

**Battery Car Lab**

Physics 432

Name \_\_\_\_\_  
 1 2 3 4 5 6 7 8

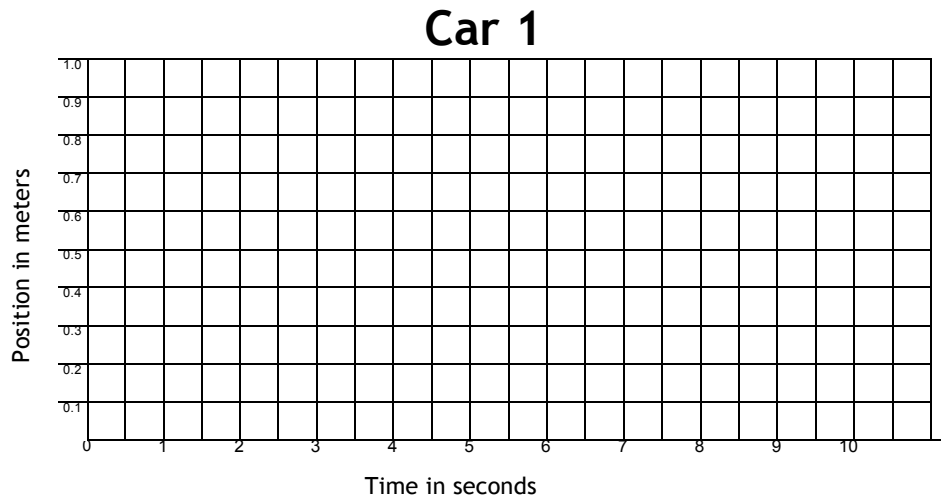
**A Perfect Tie!**

In this lab, you will be taking measurements on two different battery powered cars. Be nice and share your car!  
 All measurements must be to the nearest tenth of a meter (0.1 m) or hundredth of a second (0.01 s).

Which car did you use?

-----  
 Use the space below to record at least 5 data points

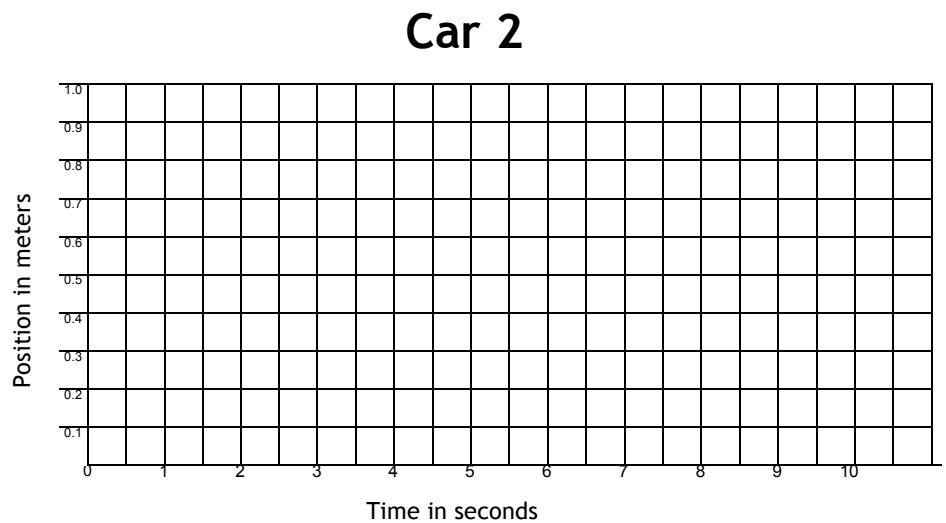
t (s)	x (m)



Which car did you use?

