

CHAPTER 1

Driving the Roads

Chapter Overview

Chapter Challenge

Students are challenged to demonstrate some essential knowledge of what they know about the physics of driving in a two-to-three minute presentation to their driving academy's instructors. They are asked to write a report and enhance it using graphs and charts on posters. They are also expected to answer their parents' questions about driving safety. The *Chapter Challenge* is set against the background of insurance companies' policies, which requires drivers to have passed a driving course. The project draws on driving schools that enroll teenage drivers.

In their presentation, students are expected to explain various factors that affect safe driving. They have to show how speed, friction, and the radius of a curve determine the decision to slow down when negotiating a turn on the road. They are required to present the relationship between reaction distance, braking distance, and total stopping distance. Most importantly, students have to explain how these factors affect a driver's decision when approaching an intersection.

As you review the assignments, reassure students, that while they may feel unprepared now, by the end of the chapter they will have the necessary skills and vocabulary to respond adequately. To facilitate cooperative work in groups, have each student take individual responsibility for different tasks that make up the challenge. The academy instructor(s) should be given a rubric of the criteria to evaluate each presentation and write comments to describe how well students met their challenge. The academy instructors could be teachers from your school or other persons you might choose.

Read over the *Chapter Challenge* and the *Criteria for Success* with the class to establish a rubric for assessing student performance. In your grading criteria, include factors such as the number of physics principles referenced, the number of physics terms used properly, clarity of expression, legality of advice, adherence to safety, and credibility.

Chapter Summary

Driving the Roads investigates how reaction time is related to following distance and concepts of velocity and acceleration. Students

- learn why reaction time is critical to avoiding accidents while driving.
- understand the significance of uncertainties in measurements, and distinguish between accurate and precise measurements in order to maintain a safe distance to avoid a collision.
- understand the difference between average speed and instantaneous speed, use graphs of motion to measure velocity, and use equations to calculate average speed and velocity.
- examine how a change in velocity determines the acceleration of an automobile and learn the difference between positive and negative acceleration.
- learn how the speed of an automobile is related to its braking distance. Explore the concept of negative acceleration.
- understand why it is unsafe to stop a vehicle beyond the STOP Zone when the light at an intersection turns yellow.
- learn why it is important to slow down while driving around a curve.