Discoveries with the CBL & the Motion Detector

I. Walking Lines with the CBL.

1. What is the CBL graphing? Can you give convincing evidence that your answer is correct?
2. Get a graph of:
   a) an increasing line
   b) a steeper increasing line
   c) a horizontal line
   d) a decreasing line
   e)a steeper decreasing line
3. What is the relationship between speed, distance, and time?
4. For each case in (2), find the average speed of the graph and the average speed of a shorter interval. List the points that you use and show your computations.
5. Discuss how you got each of the graphs in (2) in relation to your answers in (4).
6. What is the relationship of the average speeds in (4) and the graphs in (2). The horizontal line may not follow the pattern. Why is the horizontal line different?

II. Walking a Parabola with the CBL.

1. Use the CBL and the motion detector to get the graph of a parabola opening down.
2. Use TRACE to find the coordinates of the vertex and the coordinates of the first point. Find the average speed of the first half of the walk.
3. Similarly find the average speed of the second half of the walk. (Continue to list coordinats for future analysis.)
4. Find the average speed of an interval on the first half of the walk.
5. Find the average speed of a "tiny" interval.
6. How do average speeds differ when the graph is a straight line and when the graph is a parabola? Can you define "slope of a parabola"?
7. What would be the relationship between the speeds that we have found using the graph of the parabola and the speed which a car speedometer gives?

III. Dropping a "Ball".

1. Analyze the graph after dropping an object several times.
2. Are there horizontal segments of the graph? If so, how can you explain them?
3. What type function might model the other portion of the graph? Is it reasonable that this type of graph should model this event? Why or why not?
4. The height is stored in L2 and the time in L1. Use regression techniques to find an equation of your graph. Is it a "good fit" to your data? Comment.
5. Do the values of your constants have any physical significance? Explain.

IV. Tossing an Object.

Toss an object above the motion detector several times. (Catich it BEFORE it hits the motion detector!) Consider 1-5 above in this situation. How could you find an equation for this graph without regression techniques?

V. Who Tosses the Ball the Highest? (if time permits)