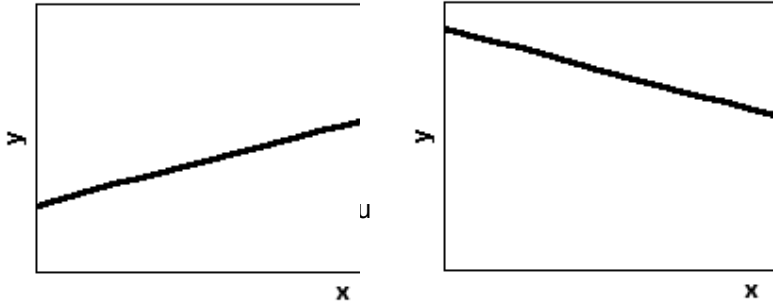## *Mathematics in Motion*

Investigations with the TI-83 and CBL

1. Introduction - Position-Time Graph

In which direction, relative to the motion detector, must you walk if:

- the y-values on the graph increase as the x-values increase?

- the y-values on the graph decrease as the x-values increase?

- the y-values on the graph stay the same as the x-values increase?

What variable does the x-axis represent? What variable does the y-axis represent?

If you travel at a constant speed and go a long distance in a short time, how would the graph look? Describe a real-world situation in which you might travel in this way.

If you travel at a constant speed and go a short distance in a long time, how would the graph look? Describe a real-world situation in which you might travel in this way.

Mathematics in Motion **Name _____**

1. Which direction must you walk with respect to the motion detector to make the graphs in figure A?

2. Walk at a constant rate AWAY from the motion detector as described below.

A) Create a graph that looks like one of the graphs in problem 1 above.

B) Create another graph by walking more slowly than you did for part A.

C) Create another graph by walking more quickly than you did for part A.

Explain why the graphs look like they do. (Ignore horizontal parts of the graphs that occurred because you ran out of space to walk.)

3. Now create graphs by walking TOWARD the motion detector. Remember to walk at a constant rate as described above.

A) Create a graph that looks like one of the graphs in problem 1 above.

B) Create another graph by walking more slowly than you did for part A.

C) Create another graph by walking more quickly than you did for part A.

Explain why the graphs look like they do.

How do these graphs compare to those created in problem 2?

4. Using the motion detector, can you create the graph in the figure below? If so, how? If not, why not?
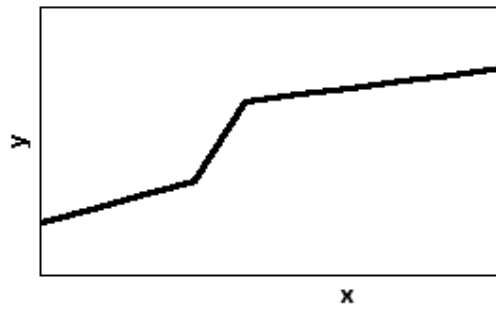
5. Gavin and Austen walk five blocks to a park along different routes. Suppose that Gavin's graph in the first graph shown below and that Austen's is the second. Write a sentence describing how each boy walked. Assume that each boy encountered a hill on his walk. At what part of the walk did Gavin walk over the hill? At what part of the walk did Austen walk over the hill? Why do you think so?
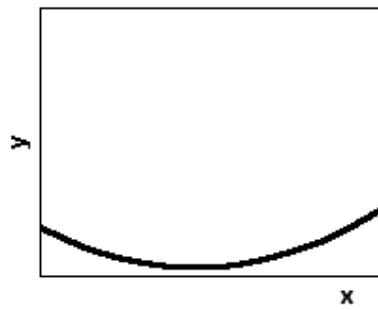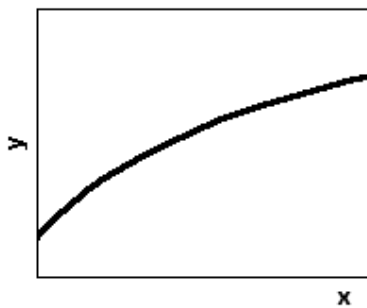
6. Use the motion detector to recreate the four graphs below. Write a sentence or two describing how you moved in each example.
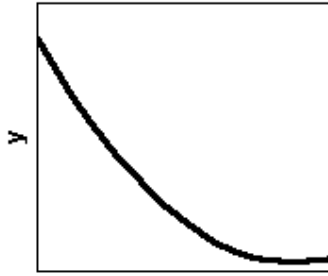
(a)

(b)

(d)

(c)

7. How fast should you walk if the graph is not very steep? If it is quite steep?