

Physics

At Work

Christine Lopez**New York State Trooper; Poughkeepsie, NY**

On average, Christine Lopez spends 12 hours a day in a car. No, she is not a chauffeur or a professional race car driver. For the past 14 years, Lopez has been a New York State Trooper in Troop K headquarters, which covers Columbia, Dutchess, Putnam and Westchester counties.

Lopez said that State Troopers are responsible for assisting the public in a variety of circumstances, including motor vehicle accidents, burglaries, assaults and larcenies. Lopez said that since a State Trooper's job involves long hours in a vehicle, their risk of being involved in a collision is heightened. "Law enforcement officers are ten times more likely than the average driver to be involved in a collision," said Lopez. "Troopers may be exempt from vehicle and traffic laws while responding to emergencies, but they are bound by the same laws of nature as the average driver."

In 2007 alone, Troop K dealt with 3933 accidents. According to Lopez, 814, or 22 percent of those accidents involved drivers between the ages of 16 and 19. The majority of those accidents were caused by unsafe speed, following too closely, and driver inattentiveness/distraction. "All drivers should adhere to the three-second rule for following distance," said Lopez. "By allowing three seconds between your vehicle and the vehicle in front of you, you will have ample braking distance to allow you to make a complete stop."

Lopez also believes that reaction time plays a crucial role in preventing accidents. "The average reaction time is 1.6 seconds. This varies from individual to individual depending on age, illness, fatigue, and alcohol consumption. A drunk driver will take longer to perceive hazards and will have a slower reaction time," said Lopez.

**Dr. Jose Holquin-Veras****Professor, Rensselaer Polytechnic Institute; Troy, NY**

Dr. Jose Holquin-Veras is a Professor of Civil and Environmental Engineering at Rensselaer Polytechnic Institute (RPI). Veras believes that an understanding of physics is essential in solving problems and designing roads. "I design traffic signals to deal with the Dilemma Zone, and use braking distance to take reaction time into account." According to Veras, in order to avoid a Dilemma Zone, traffic engineers must use physics to ensure that a yellow light is long enough for a driver to stop or go through the light.

Alyson Coyle**Instructor, Transportation Safety Institute; Oklahoma City, OK**

Alyson Coyle is an instructor with the Transportation Safety Institute. Coyle's division is responsible for developing training programs for the National Highway Traffic Safety Administration (NHTSA). Coyle informs participants about everything that happens in a crash, including how seat belts and child safety seats protect occupants. "The best part of my job is helping to save lives every day. According to NHTSA, more than 62,000 lives have been saved by seat belts in the past ten years," said Coyle.



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advanced degree or be a scientist to employ physics. The different profiles presented show how people from diverse backgrounds use physics as a part of their job for different purposes.

State Trooper, Christine Lopez's acknowledgment that all drivers are bound by the same laws of nature as an average driver provides an opportunity for yet another meaningful discussion on the speed of a vehicle and the three-second rule for following distance. Point out how Lopez' knowledge of the physics involved in driving improves her chances of avoiding an accident and being safer on the roads. In other words, reaction time while driving plays a crucial role in her life as well, and she has to bear that in mind to help her prevent hazardous situations.

Dr. Jose Holquin-Veras's experience as an engineer helps him in designing roads, and Alyson Coyle's experience in developing training programs to help save lives are both significant profiles that should be emphasized in relation to the physics that students are learning. Consider asking students to write their impression of professional profiles presented to them to explain why they are so fundamental to improving safety on the roads. Students should note how each profile has the potential to contribute to their *Chapter Challenge* by opening up connections between physics and real-life applications that are intrinsic to safety on the roads while driving.

Physics At Work

The *Physics At Work* gives students examples of how physics is applied in the real world. Profiles of professionals are provided to help students realize that their *Chapter Challenge* is designed for a practical application of physics, and the investigations they performed were geared to give them a hands-on experience of science.

Each *Investigate* involved in *Active Physics* uses practical procedures that are employed by a variety of people featured in this section. Students read how physics is embedded in many professions and is practiced by a broad range of people. There are no geographic, ethnic, or gender barriers for people who apply physics in their professions. It is not necessary to have an