PrepWiser.

PHYSICS · JEE MAIN

Work, Energy & Power

Chapter-wise previous year questions, with answer key

63	2020–2025	6
PYQS	PAPERS	TOPICS

Work-Energy Theorem · Power · Work by Constant and Variable Force · Potential Energy · Conservative and Non-Conservative Forces · Conservation of Mechanical Energy

1. Attempt each question on paper first — they're grouped by topic, newest papers first.
2. Check yourself against the answer key at the end.
3. Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

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Work-Energy Theorem · 25 PYQs

Q1 JEE Main 2025 · 3 Apr · Shift 2

A block of mass 1 kg , moving along x with speed $v_i = 10\mathrm{m/s}$ enters a rough region ranging from $x = 0.1\mathrm{m}$ to $x = 1.9\mathrm{m}$. The retarding force acting on the block in this range is $\mathrm{F_r} = -\mathrm{krN}$, with k $= 10\mathrm{N/m}$. Then the final speed of the block as it crosses rough region is.

(A) $4\mathrm{m/s}$ **(B)** $10\mathrm{m/s}$

(C) $8\mathrm{m/s}$ **(D)** $6\mathrm{m/s}$

Step-by-step solution ▸ prepwiser.in/questions/msQzt_713d

Q2 JEE Main 2024 · 9 Apr · Shift 1

A particle of mass m moves on a straight line with its velocity increasing with distance according to the equation $v = \alpha\sqrt{x}$, where α is a constant. The total work done by all the forces applied on the particle during its displacement from $x = 0$ to $x = \mathrm{d}$, will be :

(A) $\frac{\mathrm{m}}{2\alpha^2\mathrm{d}}$

(B) $\frac{\mathrm{md}}{2\alpha^2}$

(C) $\frac{\mathrm{m}\alpha^2\mathrm{d}}{2}$

(D) $2\mathrm{m}\alpha^2\mathrm{d}$

Step-by-step solution ▸ prepwiser.in/questions/E7TMAu6WrN

Q3 JEE Main 2024 · 6 Apr · Shift 1

Four particles A, B, C, D of mass $\frac{m}{2}, m, 2m, 4m$, have same momentum, respectively. The particle with maximum kinetic energy is :

(A) B **(B)** C

(C) D **(D)** A

Step-by-step solution ▸ prepwiser.in/questions/IYCUN-LZ38

Q4 JEE Main 2024 · 6 Apr · Shift 1

A bullet of mass $50\mathrm{g}$ is fired with a speed $100\mathrm{m/s}$ on a plywood and emerges with $40\mathrm{m/s}$. The percentage loss of kinetic energy is :

(A) 44% **(B)** 16%

(C) 84% **(D)** 32%

Step-by-step solution ▸ prepwiser.in/questions/fb4cKNH1cC

Q5 JEE Main 2024 · 6 Apr · Shift 2

When kinetic energy of a body becomes 36 times of its original value, the percentage increase in the momentum of the body will be :

(A) 60% **(B)** 500%

(C) 6% **(D)** 600%

Step-by-step solution ▸ prepwiser.in/questions/zekv2UJmy2

Q6 JEE Main 2024 · 27 Jan · Shift 2

A bullet is fired into a fixed target looses one third of its velocity after travelling $4\mathrm{cm}$. It penetrates further $\mathrm{D} \times 10^{-3}\mathrm{m}$ before coming to rest. The value of D is :

(A) 23

(B) 32

(C) 42

(D) 52

Step-by-step solution ▸ prepwiser.in/questions/39AcJXWcAE

Q7 JEE Main 2023 · 13 Apr · Shift 1

Two bodies are having kinetic energies in the ratio 16 : 9. If they have same linear momentum, the ratio of their masses respectively is :

(A) $3:4$

(B) $4:3$

(C) $9:16$

(D) $16:9$

Step-by-step solution ▸ prepwiser.in/questions/ruFeu82W-F

Q8 JEE Main 2023 · 13 Apr · Shift 2

A car accelerates from rest to $u\mathrm{m/s}$. The energy spent in this process is E J. The energy required to accelerate the car from $u\mathrm{m/s}$ to $2u\mathrm{m/s}$ is nEJ. The value of n is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ND8k43WQkL

Q9 JEE Main 2023 · 12 Apr · Shift 1

Given below are two statements:

Statement I : A truck and a car moving with same kinetic energy are brought to rest by applying breaks which provide equal retarding forces. Both come to rest in equal distance.

