

PHYSICS

FOR SCIENTISTS AND ENGINEERS A STRATEGIC APPROACH 4/E

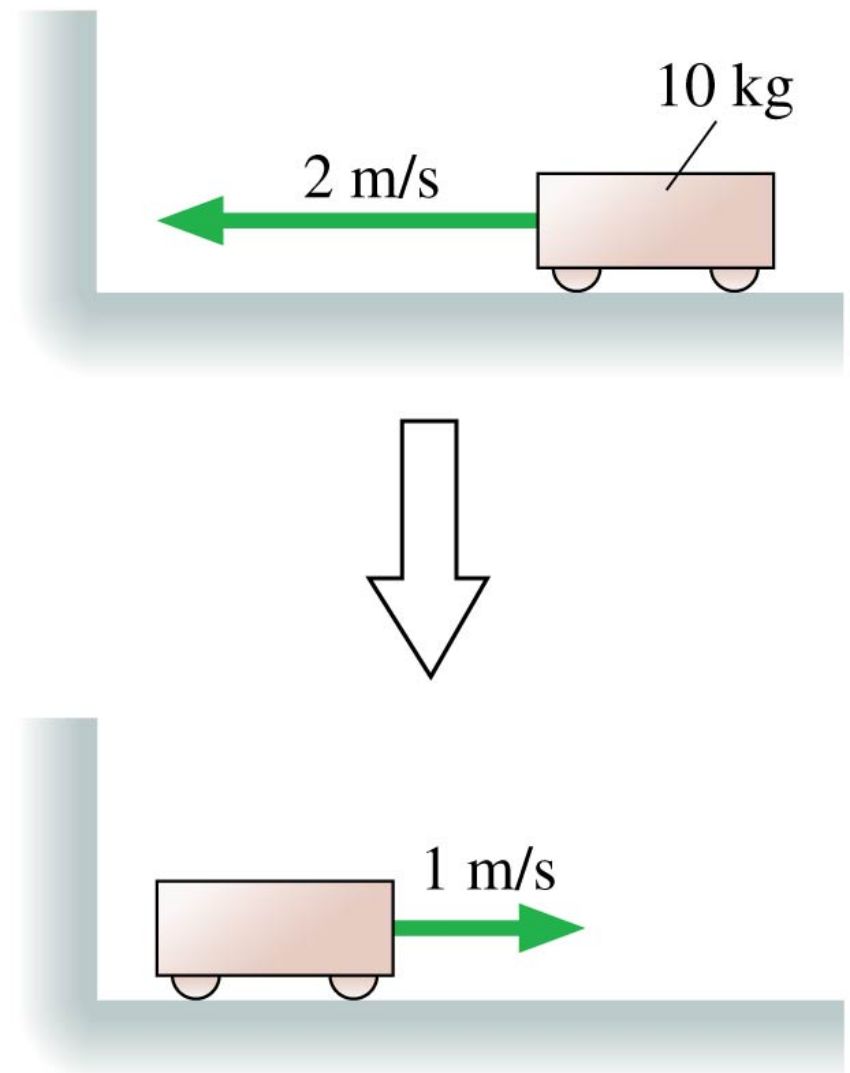
Chapter 11 QuickCheck Questions

RANDALL D. KNIGHT

QuickCheck 11.1

The cart's change of momentum Δp_x is

- A. -20 kg m/s
- B. -10 kg m/s
- C. 0 kg m/s
- D. 10 kg m/s
- E. 30 kg m/s



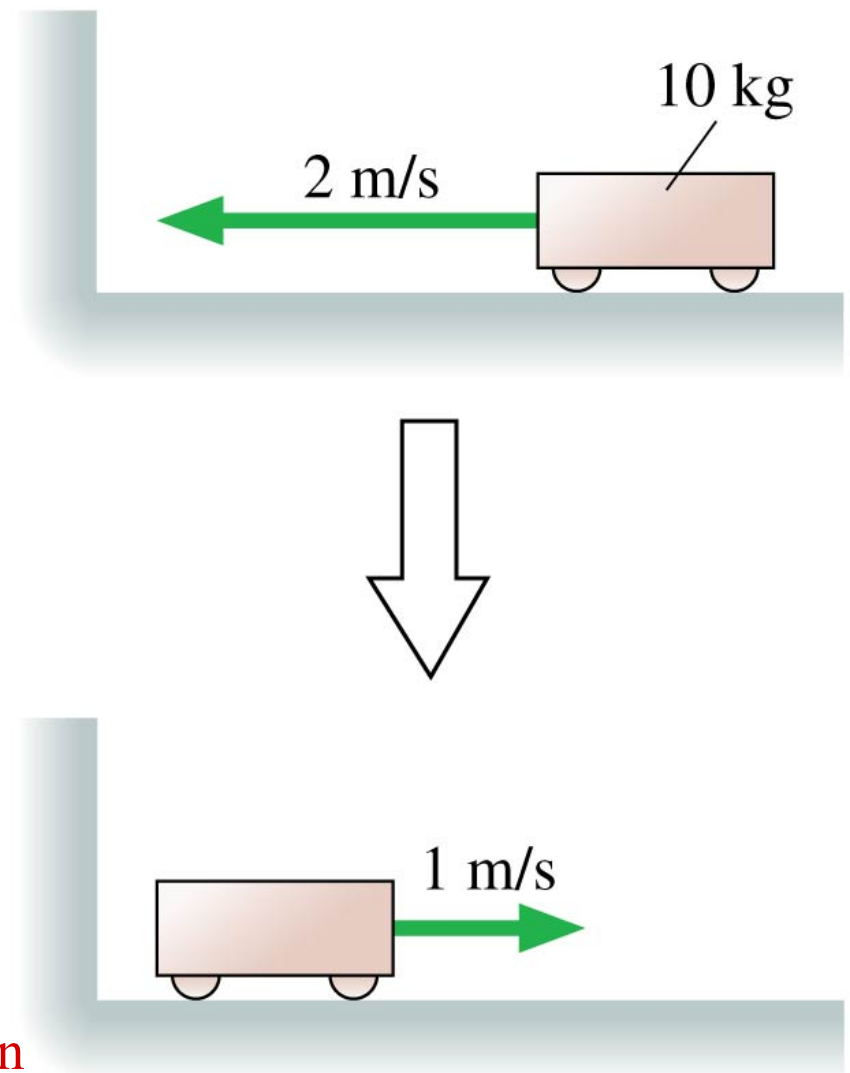
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- B. -10 kg m/s
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- ✓ E. **30 kg m/s**

