

APOLLO

Work, energy and power

SL

Physics

First assessment 2025

7 questions | questions

5. A spring obeys Hooke's law and has a spring constant k .
 The spring is extended horizontally. The extension of the spring is x .
 When released, the spring returns to its original length in time Δt .

What is the average power developed by the spring as it returns to its original length?

- A. $\frac{kx}{2\Delta t}$
- B. $\frac{kx}{\Delta t}$
- C. $\frac{kx^2}{2\Delta t}$
- D. $\frac{kx^2}{\Delta t}$

12. A solar panel has a surface area of 0.20 m^2 . The efficiency of the solar panel is 30 %. At one instant the radiation intensity at normal incidence to the panel is $0.15\text{ kJ m}^{-2}\text{ s}^{-1}$.

What is the power output of the panel?

- A. 9.0 mW
- B. 30 mW
- C. 9.0 W
- D. 30 W

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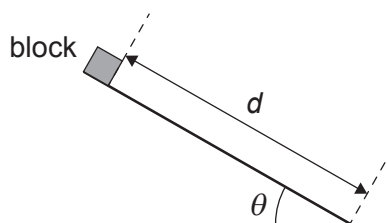
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5. 0.25 J of work is done to compress a spring by a distance of 0.10 m from its unstretched length. What is the spring constant?
- A. 2.5 N m^{-1}
 - B. 5.0 N m^{-1}
 - C. 25 N m^{-1}
 - D. 50 N m^{-1}

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6. A block of mass m is released from rest and slides down a ramp of length d that makes an angle θ with the horizontal. A constant frictional force F acts on the block.



What is the kinetic energy of the block at the bottom of the ramp?

- A. $mgd - Fd \cos \theta$
- B. $mgd - Fd$
- C. $mgd \sin \theta - Fd \cos \theta$
- D. $mgd \sin \theta - Fd$

5. A pump has efficiency η when raising water from a well of depth d . The mass of water raised per second is R . Changes in kinetic energy of the water are considered negligible.

What is the input power to the pump required to raise the water?

- A. $\frac{Rd}{\eta g}$
- B. $\frac{\eta R}{gd}$
- C. ηRgd
- D. $\frac{Rdg}{\eta}$

— T —

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3. A net force of 8.0 N accelerates a 4.0 kg body from rest to a speed of 5.0 m s^{-1} .

What is the work done by the force?

- A. 50 J
- B. 40 J
- C. 32 J
- D. 20 J

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5. An object is released from rest in a vacuum at a height H above the Earth's surface.

As the object falls it passes a point at a height of $0.75H$ above the surface.

What is $\frac{\text{kinetic energy of the object at a height of } 0.75H}{\text{gravitational potential energy of the object at a height of } H}$?

A. $\frac{1}{16}$

B. $\frac{1}{4}$

C. $\frac{9}{16}$

D. $\frac{3}{4}$

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