Physics 211 Group Exam 1, Form 3

Problem 5	Problem 6	Total
/50	/50	/100

Name: _____

Partner #1: _____

Partner #2: _____

Recitation section number: _____

- There are two questions, each worth twenty-five points.

- **You must show your reasoning to receive credit**. A numerical answer with no logic shown will be treated as no answer.

- You are highly encouraged to use both pictures and words to show your reasoning, not just algebra.

- If you run out of room, ask for an extra sheet of paper, or get one from your notebook.

- how your reasoning as thoroughly as possible for partial credit.

- You may use $g = 10\,\mathrm{m/s^2}$ throughout, except where indicated, to minimize arithmetic.

QUESTION 5

A firefighter in an airplane is trying to put out a fire by dropping a load of sand on it. She is flying horizontally toward the fire at an altitude of 100 meters, traveling at a speed of 60 m/s.

If she drops her sand directly over the fire, it will overshoot the target.

a) How far in advance of the fire must she release the sand in order for it to land on the fire? *(12 points)*

b) In what direction will the sand be traveling when it strikes the ground? *(8 points)*

c) Will the airplane be behind the load of sand, directly above it, or ahead of it when it lands on the fire? Explain briefly how you know. *(5 points)*

QUESTION 6

A person drops a baseball from a height h onto a hard floor. When the baseball hits the floor, it will bounce back in the opposite direction with a speed equal to *half* of the speed with which it hit the floor.

In terms of h and g, find:

a) how long it takes to hit the floor the first time (5 points)

b) how fast it is going when it hits the floor the first time (5 points)

c) how high it travels after bouncing off the ground the first time (5 points)

d) the amount of time between the ball being dropped and it hitting the floor the second time (5 points)

e) On the axes provided, graph the ball's velocity vs. time and position vs. time, starting at the time that it is dropped and ending when it strikes the ground for the second time. (5 points)

Velocity

- v=0

Position

Time