$$\Delta p_x = 10 \text{ kg m/s} - (-20 \text{ kg m/s}) = 30 \text{ kg m/s}$$

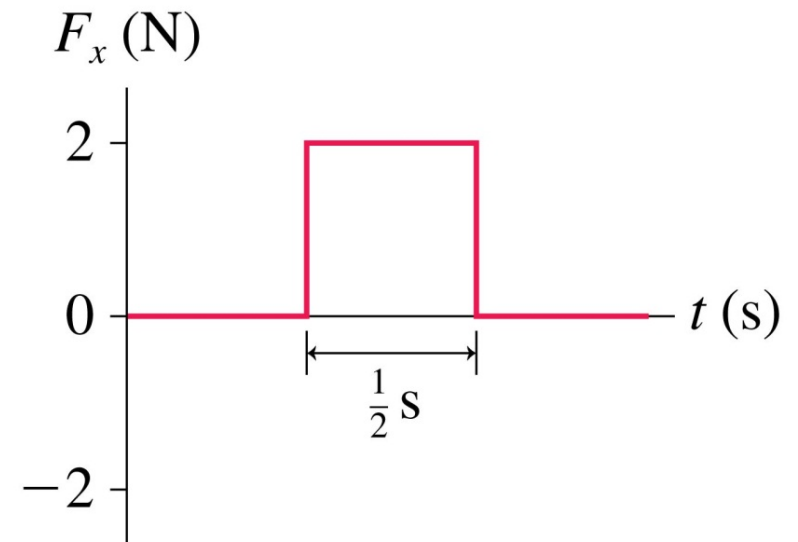
Negative initial momentum because motion is to the left and $v_x < 0$.



QuickCheck 11.2

A 2.0 kg object moving to the right with speed 0.50 m/s experiences the force shown. What are the object's speed and direction after the force ends?

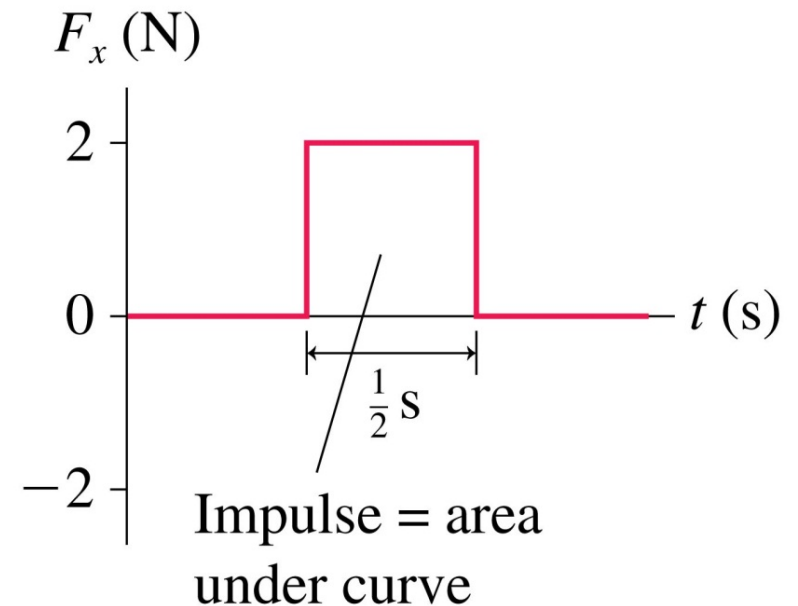
- A. 0.50 m/s left
- B. At rest
- C. 0.50 m/s right
- D. 1.0 m/s right
- E. 2.0 m/s right



