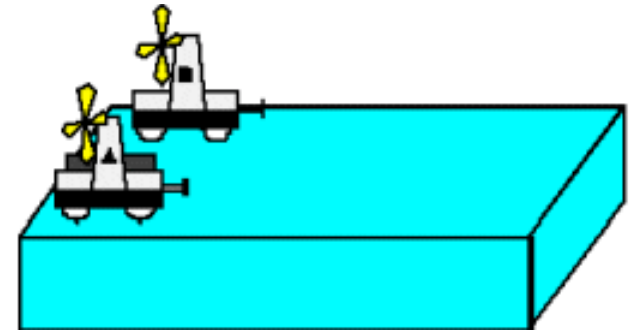


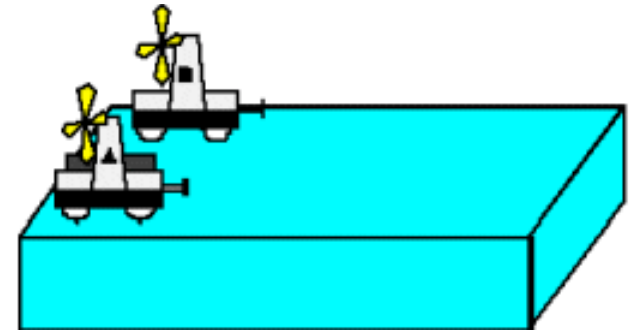
Two fan carts are on opposite sides of a table with their fans pointed in the same direction. Cart A is twice as heavy as cart B. When the fans are on, they cause the air to exert a constant force of the cart independent of its mass. Assume friction can be neglected. The fans are set with a timer so that after they are switched on, **they stay on for a fixed length of time, Δt , and then are turned off.**



Just after the fans are turned off, which is true about the momenta of the two carts?

- (A) $\mathbf{p}_A > \mathbf{p}_B$
- (B) $\mathbf{p}_A < \mathbf{p}_B$
- (C) $\mathbf{p}_A = \mathbf{p}_B$

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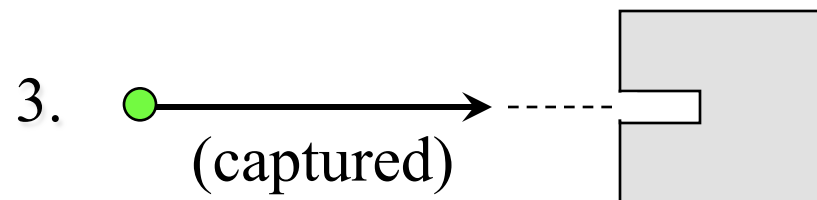
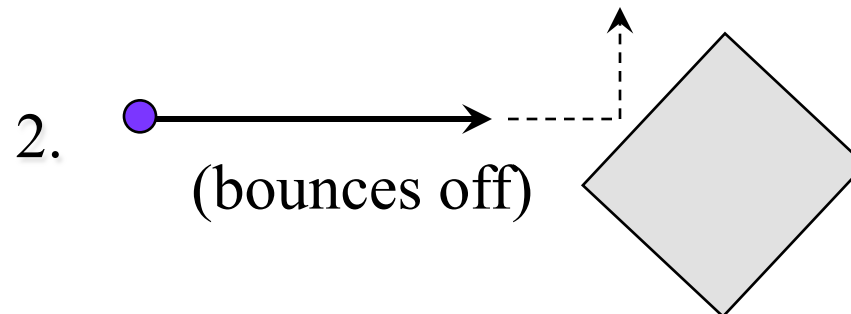
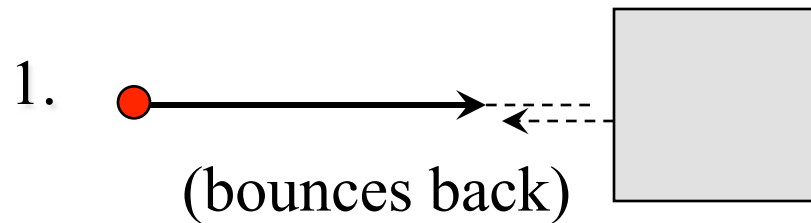


Just after the fans are turned off, which is true about the velocity of the two carts?

- (A) $v_A > v_B$
- (B) $v_A < v_B$
- (C) $v_A = v_B$

A ball on a table sliding
and hitting a block.

