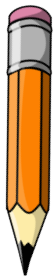
PhyzExperiment: A Notion for Motion

In Physics use pencil, not pen!



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Preliminary Discussion

1. In the *Making Motion Graphs* Springboard, what data had to be collected in order to produce a graph representing the motion of an object?

2. Was one set of data sufficient, or were several data points needed to produce a graph?

Purpose

To produce and interpret an accurate position vs. clock reading (time) graph for a constant velocity car

Apparatus

___constant velocity car
___2 C-cell batteries
___aluminum cylinders and foil
___paper, tape, and pencil
OR marker pen and eraser
___2 tables
___stopwatch
___meterstick
___graph paper

Preparation

Learn how to make the constant velocity car go. Then determine how to make the car move slowly. Record helpful notes here.

Strategies

METHOD 1: Independent Variable: Distance, Dependent Variable: Time

i. Mark a series of distances (0 cm, 30 cm, 60 cm, 90 cm, 120 cm, 150 cm, ...) on the table.

ii. Set the car in motion.

iii. When it passes the 0 cm mark, start the stopwatch.

iv. When the car passes each mark, get the time reading from the stopwatch.

v. Record the ordered pairs in an organized table.

x (cm)	0	30	60	90	120	150		
t (s)								

METHOD 2 - Independent Variable: Time, Dependent Variable: Distance

i. Set the car in motion.

ii. When starting the stopwatch, say "Go!" When "Go!" is said, mark the position of the car.

iii. Each time a new second starts, the stopwatch operator says "Go!" and the marker operator makes a mark on the table.

iv. After the run, measure the distance of each mark (in centimeters) from the first (zero) mark.

v. Record the ordered pairs in an organized table.

t (s)	0	1	2	3	4	5		
x (cm)								

Evaluation

Try both methods. Which method is more practical with the apparatus given? Justify your decision.

Graph

Plot the data on a graph. Use the graph paper provided. Make sure the graph is made correctly. Consult the reference sheet on Graphing Technique and follow the guidelines provided.

___The graph was scaled so the plot filled the page

___The graph was titled correctly

___The axes were labeled correctly

Analysis

1. **How** can the average speed of the constant velocity car be determined from the graph you plotted? Collected data is not to be used. Your method must rely only on analysis of the graph.

2. **Use** the method described above and determine the speed of the CV cart. **Show work!** Include units in your work and in your answer. Again, data from the trial is not to be used. Mark and identify specific points on the graph that were used in your method.

3. Add and label the following lines to your motion graph. (You don't have data for these, so just draw lines without marking specific data points. Don't forget to label the lines you plot.)
a. "Faster Car" - a higher-powered constant velocity car that moves faster than the one you observed.
b. "Out of Gas Car" - a car that slows down; perhaps its batteries ran out during the trial.
c. "Backward Car" - a constant velocity car just like the one you observed, except that it moves in the opposite direction—**toward** the "zero" instead of away from it.