

Name _____ Hour _____

CARS LAB

10 pts, DUE _____ AT THE BEGINNING OF THE HOUR. If you have questions, you need to get them answered before then. Make sure you complete everything and that you understand all of it.

Vocabulary:

Δ : represents change in (Δt = change in time)

TIME: How long something takes, measured in _____

DISTANCE: How far an object travels, measured in _____

SPEED: How much distance is traveled over time, measured in _____ (Ex: 10 m/s)

VELOCITY: How fast an object is traveling AND in what direction, measured in _____ (Ex: 10 m/s north)

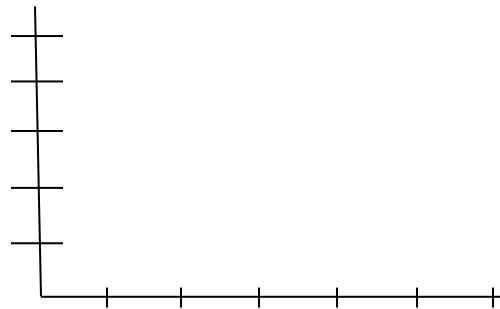
ACCELERATION: How fast the speed of an object changes over time, (speed/time), measured in _____

Part A DATA: The battery powered buggy on the carpet.

You need to run the buggy down a track that is 5 meters long (this can be done on carpet). Mark off the distances shown below and record the time it takes your buggy to pass each mark. Then **make a distance vs. time graph**. Make sure to **label the axes** and draw a **BEST-FIT LINE**. (It says "distance vs. time" graph which means ___TIME___ goes on the x-axis...)

Distance (m)	Time (sec)
0	
1	
2	
3	
4	
5	

GRAPH A



Analysis:

1. What type of line did you get? straight / curved (Circle one)
2. **Find the slope** ($y_2 - y_1 / x_2 - x_1$) of graph A. (Show your work!)
3. What **units** would the slope be in? (Think...slope is $\Delta y / \Delta x$, so are the units) _____
4. Using your **units of slope** (distance traveled over time), determine what the slope measures.
 Time / Distance / Speed / Acceleration (Circle one)
5. Did the speed change or was it constant? _____ How could you tell by looking at your graph?
6. Find the equation of the line for Graph A in **$y = mx + b$** form. (Remember... b = y intercept)
 - a. What does the "y" (or y-axis) represent in the equation? _____
 - b. What does the "x" (or x-axis) represent in the equation? _____
 - c. The b is the y-intercept. Where did that occur in this lab? _____

To summarize PART A...

- a. The calculated slope is equal to the _____ of the car and is measured in _____.
- b. The speed of the car was: _____ The units of speed are: _____
- c. The speed of the car was constant / changed throughout the 5 meters (circle one)
 I could tell because the line on my graph was straight / curved (circle one)

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7. Make a **speed vs. time** graph for PART A. **Add numbers** to the axis using the speed you calculated (look at summary b) and the TOTAL time your buggy traveled in lab. **Add units** to the axis as well. Your speed is CONSTANT, so the line should be _____.



8. Calculate the **area under the line** of your graph above using the numbers from your graph. (Hint: Make it into a **rectangle**) The equation for area of a rectangle is $__L \times W______$

The area under the line is _____

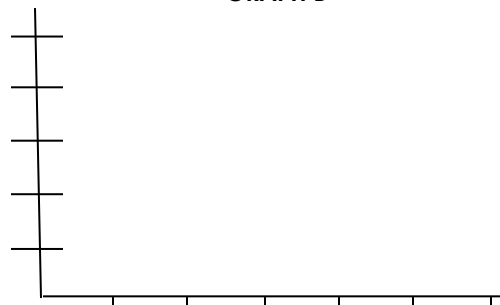
9. What is the **unit of the area** under the line? (Multiply the **units of length x units of width**, not just numbers if you are stuck)
- What **quantity** are you measuring when you calculated the area under the graph?
 speed / distance / time / acceleration (Circle one)
 - How far did the buggy actually travel? (Look at front if you forgot) _____ m
 - Calculate a **percent error** for your distance traveled. $\left| \frac{\text{accepted} - \text{experimental}}{\text{accepted}} \right| \times 100\%$
 SHOW WORK!
10. What is the slope of your graph in #7? _____ What do you think this means in regard to the speed?

PART B: Pull-back car

On the tile floor run the pull-back car down a track that is 2.5 meters long. Record the time it takes your car to pass each ½ meter mark. Then **make a distance vs. time graph**. Make sure to **label the axes** and **CONNECT THE DOTS** starting from zero (no best-fit line).

Distance (m)	Time (sec)
0	
0.5	
1.0	
1.5	
2.0	
2.5	

GRAPH B



Analysis:

- What type of line did you get? straight / curved (Circle one)
- What does a **curved line** on a distance vs. time graph mean (as opposed to a straight line in part A?)