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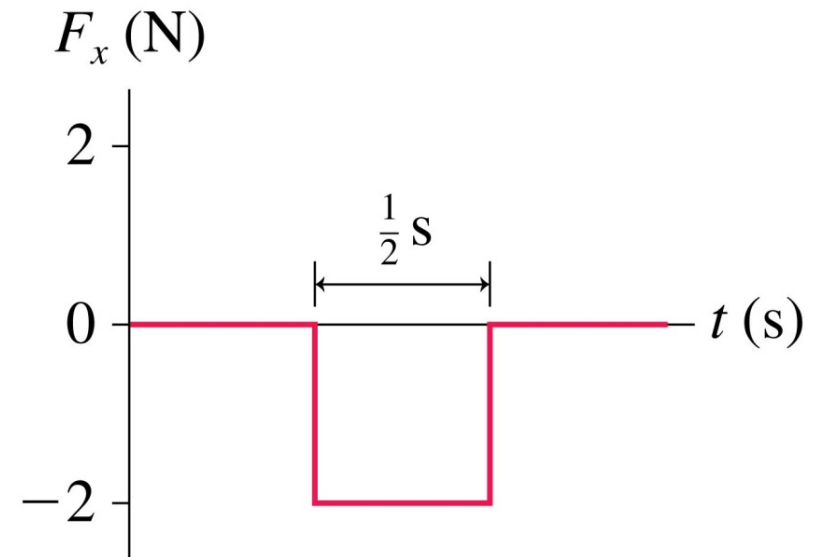


$$\Delta p_x = J_x \text{ or } p_{fx} = p_{ix} + J_x$$

QuickCheck 11.3

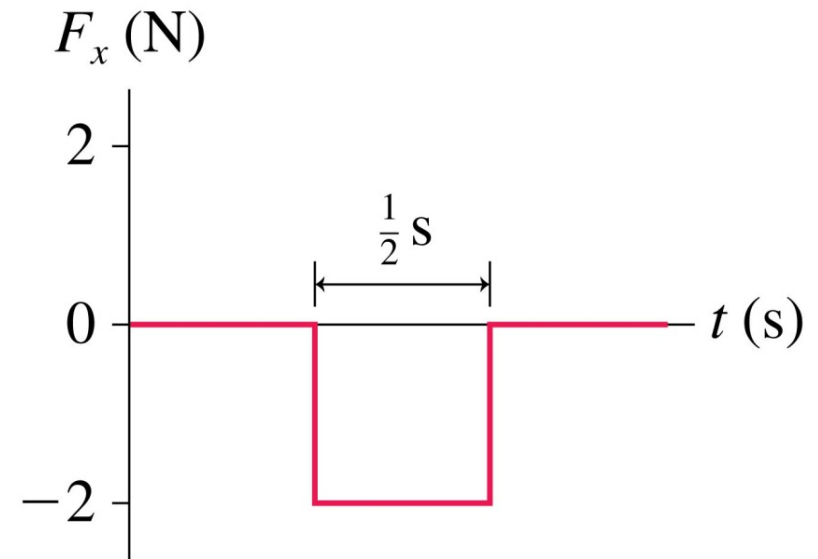
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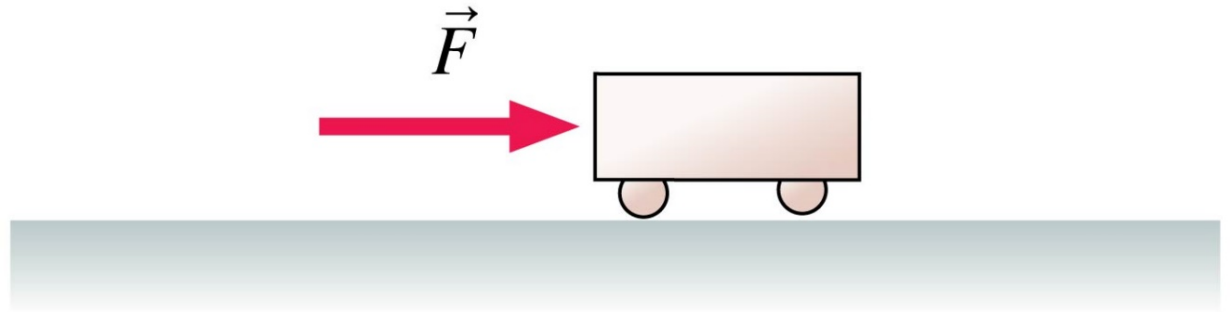