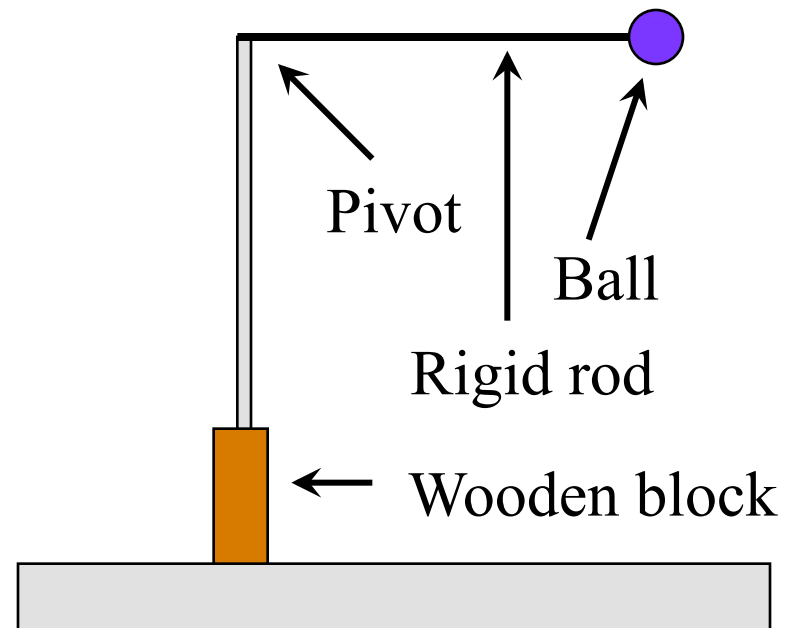
Which ball exerts
the most force on the block?



Which ball will knock the block over?



1. A superball
2. A clay ball of equal mass
3. Both
4. Neither





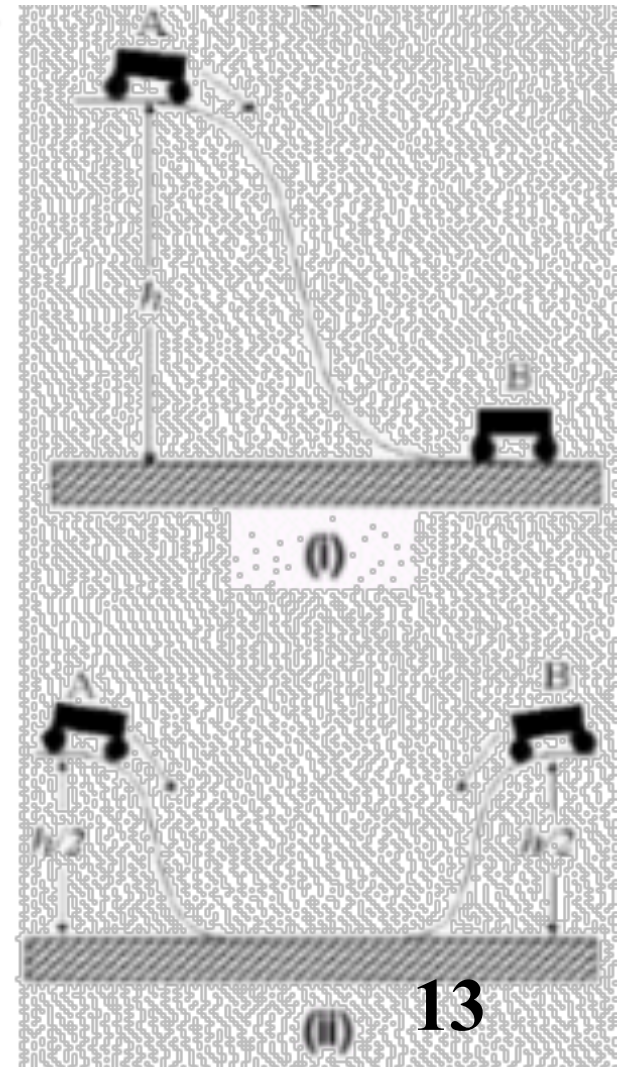
Two identical carts A and B roll down a hill and collide as shown in the figures at the right.

(i): A starts from rest. It rolls down and collides head-on with B which is initially at rest on the ground. The two carts stick together.

(ii): A and B are at rest on opposite sides of the hill. They roll down, collide head-on and stick together.

Which statement is true about the two-cart system just before the carts collide in the two cases?

1. The momentum of the system is zero in case (ii).
2. The momentum of the system is greater in case (i) than in case (ii).
3. The momentum of the system is greater in case (ii) than in case (i).
4. The momentum of the system is the same in both cases (but not 0).
5. More than one statement is true.





