

Unit 1 Mechanical Systems

CHAPTER 1 Motion and Forces

Extension Exercise

Speed and Velocity—Additional Practice

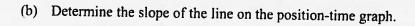
Complete this worksheet to help you learn key information in section 1.1.

- Explain the difference between each of the following quantities:
 - (a) average speed and instantaneous speed
 - (b) average velocity and instantaneous velocity
 - (c) average speed and average velocity
- 2. Helen starts from home and walks in a straight line 140 m west to a friend's house in 39 s. The two friends then walk 65 m east on the same sidewalk in 19 s to arrive at school on time.
 - (a) Draw a sketch of the motion and find the position of the friend's house and the school, relative to Helen's house.
 - (b) Determine Helen's average speed for the entire walk.
 - (c) Determine Helen's average velocity for the entire walk.
 - (d) Explain why the answers are different.
- The speed of a car on a street where the speed limit is 60 km/h is measured by a motion detector (radar) held by a police officer at the side of the road. Table 1 shows the position of the car, as measured from the officer.



Time (s)	Position (m [W])
0.00	49
0.50	41
1.00	35
1.50	29
2.00	23

(a) Plot a position-time graph of the motion and draw a line of best fit.



(c) Plot a velocity-time graph of the motion.

(d) Will the officer pull over the car for speeding? Explain. (Hint: Convert the speed limit to m/s.)

(e) Use the velocity-time graph to determine the total displacement of the car. Check your answer using **Table 1**.