Statement II : A car moving towards east takes a turn and moves towards north, the speed remains unchanged. The acceleration of the car is zero.

In the light of given statements, choose the most appropriate answer from the options given below

(A) Statement I is incorrect but Statement II is correct.

(B) Statement I is correct but Statement II is incorrect.

(C) Both Statement I and Statement II are correct.

(D) Both Statement I and Statement II are incorrect.

Step-by-step solution ▸ prepwiser.in/questions/13nJDMj4bn

Q10 JEE Main 2023 · 8 Apr · Shift 2

A body of mass $5\mathrm{kg}$ is moving with a momentum of $10\mathrm{kgms}^{-1}$. Now a force of $2\mathrm{N}$ acts on the body in the direction of its motion for $5\mathrm{s}$. The increase in the Kinetic energy of the body is _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/W0IBN8298D

Q11 JEE Main 2023 · 8 Apr · Shift 1

The momentum of a body is increased by 50%. The percentage increase in the kinetic energy of the body is _____ $\%$.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/wYs7t01kHp

Q12 JEE Main 2023 · 6 Apr · Shift 1

A particle of mass $10\mathrm{g}$ moves in a straight line with retardation $2x$, where x is the displacement in SI units. Its loss of kinetic energy for above displacement is $\left(\frac{10}{x}\right)^{-n}$ J. The value of n will be _____

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/tUwGH4heL5

Q13 JEE Main 2023 · 31 Jan · Shift 1

A lift of mass $\mathrm{M} = 500\mathrm{kg}$ is descending with speed of $2\mathrm{ms}^{-1}$. Its supporting cable begins to slip thus allowing it to fall with a constant acceleration of $2\mathrm{ms}^{-2}$. The kinetic energy of the lift at the end of fall through to a distance of $6\mathrm{m}$ will be _____ kJ.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/36FoI7kMry

Q14 JEE Main 2022 · 29 Jul · Shift 2

If momentum of a body is increased by 20%, then its kinetic energy increases by

(A) 36%
(B) 40%
(C) 44%
(D) 48%

Step-by-step solution ▸ prepwiser.in/questions/isVXA_RGZ6

Q15 JEE Main 2022 · 27 Jul · Shift 2

The velocity of the bullet becomes one third after it penetrates 4 cm in a wooden block. Assuming that bullet is facing a constant resistance during its motion in the block. The bullet stops completely after travelling at (4 + x) cm inside the block. The value of x is :

(A) 2.0
(B) 1.0
(C) 0.5
(D) 1.5

Step-by-step solution ▸ prepwiser.in/questions/9Oifi3VOxF

Q16 JEE Main 2022 · 26 Jul · Shift 2

A body of mass $8\mathrm{kg}$ and another of mass $2\mathrm{kg}$ are moving with equal kinetic energy. The ratio of their respective momentum will be :

(A) 1 : 1
(B) 2 : 1
(C) 1 : 4
(D) 4 : 1

Step-by-step solution ▸ prepwiser.in/questions/_NFgKKd_8I

Q17 JEE Main 2022 · 25 Jul · Shift 1

A body of mass $0.5\mathrm{kg}$ travels on straight line path with velocity $v = \left(3x^2 + 4\right)\mathrm{m/s}$. The net workdone by the force during its displacement from $x = 0$ to $x = 2\mathrm{m}$ is :