- A. 0.50 m/s left
- ✓ B. **At rest**
- C. 0.50 m/s right
- D. 1.0 m/s right
- E. 2.0 m/s right

QuickCheck 11.4

A force pushes the cart for 1 s, starting from rest. To achieve the same speed with a force half as big, the force would need to push for

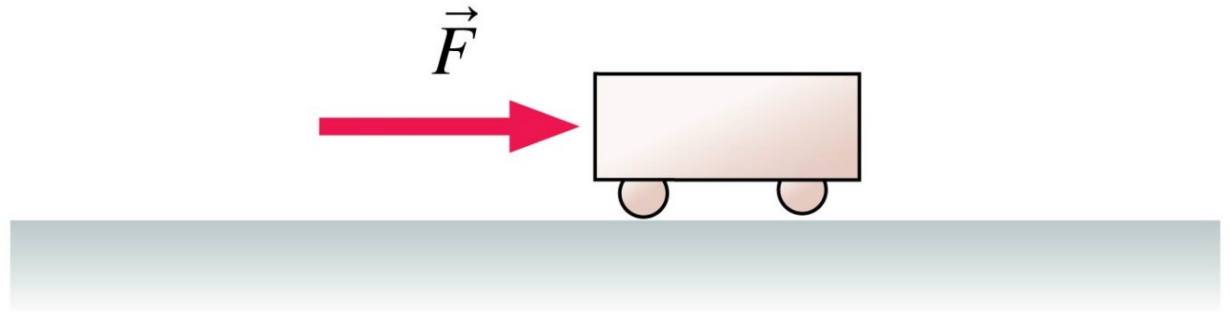
- A. $\frac{1}{4}$ s
- B. $\frac{1}{2}$ s
- C. 1 s
- D. 2 s
- E. 4 s



QuickCheck 11.4

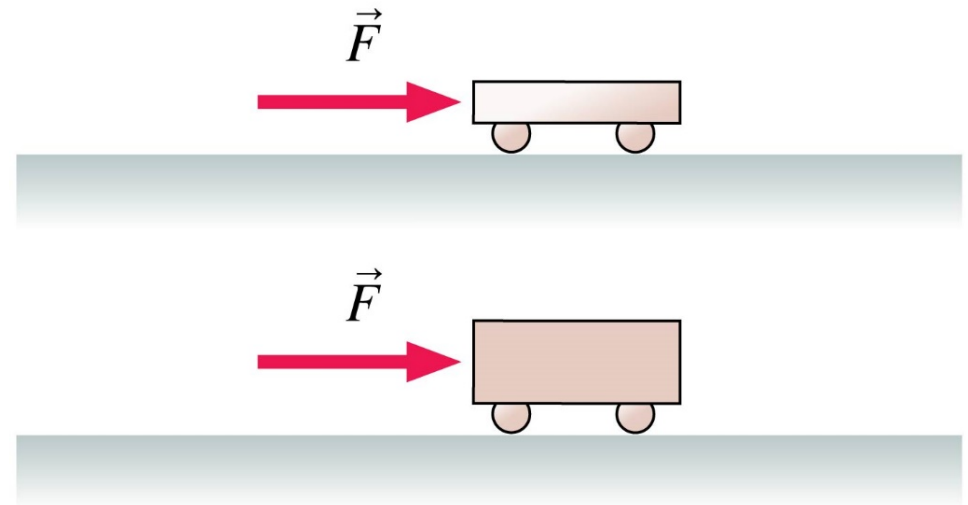
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- A. $\frac{1}{4}$ s
- B. $\frac{1}{2}$ s
- C. 1 s
- ✓ D. 2 s
- E. 4 s



