PHY 201 Quiz #5 **Name _____**

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

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1. **Multiple Guess (3 pts)** Find the answer which best fits the question and **write it in the space provided**.

a. A baseball player follows through with his swing to
a) increase the impulse imparted to the ball;
b) conserve momentum; c) ensure an elastic collision;
d) make the contact time with the ball as short as possible;
e) none of the above.

_____

b. In an inelastic collision what is conserved?
a) energy b) mass c) velocity d) momentum

_____

c. Two objects undergo an elastic collision. The table shows four possible sets of the initial and final kinetic energies of the objects. Which is the only set that could occur?

_____

	Initial KE		Final KE	
	Mass 1	Mass 2	Mass 1	Mass 2
a	15 J	0 J	10 J	9 J
b	8 J	6 J	10 J	4 J
c	8 J	6 J	16 J	-2 J
d	3 J	8 J	2 J	6 J

2. **Definition/Principle (4 pts)**

a. When is linear momentum conserved?

b. Mass m_1, traveling at velocity v_{1i}, collides <u>elastically</u> with mass m_2 at rest. Write down the exact expression for the final velocity v_{1f} of mass m_1.

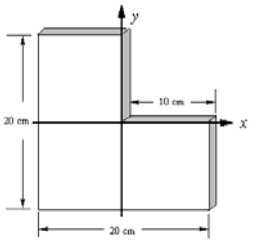
Bonus: What were the names of the two atomic bombs dropped on Japan?

What was the name of the plane that delivered them?

3. **Problems (13 pts)**

a. A 62.0 kg person dives straight down into a pool. Just before striking the water, her speed is 5.50 m/s. In 1.65 s her speed is reduced to 1.10 m/s. What is the average force on her when she hits the water?

b. A uniform square plate has a square piece removed. Find the center of mass of the remaining piece shown below.



c. A 12000 kg railroad car traveling at 10 m/s strikes and couples with a 6000 kg caboose at rest. What is the speed of the final combination?

d. In 1993 Cuba's Javier Sotomayor set a men's high jump world record of 2.45 m. He cleared the bar at this height and landed on an air mattress. If his mass was 90.0 kg, what was the impulse that the air mattress exerted on him?

e. A 2.50 g bullet, traveling at 425 m/s, strikes the 215 g wooden block of a ballistic pendulum.

i. Find the speed of the bullet-block combination just after the collision.

ii. How high does the combination rise above the initial position?