

Physics Lab Activity - Motorized Cars

Use the Lab Report Grading sheet as you are writing your lab report in addition to this paper to make sure you are including everything necessary in each section!!!

Purpose: To determine the mathematical relationship between position from the starting point and time for a battery-powered car and to see how the relationships differ for cars moving at different speeds.

Hypothesis: This should be an educated guess so give your reasoning. Also you should watch the cars move before making your hypothesis. Make sure your hypothesis addresses both parts of the purpose statement. Use the “Graphical Methods Summary” sheet to describe the mathematical model and then explain how the graphs of your two cars will be different. Don’t forget to explain the “why” of your hypothesis.

Materials: List what you used in this lab.

Procedure: Write a step-by-step explanation of how you gathered your data (i.e. 1, 2, 3, etc.). This should be clear enough so that someone else could duplicate your experiment.

Data: On a separate sheet of paper, put your data into an organized table. Record the value of any constants and any observations. Make sure you include units (i.e. centimeters or seconds). Use the metric system.

Take at least 6 data points and several trials per data point.

NOTE: Sig Figs!!!! When recording measurement, you should keep all digits you are sure of and then estimate one more digit. For example, if you are using a meter stick to measure distance, and recorded 104.25 cm, this means that you were sure of the distance to the millimeter mark (you know it was 104.2 and not 104.1 or 104.3) and were able to estimate between the millimeter marks. If the distance were exactly on the centimeter mark, you would record the measurement as 104.00 cm to show that you could have estimated between millimeter marks with the equipment you were using.

Review the rules for significant figures when taking averages in the packet, “Unit 1 Reading – Significant Figures.”

Data Analysis:

IMPORTANT: In this graph, put “time” on the x-axis and “position” on the y-axis regardless of which is the independent and dependent variable.

Graph your data using proper graphing techniques. Graph both the red car and blue car on the same graph (In LoggerPro, go to *Data>Insert New Data Set*). Find the equations or

mathematical model that best fits your data for both cars. Make sure your slope and y-intercept have units and that rather than using x and y as variables, you choose something that better fits your experiment (i.e. t for time).

Conclusion: Write your conclusion on a separate sheet of paper. Make sure you answer each of the following questions.

- ✓ What were your results (describe the relationship between the independent and dependent variables in a clear, English sentence and restate your equations or mathematical models).
- ✓ What is the physical meaning of your slope and y-intercept in terms of the car's motion or starting place?
- ✓ Do your results agree with both parts of your hypothesis?
- ✓ How accurate do you think your results are and why?
- ✓ All experiments have experimental error, which occurs because no measurement can be made perfectly. An example of experimental error could be when making timings with a stopwatch. Sometimes you may stop the watch too soon, sometimes too late. Sometimes the measuring tool itself may not be precise. This is also a source of error in measurements. What are areas of experimental error in this experiment and how does this affect your results?
- ✓ How could you improve the accuracy of this experiment if you were to do it again?

Use the Lab Report Grading sheet to check your lab report and make sure you haven't forgotten anything! This is how your final lab report will be graded!!!!!!!!!!