

This print-out should have 14 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Conceptual 06 03

001 (part 1 of 2) 10.0 points

Two 0.5 kg balls move away from each other, one traveling 4 m/s to the right, the other 2 m/s to the left.

What is the magnitude of the total momentum of the system?

002 (part 2 of 2) 10.0 points

Two 1000 kg cars drive east; the first moving at 25 m/s, the second at 20 m/s.

What is the magnitude of the total momentum of the system?

Pitching Machine Recoil

003 10.0 points

A baseball player uses a pitching machine to help him improve his batting average. He places the 45.4 kg machine on a frozen pond. The machine fires a 0.106 kg baseball horizontally at a speed of 30.3 m/s.

What is the magnitude of the recoil velocity of the machine?

Serway CP 06 18

004 10.0 points

A(n) 645 N man stands in the middle of a frozen pond of radius 12 m. He is unable to get to the other side because of a lack of friction between his shoes and the ice. To overcome this difficulty, he throws his 1.2 kg physics textbook horizontally toward the north shore, at a speed of 4.5 m/s.

The acceleration of gravity is 9.81 m/s^2 .

How long does it take him to reach the south shore?

Serway CP 04 02

005 10.0 points

A football punter accelerates a 0.33 kg football from rest to a speed of 9 m/s in 0.18 s.

What constant force does the punter exert on the ball?

Bouncing a Superball

006 10.0 points

A child bounces a 46 g superball on the sidewalk. The velocity change of the superball is from 26 m/s downward to 14 m/s upward.

If the contact time with the sidewalk is $\frac{1}{800}$ s, what is the magnitude of the average force exerted on the superball by the sidewalk?

Correct answer: 1472 N.

Collision of Spheres

007 10.0 points

A(n) 3.31 kg sphere makes a perfectly inelastic collision with a second sphere that is initially at rest. The composite system moves with a speed equal to one-third the original speed of the 3.31 kg sphere.

What is the mass of the second sphere?

Correct answer: 6.62 kg.

Hitting a Softball

008 (part 1 of 2) 10.0 points

A(n) 0.6 kg softball is pitched at a speed of 10 m/s. The batter hits it back directly at the pitcher at a speed of 29 m/s. The bat acts on the ball for 0.018 s.

What is the magnitude of the impulse imparted by the bat to the ball?

Correct answer: $23.4 \text{ N} \cdot \text{s}$.

009 (part 2 of 2) 10.0 points

What is the magnitude of the average force exerted by the bat on the ball?

Correct answer: 1300 N.

Illegal Soccer Hit**010 10.0 points**

A(n) 0.254 kg soccer ball approaches a player horizontally with a speed of 19.6 m/s. The player illegally strikes the ball with her hand and causes it to move in the opposite direction with a speed of 34.5 m/s.

What is the magnitude of the impulse delivered to the ball by the player?

Correct answer: 13.7414 kg m/s.

Holt SF 06Rev 39**011 10.0 points**

A 14 g toy car moving to the right at 24 cm/s has a head-on nearly elastic collision with a 22 g toy car moving in the opposite direction at 32 cm/s. After colliding, the 14 g car moves with a velocity of 44 cm/s to the left.

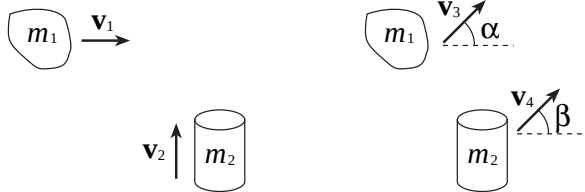
Find the speed of the second car after the collision.

Correct answer: 11.2727 cm/s.

Midair Collision**012 (part 1 of 2) 10.0 points**

before

after



An $m_2 = 1.7$ kg can of soup is thrown upward with a velocity of $v_2 = 5.9$ m/s. It is immediately struck from the side by an $m_1 = 0.66$ kg rock traveling at $v_1 = 7.1$ m/s. The rock ricochets off at an angle of $\alpha = 68^\circ$ with a velocity of $v_3 = 6.3$ m/s.

What is the angle of the can's motion after the collision?

Correct answer: 63.1314° .

013 (part 2 of 2) 10.0 points

With what speed does the can move immediately after the collision?

Correct answer: 4.07179 m/s.

Impact of a Bullet**014 10.0 points**

A(n) 10 g bullet is fired into a(n) 110 g block of wood at rest on a horizontal surface and stays inside. After impact, the block slides 10 m before coming to rest.

The acceleration of gravity is 9.8 m/s^2 .

If the coefficient of friction between the surface and the block is 0.6, find the speed of the bullet before impact.

Correct answer: 130.132 m/s.