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32. A boy lifts a mass of 300g for 1.2 second at height of 4m. What would be the power of boy? (Take $g = 10ms^{-2}$).

A. 5W

B. 10W

C. 15W

D. 20W

Answer: A



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33. $\frac{1 \text{ megawatt (MW)}}{1 \text{ kilowatt (kW)}} = \dots\dots\dots$

A. 10^{-3}

B. 10^3

C. 10^6

D. 10^{-6}

Answer: A::C



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34. What is necessary for work to be done?

Choose the correct statement.

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(2) Displacement is necessary.

(3) Displacement in the direction of force is necessary.

A. Statement 1

B. Statement 2

C. Statement 3

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Answer: A::C::D



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35. A body of mass 10kg performs motion along a circle of radius 5m with speed of 10ms^{-1} . Work done during one revolution is

A. 2000π

B. 1000π

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D. zero

Answer:



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36. Which one among kinetic energy, potential energy and mechanical energy cannot be negative?

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C. mechanical energy

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Answer: C



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37. Work done on a body is equal to change in its.....

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- D. energy

Answer:



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38. Mass of a man is 60kg. He climbs up 20m height with a bucket having water of mass 15kg. So, work done is kJ. ($g = 9.8ms^{-2}$)

A. 15

B. 20

C. 150

D. 1.5

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39. A box of 20kg mass is pulled by force F with constant velocity on a horizontal surface.

If force of friction is 49 N, work done during displacement of 10m is.....J.

A. 490

B. 245

C. 980

D. zero

Answer: D



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40. Masses of two bodies are 1kg and 4kg respectively. If their kinetic energies are in 2:1 proportion, ratio of their speeds is

A. $2\sqrt{2}:1$

B. $1:\sqrt{2}$

C. 1:2

D. 2:1

Answer: A



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41. Engine of a car of mass 1500kg, keeps car moving with constant velocity 5ms^{-1} . If frictional force is 1000 N, power of engine is

A. 5kW

B. 7.5kW

C. 15kW

D. 75kW

Answer: A



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42. Height of water dam in hydroelectric power station is 20m. How much water, in 1 second, should fall on turbine, so that 1 MW power is generated? ($g = 10ms^{-2}$)

A. $5000kg$

B. $10,000kg$

C. $500kg$

D. $7500kg$

Answer: A



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43. Speed of a body in motion is doubled. Its kinetic energy is now Times the original kinetic energy.

A. two

B. three

C. four

D. half

Answer: C



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44. An object is thrown vertically upwards with velocity of $20ms^{-1}$. At what height will its kinetic energy and potential energy be equal?

$$(g = 10ms^{-2})$$

A. $10m$

B. $20m$

C. $15m$

D. $5m$

Answer: B



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45. $1kWh = \dots\dots\dots J$

A. 36×10^6

B. 3.6×10^6

C. 3.6×10^7

D. 3.6×10^5

Answer: B



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46. When spring is compressed its potential energy

A. remains constant

B. reduces

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D. nothing can be said about it

Answer: A::C



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47. What is the unit of work in the SI system of unit?

A. newton metre⁻¹

B. joule second⁻¹

C. newton-metre

D. watt

Answer: C



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48. What is power?

- A. Rate of change in momentum
- B. Rate of change in energy
- C. A force through which an object moves
- D. Rate of change of force

Answer: B



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49. A person of mass 55kg pushesh a wall.

Work done by this person

A. $55J$

B. $550J$

C. $5.5J$

D. zero

Answer:



50. In momentum of the object having mass 4kg is 20kgms^{-1} , what would be its kinetic energy?

A. 25J

B. 50J

C. 75J

D. 100J

Answer: B



51. An object of mass 2kg is thrown in the upward direction with velocity of 3ms^{-1} .

What would be the maximum potential energy of this object?

A. $18J$

B. $4.5J$

C. $9J$

D. $2.25J$

Answer: C



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52. The kinetic energy of the object

A. depends only on its mass

B. depends only on its speed

C. depends on both its mass as well as its
speed

D. depends neither on its mass nor on its speed

Answer: C



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53. An object of mass 100g moves with speed 1ms^{-1} . Its kinetic energy would beJ.

