Lab 2

Physics I

College of the Atlantic

General Instructions:

1. Goals for this lab:

   (a) Gain experience working with the vernier equipment and logger pro software

   (b) Qualitatively and quantitatively explore the idea of momentum-transferring interactions via collisions with carts.

2. Work in groups of two or three.

3. I will need to show you a bunch of detail for how the experimental setup works. It's not complicated but it's also not immediately obvious.

4. There is nothing that you need to hand in, but at least one of your group members should record your work. Please check with me before you leave the lab, so I can look over your work and ask a few questions before you leave.

Setting Up

1. Set up the track and the motion detector. (This should be mostly set up already.)

2. Be certain that your track is level. Make sure that a cart placed in the middle of the track does not roll.

3. Start recording and give one cart a push. Examine the position and velocity graphs and make sure they make sense to you.

Collisions

1. Experiment with a number of different sorts of collisions. Ones where the carts stick together, ones where they bounce off each other, and a collision where they start stuck together and "explode" apart.

2. Choose three collision experiments to analyze quantitatively. For each cart, determine the velocity before and after the collision. To do so, use the linear fit function on a segment of the position graph. I'll show you what I mean by this. It will take a few trials to get semi-clean results. I found that pushing the initial cart fairly hard helps, and it is best to start the moving cart about 3/4 of the way from the stationary cart.

3. Make a momentum arrow diagram for each experiment as we've done in class.

4. You will probably find that the experimental results are all a bit off from what the theory predicts, and that the discrepancy is always in the same direction—i.e., either too large or too small. Why do you think this is?