Chapter 9 Review

Understanding Concepts

1. State the number of significant digits in each of the following values.
   (a) 10.2 km
   (b) 0.02 m
   (c) 5.0 cm

2. State, in your own words, the rule for determining the number of digits allowed in an answer calculated by multiplying two measured values.

3. If metres per second, m/s, is the unit of measure of a value,
   (a) what is the defining equation for the value?
   (b) what evidence is collected to calculate the value?
   (c) what labels are on the axes of the graph used to present the evidence?
   (d) what does the slope of this graph yield?

Applying Inquiry Skills

7. Percy Williams is the only Canadian athlete to have ever won gold Olympic medals in both the 100-m and the 200-m sprints. He accomplished this amazing feat in the 1928 Amsterdam Olympics. Calculate the missing quantities in Table 1. Show your work.

Table 1	Percy Williams' Gold Medal Performances	
Average speed (m/s)	Distance (m)	Time (s)
(a)	100	10.8
9.17	200	(b)

8. In the 1999 World Solar Car Challenge, the Queen's University *Radiance* car came second, completing the 2998.7-km course across Australia in a time of 41.58 h. What was the average speed of the *Radiance* (Figure 1)?

Figure 1

9. A car is moving at a constant 88 km/h when a dog suddenly appears on the road ahead. The driver immediately brakes to avoid hitting the dog.
   (a) Convert 88 km/h into metres per second.
   (b) If the reaction time of the driver is 0.2 s, how far has the car moved by the time the driver just touches the brake pedal?

10. In 1979, Bryan Allen pedalled the *Gossamer Albatross* aircraft 35 km across the English Channel in a time of 169 min (Figure 2).
    (a) Calculate the average speed of the aircraft.
    (b) During his famous flight, Allen had to battle a headwind that slowed him down. With no wind, he is capable of pedalling at a constant rate to keep the plane flying at 19 km/h. How long would the crossing have taken flying at 19 km/h?

Figure 2

12. Complete the Analysis and Evaluation in the following lab report.

Question
What is Heather's average swimming speed over 50 m?

Design
Several of Heather's teammates are positioned every 10.0 m with stopwatches. All teammates start their stopwatches when Heather dives into the pool and each stops their watch when Heather reaches their assigned distance.

Evidence

Table 2	Heather's Swimming Record
Distance (m)	Time (s)
0.0	0.0
10.0	4.1
20.0	9.9
30.0	15.9
40.0	19.5
50.0	25.2

Analysis and Evaluation
(a) Plot a distance–time graph of Heather's swim.
(b) Calculate the slope of the best-fit straight line and answer the Question.

Making Connections

14. Cell phone technology has developed to the point that good quality units are readily available and affordable.
    (a) What is a significant benefit of having a cell phone in a vehicle?
    (b) What are some risks created when someone uses a cell phone while driving a vehicle?
    (c) It takes about 5.0 s to dial a number on a cell phone. How far would a vehicle travel while the number is being dialed, if the vehicle is moving at a constant speed of 60 km/h?
    (d) What can you do to reduce the risks when cell phones are used in vehicles?