

# PHYSICS MADE EASY

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قيّم معلوماتك

Ch1-Energy and its conservation

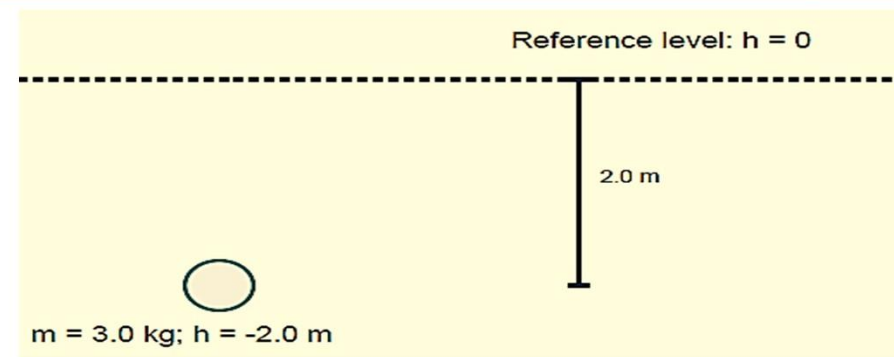
أسم الطالب:

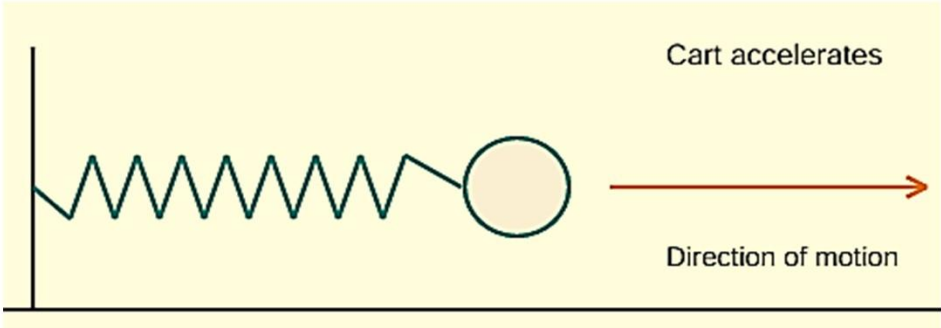
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|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--|
| Q1                        | An external agent does (+60 J) of work on a system. No other energy enters or leaves the system. How does the system's total energy change? |  |
| A. It decreases by 60 J.  |                                                                                                                                             |  |
| D. It increases by 60 J.  |                                                                                                                                             |  |
| C. It remains unchanged.  |                                                                                                                                             |  |
| B. It increases by 120 J. |                                                                                                                                             |  |

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| Q2        | A uniform solid sphere of mass $M = 5.0$ kg and radius $R = 0.2$ m rolls without slipping with an angular velocity of 10 rad/s. What is its rotational kinetic energy ( $I_{\text{sphere}} = \frac{2}{5}MR^2$ )? |  |
| A) 2.0 J  |                                                                                                                                                                                                                  |  |
| B) 4.0 J  |                                                                                                                                                                                                                  |  |
| C) 8.0 J  |                                                                                                                                                                                                                  |  |
| D) 20.0 J |                                                                                                                                                                                                                  |  |

|                  |                                                                                                                                                                                |  |
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| Q3               | A car travels at speed ( $v$ ). Its speed increases to ( $3v$ ), while its mass remains constant. What is the ratio of its final kinetic energy to its initial kinetic energy? |  |
| A. 3             |                                                                                                                                                                                |  |
| D. 6             |                                                                                                                                                                                |  |
| C. 9             |                                                                                                                                                                                |  |
| B. $\frac{1}{3}$ |                                                                                                                                                                                |  |

|            |                                                                                                                                                                          |  |
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| Q4         | A (3.0) object is located (2.0 m) below the chosen zero level for gravitational potential energy. What is the gravitational potential energy of the object–Earth system? |  |
| A. +58.8 J |                                                                                                                                                                          |  |
| D. −58.8 J |                                                                                                                                                                          |  |
| C. 0 J     |                                                                                                                                                                          |  |
| B. −5.88 J |                                                                                                                                                                          |  |