A. 50

B. 5

C. 0.5

D. 0.05

Answer:



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54. When the speed of a car moving with accelerated motion on a horizontal surface becomes four times than at the starting, then what is the change in its potential energy?

A. Would not change

B. Would be doubled

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D. Would be sixteen times

Answer: A::C::D



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55. A bullet of mass 20g fired from a rifle is found to cover the distance of 30m in 4 s.

Assuming that the speed of the bullet to be constant, find its kinetic energy.

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B. $56.25J$

C. $30.08J$

D. $1.125J$

Answer: B



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56. A body is thrown up with a kinetic energy of 10 J. If it attains maximum height of 5 m, then find its mass. ($g = 10ms^{-2}$)

A. $2kg$

B. $20kg$

C. $0.02kg$

D. $0.2kg$

Answer: D



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57. If an object is falling freely from certain height towards the surface of earth, its total mechanical energy

A. decreases

B. increases

C. does not change

D. goes on increasing and decreasing

Answer: C



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58. The work done on the object is negative, then the measure of angle between force and displacement would be

A. 0°

B. 45°

C. 90°

D. 180°

Answer: D



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59. The diameter of an iron sphere of mass 10 kg is same as that of aluminium sphere of mass 3.5 kg. Both of them are made to fall freely simultaneously from the top of a tower. When both of them would be at 10 m above the ground, they would have same

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- B. momentum
- C. potential energy
- D. kinetic energy

Answer: A::C



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60. A girl is carrying a school bag of 3 kg mass on her back and moves 200 m on a levelled road, then the work done against the gravitational force would be J (Take $g = 10ms^{-2}$)

A. 6×10^3

B. 6

C. 0.06

D. zero

Answer:



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61. Which of the following is not the unit of energy?

A. joule

B. newton metre

C. kilowatt

D. kilowatt-hour

Answer: C



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62. Work done on an object is not dependent on

A. displacement

B. force applied

C. the angle between force and displacement

D. initial velocity of the object

Answer: A::B::C



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63. Water stored in the dam

A. does not possess energy

B. possesses electrical energy

C. possesses kinetic energy

D. possesses potential energy

Answer: D



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64. A body is falling freely from a height h .

When it covers distance $\frac{h}{2}$ in downward

direction, at that place it possesses.

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B. only kinetic energy

C. half potential energy and half kinetic energy

D. more kinetic energy and less potential energy

Answer: C



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B. 10W

C. 15W

D. 20W

Answer: B



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66. $\frac{1 \text{ megawatt (MW)}}{1 \text{ kilowatt (kW)}} = \dots\dots\dots$

A. 10^{-3}

B. 10^3

C. 10^6

D. 10^{-6}

Answer: A:C



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1. 1 watt-second = Joule.



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2. A stone of mass 20g is tied to one end of a strong string by a boy. He make it to revolve on a circular path, then work done by him would be joule.



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3. An object of mass 120g is taken upward at the height 5 m, then Joule work is done.

$$(g = 10ms^{-2})$$



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4. Hetal having mass 50 kg climbs up 20 m height with an object of mass 30 kg for 40 s, then her power is W. (Take

$$g = 10ms^{-2})$$



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5. The gravitational acceleration on moon is one-sixth that on the earth. A person can jump as high as 2 m on earth's surface. He can jump M high on the moon's surface.



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6. An electric bulb of 60 W is used for 10 h per day Unit of electrical energy will be used in the month of June.



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7. A object of weight 40 N is made to fall freely towards the ground from height 10 m. When it reaches the ground its kinetic energy would be J.



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8. 3730 watt = hp



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9. A constant force of 1 N is applied on an object. The body displaces 1 m in the direction of the force. Then work done is J



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10. 1 watt-second = Joule.



