**Stopping Distance**  **Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Visit the site below for necessary information:

<http://sciannamath.weebly.com/stopping-distance.html>

Start by opening the simulator. Read the direction and then close the directions panel.

1. Select any vehicle, tire, road, and weather combination that you want. And complete the following table below. Make sure to keep all of your chosen setting the same and only vary the speed.

Vehicle:\_\_\_\_\_\_\_\_\_\_ Tire\_\_\_\_\_\_\_\_\_\_\_ Road Surface\_\_\_\_\_\_\_\_\_\_ Weather\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Speed (km/hr)** | **Reaction Distance (m)** | **Braking Distance (m)** | **Total Distance (m)** |
| 0 | 0 | 0 | 0 |
| 10 |  |  |  |
| 20 |  |  |  |
| 30 |  |  |  |
| 40 |  |  |  |
| 50 |  |  |  |
| 60 |  |  |  |
| 70 |  |  |  |
| 80 |  |  |  |
| 90 |  |  |  |
| 100 |  |  |  |

1. Recreate this table in Microsoft Excel.
2. Create a scatter plot for Reaction Distance (Y) vs. Speed (X).
   1. Add a ‘linear’ trendline to your plot. Record the equation and r-squared value of this line.
3. Create a scatter plot for Braking Distance (Y) vs. Speed (X).

**(Hint: To create a scatter plot for data not adjacent to reach either, highlight your x data. Then, while holding the ‘ctrl’ button, highlight your y data as well. Once both sets of data are highlighted, you can insert the scatter plot.)**

* 1. Add a ‘linear’ trendline to your plot. Record the equation and r-squared value of this line.
  2. Add a ‘polynomial’ order 2 trendline to your plot. Record the equation and r-squared value of this line.
  3. Which trendline better fits the data? Why?

1. What type of function is the Reaction Distance vs. Speed? What type of function is the Braking Distance vs. Speed?
2. Create a scatter plot for Total Distance vs. Speed.
   1. Add a ‘polynomial’ order 2 trendline to your plot. Record the equation and r-squared value of this line.
   2. Add the functions you found in 3a. and 4b to create a new function. Compare this to your answer in 6a.
3. What would the Total Stopping distance be if you were traveling 95 km/hr? Calculate algebraically and verify with your graph.
4. If you needed to stop to avoid an accident that is 20 meters ahead of you, what would the maximum allowable speed be in order to not hit the car in front of you? Calculate algebraically and verify with your graph.
5. Repeat this simulation by creating another table in Microsoft Excel. Keep all of the variables the same except change one of the following: either the vehicle, tire, road surface or weather type.

Vehicle:\_\_\_\_\_\_\_\_\_\_ Tire\_\_\_\_\_\_\_\_\_\_\_ Road Surface\_\_\_\_\_\_\_\_\_\_ Weather\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Speed (km/hr)** | **Reaction Distance (m)** | **Braking Distance (m)** | **Total Distance (m)** |
| 0 | 0 | 0 | 0 |
| 10 |  |  |  |
| 20 |  |  |  |
| 30 |  |  |  |
| 40 |  |  |  |
| 50 |  |  |  |
| 60 |  |  |  |
| 70 |  |  |  |
| 80 |  |  |  |
| 90 |  |  |  |
| 100 |  |  |  |

1. Create a scatter plot for Total Distance vs. Speed
   1. Add a ‘polynomial’ order 2 trendline to your plot. Record the equation and r-squared value of this line.
2. Compare and contrast the two scenarios you collected data for. What was different about the two scenarios and why do you think it affected your results?
3. Use the simulator and other online resources to determine the best type of tire to stop the quickest. Will this always be the best tire choice given any scenario?
4. Watch the following video at: <http://sciannamath.weebly.com/stopping-distance.html>
   1. In the last 5 meters, how much speed did the vehicle lose?
   2. Compare this with each of your scenarios. How much speed did you lose in the last 5 meters for each scenario?