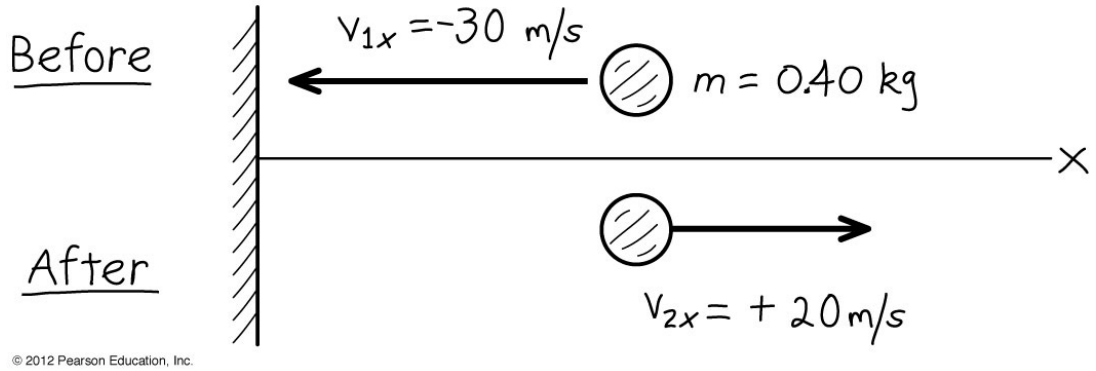
Q8.1

A ball (mass 0.40 kg) is initially moving to the left at 30 m/s. After hitting the wall, the ball is moving to the right at 20 m/s. What is the impulse of the net force on the ball during its collision with the wall?



A. 20 kg • m/s to the right

B. 20 kg • m/s to the left

C. 4.0 kg • m/s to the right

D. 4.0 kg • m/s to the left

E. none of the above

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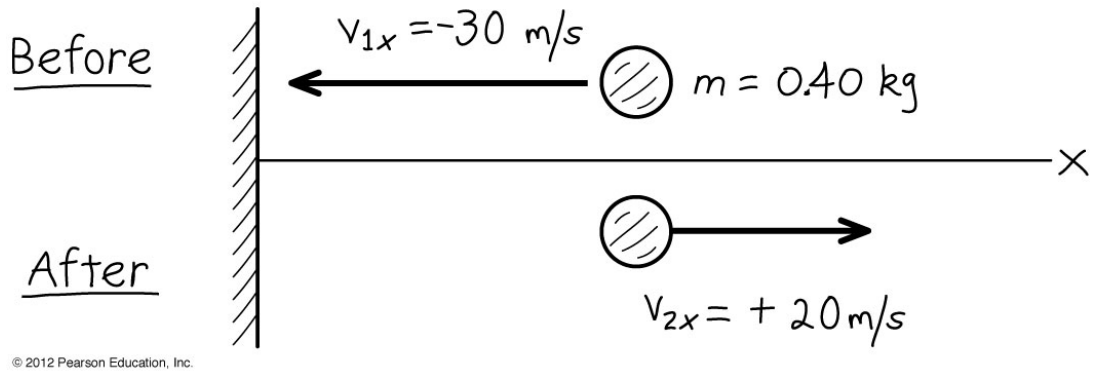

A. 20 kg • m/s to the right

B. 20 kg • m/s to the left

C. 4.0 kg • m/s to the right

D. 4.0 kg • m/s to the left

E. none of the above

Q8.2

You are testing a new car using crash test dummies. Consider two ways to slow the car from 90 km/h (56 mi/h) to a complete stop:

(i) You let the car slam into a wall, bringing it to a sudden stop.

(ii) You let the car plow into a giant tub of gelatin so that it comes to a gradual halt.

In which case is there a greater *impulse* of the net force on the car?