QuickCheck 11.5

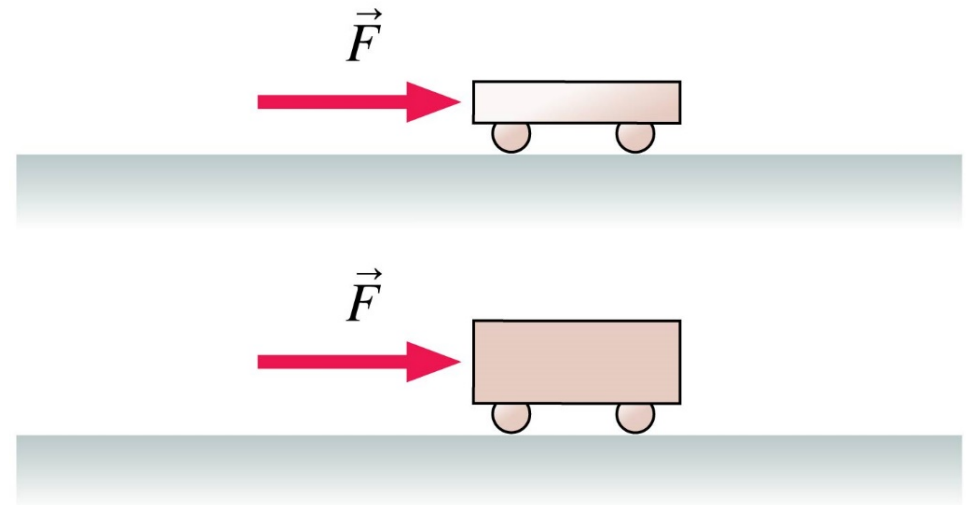
A light plastic cart and a heavy steel cart are both pushed with the same force for 1.0 s, starting from rest. After the force is removed, the momentum of the light plastic cart is _____ that of the heavy steel cart.



- A. greater than
- B. equal to
- C. less than
- D. Can't say. It depends on how big the force is.

QuickCheck 11.5

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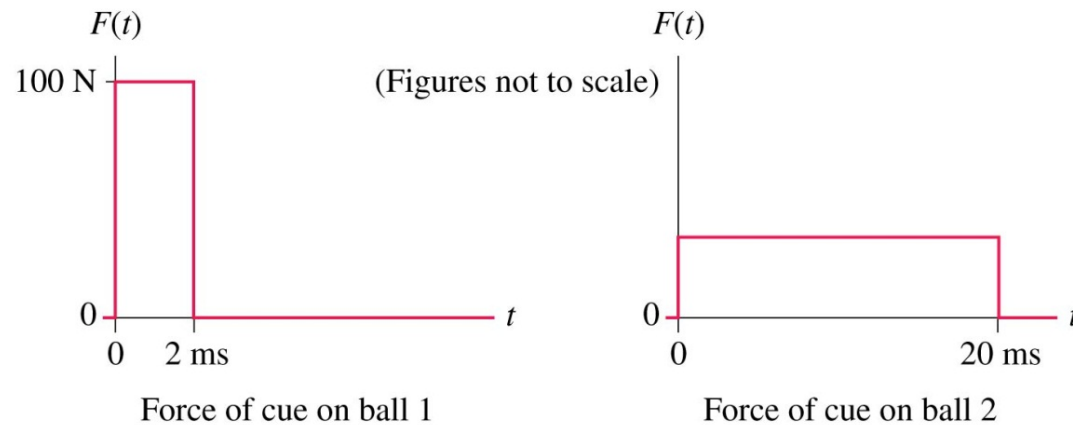


- A. greater than
- ✓ B. equal to
- C. less than
- D. Can't say. It depends on how big the force is.

Same force, same time \rightarrow same impulse
Same impulse \rightarrow same change of momentum

QuickCheck 11.6

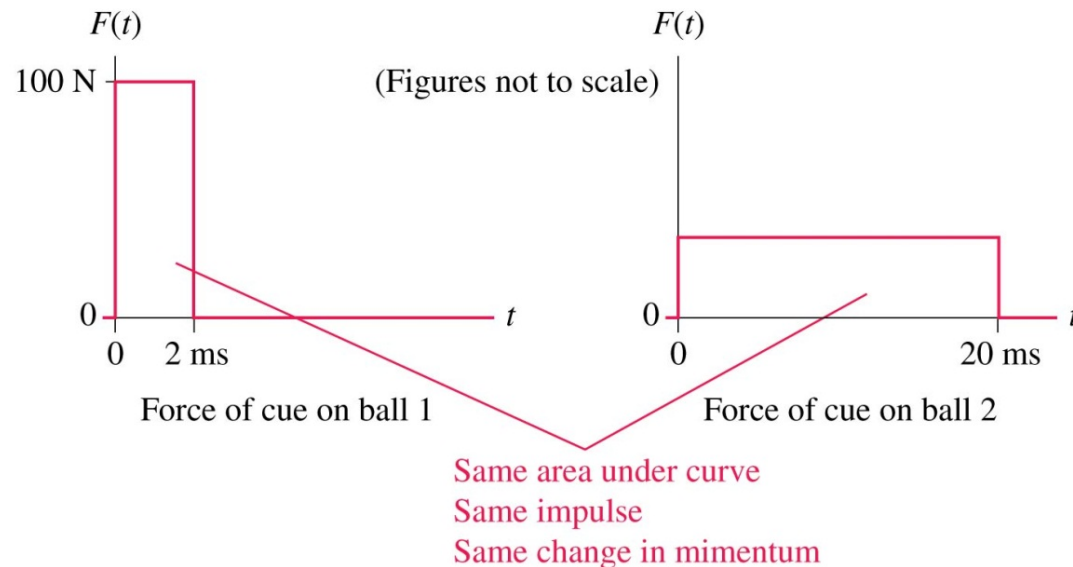
Two 1.0 kg stationary cue balls are struck by cue sticks. The cues exert the forces shown. Which ball has the greater final speed?



