CHAPTER 1

Constant velocity represents uniform motion.

Learning Expectations

By the end of this chapter, you will:

Relating Science to Technology, Society, and the Environment

- analyze, on the basis of research, a technology that applies concepts related to kinematics

Developing Skills of Investigation and Communication

- use appropriate terminology related to kinematics, including, but not limited to: time, distance, position, displacement, speed, and velocity
- analyze and interpret position-time and velocity-time graphs of motion in one dimension
- conduct an inquiry into the uniform and non-uniform linear motion of an object
- solve problems involving distance, position, and displacement

Understanding Basic Concepts

- distinguish between the terms constant, instantaneous, and average with reference to speed and velocity and provide examples to illustrate each term
- distinguish between, and provide examples of, scalar and vector quantities as they relate to the description of uniform and non-uniform motion

Many car drivers have become conscious of reducing gas consumption to save money and the environment. Hypermiling is a technique that drivers use to maximize fuel economy. Two criteria are extremely important for hypermiling. One is avoiding excessive braking and speeding, which can be done by keeping enough distance between your car and the car in front of you. The other criterion is driving your car at a reasonable constant speed. It has been found that constant speed is the best way to hypermile as it can reduce gas consumption significantly.

Some research and experience has shown that on a highway, if you drive at a constant speed close to 100 km/h, you can increase the distance travelled appreciably. While driving, it would be very difficult and unsafe for a car driver to maintain constant speed just by observing the speedometer on the dashboard. To facilitate this, most new cars have a system called cruise control or auto cruise (Figure 1.1). When this system is activated, it automatically controls the speed of the car and keeps it at a set constant value. On a highway, if the traffic allows, some drivers use it to drive at a constant speed and maintain a safe distance from the car in front. Both reduced braking and keeping a constant speed help in hypermiling, and can save a considerable amount of gas while protecting the environment from pollution.

Figure 1.1 Hypermiling dramatically reduces gas consumption in a car. One of the ways to implement hypermiling is using a cruise control system to maintain a constant speed.