

**Percent uncertainty**

= the ratio of the uncertainty to the measured value, multiplied by 100

5.2 ± 0.1 cm

$$\text{percent uncertainty} = \frac{0.1}{5.2} \times 100 = 1.9 \approx 2\%$$

11.6 ± 0.5 in

$$\text{percent uncertainty} = \frac{0.5}{11.6} \times 100 = 4.31 \approx 4\%$$

5.34 m

$$\text{percent uncertainty} = \frac{0.01}{5.34} \times 100 = 0.187 \approx 0.2\%$$

## Homework (due first meeting next week)

Physics (5<sup>th</sup> ed.). pp.16-18 (nos. 4 to 15, 21, 42 and 43 – total 15)

### p. 16

- How many significant figures do each of the numbers have: (a) 142, (b) 81.60, (c) 7.63, (d) 0.03, (e) 0.0086, (f) 3236, (g) 8700?
- What is the percent uncertainty in the measurement  $2.26 \pm 0.25$  m?
- What, approximately, is the percent uncertainty for the measurement 1.67?

### p. 17

- Time intervals measured with a stopwatch typically have an uncertainty of about a half second, due to human reaction time at the start and stop moments. What is the percent uncertainty of a hand-timed measurement of (a) 5 s, (b) 50 s, (c) 5 min?
- Multiply  $2.079 \times 10^2$  m by  $0.072 \times 10^{-1}$ , taking into account significant figures.
- Add  $7.2 \times 10^3$  s +  $8.3 \times 10^4$  s +  $0.09 \times 10^6$  s.
- What is the area, and its approximate uncertainty, of a circle of radius  $2.8 \times 10^4$  cm?
- What is the percent uncertainty in the volume of a spherical beach ball whose radius is  $r = 3.86 \pm 0.08$  m?
- Express the following using the prefixes of Table 1-4: (a)  $10^6$  volts, (b)  $10^{-6}$  meters, (c)  $5 \times 10^3$  days, (d)  $8 \times 10^2$  bucks, and (e)  $8 \times 10^9$  pieces.
- Write the following as full (decimal) numbers with standard units: (a) 86.6 mm, (b)  $35 \mu\text{V}$ , (c) 860 mg, (d) 600 picoseconds, (e) 12.5 femtometers, (f) 250 gigavolts.
- Express the following sum with the correct number of significant figures:  
 $1.00 \text{ m} + 142.5 \text{ cm} + 1.24 \times 10^5 \mu\text{m}$ .
- Determine the conversion factor between (a) km/h and mi/h, (b) m/s and ft/s, and (c) km/h and m/s.
- A *light-year* is the distance light (speed =  $2.998 \times 10^8$  m/s) travels in 1.00 year. (a) How many meters are there in 1.00 light year? (b) An astronomical unit (AU) is the average distance from the Sun to Earth,  $1.50 \times 10^8$  km. How many AU are there in 1.00 light year? (c) What is the speed of light in AU/h?

### p.18

- The volume of an object is  $1000 \text{ m}^3$ . Express this volume in (a)  $\text{cm}^3$ , (b)  $\text{ft}^3$ , (c)  $\text{in}^3$ .
- Estimate how long it would take to walk around the world.