- A. Ball 1
- B. Ball 2
- C. Both balls have the same final speed.

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- A. Ball 1
- B. Ball 2
- ✓ C. Both balls have the same final speed.

QuickCheck 11.7

You awake in the night to find that your living room is on fire. Your one chance to save yourself is to throw something that will hit the back of your bedroom door and close it, giving you a few seconds to escape out the window. You happen to have both a sticky ball of clay and a super-bouncy Superball next to your bed, both the same size and same mass. You've only time to throw one. Which will it be? Your life depends on making the right choice!

- A. Throw the Superball.
- B. Throw the ball of clay.
- C. It doesn't matter. Throw either.

QuickCheck 11.7

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- ✓ **A. Throw the Superball.** Larger $\Delta p \rightarrow$ more impulse to door
- B. Throw the ball of clay.
- C. It doesn't matter. Throw either.

QuickCheck 11.8

A mosquito and a truck have a head-on collision. Splat! Which has a larger change of momentum?

- A. The mosquito
- B. The truck
- C. They have the same change of momentum.
- D. Can't say without knowing their initial velocities.

QuickCheck 11.8

A mosquito and a truck have a head-on collision. Splat! Which has a larger change of momentum?

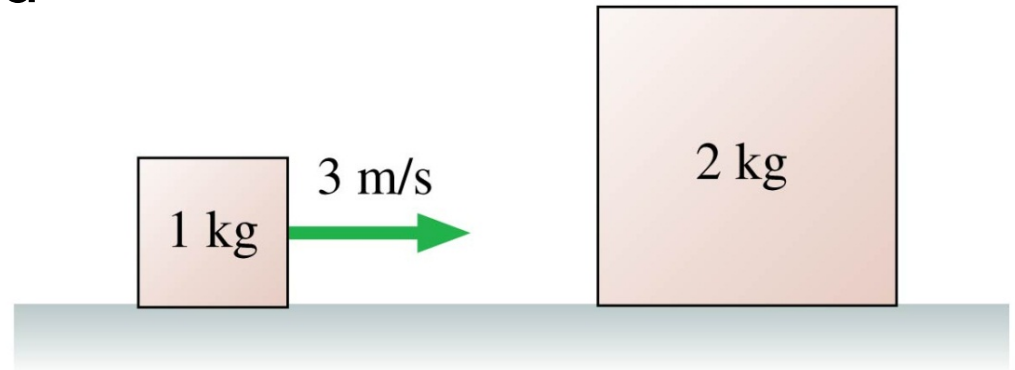
- A. The mosquito.
- B. The truck.
- ✓ **C. They have the same change of momentum.**
- D. Can't say without knowing their initial velocities.

Momentum is conserved, so $\Delta p_{\text{mosquito}} + \Delta p_{\text{truck}} = 0$.

Equal magnitude (but opposite sign) changes in momentum.

QuickCheck 11.9

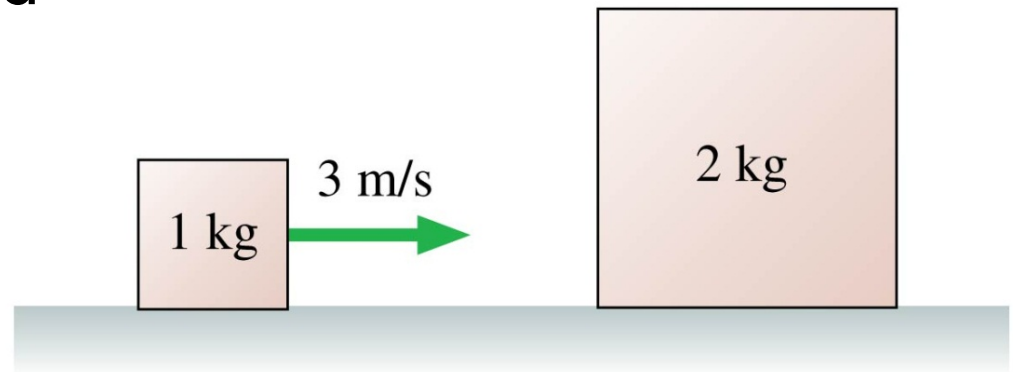
The 1 kg box is sliding along a frictionless surface. It collides with and sticks to the 2 kg box. Afterward, the speed of the two boxes is