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[Watch Video Solution](#)

13. Hetal having mass 50 kg climbs up 20 m height with an object of mass 30 kg for 40 s, then her power is W. (Take $g = 10ms^{-2}$)



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[Watch Video Solution](#)

17. 3730 watt = hp



[Watch Video Solution](#)

18. A constant force of 1 N is applied on an object. The body displaces 1 m in the direction of the force. Then work done is J



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Question Answer Fill In The Blanks By Selecting The Correct Alternative From Those Given In The Bracket

1. As the angle between force and displacement increases, the magnitude of work

(remains constant, increases, decreases)



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2. On pressing a spring its potential energy

.....

(remains constant, increases, decreases)



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3. is a scalar quantity.

(Force, Work, Displacement)



Watch Video Solution

4. The unit of power is

(joule, watt, unit)



Watch Video Solution

5. When an object of mass 10 kg is at height

..... m, its potential energy would be 200 J.

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

(2, 5, 10)



Watch Video Solution

6. $1MW = \dots\dots\dots W$

$(10^3, 10^5, 10^6)$



Watch Video Solution

7. 20 unit = Watt-second.

$(20 \times 10^3, 3.6 \times 10^6, 7.2 \times 10^7)$



Watch Video Solution

8. The total energy of a body falling freely towards the earth

(increases, decreases, remains constant)



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9. 5 electric bulbs of 100 W are used for 8 hours, then unit of energy would be consumed in 1 day.

(4, 5, 8)



[Watch Video Solution](#)

10. Power of a water-pump is $2kW$ Litre of water can be lifted to a height of $10m$ in 1 minute.

(600, 1200, 2000)



Watch Video Solution

11. As the angle between force and displacement increases, the magnitude of work

(remains constant, increases, decreases)



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12. On pressing a spring its potential energy

.....

(remains constant, increases, decreases)



[Watch Video Solution](#)

13. is a scalar quantity.

(Force, Work, Displacement)



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Watch Video Solution

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(increases, decreases, remains constant)



Watch Video Solution

19. 5 electric bulbs of 100 W are used for 8 hours, then unit of energy would be consumed in 1 day.

(4, 5, 8)



Watch Video Solution

20. Power of a water-pump is $2kW$ Litre of water can be lifted to a height of $10m$ in 1 minute.

(600, 1200, 2000)



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Question Answer State Whether The Following Statements Are True Or False

1. Ability of an object to do work is called energy of that object.



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2. The unit of work and energy is the same.



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3. The potential energy of an object is a relative concept.



[Watch Video Solution](#)

4. Power = Work \times Time taken to do the work.



[Watch Video Solution](#)

5. An force 10 N, then its kinetic energy would be zero at maximum height.



[Watch Video Solution](#)

6. 1 unit electrical energy means 1000 joule electrical energy.



[Watch Video Solution](#)

7. The time rate of doing work is called power.
1 megawatt (MW) power means 10^6 watt (W) power.



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8. 1 megawatt (MW) power means 10^6 watt (W) power.



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9. Both power and energy are scalar quantities.



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10. If work is done by an object, its energy decreases.



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11. The difference between potential energy and kinetic energy is called mechanical energy.



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12. Work is the product of power and time.



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13. Ability of an object to do work is called energy of that object.



[Watch Video Solution](#)

14. The unit of work and energy is the same.



[Watch Video Solution](#)

15. The potential energy of an object is a relative concept.



Watch Video Solution

16. $\text{Power} = \frac{\text{Work}}{\text{Time taken to do the work}}$



Watch Video Solution

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Watch Video Solution

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1 megawatt (MW) power means 10^6 watt (W) power.



Watch Video Solution

20. 1 megawatt (MW) power means 10^6 watt (W) power.



Watch Video Solution

21. Both power and energy are scalar quantities.



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22. If mechanical work done on the body then kinetic energy increases or decreases ?



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23. The difference between potential energy and kinetic energy is called mechanical energy.



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24. Work is the product of power and time.



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**Question Answer Answer The Following
Questions In Short**

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



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2. What is the work done by the force of gravity on a satellite moving round the earth?

Justify your answer.



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3. Think of situation when an object gets displaced in the absence of a force acting on it.