(A) 64 J
(B) 60 J
(C) 120 J
(D) 128 J

Step-by-step solution ▸ prepwiser.in/questions/U8lT-g1Iiz

Q18 JEE Main 2022 · 30 Jun · Shift 1

Two bodies A and B of masses 5 kg and 8 kg are moving such that the momentum of body B is twice that of the body A. The ratio of their kinetic energies will be :

(A) 4 : 5 **(B)** 2 : 5

(C) 5 : 4 **(D)** 5 : 2

Step-by-step solution ▸ prepwiser.in/questions/OjRGp7hJ9b

Q19 JEE Main 2022 · 29 Jun · Shift 1

A particle of mass 500 gm is moving in a straight line with velocity v = b $x^{5/2}$. The work done by the net force during its displacement from x = 0 to x = 4 m is : (Take b = 0.25 $m^{-3/2}$ s^{-1}).

(A) 2 J **(B)** 4 J

(C) 8 J **(D)** 16 J

Step-by-step solution ▸ prepwiser.in/questions/SV3mlas5cA

Q20 JEE Main 2022 · 25 Jun · Shift 1

A 0.5 kg block moving at a speed of 12 ms^{-1} compresses a spring through a distance 30 cm when its speed is halved. The spring constant of the spring will be _____ Nm^{-1}.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/HOjGf_QE-G

Q21 JEE Main 2022 · 24 Jun · Shift 1

A particle experiences a variable force $\vec{F} = \left(4x\hat{i} + 3y^2\hat{j}\right)$ in a horizontal x-y plane. Assume distance in meters and force is newton. If the particle moves from point (1, 2) to point (2, 3) in the x-y plane, then Kinetic Energy changes by :

(A) 50.0 J **(B)** 12.5 J

(C) 25.0 J **(D)** 0 J

Step-by-step solution ▸ prepwiser.in/questions/zcoBXkjtgz

Q22 JEE Main 2021 · 1 Sep · Shift 2

An engine is attached to a wagon through a shock absorber of length 1.5 m. The system with a total mass of 40,000 kg is moving with a speed of 72 kmh^{-1} when the brakes are applied to bring it to rest. In the process of the system being brought to rest, the spring of the shock absorber gets compressed by 1.0 m. If 90% of energy of the wagon is lost due to friction, the spring constant is _____ $\times 10^5$ N/m.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/yPctuPp69T

Q23 JEE Main 2021 · 1 Sep · Shift 2

A body of mass 'm' dropped from a height 'h' reaches the ground with a speed of $0.8\sqrt{gh}$. The value of workdone by the air-friction is :

(A) -0.68 mgh **(B)** mgh

(C) 1.64 mgh **(D)** 0.64 mgh

Step-by-step solution ▸ prepwiser.in/questions/xzdkMXc_BA

Q24 JEE Main 2021 · 20 Jul · Shift 2

If the Kinetic energy of a moving body becomes four times its initial Kinetic energy, then the percentage change in its momentum will be :

(A) 100%

(B) 200%

(C) 300%

(D) 400%

Step-by-step solution ▸ prepwiser.in/questions/4MLgMR_XjR

Q25 JEE Main 2021 · 17 Mar · Shift 1

A boy is rolling a 0.5 kg ball on the frictionless floor with the speed of 20 ms^{-1}. The ball gets deflected by an obstacle on the way. After deflection it moves with 5% of its initial kinetic energy. What is the speed of the ball now?

