Question 1

A telephone is suspended from a rope. A person controls the rope so that the telephone is lowered at a constant speed.

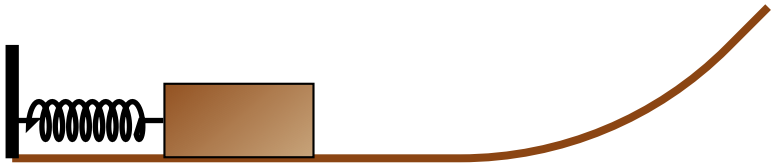
Which of the following is true?

1. The rope does positive work, gravity does positive work.
2. The rope does positive work, gravity does negative work.
3. The rope does negative work, gravity does positive work.
4. The rope does negative work, gravity does negative work.

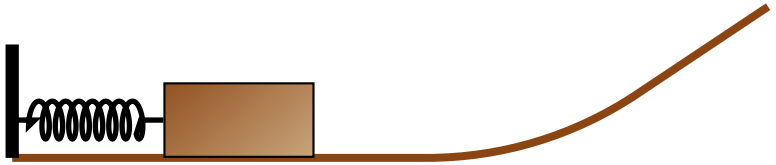
Question 2

Identical blocks are each pushed against identical springs so that each spring is compressed by the same amount.

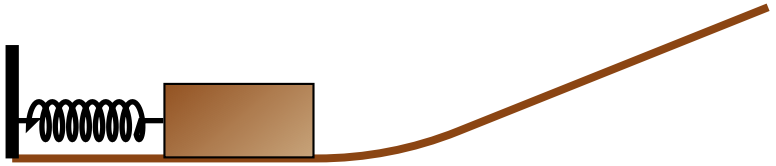
Case A



Case B



Case C

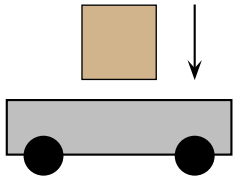


Each block is released from rest and slides along the frictionless surface. Consider the maximum height that each block reaches along the ramp. Which of the following best represents the order of these?

1. $h_A = h_B = h_C$
2. $h_A < h_B < h_C$
3. $h_A > h_B > h_C$
4. Not enough info to decide.

Question 3

An $8\,\mathrm{kg}$ cart moves to the right with speed $10\,\mathrm{m/s}$. A $2\,\mathrm{kg}$ block is dropped gently onto the cart, so that at the moment before it touches the cart, the block is almost at rest. The block sticks to the cart after it lands.

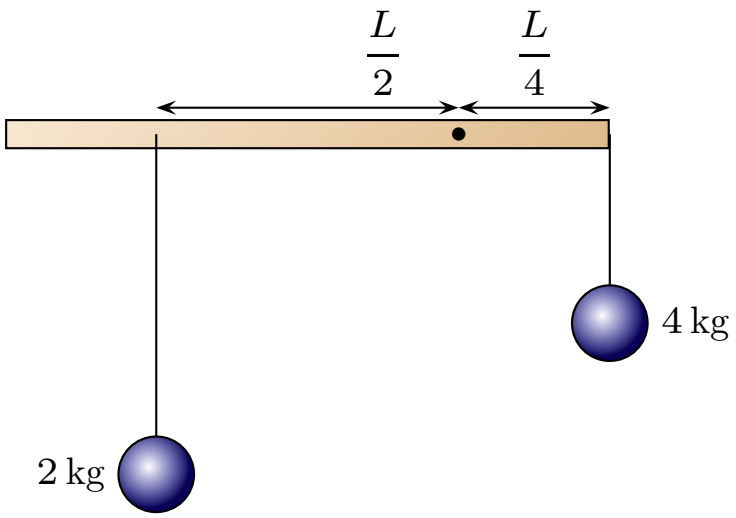


Which of the following best describes the velocity of the cart and block?

1. $10\,\mathrm{m/s}$ $\longrightarrow$
2. $10\,\mathrm{m/s}$ $\longleftarrow$
3. $8\,\mathrm{m/s}$ $\longrightarrow$
4. $5\,\mathrm{m/s}$ $\longrightarrow$
5. $1\,\mathrm{m/s}$ $\longrightarrow$
6. $0\,\mathrm{m/s}$

Question 4

A $1.0\,\mathrm{kg}$ metal rod with length L is free to pivot about *an axle to the right of its midpoint.* Two balls are suspended as illustrated.

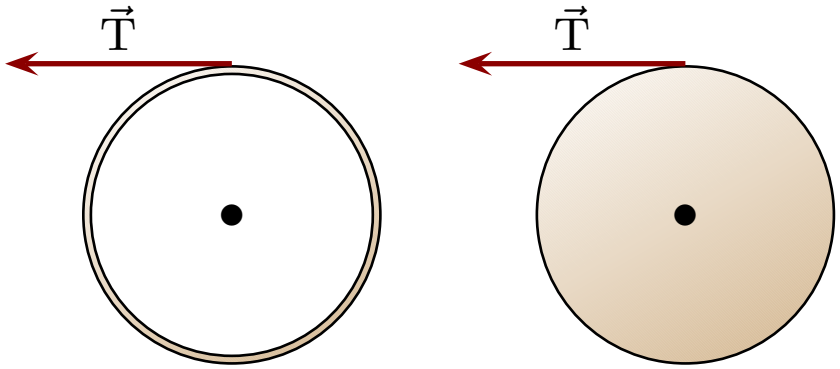


Which of the following best describes the net torque on the metal rod?

1. $\tau_{\text{net}} = 0$
2. $\tau_{\text{net}} > 0$
3. $\tau_{\text{net}} < 0$

Question 5

A disk and a hoop have the same mass and radius and can rotate about a frictionless axle at their centers. A string is connected to the rim of each and pulled with the same constant tension. Both are initially at rest.



Which of the following describes their angular accelerations?

1. $\alpha_{\text{hoop}} = \alpha_{\text{disk}}$.
2. $\alpha_{\text{hoop}} > \alpha_{\text{disk}}$.
3. $\alpha_{\text{hoop}} < \alpha_{\text{disk}}$.