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4. An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground. The initial and the final points of the path of the object lie on the same horizontal line. What is the work done by the force of gravity on the object?



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5. When is the work done by a force is positive and negative ?



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6. How is work calculated, if a applying force to the object (i) there is no displacement (ii) displacement is perpendicular to the force.



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7. Four men lift a 250 kg box to a height of 1 m and hold it without raising or lowering it. (i) How much work is done by men in lifting the

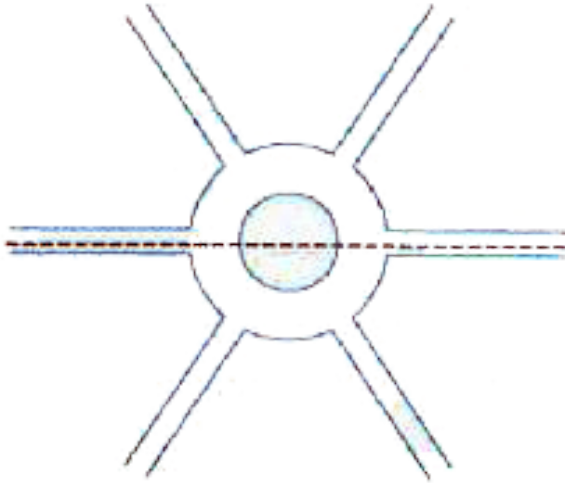
box? (ii) How much work is done in just holding it? (Take $g = 10ms^{-2}$).



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8. A boy is moving on a straight road against a frictional force of 5 N. After travelling 1.5 km, he forgot the path at cross roads of radius 100m. He moves on the circular path for one and half cycle and then he moves forward up

to 2 km. Calculate the work done by him.



Cross roads |



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9. Name different types of energy. Give the unit of energy.



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10. A freely falling object eventually stops on reaching the ground. What happens to its kinetic energy?



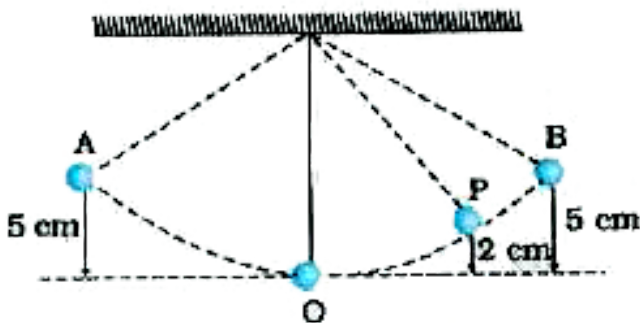
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11. Write a suitable reason for heating up of a metal when hit by a fast moving hammer.



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12. The figure show a simple pendulum consisting a bob of mass 100 g. Initially the bob of the pendulum is at rest at O. It is displaced to one side at A. The height of A above O is 5 cm. (i) What is the value of potential energy of the bob at A? (ii) What is the value of kinetic energy of the bob at position P, whose height above O is 2 cm? (Take $g = 10\text{ms}^{-2}$)





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13. Certain force acting on a 20 kg mass changes its velocity from 5ms^{-1} to 2ms^{-1} .

Calculate the work done by the force.



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14. An object of mass 16 kg has 3200 J of kinetic energy. What will be its velocity?



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15. Find the momentum of a body of mass 100 g having kinetic energy 500 J.



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16. 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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17. Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60kmh^{-1} .



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18. Can kinetic energy be negative? Why?



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19. Give any four illustrations of the kinetic energy.



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20. An object of mass 40kg is raised to a 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 halfway down. (Take $g = 10ms^{-2}$.)



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21. What are the various energy transformations that occur when you are riding a bicycle?



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22. Does the transfer of energy take place when you push a huge rock with all your might and fail to move it? Where is the energy you spend going?



