# PHY180F 2002 ASSIGNMENT 8

Due: Thursday, November 18

1.   On Friday Nov. 5 we demonstrated a tennis ball and a basketball falling together. We first dropped the basketball from about 1.0 m but it only rebounded to about half the distance that it should have and I said that this indicated that the collision with the earth was not elastic. We then calculated how high the tennis ball would have gone if we could ignore the mass of the tennis ball compared to the mass of the basket ball. Safa Mahmood said that this was not a good assumption since she didn't think that the mass of the basket ball was that much greater than the tennis ball. Also some one else (male, but I have forgotten whom), said that he noticed that after the collision of the basket ball with the tennis ball, the basket ball only rose to about half the distance that it should have if the mass of the tennis ball could be ignored compared to the basket ball. The following Saturday evening I came to the University and measured the mass of the basket ball (625 grams) and the mass of the tennis ball (57 grams) and I wrote this problem. After making the appropriate calculations (i.e. how high should the basket ball have gone after the collision with the tennis ball), comment on the observations of these two students.

2.   On Friday Nov. 5 we demonstrated the "Astro Blaster" in class. I measured the masses of the three balls and they are given in the diagram.

    a) Assuming that the collisions are completely elastic, if we dropped the Astro Blaster from a distance of 1.0 m from the floor, calculate how high the top ball would have gone if the ceiling had been much higher. Based on your observations of the demonstration in class, is the assumption that we have made a good assumption? You may ignore the dimensions of the balls.

    b) If we were to assume that not only were the collisions elastic but also the mass of each ball was negligible compared to the next larger ball, how high would the top ball go? There is a brute force hard way to do this problem and also an elegant and easy way to do this problem. You may do it either way.

Astro Blaster

Works like a Real Super Nova!

9.4 g

27 g

63 g
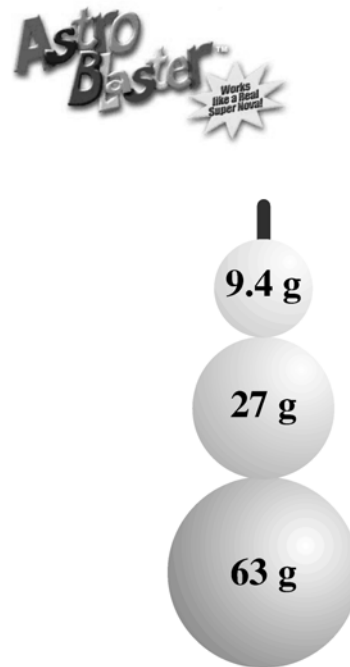
Ages 8 and Up

WARNING
CHOKING HAZARD: Toy contains small balls.
Not for children under 3 years

3.   Chapter 9, Number 66

4.   Chapter 9, Number 72