(A) 14.41 ms^{-1}

(B) 19.0 ms^{-1}

(C) 4.47 ms^{-1}

(D) 1.00 ms^{-1}

Step-by-step solution ▸ prepwiser.in/questions/OFScAd6cjA

Power · 18 PYQs

Q26 JEE Main 2025 · 7 Apr · Shift 1

An object of mass 1000 g experiences a time dependent force $\vec{F} = \left(2t\hat{i} + 3t^2\hat{j}\right) N$. The power generated by the force at time t is:

(A) $\left(2t^2 + 18t^3\right) W$

(B) $\left(3t^3 + 5t^5\right) w$

(C) $\left(2t^3 + 3t^5\right) w$

(D) $\left(2t^2 + 3t^3\right) w$

Step-by-step solution ▸ prepwiser.in/questions/VKxEIwRPJ7

Q27 JEE Main 2025 · 29 Jan · Shift 2

A sand dropper drops sand of mass m(t) on a conveyer belt at a rate proportional to the square root of speed (v) of the belt, i.e., $\frac{dm}{dt} \propto \sqrt{v}$. If P is the power delivered to run the belt at constant speed then which of the following relationship is true?

(A) P $\propto \sqrt{v}$

(B) P $\propto v$

(C) $P^2 \propto v^3$

(D) $P^2 \propto v^5$

Step-by-step solution ▸ prepwiser.in/questions/eqbpzjs7x5

Q28 JEE Main 2025 · 28 Jan · Shift 2

A body of mass 4 kg is placed on a plane at a point P having coordinate $(3, 4)\mathrm{m}$. Under the action of force $\overrightarrow{\mathrm{F}} = (2\hat{i} + 3\hat{j})\mathrm{N}$, it moves to a new point Q having coordinates $(6, 10)\mathrm{m}$ in 4 sec . The average power and instanteous power at the end of 4 sec are in the ratio of :

(A) 4 : 3

(B) 13 : 6

(C) 1 : 2

(D) 6 : 13

Step-by-step solution ▸ prepwiser.in/questions/a1VITojvP0

Q29 JEE Main 2024 · 5 Apr · Shift 2

A body is moving unidirectionally under the influence of a constant power source. Its displacement in time t is proportional to :

(A) $t^{2/3}$

(B) $t^{3/2}$

(C) t

(D) t^2

Step-by-step solution ▸ prepwiser.in/questions/arK86jdp0J

Q30 JEE Main 2024 · 31 Jan · Shift 2

A body of mass $2\mathrm{kg}$ begins to move under the action of a time dependent force given by $\vec{F} = \left(6t\hat{i} + 6t^2\hat{j}\right) N$. The power developed by the force at the time t is given by:

(A) $\left(3t^3 + 6t^5\right) W$

(B) $\left(9t^5 + 6t^3\right) W$

(C) $\left(6t^4 + 9t^5\right) W$

(D) $\left(9t^3 + 6t^5\right) W$

Step-by-step solution ▸ prepwiser.in/questions/FUPcjwMsKV

Q31 JEE Main 2023 · 13 Apr · Shift 1

The ratio of powers of two motors is $\frac{3\sqrt{x}}{\sqrt{x}+1}$, that are capable of raising $300\mathrm{kg}$ water in 5 minutes and $50\mathrm{kg}$ water in 2 minutes respectively from a well of $100\mathrm{m}$ deep. The value of x will be

(A) 16

(B) 4

(C) 2

(D) 2.4

Step-by-step solution ▸ prepwiser.in/questions/gGK0xx7x6W

Q32 JEE Main 2023 · 11 Apr · Shift 2

A block of mass $5\mathrm{kg}$ starting from rest pulled up on a smooth incline plane making an angle of 30° with horizontal with an affective acceleration of $1\mathrm{ms}^{-2}$. The power delivered by the pulling force at $t = 10\mathrm{s}$ from the start is _____ W.