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



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



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



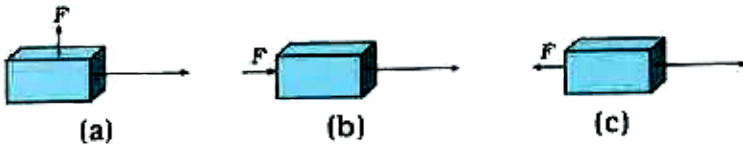
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26. An electric heater is rated 1500 W. How much energy does it use in 10 hour?



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27. In each of the following a force F is acting on an object of mass m . The direction of displacement is from west to east shown by the longer arrow. Observer the diagrams carefully and state whether the work done by the force is negative, positive or zero.



Forces acting on objects |



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28. Soni says that the acceleration in an object could be zero even when several forces are acting on it. Do you agree with her? Why?



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29. Find the energy in kWh consumed in 10 hour by 4 devices of power 500 W each.



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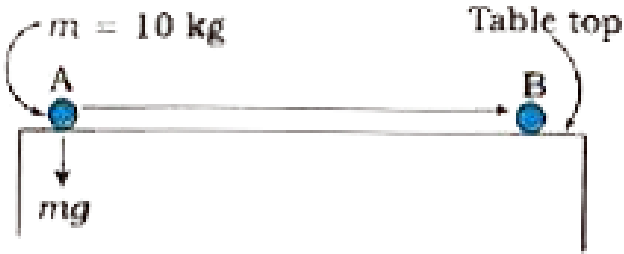
30. A certain household has consumed 250 units of energy during a month. How much energy is this in joule?



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

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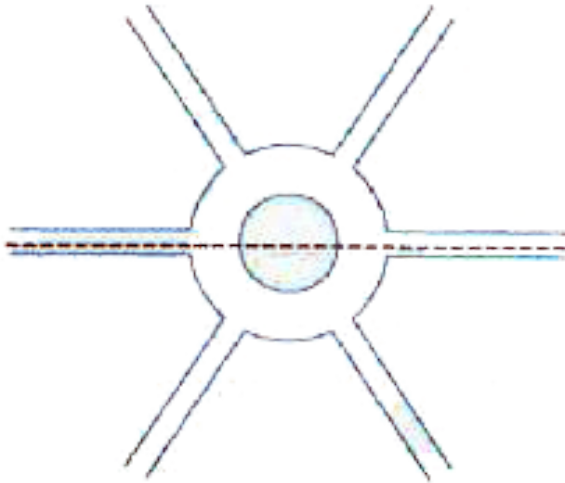
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Cross roads |



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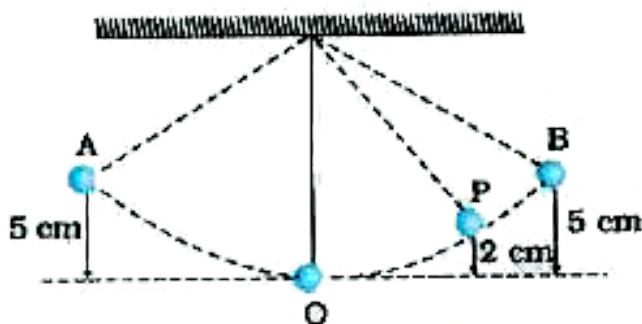


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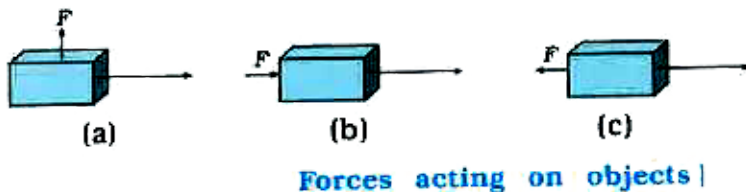
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59. Find the energy in kWh consumed in 10 hour by 4 devices of power 500 W each.



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60. A certain household has consumed 250 units of energy during a month. How much energy is this in joule?



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Question Answer Give Scientific Reasons For The Following Statements

1. A man standing with a load on his head or a man walking with load does no work scientifically.



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2. A bullet fired from a gun can pierce through a thick wooden board but the same bullet

thrown with a blow of hand can't pierce in the board.



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3. When the earth revolves around the sun, the work done by the gravitational force of the sun is zero.



