Lab 2-3: Constant Acceleration

Purpose: 1. To define the term *acceleration*.

- 2. To examine the motion graphs for an object that is speeding up.
- 3. To examine the motion graphs for an object that is slowing down.

Materials: 1 track 1 motion cart

Procedure & Data:

- 1. Start up Logger Pro and open the file "02_Cart.cmbl".
- 2. Set up the equipment as shown below, with the motion detector at the top of the ramp. Use books, blocks of wood or clamps to raise one end of the track a few to several inches.



- 3. Hold the cart in place, hit "Collect" and once you hear the motion detector making noise, release the cart. Please don't let it slam into the end of the track.
- 4. Sketch the resulting position and velocity graphs below. ONLY SKETCH THE PARTS THAT SHOW THE CART SPEEDING UP. Sorry for yelling, but expect a lot of sarcasm if you attempt to copy the entire graph from Logger Pro.



- 5. Determine the slope of the straight part of the velocity graph while the cart was speeding up. Record the slope above.
- 6. Now place the motion detector at the bottom of the track.



- 7. Hit the "Collect" button, and when you hear the motion detector, give the cart a slight push up the ramp. It should get close to the end but don't let it hit the end of the track and don't let it slam into the motion detector. Stop the cart at the top of the ramp so that it does not go back down the track.
- 8. Determine the slope of the straight part of the velocity graph while the cart went up the track. Now sketch both graphs in the space on the other side and record the slope. Only sketch the parts after the cart left your hand and before you stopped it

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slope =

Questions:

- 1. From both trials, how can you tell that the positions vs time graphs were not constant velocity?
- 2. From both trials, how can you tell that the velocity vs time graphs were not constant velocity?
- 3. Recall that *velocity* is the slope of *position*, and tells you the rate at which your position changes. What does the slope of a *velocity* graphs tell you? What do we call that?

For the first trial with the cart just speeding up

- 4. How does the position graph show you that the car does not have a constant speed?
- 5. How does the velocity graph show you that the object is speeding up?
- 6. What was the acceleration of the cart while speeding up?

For the second trial with the cart just slowing down7. How does the position graph show you that the car does not have a constant speed?

- 8. How does the velocity graph show you that the object is slowing down?
- 9. What was the acceleration of the cart while slowing down?
- 10. What is the definition of acceleration?