- A. 0 m/s
- B. 1 m/s
- C. 2 m/s
- D. 3 m/s
- E. There's not enough information to tell.

QuickCheck 11.9

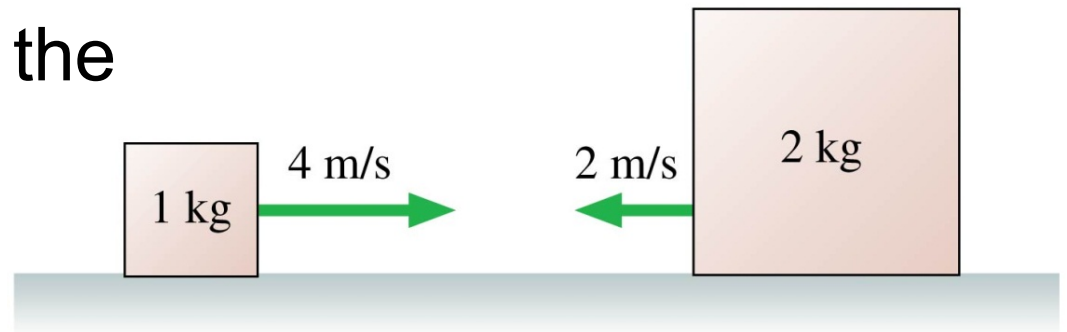
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QuickCheck 11.10

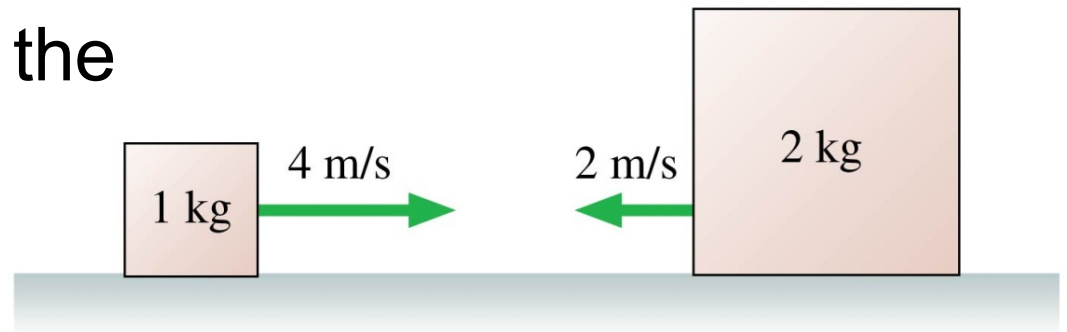
The two boxes are sliding along a frictionless surface. They collide and stick together. Afterward, the velocity of the two boxes is



- A. 2 m/s to the left.
- B. 1 m/s to the left.
- C. 0 m/s, at rest.
- D. 1 m/s to the right.
- E. 2 m/s to the right.

QuickCheck 11.10

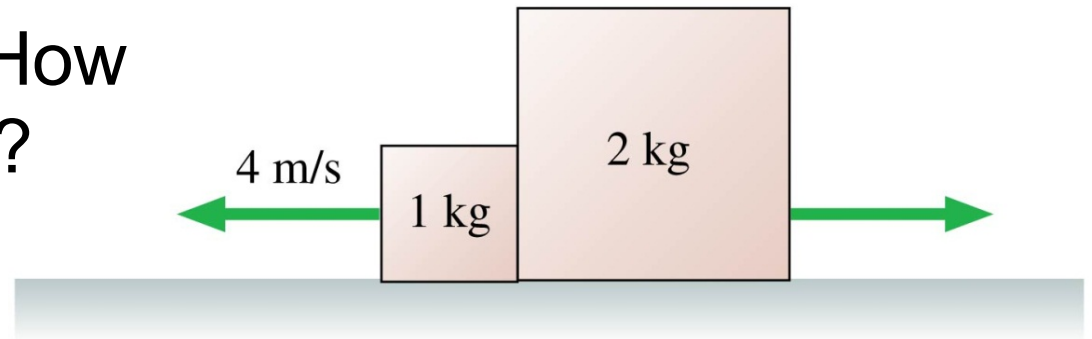
The two boxes are sliding along a frictionless surface. They collide and stick together. Afterward, the velocity of the two boxes is



- A. 2 m/s to the left.
- B. 1 m/s to the left.
- ✓ C. **0 m/s, at rest.**
- D. 1 m/s to the right.
- E. 2 m/s to the right.