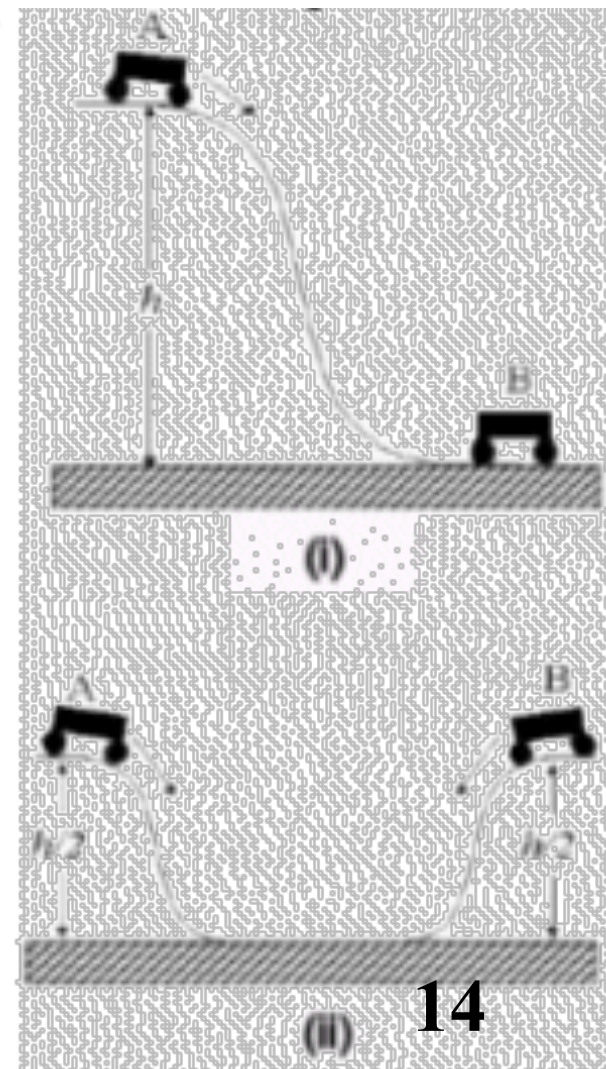
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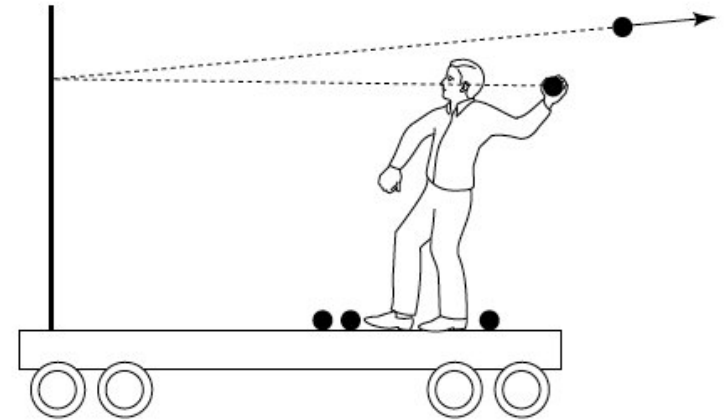
Which statement is true about the two-cart system just after the carts collide and stick in the two cases?

1. The momentum of the system is zero in case (ii).
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5. More than one statement is true.



Suppose you are on a cart, initially at rest on a track with negligible friction.

You throw balls at a partition that is rigidly mounted on the cart. The balls bounce straight back as shown in the figure.



Is the total horizontal momentum of the person, cart, partition, plus all the balls conserved in the process of throwing the balls and having them bounce off the partition?

- (1) Yes.
- (2) No.
- (3) You are not given enough information to decide.

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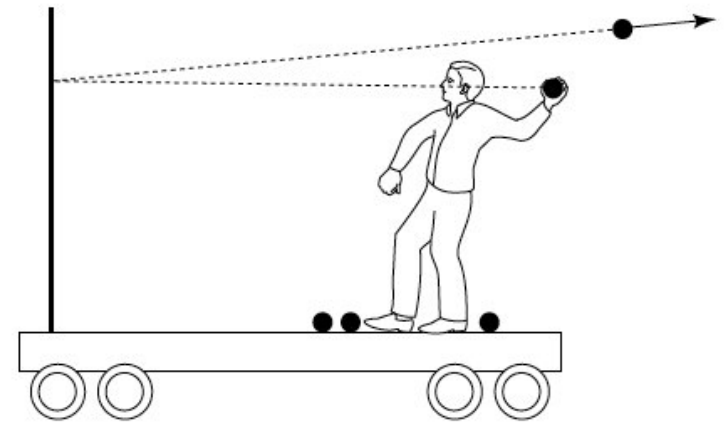
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Suppose you are on a cart, initially at rest on a track with negligible friction.

You throw balls at a partition that is rigidly mounted on the cart. The balls bounce straight back as shown in the figure.



Is the cart put in motion?

- (1) Yes. Towards the left
- (2) Yes. Towards the right.
- (3) No.
- (4) You are not given enough information to decide.

