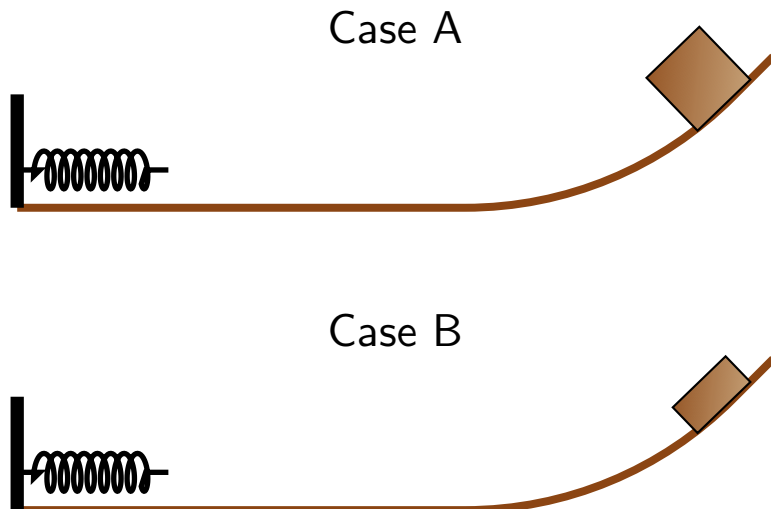


Question 1

Two blocks are released from rest at the same height on the same tracks. They slide down the frictionless tracks, colliding with identical springs. The mass of A is twice the mass of B.

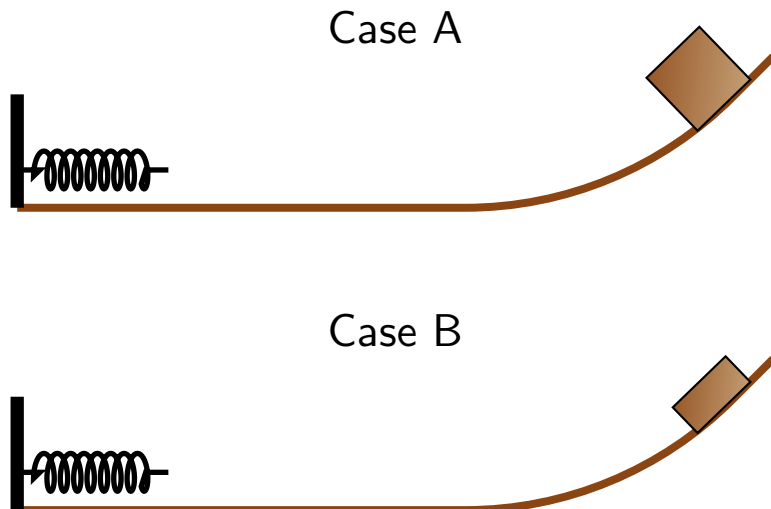


Let v_A be the speed of block A just before hitting its spring and v_B be the speed of block B just before hitting its spring. Which of the following is true?

1. $v_A = v_B$
2. $v_A > v_B$
3. $v_A < v_B$

Question 2

Two blocks are released from rest at the same height on the same tracks. They slide down the frictionless tracks, colliding with identical springs. The mass of A is twice the mass of B.

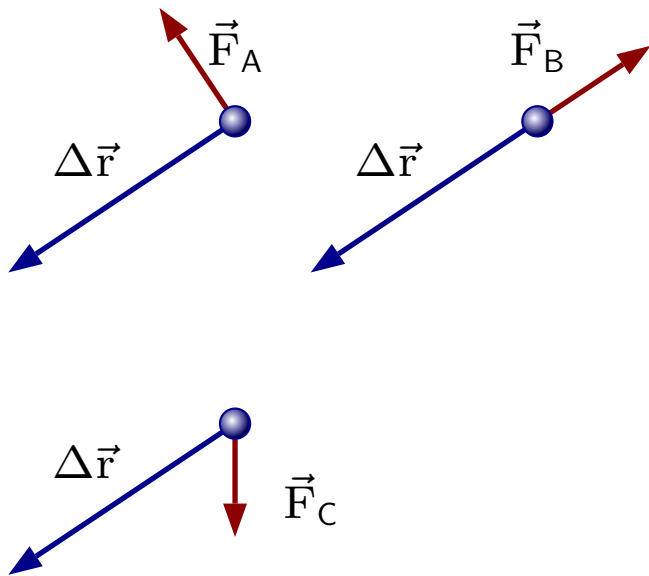


Let x_A be the maximum compression of spring A during the collision with the block and x_B , the maximum compression of spring B. Which of the following is true?

1. $x_A = x_B$
2. $x_A > x_B$
3. $x_A < x_B$

Question 3

Three objects have the same displacement while forces of the same magnitude act on them.

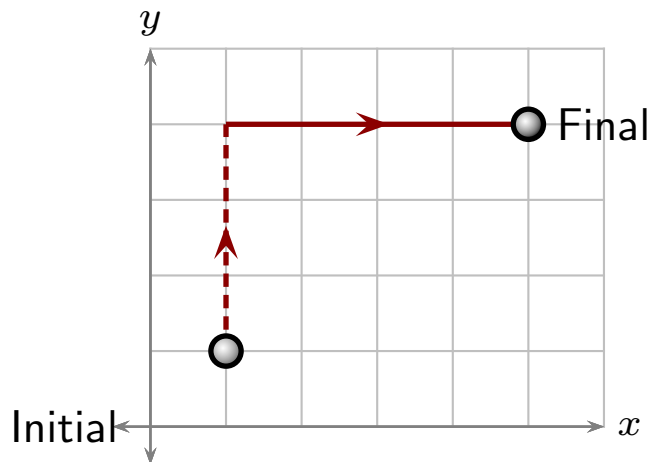


Which of the following represents the rank of the works done by the forces?

1. $W_A = W_B = W_C$
2. $W_B > W_A > W_C$
3. $W_B > W_C > W_A$
4. $W_C > W_B > W_A$
5. $W_C > W_A > W_B$

Question 4

A ball moves on a horizontal surface from an initial to a final location via the illustrated route (units in meters). The force along the dashed line section is $3.0 \text{ N}\hat{i} + 4.0 \text{ N}\hat{j}$ and along the solid line section it is $-3.0 \text{ N}\hat{i} + 4.0 \text{ N}\hat{j}$.

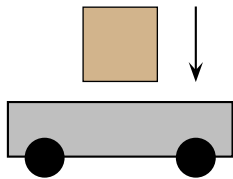


Which of the following is the work done by these forces on the ball as it moves from initial to final location?

1. 0 J
2. 5 J
3. 24 J
4. 25 J

Question 5

An 8 kg cart moves to the right with speed 10 m/s. A 2 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 m/s \rightarrow
2. 10 m/s \leftarrow
3. 8 m/s \rightarrow
4. 5 m/s \rightarrow
5. 1 m/s \rightarrow
6. 0 m/s