[use $\mathrm{g} = 10\mathrm{ms}^{-2}$]

(calculate the nearest integer value)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Ix0-UC7JLd

Q33 JEE Main 2023 · 10 Apr · Shift 2

If the maximum load carried by an elevator is $1400\mathrm{kg}$ ($600\mathrm{kg}$ - Passengers + 800 kg - elevator), which is moving up with a uniform speed of $3\mathrm{ms}^{-1}$ and the frictional force acting on it is $2000\mathrm{N}$, then the maximum power used by the motor is _____ kW $\left(\mathrm{g}=10\mathrm{m/s}^2\right)$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/42fC-LuUUc

Q34 JEE Main 2023 · 30 Jan · Shift 2

A body of mass $2\mathrm{kg}$ is initially at rest. It starts moving unidirectionally under the influence of a source of constant power P. Its displacement in $4\mathrm{s}$ is $\frac{1}{3}\alpha^2\sqrt{P}m$. The value of α will be _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/QqSPsY1agx

Q35 JEE Main 2023 · 24 Jan · Shift 2

A body of mass 1kg begins to move under the action of a time dependent force $\overrightarrow{F}=\left(t\hat{i}+3t^2\,\hat{j}\right)$ N, where $\hat{i}$ and $\hat{j}$ are the unit vectors along x and y axis. The power developed by above force, at the time t = 2s, will be _____ W.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/EA0ALn9JiL

Q36 JEE Main 2022 · 27 Jul · Shift 1

Sand is being dropped from a stationary dropper at a rate of $0.5\,\mathrm{kgs}^{-1}$ on a conveyor belt moving with a velocity of $5\mathrm{ms}^{-1}$. The power needed to keep the belt moving with the same velocity will be :

(A) 1.25 W
(B) 2.5 W
(C) 6.25 W
(D) 12.5 W

Step-by-step solution ▸ prepwiser.in/questions/gZkycro3ur

Q37 JEE Main 2022 · 28 Jun · Shift 2

Water falls from a 40 m high dam at the rate of 9 $\times$ 10^4 kg per hour. Fifty percentage of gravitational potential energy can be converted into electrical energy. Using this hydroelectric energy number of 100 W lamps, that can be lit, is :

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

(A) 25
(B) 50
(C) 100
(D) 18

Step-by-step solution ▸ prepwiser.in/questions/Rg8kuByFIN

Q38 JEE Main 2022 · 28 Jun · Shift 1

A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration (a) is varying with time t as $a = k^2rt^2$, where k is a constant. The power delivered to the particle by the force acting on it is given as

(A) zero

(B) $mk^2r^2t^2$

(C) mk^2r^2t

(D) mk^2rt

Step-by-step solution ▸ prepwiser.in/questions/kBbLcANqab

Q39 JEE Main 2021 · 27 Jul · Shift 2

An automobile of mass 'm' accelerates starting from origin and initially at rest, while the engine supplies constant power P. The position is given as a function of time by :

(A) $\left(\frac{9P}{8m}\right)^{\frac{1}{2}}t^{\frac{3}{2}}$

(B) $\left(\frac{8P}{9m}\right)^{\frac{1}{2}}t^{\frac{2}{3}}$

(C) $\left(\frac{9m}{8P}\right)^{\frac{1}{2}}t^{\frac{3}{2}}$

(D) $\left(\frac{8P}{9m}\right)^{\frac{1}{2}}t^{\frac{3}{2}}$

Step-by-step solution ▸ prepwiser.in/questions/GorRzVTWXm

Q40 JEE Main 2021 · 20 Jul · Shift 2

A body at rest is moved along a horizontal straight line by a machine delivering a constant power. The distance moved by the body in time 't' is proportional to :

(A) $t^{\frac{3}{2}}$

(B) $t^{\frac{1}{2}}$

(C) $t^{\frac{1}{4}}$

(D) $t^{\frac{3}{4}}$

Step-by-step solution ▸ prepwiser.in/questions/5eH3H_0-7L

Q41 JEE Main 2021 · 18 Mar · Shift 1

A constant power delivering machine has towed a box, which was initially at rest, along a horizontal straight line. The distance moved by the box in time 't' is proportional to :-