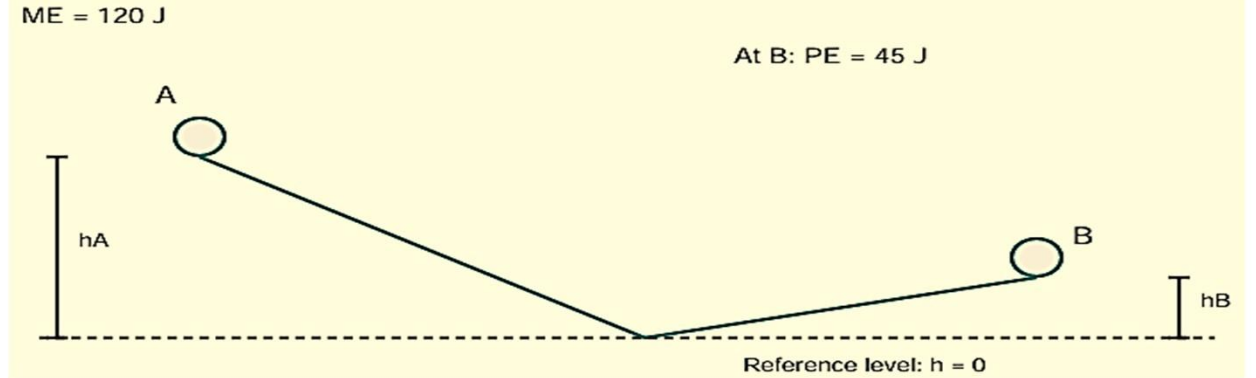


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| Q5                                                                                                                                                                                                                       | A compressed spring launches an initially stationary cart along a horizontal track. Which energy conversion occurs as the spring expands and the cart speeds up? |  |
| <p>A. Thermal energy into gravitational potential energy.</p> <p>D. Kinetic energy into nuclear energy.</p> <p>C. Elastic potential energy into kinetic energy.</p> <p>B. Rest energy into elastic potential energy.</p> |                                                                               |  |

|                                                                                                                                                                              |                                                                                              |  |
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| Q6                                                                                                                                                                           | A particle has a mass of (2.0 kg). Calculate its rest energy using ( $c=3 \times 10^8$ m/s ) |  |
| <p>A. <math>1.8 \times 10^8</math> J</p> <p>D. <math>6.0 \times 10^{-1}</math> J</p> <p>C. <math>1.8 \times 10^{-8}</math> J</p> <p>B. <math>9.0 \times 10^{16}</math> J</p> | $E = mc^2$                                                                                   |  |

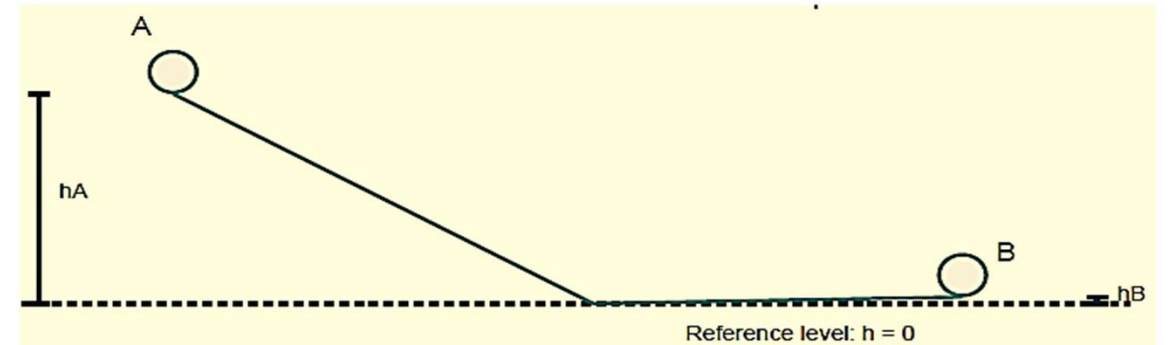
Q7 A cart moves along a frictionless track. The total mechanical energy of the cart–Earth system is (120J). At point B, the gravitational potential energy is (45 J). What is the cart's kinetic energy at B?

- A. 165 J
- D. 45 J
- C. 120 J
- B. 75 J



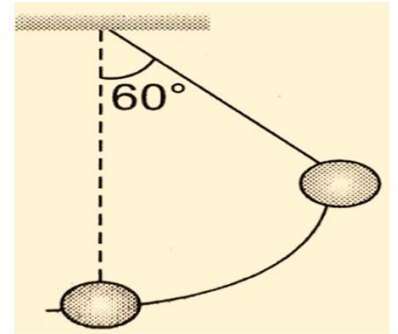
Q8 A uniform solid sphere starts from rest and rolls without slipping down a ramp through a vertical drop of (1.40m) What is its linear speed after this drop? Assume no dissipative energy losses. Use  $I = \frac{2}{5}mr^2$ ,  $\omega = \frac{v}{r}$

- A. 4.43 m/s
- D. 5.24 m/s
- C. 3.70 m/s
- B. 6.20 m/s



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| Q9        | A ball is dropped from rest at a height of (10 m) above the floor. During each impact, (20%) of its mechanical energy immediately before impact is converted into internal energy and sound. Ignoring air resistance, what maximum height does the ball reach after its <b>third impact</b> ? |  |
| A. 8.00 m |                                                                                                                                                                                                                                                                                               |  |
| D. 6.40 m |                                                                                                                                                                                                                                                                                               |  |
| C. 5.12 m |                                                                                                                                                                                                                                                                                               |  |
| B. 2.00 m |                                                                                                                                                                                                                                                                                               |  |

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| Q10         | A pendulum consists of a small bob attached to a light string of length (1.20 m). The bob is released from rest when the string makes an angle of ( $60^0$ ) with the vertical. What is the bob's speed at the lowest point? Neglect air resistance and pivot friction |  |
| A. 3.43 m/s |                                                                                                                                                                                                                                                                        |  |
| D. 4.85 m/s |                                                                                                                                                                                                                                                                        |  |
| C. 2.43 m/s |                                                                                                                                                                                                                                                                        |  |
| B. 5.94 m/s |                                                                                                                                                                                                                                                                        |  |



**Q)** A (1.0kg) cart moving at (+6.0m/s) collides elastically with a stationary (2.0kg) cart on a horizontal track. Assuming negligible external impulse, what are the final velocities( $v_1$ ) and ( $v_2$ ), respectively? Take motion to the right as positive