A. in case (i)

B. in case (ii)

C. The impulse is the same in both cases.

D. not enough information given to decide

A8.2

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Q8.3

A 3.00-kg rifle fires a 0.00500-kg bullet at a speed of 300 m/s. Which force is greater in magnitude:
(i) the force that the *rifle* exerts on the *bullet*; or
(ii) the force that the *bullet* exerts on the *rifle?*

A. the force that the rifle exerts on the bullet

B. the force that the bullet exerts on the rifle

C. both forces have the same magnitude

D. not enough information given to decide

A8.3

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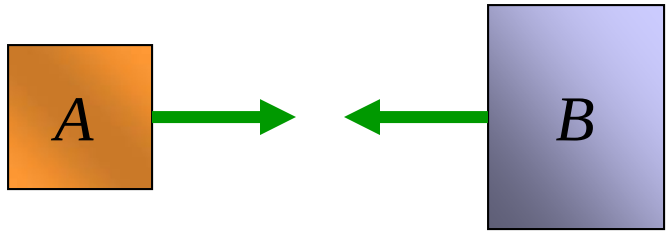
B. the force that the bullet exerts on the rifle

C. both forces have the same magnitude

D. not enough information given to decide

Q8.4

Two objects with different masses collide and *stick* to each other. Compared to *before* the collision, the system of two objects *after* the collision has



A. the same total momentum and the same total kinetic energy.

B. the same total momentum but less total kinetic energy.

C. less total momentum but the same total kinetic energy.

D. less total momentum and less total kinetic energy.

E. not enough information given to decide

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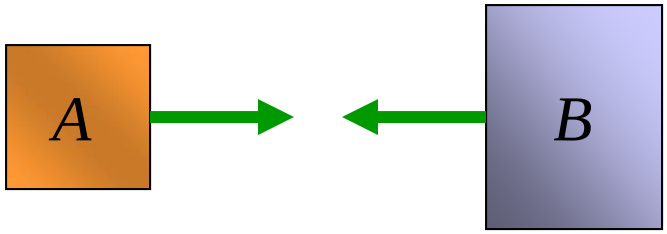


A. the same total momentum and the same total kinetic energy.

B. the same total momentum but less total kinetic energy.

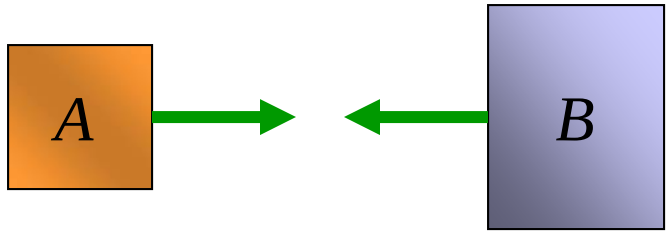
C. less total momentum but the same total kinetic energy.

D. less total momentum and less total kinetic energy.

E. not enough information given to decide

Q8.5

Two objects with different masses collide and *bounce off* each other. Compared to *before* the collision, the system of two objects *after* the collision has



A. the same total momentum and the same total kinetic energy.

B. the same total momentum but less total kinetic energy.

C. less total momentum but the same total kinetic energy.

D. less total momentum and less total kinetic energy.

E. not enough information given to decide

A8.5

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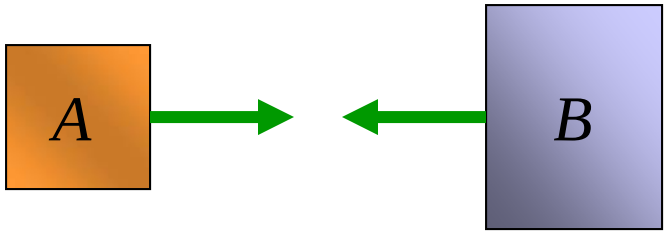

A. the same total momentum and the same total kinetic energy.

B. the same total momentum but less total kinetic energy.

C. less total momentum but the same total kinetic energy.

D. less total momentum and less total kinetic energy.

E. not enough information given to decide

Q8.6

Block *A* has mass 1.00 kg and block *B* has mass 3.00 kg. The blocks collide and stick together on a level, frictionless surface. After the collision, the kinetic energy (KE) of block *A* is

