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## WebAssign CH10-HW02-SP12 (Homework)

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**Current Score :** 20 / 20 **Due :** Tuesday, March 27 2012 11:59 PM EDT

1. 2/2 points | Previous Answers

MI3 10.1.X.010

In a collision between an electron and a hydrogen atom, it is useful to select both objects as the system because:

- The sum of the final kinetic energies must equal the sum of the initial kinetic energies for a two-object system
- The forces the objects exert on each other are internal to the system and don't change the total momentum of the system
- ✓ During the time interval just before to just after the collision, external forces are negligible
- ▼ The total momentum of the system does not change during the collision
- The kinetic energy of a two-object system is nearly zero
  - Read the eBook
  - Section 10.1

## 2. 2/2 points | Previous Answers

MI3 10.4.X.019

Consider a head-on elastic collision between two objects. Object 1, which has mass  $m_1$ , is initially in motion, and collides head-on with object 2, which has mass  $m_2$ , and is initially at rest. Which of the following statements about the collision are true?

- $|\vec{p}|_{1,\text{final}}| < |\vec{p}|_{1,\text{initial}}|$
- $\checkmark$  If  $m_2 >> m_1$ , then the final speed of object 1 is greater than the final speed of object 2.
- $\square$  If  $m_1 >> m_2$ , then the final speed of object 2 is less than the initial speed of object 1.
- $\blacksquare$  If  $m_2 >> m_1$ , then  $|\Delta \vec{p}_1| > |\Delta \vec{p}_2|$
- $\vec{y}_{1,\text{initial}} = \vec{p}_{1,\text{final}} + \vec{p}_{2,\text{final}}$



- Read the eBook
- Section 10.4

## **3.** 6/6 points | Previous Answers

MI3 10.5.X.016

In outer space a rock with mass 7 kg, and velocity < 3200, -3200, 2600 > m/s, struck a rock with mass 15 kg and velocity < 270, -300, 240 > m/s. After the collision, the 7 kg rock's velocity is < 3000, -2600, 3000 > m/s.

What is the final velocity of the 15 kg rock?

$$\vec{v}_f = \sqrt{m/s}$$

What is the change in the internal energy of the rocks?

$$\Delta E_{\text{internal}} = 6.79932894$$
 J

Which of the following statements about Q (transfer of energy into the system because of a temperature difference between system and surroundings) are correct? (Ignore heat transfer by radiation.) Check all that apply:

- ${f ec{Q}} \approx 0$  because there are no significant objects in the surroundings.
- ${\color{red} { \vec{Q}}} \approx 0$  because the duration of the collision was very short.
- $_{\square} Q = \Delta E_{internal}$  of the rocks.



- Read the eBook
- <u>Section 10.5</u>

## 4. 10/10 points | Previous Answers

MI3 10.5.X.020

A bullet of mass 0.08 kg traveling horizontally at a speed of 100 m/s embeds itself in a block of mass 2.5 kg that is sitting at rest on a nearly frictionless surface.

(a) What is the speed of the block after the bullet embeds itself in the block?

$$v = 3.1$$
  $\checkmark$  m/s

(b) Calculate the kinetic energy of the bullet plus the block before the collision:

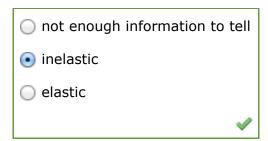
$$K_i = 400$$
  $\checkmark$  J

(c) Calculate the kinetic energy of the bullet plus the block after the collision:

$$K_f = 12.3969$$
  $\checkmark$  J

d) Was this collision elastic or inelastic?

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(e) Calculate the rise in thermal energy of the bullet plus block as a result of the collision:

 $\Delta E_{\text{thermal,bullet}} + \Delta E_{\text{thermal,block}} = 387.6031$   $\checkmark$  J

(f) What was the transfer of energy Q (microscopic work) from the surroundings into the block+bullet system during the collision? (Remember that Q represents energy transfer due to a temperature difference between a system and its surroundings.)

$$Q = \boxed{0}$$
  $\checkmark$  J

- Read the eBook
- <u>Section 10.5</u>

