

Speed Limits

Activity developed at Cégep régional de Lanaudière
à L'Assomption by **ARIEL FRANCO**

At the end of the *Differential Calculus* course, the teacher presents a problem situation that deals with the motion of two cars over time. This activity brings students to integrate the fundamentals of the course (definition of a function, derivative of a function and continuity of a function) by applying them to real-life situations. Students must solve this problem situation with the *Maple* software program. Basically, the problem to be solved is as follows:

Last week, on his way to college, Bernard was stopped by the police for speeding while, according to the radar data, he was driving at 88.1 km/h in a 70-km/h zone. Bernard believes that the police committed an injustice towards him. The officer who gave him his ticket said that any vehicle that exceeded the allowable speed limit by 5 km/h or more was automatically stopped. Now, when he stopped at the traffic light, Bernard saw Ariel, one of his friendly colleagues, driving at about 10 m in front of him. At the green light, the two cars took off and Bernard never passed Ariel over the 437.5-meter distance that he drove before he was stopped by the police. Yet the police never stopped Ariel. Is it unfair? Did the police officer lie? Was this a setup? It is up to you to shed some light on the mystery!

Knowing the mathematical function that describes the position of Ariel's car versus time, students must determine the mathematical function that gives the position of Bernard's car versus time, by fulfilling several requirements with regard to the position, speed and acceleration of both cars, as well as the continuity of these functions at any point. This activity was adapted from pedagogical support material in mathematics, in the *International Baccalaureate* program.

Since this is a real-life and believable situation, students are eager to solve the problem. This activity integrates physics and mathematics concepts.