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4. While fixing a nail in a wooden block, the hammer is raised and brought on it.



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5. It is necessary to wind the clock regularly to run it.



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6. When an object is falling freely from the height h from the earth's surface its gravitational potential energy decreases gradually but its mechanical energy does not change.



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7. A man standing with a load on his head or a man walking with load does no work scientifically.





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Question Answer Match The Following Properly

1.

Column I

Column II

- | | |
|---|--------------------------------------|
| 1. Unit of work | <i>a.</i> Kinetic energy |
| 2. Unit of power | <i>b.</i> potential energy |
| 3. Energy present in compressed spring | <i>c.</i> newton |
| | <i>d.</i> joule |
| 4. Energy present in the bullet released from the gun | <i>e.</i> joule second ⁻¹ |



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Column I
(Physical Quantity)

Column II
(Formula)

- | | | | |
|----|------------------|-----------|-------------------|
| 1. | Work | <i>a.</i> | $\frac{W}{t}$ |
| 2. | Power | <i>b.</i> | mgh |
| 3. | Potential energy | <i>c.</i> | $\frac{1}{2}mv^2$ |
| 4. | Kinetic energy | <i>d.</i> | Fs |
| | | <i>e.</i> | ma |



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3.

Column I

Column II

- | | |
|---|--------------------------------------|
| 1. Unit of work | <i>a.</i> Kinetic energy |
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(Physical Quantity)

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- | | | | |
|----|------------------|----|-------------------|
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| 4. | Potential energy | c. | $\frac{1}{2}mv^2$ |
| 3. | Kinetic energy | d. | Fs |
| | | e. | ma |



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Question Answer Distinguish Between The Following

1. Distinguish Between Work and Energy



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2. Distinguish Between Potential energy and Kinetic energy



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3. Distinguish Between Energy and Power



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4. Distinguish Between Work and Power



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5. Distinguish Between Work and Energy



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6. Distinguish Between Potential energy and Kinetic energy



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7. Distinguish Between Energy and Power



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8. Distinguish Between Work and Power



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Question Answer Answer The Following
Questions In Brief

1. Look at the activities listed below.

Reason out whether or not work is done in the light of your understanding of the term 'work'.

(i) Suma is swimming in a pond.

(ii) A donkey is carrying a load on its back.

(iii) A windmill is lifting water from a well.

(iv) A green plant is carrying out photosynthesis.

(v) An engine is pulling a train.

(vi) Food grains are getting dried in the sun.

(vii) A sailboat is moving due to wind energy.



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2. A car weighing 1000 kg is travelling at the speed of 15m s^{-1} . It decelerated due to brakes applied and stops after covering a distance of 25 m. Find the force exerted by the brakes and the work done by the brakes.



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3. A lift carries a maximum weight of 2400 N to a height of 10 m with a constant speed 2m s^{-1} . Find out the power and the work done.



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4. (a) Define work done by a constant force.

Write its SI unit and define this unit.

(b) A 3000kg truck at a speed of 72kmh^{-1}

stops after covering some distance. The force

applied by brakes is 2400 N. Compute the

distance covered and work done by this force.



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5. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest? What happens to its energy eventually? Is it a violation of the law of conservation of energy?



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6. (a) State the law of conservation of energy.

(b) Name two forms of mechanical energy.

(c) Give three examples on transformation of energy to show that solar energy provides different forms of energy.



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7. Look at the activities listed below.

Reason out whether or not work is done in the light of your understanding of the term 'work'.

- (i) Suma is swimming in a pond.
- (ii) A donkey is carrying a load on its back.
- (iii) A windmill is lifting water from a well.
- (iv) A green plant is carrying out photosynthesis.
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12. The vacant space of solid's electronic energy level is called



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Question Answer Textual Examples Numericals

1. A force of 5 N is acting on an object. The object is displaced through 2m in the direction of force. If the force acts on the object all through the displacement, then find

the work done on the object.



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2. A porter lifts a luggage of 15 kg from the ground and puts it on his head 1.5 m above the ground. Calculate the work done by him on the luggage.



