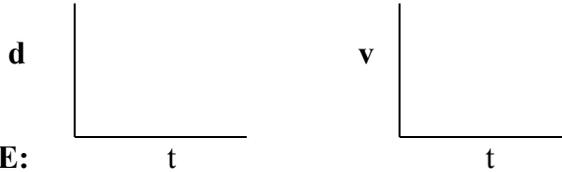


# DUNE BUGGY DERBY

NAME \_\_\_\_\_ PARTNERS \_\_\_\_\_

**OBJECTIVE:** The purpose of this lab is to analyze the motion of an object traveling at constant velocity.

**PREDICTION:** What do you think a plot of position versus time will look like for an object traveling slowly at a constant speed? Sketch it. Sketch a plot of what the speed versus time would look like for this object.



**PROCEDURE:**  
**Slow mode...**



1. Set up the dune buggy with only 1 “C” battery and a metal cylinder in the place of the 2<sup>nd</sup> battery. This effectively runs the dune buggy in “slow” mode.
2. Time how long it takes the buggy to travel 25 cm. Repeat this measurement two more times and record the average, as well in the data table.
3. Determine the time for the buggy to travel at 25 cm increments up to 125 cm as in procedure 2.
4. Calculate the average speed of the buggy over each interval by dividing the distance traveled by the time interval.

Distance (cm)	Time #1 (s)	Time #2 (s)	Time #3 (s)	Average Time (s)	Average Speed (cm/s) $v = d / \text{avg. } t$
25.0					
50.0					
75.0					
100.0					
125.0					

5. Plot a graph of distance traveled versus average time. On a separate graph plot average speed versus average time.

**Fast mode...**



6. This time repeat the procedure using both “C” batteries in “fast” mode.

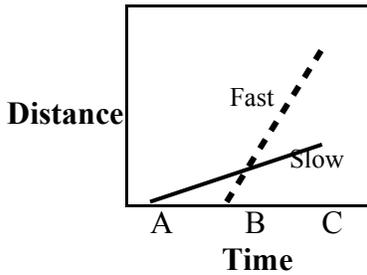
Distance (cm)	Time #1 (s)	Time #2 (s)	Time #3 (s)	Average Time (s)	Average Speed (cm/s) $v = d / \text{avg. } t$
25.0					
50.0					
75.0					
100.0					
125.0					

On the same axes as before plot a graph of distance traveled versus average time and average speed versus average time for the “fast” buggy in blue.

**QUESTIONS:**

1. What does the slope of a distance vs time graph represent? Compare and contrast the distance vs time graphs for the slow and fast buggies.
2. What does the area under the speed vs time graph represent? Think! Look at the units you would get by multiplying the two quantities together.

Imagine this...The slow buggy starts off at time A and the fast buggy is released a short time later eventually catching up to (at time B) and passing the slow buggy.



The distance vs time plots for this race would look like this.

3. At what point (if ever) were the two cars at the same position? Explain your reasoning.
4. At what point (if ever) were the two cars traveling the same speed? Explain your reasoning.