QuickCheck 11.11

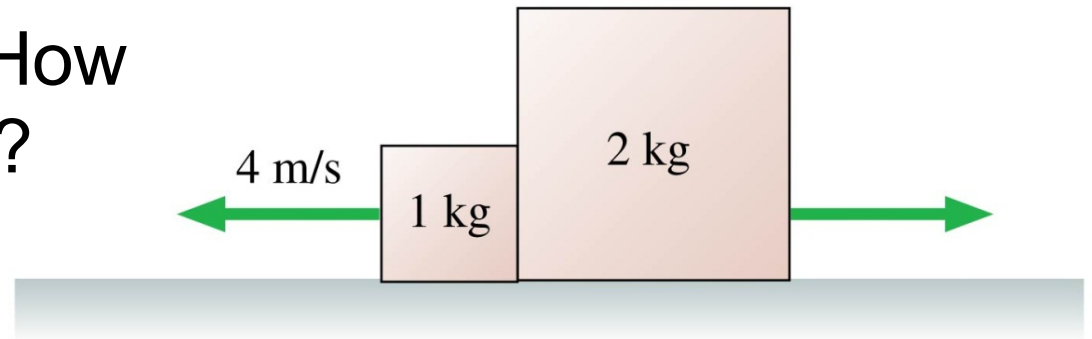
The two boxes are on a frictionless surface. They had been sitting together at rest, but an explosion between them has just pushed them apart. How fast is the 2 kg box going?



- A. 1 m/s
- B. 2 m/s
- C. 4 m/s
- D. 8 m/s
- E. There's not enough information to tell.

QuickCheck 11.11

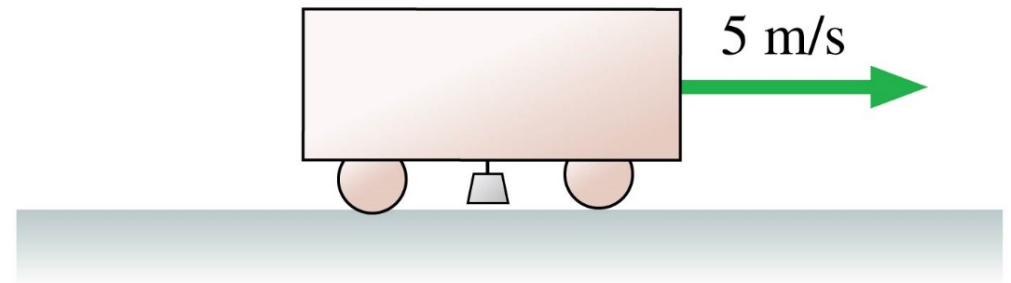
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- ✓ B. 2 m/s
- C. 4 m/s
- D. 8 m/s
- E. There's not enough information to tell.

QuickCheck 11.12

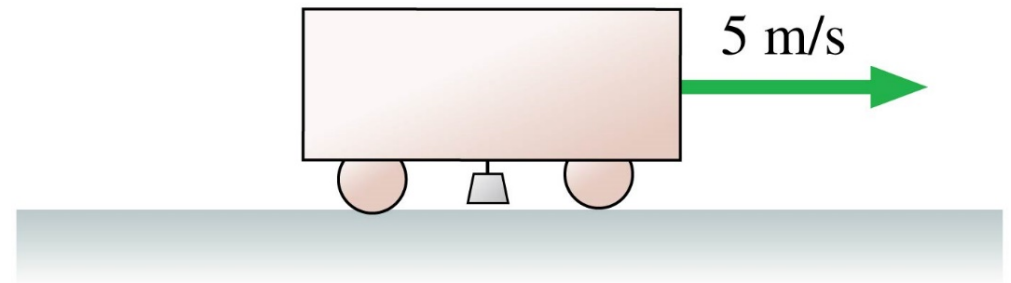
A cart is rolling at 5 m/s . A heavy lead weight is suspended by a thread beneath the cart. Suddenly the thread breaks and the weight falls. Immediately afterward, the speed of the cart is



- A. Less than 5 m/s
- B. Still 5 m/s
- C. More than 5 m/s

QuickCheck 11.12

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- A. Less than 5 m/s
- ✓ B. **Still 5 m/s**
- C. More than 5 m/s

No external forces to exert an impulse.
The falling weight still has forward momentum.