(A) $t^{2/3}$

(B) $t^{3/2}$

(C) t

(D) $t^{1/2}$

Step-by-step solution ▸ prepwiser.in/questions/76LpSBdARE

Q42 JEE Main 2020 · 7 Jan · Shift 1

A 60 HP electric motor lifts an elevator having a maximum total load capacity of 2000 kg. If the frictional force on the elevator is 4000 N, the speed of the elevator at full load is close to :

(1 HP = 746 W, g = 10 ms^{-2})

(A) 1.5 ms^{-1}

(B) 1.7 ms^{-1}

(C) 2.0 ms^{-1}

(D) 1.9 ms^{-1}

Step-by-step solution ▸ prepwiser.in/questions/rQyRjOVq3s

Q43 JEE Main 2020 · 7 Jan · Shift 2

An elevator in a building can carry a maximum of 10 persons, with the average mass of each person being 68 kg, The mass of the elevator itself is 920 kg and it moves with a constant speed of 3 m/s. The frictional force opposing the motion is 6000 N. If the elevator is moving up with its full capacity, the power delivered by the motor to the elevator (g = 10 m/s^2) must be at least :

(A) 48000 W

(B) 62360 W

(C) 56300 W

(D) 66000 W

Step-by-step solution ▸ prepwiser.in/questions/kyB81oOOGC

Work by Constant and Variable Force · 14 PYQs

Q44 JEE Main 2025 · 24 Jan · Shift 1

A force $\mathrm{F} = \alpha + \beta \mathrm{x}^2$ acts on an object in the x -direction. The work done by the force is 5 J when the object is displaced by 1 m . If the constant $\alpha = 1\mathrm{N}$ then β will be

(A) $15\mathrm{N/m^2}$

(B) $10\mathrm{N/m^2}$

(C) $12\mathrm{N/m^2}$

(D) $8\mathrm{N/m^2}$

Step-by-step solution ▸ prepwiser.in/questions/zUN59QaQtp

Q45 JEE Main 2025 · 23 Jan · Shift 1

A force $\mathrm{f} = \mathrm{x}^2\mathrm{y}\hat{\mathrm{i}} + \mathrm{y}^2\hat{\mathrm{j}}$ acts on a particle in a plane $\mathrm{x} + \mathrm{y} = 10$. The work done by this force during a displacement from $(0, 0)$ to $(4\mathrm{m}, 2\mathrm{m})$ is _____ Joule (round off to the nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/2i4exPdz-4

Q46 JEE Main 2024 · 9 Apr · Shift 2

A force $(3x^2 + 2x - 5)\mathrm{N}$ displaces a body from $x = 2\mathrm{m}$ to $x = 4\mathrm{m}$. Work done by this force is _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/3VfR2r55Yj

Q47 JEE Main 2023 · 15 Apr · Shift 1

A block of mass 10kg is moving along x-axis under the action of force $F = 5xN$. The work done by the force in moving the block from $x = 2m$ to $4m$ will be _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/YkqBX2LYOz

Q48 JEE Main 2023 · 12 Apr · Shift 1

To maintain a speed of 80 km/h by a bus of mass 500 kg on a plane rough road for 4 km distance, the work done by the engine of the bus will be _____ KJ. [The coefficient of friction between tyre of bus and road is 0.04.]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/lvT9h977qB

Q49 JEE Main 2023 · 11 Apr · Shift 1

A force $\vec{F} = (2 + 3x)\hat{i}$ acts on a particle in the x direction where F is in newton and x is in meter. The work done by this force during a displacement from $x = 0$ to $x = 4\text{m}$, is _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/YG5kwgDtkR

Q50 JEE Main 2023 · 1 Feb · Shift 1

A small particle moves to position $5\hat{i} - 2\hat{j} + \hat{k}$ from its initial position $2\hat{i} + 3\hat{j} - 4\hat{k}$ under the action of force $5\hat{i} + 2\hat{j} + 7\hat{k}\text{N}$. The value of work done will be _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Qfq31Lafag