A. 1/9 the KE of block *B*.

B. 1/3 the KE of block *B*.

C. 3 times the KE of block *B*.

D. 9 times the KE of block *B*.

E. the same as the KE of block *B*.

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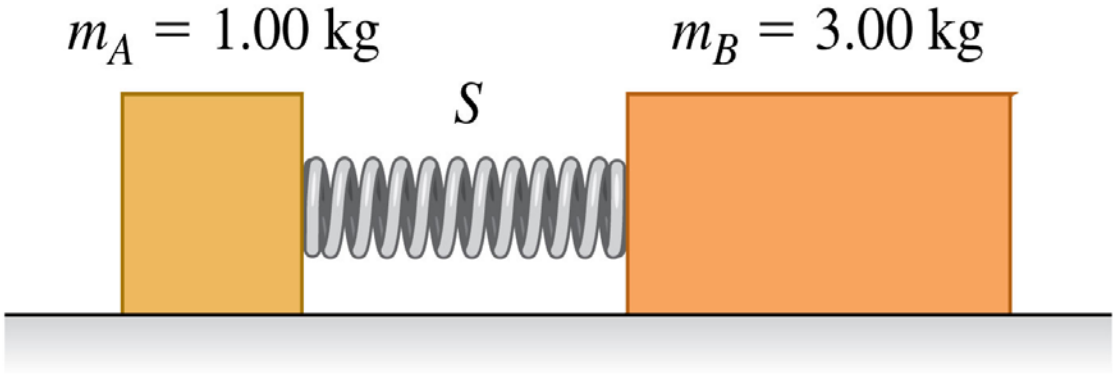
D. 9 times the KE of block *B*.

E. the same as the KE of block *B*.

Q8.7

Block *A* on the left has mass 1.00 kg. Block *B* on the right has mass 3.00 kg. The blocks are forced together, compressing the spring. Then the system is released from rest on a level, frictionless surface. After the blocks are released, the kinetic energy (KE) of block *A* is



A. 1/9 the KE of block *B*.

B. 1/3 the KE of block *B*.

C. 3 times the KE of block *B*.

D. 9 times the KE of block *B*.

E. the same as the KE of block *B*.

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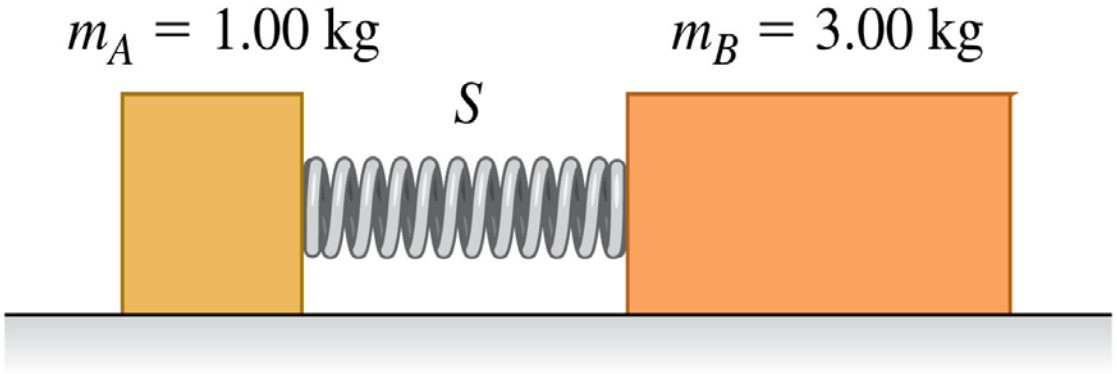


