Force & Motion

NAME_____

MEASURING & GRAPHING MOTION

PROBLEM:
To measure distance

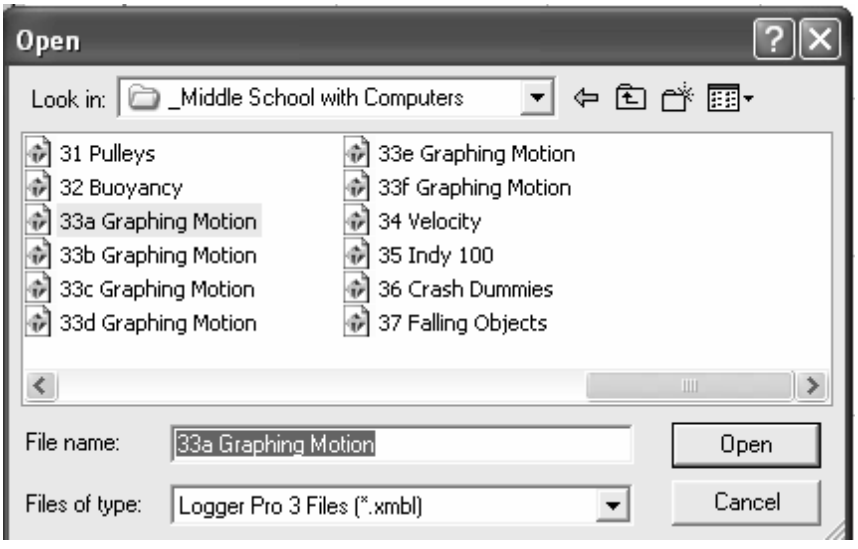
MATERIALS:

Computer	LabPro	Motion Sensor
Meter Stick	Masking Tape	

PROCEDURES:
1) Attach the motion detector to a table or cabinet 15 cm above your waist.
2) Use masking tape to make a 4 meter line on the floor in front of the motion detector. Mark the tape at 1 meter intervals.
3) Set up the computer & LabPro:
   a) Connect the motion sensor to the **DIG/SONIC** port on the LabPro.
   b) Go to **Start** → **Programs** → **Vernier** → **LoggerPro 3.2.1**

Part 1: *Making Graphs* --

4) From LoggerPro go to **File** → **Open** → **Middle School with Computers** → **33a Graphing Motion**



The computer will display a *position (distance)* vs. *time graph*.

5) Stand at the one meter mark on the masking tape.
6) Face the motion sensor.

7) Have your partner click **COLLECT**, and begin **slowly** walking backwards, away from the motion sensor.
8) Go to **Experiment → Store Latest Run**
9) Sketch your graph in the data section.
10) Repeat steps 4 – 6, walking a little more **quickly** this time.
11) Sketch your second graph in the data section.

DATA:

Sketch of graph 1

Sketch of graph 2

TO THINK ABOUT:

What were you doing when the line of the graph was moving horizontally (across) the graph?

What were you doing when the line of the graph was moving vertically (up & down) the graph?

DATA ANALYSIS:

1. Describe the difference between the two lines on the graph. Explain why the lines are different.

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2. What would the graph look like if you walked toward the motion sensor instead of away from it?

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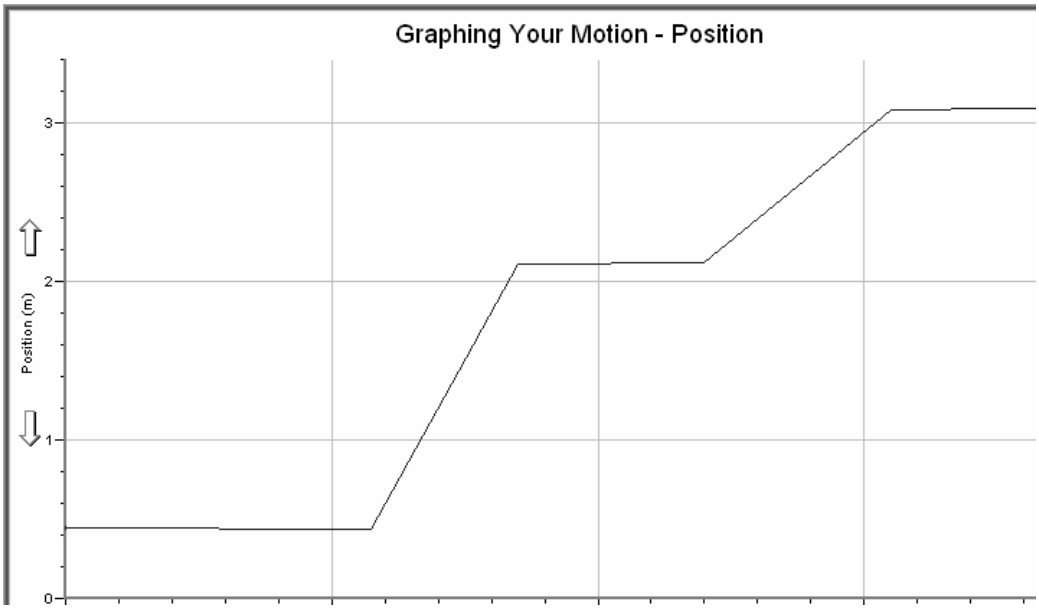
Part 2: ***Matching Graphs --***

12) Go to **File → Open → 33b Graphing Motion**. You will get a screen with this graph:



13) Try to "match" (make a graph that lines up with the graph that is already on the screen) the graph by moving toward and away from the motion sensor.

CONCLUSION:

1. Describe what you had to do to match the graphs.

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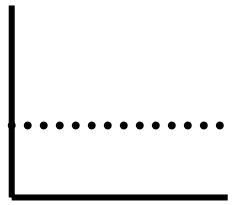
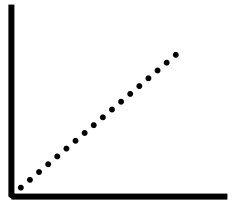
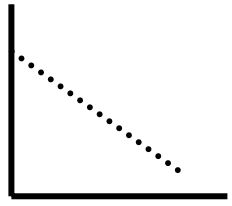
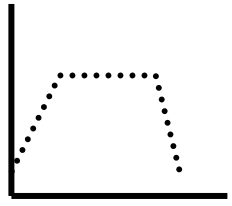
2. What do the following graphs tell you about motion?

3. Sketch a distance (position) vs. time graph for a car that starts slowly from a stopped position, moves down the street faster, stops at a stop sign, and then starts slowly again.