Q51 JEE Main 2023 · 1 Feb · Shift 2

A force $\text{F} = \left(5 + 3y^2\right)$ acts on a particle in the y-direction, where F is in newton and y is in meter. The work done by the force during a displacement from $y = 2\text{m}$ to $y = 5\text{m}$ is _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/G4iv9exIDW

Q52 JEE Main 2023 · 29 Jan · Shift 2

Identify the correct statements from the following :

A. Work done by a man in lifting a bucket out of a well by means of a rope tied to the bucket is negative.

B. Work done by gravitational force in lifting a bucket out of a well by a rope tied to the bucket is negative.

C. Work done by friction on a body sliding down an inclined plane is positive.

D. Work done by an applied force on a body moving on a rough horizontal plane with uniform velocity is zero.

E. Work done by the air resistance on an oscillating pendulum is negative.

Choose the correct answer from the options given below :

(A) A and C only

(B) B and D only

(C) B, D and E only

(D) B and E only

Step-by-step solution ▸ prepwiser.in/questions/5pfQ3UXQsg

Q53 JEE Main 2022 · 28 Jun · Shift 2

A block of mass 2 kg moving on a horizontal surface with speed of 4 ms^{-1} enters a rough surface ranging from x = 0.5 m to x = 1.5 m. The retarding force in this range of rough surface is related to distance by F = $-kx$ where k = 12 Nm^{-1}. The speed of the block as it just crosses the rough surface will be :

(A) zero

(B) 1.5 ms^{-1}

(C) 2.0 ms^{-1}

(D) 2.5 ms^{-1}

Step-by-step solution ▸ prepwiser.in/questions/hZE5rbJN3d

Q54 JEE Main 2021 · 27 Aug · Shift 1

Two persons A and B perform same amount of work in moving a body through a certain distance d with application of forces acting at angle 45° and 60° with the direction of displacement respectively. The ratio of force applied by person A to the force applied by person B is $\frac{1}{\sqrt{x}}$. The value of x is ..... .

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/rBddijecPN

Q55 JEE Main 2021 · 25 Jul · Shift 2

A force of F = (5y + 20)$\hat{j}$ N acts on a particle. The work done by this force when the particle is moved from y = 0 m to y = 10 m is _____ J.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/_Da1gfDseG

Q56 JEE Main 2021 · 22 Jul · Shift 2

A porter lifts a heavy suitcase of mass 80 kg and at the destination lowers it down by a distance of 80 cm with a constant velocity. Calculate the work done by the porter in lowering the suitcase.

(take g = 9.8 ms^{-2})

(A) +627.2 J

(B) $-$62720.0 J

(C) $-$627.2 J

(D) 784.0 J

Step-by-step solution ▸ prepwiser.in/questions/yA-Qk-Uav3

Q57 JEE Main 2020 · 3 Sep · Shift 1

A cricket ball of mass 0.15 kg is thrown vertically up by a bowling machine so that it rises to a maximum height of 20 m after leaving the machine. If the part pushing the ball applies a constant force F on the ball and moves horizontally a distance of 0.2 m while launching the ball, the value of F (in N) is (g = 10 ms^{-2}) ____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/-7e1ozEFbq

Potential Energy · 3 PYQs

Q58 JEE Main 2024 · 29 Jan · Shift 1

The potential energy function (in J) of a particle in a region of space is given as $U = \left(2x^2 + 3y^3 + 2z\right)$. Here x, y and z are in meter. The magnitude of x-component of force (in N) acting on the particle at point $P(1, 2, 3)\mathrm{m}$ is :

(A) 4

(B) 2

(C) 8

(D) 6

Step-by-step solution ▸ prepwiser.in/questions/ICL03c1tzp

Q59 JEE Main 2022 · 24 Jun · Shift 2

Potential energy as a function of r is given by $U = \frac{A}{r^{10}} - \frac{B}{r^5}$, where r is the interatomic distance, A and B are positive constants. The equilibrium distance between the two atoms will be :