A. 1/9 the KE of block *B*.

B. 1/3 the KE of block *B*.

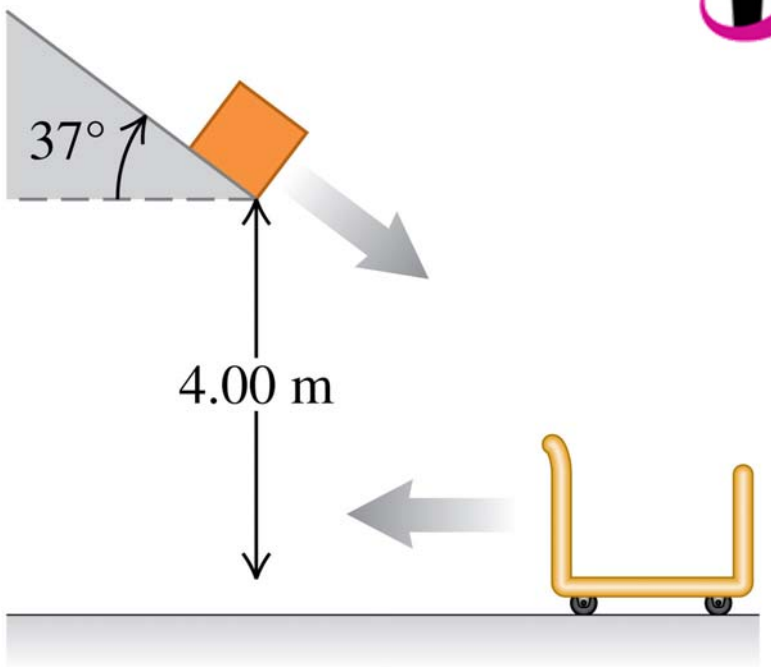
✓ C. 3 times the KE of block *B*.

D. 9 times the KE of block *B*.

E. the same as the KE of block *B*.

Q8.8

An open cart is rolling to the left on a horizontal surface. A package slides down a chute and lands in the cart. Which quantities have the same value just *before* and just *after* the package lands in the cart?



A. the horizontal component of total momentum

B. the vertical component of total momentum

C. the total kinetic energy

D. two of A., B., and C.

E. all of A., B., and C.

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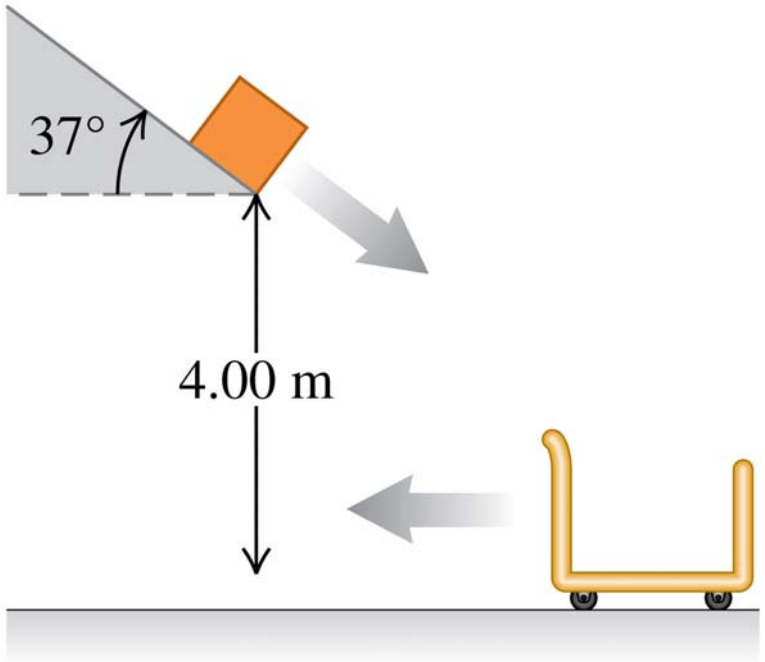

A. the horizontal component of total momentum

B. the vertical component of total momentum

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D. two of A., B., and C.

E. all of A., B., and C.

Q8.9

A yellow block and a red rod are joined together. Each object is of uniform density. The center of mass of the *combined* object is at the position shown by the black "X."

Which has the *greater mass*, the yellow block or the red rod?

A. the yellow block

B. the red rod

C. They both have the same mass.

D. not enough information given to decide

A8.9

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