# Problem 33

In SI units, speeds are measured in meters per second (m/s). But, depending on where you live, you're probably more comfortable of thinking of speeds in terms of either kilometers per hour (km/h) or miles per hour (mi/h). In this problem, you will see that 1 m/s is roughly 4 km/h or 2 mi/h, which is handy to use when developing your physical intuition. More precisely, show that (a) 1.0 m/s = 3.6 km/h and (b) 1.0 m/s = 2.2 mi/h.

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**Solution**

Multiply by the appropriate conversion factors to get the desired units.

$$1.0\ \frac{\text{m}}{\text{s}} = 1.0\ \frac{\cancel{\text{m}}}{\cancel{\text{s}}} \times \frac{1\ \text{km}}{1000\ \cancel{\text{m}}} \times \frac{60\ \cancel{\text{s}}}{1\ \cancel{\text{min}}} \times \frac{60\ \cancel{\text{min}}}{1\ \text{h}} = 3.6\ \frac{\text{km}}{\text{h}}$$

$$1.0\ \frac{\text{m}}{\text{s}} = 1.0\ \frac{\cancel{\text{m}}}{\cancel{\text{s}}} \times \frac{1250\ \cancel{\text{ft}}}{381\ \cancel{\text{m}}} \times \frac{1\ \text{mi}}{5280\ \cancel{\text{ft}}} \times \frac{60\ \cancel{\text{s}}}{1\ \cancel{\text{min}}} \times \frac{60\ \cancel{\text{min}}}{1\ \text{h}} \approx 2.2\ \frac{\text{mi}}{\text{h}}$$