

# Speedy Buggies

**Overview:** In this activity, you will investigate the motion of electric toy car traveling at different speeds.

**Materials:** Popsicle Sticks (6)                      Blue Buggy (1)  
Stopwatch (1)    Red Buggy (1)  
Red Pen (1) and Blue Pen (1)                      Measuring Tape

**Question You are Testing:** Using the Overview and Materials as a guide, design a testable question for this experiment:

**Hypothesis:** What do you think will be the outcome of your experiment?

## Pre-Lab:

1. Your group should assign the following roles
  - 1 student to operate the buggy
  - 1 student to operate the stopwatch
  - 1 student to place marker sticks
  - 1-2 students to measure distances between markers
  - 1 student to record the measurements

More than one role may be assigned to each student.

## Procedure:

1. Develop a method for measuring the how far the buggy travels along the floor every 3 seconds, up to 15 seconds. Be sure to identify the **independent** and **dependent** variables. List the steps below:

2. Construct a table to record distance and time data for two buggies: a red buggy and a blue buggy. The distance and time data you collect will be used to calculate the speed of each buggy.

**Data Table:**

3. Perform the experiment for the **red** buggy and examine the markers on the floor.  
**What does the spacing of the markers tell you about the motion of the buggy?**

4. Measure the distance the **red** buggy traveled between each marker and record in your data table.

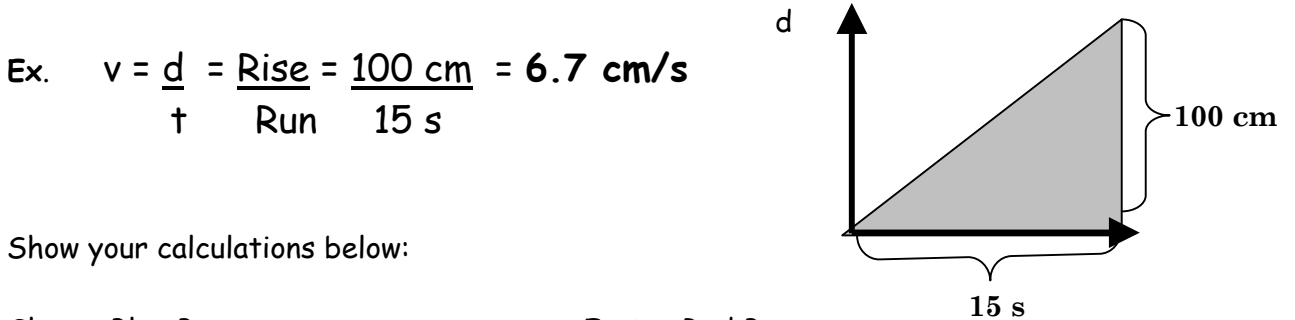
5. Now plot a graph of the total distance the **red** buggy traveled vs. the total time. Draw a best fit line or smooth curve through the data. Be sure to give your graph a title, label the x-axis and y-axis, and label your line "Red Buggy"

6. Now you will use the **blue** buggy. The blue buggy goes slower than the red buggy. **Predict** what the shape of the graph will look like by sketching it on the graph you used for the red buggy. Label your sketch "Prediction". Write the **reason for your prediction** in the space below:

- After you have made your prediction, **exchange your red buggy for a blue one.**  
Repeat step 4 and record your blue buggy data in your data table.
- Graph your **blue** buggy data and draw a best fit line or smooth curve. Label "Blue Buggy".

**Calculating the Speed From Your Graph:**

In order to calculate the speed of both the fast and the slow buggy, data from the graph may be substituted into the equation for speed. Examine the slow buggy line and read the axes to determine how far each buggy traveled during the time:



Show your calculations below:

Slower Blue Buggy:

$$v = \frac{d}{t} = \underline{\hspace{2cm}}$$

Faster Red Buggy:

$$v = \frac{d}{t} = \underline{\hspace{2cm}}$$

**Conclusion:**

- Explain:
- how the graph shows constant speed., and
  - the relationship between the steepness of the line on the graph and the speed of the buggy.

**Post-Lab:**

1. What could cause the red buggy to go faster than the blue buggy?

2. So far you have used three different ways to represent the motion of an object:

1. Distance and time data
2. Graphing Distance vs. Time
3. Mathematical Equation:  $\text{Speed} = \text{Distance}/\text{Time}$

There is another way to represent the motion of the object using diagrams or pictures. Imagine watching the motion of the red buggy as it moves along the floor and having the ability to take a photograph of the buggy every three seconds. If all of the snapshots are placed in sequence, the motion can be represented by a picture known as a "strobe" diagram:

**Red Buggy Strobe Diagram:**



3. a) Now it is time for you to draw a strobe diagram that represents the motion of the blue buggy. Use the spacing shown above for the faster red buggy as a guide to draw cars for the slower, **blue buggy**:



b) Explain how you decided on the spacing between the cars:

4. Imagine that you have a super fast buggy that can travel **twice as fast** as the red buggy. Draw a strobe diagram that could represent the motion for this super fast buggy:



# Speedy Buggies: Graph

---

(Title)

