equation to find the number of feet in 1 meter:

$$1\text{ m} = \frac{1\text{ ft}}{0.3048} = 3.28084\text{ ft}.$$

We multiply this equation by 8,000.0 (to have five significant figures):

$$8{,}000.0\text{ m} = (8{,}000.0\ \cancel{\text{m}})\left(3.28084\ \frac{\text{ft}}{\cancel{\text{m}}}\right) = 26{,}247\text{ ft}.$$

An elevation of 8000 m is 26,247 ft above sea level.

NOTE We could have done the conversion all in one line:

$$8000\text{ m} = (8000\ \cancel{\text{m}})\left(\frac{100\ \cancel{\text{cm}}}{1\ \cancel{\text{m}}}\right)\left(\frac{1\ \cancel{\text{in.}}}{2.54\ \cancel{\text{cm}}}\right)\left(\frac{1\text{ ft}}{12\ \cancel{\text{in.}}}\right) = 26{,}247\text{ ft}.$$

The key is to multiply conversion factors, each equal to one (= 1.0000), and to make sure the units cancel.

EXERCISE D There are only 14 eight-thousand-meter peaks in the world (see Example 1–3) and their names and elevations are given in Table 1–6. They are all in the Himalaya mountain range in India, Pakistan, Tibet, and China. Determine the elevation of the world's three highest peaks in feet.

TABLE 1–6 The 8000-m Peaks

Peak	Height (m)
Mt. Everest	8850
K2	8611
Kangchenjunga	8586
Lhotse	8516
Makalu	8462
Cho Oyu	8201
Dhaulagiri	8167
Manaslu	8156
Nanga Parbat	8125
Annapurna	8091
Gasherbrum I	8068
Broad Peak	8047
Gasherbrum II	8035
Shisha Pangma	8013

EXAMPLE 1–4 **Area of a semiconductor chip.** A silicon chip has an area of 1.25 square inches. Express this in square centimeters.

APPROACH We use the same conversion factor, 1 in. = 2.54 cm, but this time we have to use it twice.

SOLUTION Because 1 in. = 2.54 cm, then $1\text{ in.}^2 = (2.54\text{ cm})^2 = 6.45\text{ cm}^2$. So

$$1.25\text{ in.}^2 = (1.25\text{ in.}^2)\left(2.54\ \frac{\text{cm}}{\text{in.}}\right)^2 = (1.25\ \cancel{\text{in.}^2})\left(6.45\ \frac{\text{cm}^2}{\cancel{\text{in.}^2}}\right) = 8.06\text{ cm}^2.$$

EXAMPLE 1–5 **Speeds.** Where the posted speed limit is 55 miles per hour (mi/h or mph), what is this speed (*a*) in meters per second (m/s) and (*b*) in kilometers per hour (km/h)?

APPROACH We again use the conversion factor 1 in. = 2.54 cm, and we recall that there are 5280 ft in a mile and 12 inches in a foot; also, one hour contains (60 min/h) × (60 s/min) = 3600 s/h.

SOLUTION (*a*) We can write 1 mile as

$$1\text{ mi} = (5280\ \cancel{\text{ft}})\left(12\ \frac{\cancel{\text{in.}}}{\cancel{\text{ft}}}\right)\left(2.54\ \frac{\cancel{\text{cm}}}{\cancel{\text{in.}}}\right)\left(\frac{1\text{ m}}{100\ \cancel{\text{cm}}}\right) = 1609\text{ m}.$$

Conversion factors = 1

Note that each conversion factor is equal to one. We also know that 1 hour contains 3600 s, so

$$55\ \frac{\text{mi}}{\text{h}} = \left(55\ \frac{\cancel{\text{mi}}}{\cancel{\text{h}}}\right)\left(1609\ \frac{\text{m}}{\cancel{\text{mi}}}\right)\left(\frac{1\ \cancel{\text{h}}}{3600\text{ s}}\right) = 25\ \frac{\text{m}}{\text{s}},$$

where we rounded off to two significant figures.

(*b*) Now we use 1 mi = 1609 m = 1.609 km; then

$$55\ \frac{\text{mi}}{\text{h}} = \left(55\ \frac{\cancel{\text{mi}}}{\text{h}}\right)\left(1.609\ \frac{\text{km}}{\cancel{\text{mi}}}\right) = 88\ \frac{\text{km}}{\text{h}}.$$

NOTE These unit conversions are very handy. You can always look them up in the Table inside the front cover.

EXERCISE E Would a driver traveling at 15 m/s in a 35 mi/h zone be exceeding the speed limit?

When changing units, you can avoid making an error in the use of conversion factors by checking that units cancel out properly. For example, in our conversion of 1 mi to 1609 m in Example 1–5(*a*), if we had incorrectly used the factor $\left(\frac{100\text{ cm}}{1\text{ m}}\right)$ instead of $\left(\frac{1\text{ m}}{100\text{ cm}}\right)$, the meter units would not have cancelled out; we would not have ended up with meters.

➥ **PROBLEM SOLVING**
Unit conversion is wrong if units do not cancel