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3. An object of mass 15kg is moving with a uniform velocity of 4ms^{-1} . What is the kinetic energy possessed by the object?



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4. What is the work to be done to increase the velocity of a car from 30kmh^{-1} to 60kmh^{-1} , if the mass of the car is 1500kg ?



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5. Find the energy possessed by an object of mass 10kg when it is at a height of 6m above the ground. Given $g = 9.8ms^{-2}$.



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6. An object of mass 12 kg is at a certain height above the ground. If the potential energy of the object is 480 J, find the height at which the object is with respect to the ground. Given $g = 10ms^{-2}$.





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7. Two girls, each of weight 400 N climb up a rope through a height of 8 m. We name one of the girls A and the other B. Girl A takes 20 s while B takes 50 s to accomplish this task. What is the power expended by each girl?



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8. A boy of mass 50 kg runs up a staircase of 45 steps in 9 s. If the height of each step is 15

cm, find his power. Take $g = 10\text{ms}^{-2}$.



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9. An electric bulb of 60 W is used for 6 h per day. Calculate the 'units' of energy consumed in one day by the bulb.



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10. A force of 5 N is acting on an object. The object is displaced through 2m in the

direction of force. If the force acts on the object all through the displacement, then find the work done on the object.



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16. Two girls, each of weight 400 N climb up a rope through a height of 8 m. We name one of the girls A and the other B. Girl A takes 20 s while B takes 50 s to accomplish this task. What is the power expended by each girl?



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17. A boy of mass 50 kg runs up a staircase of 45 steps in 9 s. If the height of each step is 15 cm, find his power. Take $g = 10\text{ms}^{-2}$.



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18. An electric bulb of 60 W is used for 6 h per day. Calculate the 'units' of energy consumed in one day by the bulb.



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Question Answer Additional Numericals For Practice

1. A body of mass 15 kg undergoes downward displacement of 40 m under the effect of gravitational force. Calculate work done. (Take $g = 10\text{ms}^{-1}$).



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2. An object of mass 120g is taken upward at the height 5 m, then Joule work is done.

$$(g = 10ms^{-2})$$



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3. At what speed a person having 60 kg mass should run to acquire 750 J kinetic energy?



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4. Kinetic energy of a car, having mass 1000 kg is 1,12,500 J. Driver applies brakes when an obstacle is sighted and car comes to halt after

travelling 100 m distance (without meeting with an accident). Calculate frictional force.



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5. Hetasvi, having her own mass 50 kg, climbs 20 m height along with 30 kg mass in 40 s. Calculate her power and work done.

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



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6. 5 tubelights each of 40 W are operated by 10 hour. Calculate electrical energy consumed in 'unit'.



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7. A boy of mass 40 kg climbs a staircase of 30 steps, each of 0.2 m height, in 30 s. Calculate power. ($g = 9.8ms^{-2}$)



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8. A lady pulls a bucket filled with water having mass 10kg from a well 8 m deep in 20s.

Calculate work done and power.

$$(g = 10ms^{-2})$$



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9. A car having mass 1000 kg is moving with speed of $36kmh^{-1}$. Calculate its momentum and kinetic energy.

(Verify the value of kinetic energy using

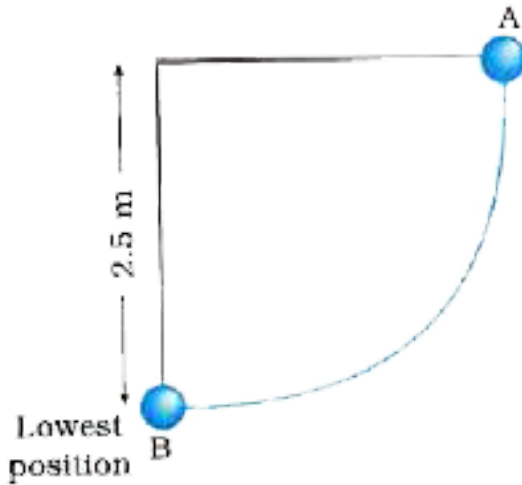
$E_k = p^2 / 2m$. 'p' is momentum, how kinetic energy is equal $E_k = p^2 / 2m$? Think)



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10. The pendulum shown in the figure is kept horizontal. It is released from this positions. What is its velocity when it reaches the lowest

position? ($g = 9.8\text{ms}^{-2}$)



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11. In a residence 4 tubelights each of 40W are operated daily for 5 hour and 3 fans each of 120 W are operated daily for 4 hour. What

would be the amount of electricity bill at ₹ 5 per unit for the month of September?