-----  
 Use the space below to record at least 5 data points

t (s)	x (m)



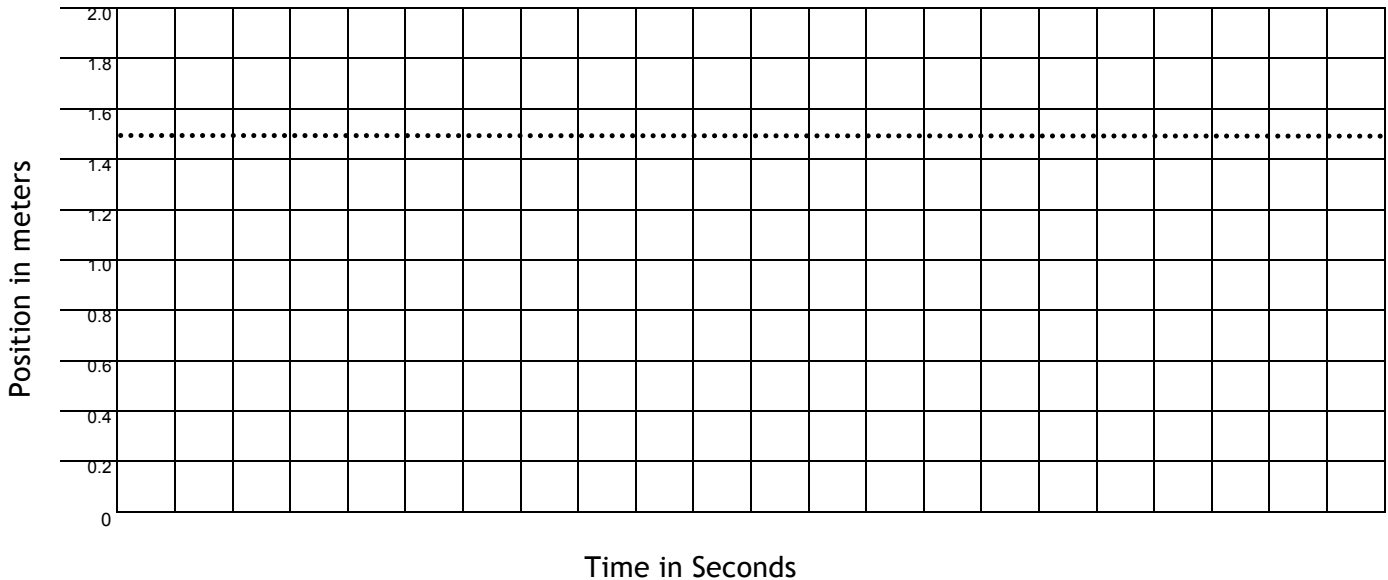
1. Draw a best fit line for each car.
2. Circle 2 good points on each graph and determine the slope of your best fit lines.
3. What is the slope of each best fit line? Give a number and units!

Car 1	Car 2
Best Fit Line Slope = _____ <span style="display: block; text-align: center;">Number      Units</span>	Best Fit Line Slope = _____ <span style="display: block; text-align: center;">Number      Units</span>

4. Why do the two best fit lines have different slopes?

We will now pretend that these two cars will have a race across 1.5 meters. Using the graphs above, you must delay the start of the faster car so that both cars reach the 1.5 meter finish at the same time. You will not use the cars to do this, but instead you will graph the progress of both cars on the following page.

**Your graph should show two lines, with both cars reaching the 1.5 meter finish line at the same time.**



5. On the graph above draw 2 lines, one for each car:

- Both cars should reach the 1.5 meter mark at the same time.
- The slope of the line for each car must be the same as the slope you determined in Question #3 for that car.
- Starting at  $t = 0$  s, graph the slower car. Figure out when it finishes, then backtrack to graph the faster car.
- If the slow car starts at  $t = 0$  s, at what time should you start the faster car so that it crosses the finish line at the same time as the slower car?

$t_{\text{fastcarstart}} = \underline{\hspace{2cm}}$  seconds

6. Looking at the graph, how can you tell that both cars finished at the same time?

7. At what time did both cars reach the finish line?

8. Both cars continue on to two meters ( $x = 2$  m). When the faster car reaches two meters, where is the slower car?

9. Earlier you calculated the slope of the two cars (it should be the same on this graph).

a. What are the units for the slope of a position vs time (x vs t) graph?

b. What quantity has the same units as these slopes?