**Unit 3 – Practicum**

**Emergency Stops on the Highway**

A highway safety commission wants to use simulations to determine what the smallest safe distance is between two cars traveling at certain speeds on a highway. Your job is to complete the simulation with your knowledge of motion and coding, as well as information you can find using resources online.

As you know, driving close behind the car in front of you at high speeds is dangerous because if they brake suddenly you may not be able to stop in time and end up hitting them. This is because in the time it takes you to notice that they are braking and apply your own brakes you are still traveling at your original speed while they have already started to slow down. At high speeds, even this slight pause can be the difference between having a collision or not based on how much space there was between the two cars.

For simplicity’s sake, you can assume that both vehicles are traveling at the same speed before they start to brake. You can also assume they both have the same average acceleration while braking. You will need to determine both the braking acceleration and the delay time between when the first car starts braking and the second car starts to brake. These numbers should be realistic. You might want to check your values with your teacher before continuing.

1. Open the simulation found here: <https://tinyurl.com/ybadebow>. Complete the missing parts of the simulation.
2. Use your simulation to complete the table below.

|  |  |  |
| --- | --- | --- |
| **Initial Speed** | **Smallest Safe Distance** | **Recommended Distance** |
| 9 m/s (~20 mph) |  |  |
| 18 m/s (~40 mph) |  |  |
| 27 m/s (~ 60 mph) |  |  |
| 36 m/s (~80 mph) |  |  |

1. Put together a whiteboard presentation with the table from question 2, graphs showing the motion of the two cars, and a motion map.