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12. A rocket is moving in upward direction with the velocity v , suddenly its velocity becomes three times, then find the ratio of its initial and final kinetic energy.



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13. Avinash is moving with the velocity 8ms^{-1} against the frictional force 10 N acting on him and Kapil is moving with the velocity 3ms^{-1} against the frictional force 25 N acting on him. Whos power would be more?



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14. The power of a water pump is 2 kW. How much amount of water can it raise in 1 minute to a height of 10 m? (Take $g = 10\text{ms}^{-2}$).





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15. Suppose the weight of a man on the planet A is half than that on the earth. If he can jump 0.4 m high on earth's surface, then how high he can jump on the planet A?



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16. A ball is falling freely from the height 10 m. On striking the ground its energy decreases 40 %, then how high can it jump?



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17. The power of an electric iron is 1200 W. It is used daily for 30 minute. How much electrical energy would be consumed in April month of any year?



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18. The momentam of a light and heavy objects are same. Find the ratio of their kinetic energy.

Whose kinetic energy is more?



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19. Car A of mass 1000 kg moves on a horizontal straight road with speed 36kmh^{-1} .

If the force resisting the motion is 100 N, then find the power of the engine.

Now, after covering 200 m distance, car A collides with a stationary car B of same mass and becomes stationary. As a result car B start moving on the horizontal road, then what

would be the speed of car B just after the collision? (The engine of car B is off.)



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20. A girl of mass 35 kg is sitting in a trolley of mass 5 kg. By applying the force on the trolley, it has given the velocity 4ms^{-1} . Trolley comes to rest after covering the distance 16 m, then

(1) How much work is done on the trolley?

(2) How much work is done on the girl?



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21. Four men lift a 250 kg box to a height of 1 m and hold it without raising or lowering it. (i) How much work is done by men in lifting the box? (ii) How much work is done in just holding it? (Take $g = 10ms^{-2}$).



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22. The height of 'Jog fall' in Karnataka state is 250 m high. 2000 ton water per minute falls

from it. If this entire energy is used up, then find out the power. (Take $g = 10ms^{-2}$)



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23. A man works with the constant power 100 W. How much mass of an object can he lift upward at the uniform velocity $1ms^{-1}$? ($g = 10ms^{-2}$)



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24. A car-engine of mass 150 kg spends 500 W power for 1 kg mass. How much force should be applied by the engine to run the car at uniform speed 20ms^{-1} ?



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25. A butterfly of mass 1.0 g moves upward against the gravitational force with velocity 0.5ms^{-1} and a squirrel of mass 250 g climbs

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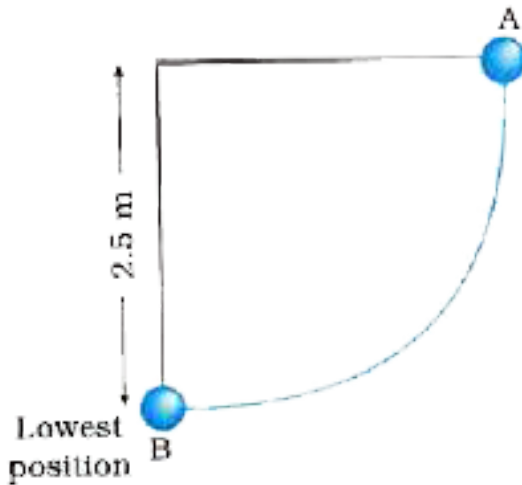
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