**Subject area/course**: Mathematics/ Algebra 2 or Integrated Math

**Grade level/band**: 10-12

**Task source**: Stanford Center for Assessment, Learning, and Equity (SCALE); authors: Kari Kokka and Vinci Daro

**Stopping Distance**

**STUDENT INSTRUCTIONS**

1. **Task context**:

The Departments of Motor Vehicles in California and in New York both publish guidelines for ‘following distance’. Their guidelines are different. Which state’s guidelines do you think are most appropriate, based on your study of the mathematics of stopping distance?

1. **Final product**:

Prepare a recommendation to one state’s DMV or the other about changing their published guidelines so that the two states’ guidelines for following distance are consistent.

* Support your recommendation with your own mathematical work (calculations, formulas, diagrams, graphs) and with relevant findings from your research (diagrams, graphs, formulas).
* Be sure to make clear how any diagrams, graphs, and formulas you use represent the important quantities in the situation.
* Your recommendation should be 1-2 pages long, including 2-3 short paragraphs of text and supporting mathematical work.
* Use the feedback you receive from your teacher on your individual and group work to inform your final product.

**Additional Information**

1. **Knowledge and skills you will need to demonstrate on this task:**

* Identify the quantities that are relevant to the stopping distance of a vehicle.
* Interpret given parameters – speed, reaction time, and distance between vehicle and cat – in the context of the situation.
* Interpret a given table of data about braking distance in the context of the situation.
* Apply your understanding of functions as tools for modeling relationships among real-world quantities.
* Recognize the different behaviors of linear, quadratic and exponential functions, and select which would be best for modeling the relationships in the situation.
* Interpret and build on other students’ ideas about the relationship between speed and braking distance.
* Conduct online research to find relevant graphs, diagrams, additional data and a formula for computing the stopping distance of a car.
* Coordinate among representations – graphs, tables, formulas, and diagrams – to identify how the relevant quantities are represented in each representation.
* Analyze guidelines for ‘following distance’ using the mathematics of stopping distance.
* Synthesize your own mathematical work and the formulas, graphs, and diagrams from your research to support a recommendation about appropriate guidelines for following distance.
* Clearly communicate your recommendation in writing, using mathematical representations to support your writing, in a way that your audience will understand.

1. **Materials needed:**

* Handout 1: The Situation (Initial Individual Notes)
* Handout 2A: The Problem (Initial Individual Work)
* Handout 2B: The Problem (Pair Work)
* Handout 3: Making Sense of Others’ Ideas (Pair Work)
* Handout 4: Building on Others’ Ideas (Individual Writing)
* Handout 5: Resource Card (Reference)
* Handout 6: Culminating Product (Individual Writing)
* Handout 7:Following Distance Guidelines for NY and CA (Reference)
* Handout 8: Three Scenarios to Consider (Reference)

1. **Time requirements:**

You will have approximately 1-2 weeks to complete this task. Your teacher will provide details regarding the timeline and due dates.

1. **Scoring:**

Your work will be scored using SCALE Math Performance Assessment Rubric (Grades 9-12). You should make sure you are familiar with the language that describes the expectations for proficient performance.