

Name: _____ Period: _____ Date: _____

Tumble Buggy Lab

Purpose: To determine the average speed and average velocity of an object and to represent the motion of an object graphically.

Materials:

Tumble Buggy • Meter Stick • Tape • Timing Device • Ruler

Procedure:

1. Obtain the materials and create a 10-meter long racetrack for your car. We will be recording the time every 2 meters so indicate those positions with your tape. When you are done you should have six pieces of tape on the ground (including 0 m and 10 m).
2. The car is going to go on the following journey:
 - a. It is going to go forward 10 meters.
 - b. It is going to stop for 10 seconds and turn around.
 - c. It is going to go back 6 meters.

Have one person turn on the car while a second person starts timing. The timer should call out the time when the car passes each piece of tape. Record these in your data table. The timer will also have to instruct the group member that picks up the car and points it in the opposite direction when it is time for it to be released.

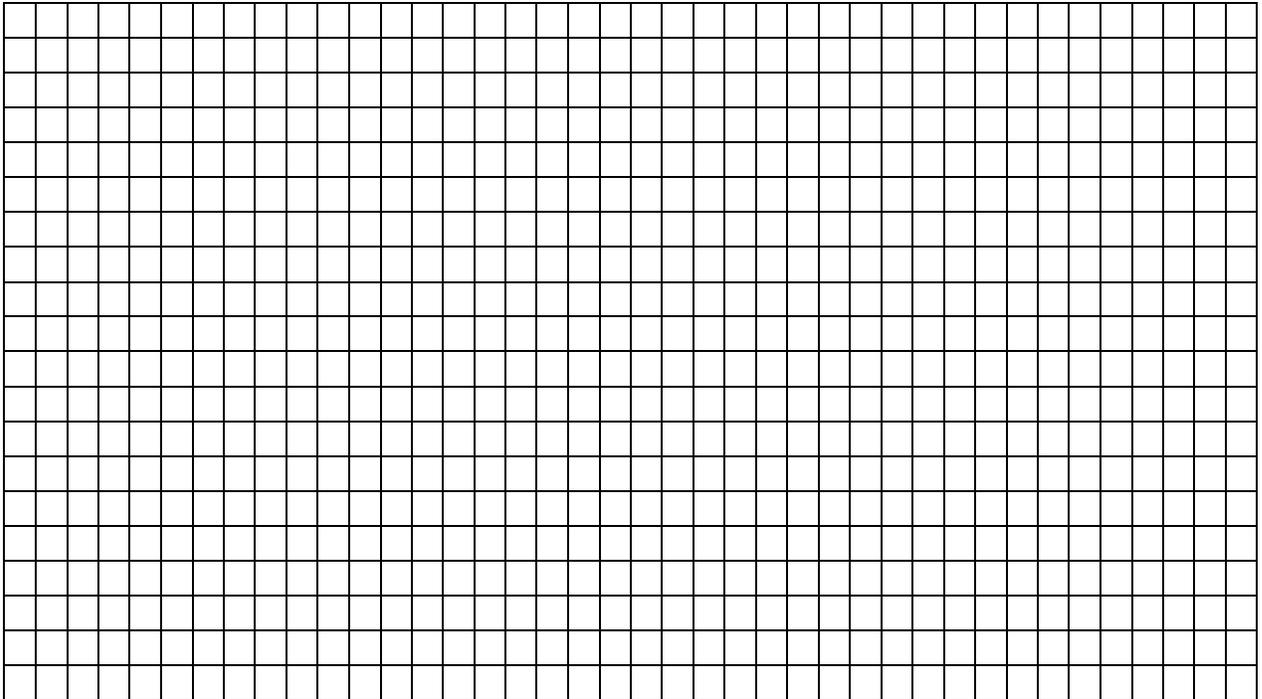
3. Repeat this course two more times and enter the data in your table. If one of your trials seems very different then keep performing trials until you get three fairly consistent results.
4. Determine the average time it took the car to pass each piece of tape and complete the final column of the table.
5. Remove all tape from the ground!
6. Use your data to create a graph of the car's position vs. average time. (Even though in this lab time depended on the position, we will treat time as the independent variable and put it on the x-axis.) Make sure to do the following:
 - a. Label your axes and scale them appropriately
 - b. Draw a best-fit line through your data points (Do not connect the dots unless they all happen to fall on a line!)

Data:

Tape Position	Trial 1	Trial 2	Trial 3	Average Time
0 m				
2 m				
4 m				
6 m				
8 m				
10 m				
8 m				
6 m				
4 m				

Graph:

Position vs. Time



Analysis:

1. Your graph changes slope three times. Calculate the three slopes and show your work below.

2. How would your graph look different if...?
 - a. The car traveled faster
 - b. The car took 30 seconds to turn around instead of 10 seconds
 - c. The car traveled slower
 - d. The car traveled 12 meters back instead of 6 meters back
 - e. You were told to graph distance instead of position

3. What is the total distance the car traveled in each trial? What is its displacement?

4. What is the average speed of the car for the entire trip? (Include the fact that it is stopped for 10 seconds)

5. What is the average velocity of the car for the entire trip? Again, include the period of time the car is stopped.

6. What is the average speed of the car when it is traveling forward?