(A) $\left(\frac{A}{B}\right)^{\frac{1}{5}}$

(B) $\left(\frac{B}{A}\right)^{\frac{1}{5}}$

(C) $\left(\frac{2A}{B}\right)^{\frac{1}{5}}$

(D) $\left(\frac{B}{2A}\right)^{\frac{1}{5}}$

Step-by-step solution ▸ prepwiser.in/questions/ZvyraHNMF7

Q60 JEE Main 2021 · 25 Feb · Shift 1

The potential energy (U) of a diatomic molecule is a function dependent on r (interatomic distance) as

$$U = \frac{\alpha}{r^{10}} - \frac{\beta}{r^5} - 3$$

where, α and β are positive constants. The equilibrium distance between two atoms will be $\left(\frac{2\alpha}{\beta}\right)^{\frac{a}{b}}$, where a = _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ALP75bEIjZ

Conservative and Non-Conservative Forces · 2 PYQs

Q61 JEE Main 2025 · 7 Apr · Shift 2

Which one of the following forces cannot be expressed in terms of potential energy?

(A) Frictional force

(B) Coulomb's force

(C) Restoring force

(D) Gravitational force

Step-by-step solution ▸ prepwiser.in/questions/lIJzZJK7Kf

Q62 JEE Main 2025 · 28 Jan · Shift 1

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason $\mathbf{R}$

Assertion A: In a central force field, the work done is independent of the path chosen.

Reason R: Every force encountered in mechanics does not have an associated potential energy.

In the light of the above statements, choose the most appropriate answer from the options given below

(A) $\mathbf{A}$ is false but $\mathbf{R}$ is true

(B) Both $\mathbf{A}$ and $\mathbf{R}$ are true but $\mathbf{R}$ is NOT the correct explanation of $\mathbf{A}$

(C) $\mathbf{A}$ is true but $\mathbf{R}$ is false

(D) Both $\mathbf{A}$ and $\mathbf{R}$ are true and $\mathbf{R}$ is the correct explanation of $\mathbf{A}$

Step-by-step solution ▸ prepwiser.in/questions/WjzCw5o_TB

Conservation of Mechanical Energy · 1 PYQs

Q63 JEE Main 2024 · 4 Apr · Shift 1

If a rubber ball falls from a height h and rebounds upto the height of $h/2$. The percentage loss of total energy of the initial system as well as velocity ball before it strikes the ground, respectively, are :

(A) $50\%, \sqrt{2gh}$

(B) $50\%, \sqrt{gh}$

(C) $50\%, \sqrt{\frac{gh}{2}}$

(D) $40\%, \sqrt{2gh}$

Step-by-step solution ▸ prepwiser.in/questions/tKux_RVBYb

Answer key — Work, Energy & Power

Numbers match the question numbers above. For full working, open the solution link under each question.

1 **C**	2 **C**	3 **D**	4 **C**	5 **B**	6 **B**	7 **C**	8 **3**
9 **B**	10 **30**	11 **125**	12 **2**	13 **7**	14 **C**	15 **C**	16 **B**
17 **B**	18 **B**	19 **D**	20 **600**	21 **C**	22 **16**	23 **A**	24 **A**
25 **C**	26 **C**	27 **D**	28 **D**	29 **B**	30 **D**	31 **A**	32 **300**
33 **48**	34 **4**	35 **100**	36 **D**	37 **B**	38 **C**	39 **D**	40 **A**
41 **B**	42 **D**	43 **D**	44 **C**	45 **152**	46 **58**	47 **30**	48 **784**
49 **32**	50 **40**	51 **132**	52 **D**	53 **C**	54 **2**	55 **450**	56 **C**
57 **150**	58 **A**	59 **C**	60 **1**	61 **A**	62 **B**	63 **A**	

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