1.17. A rather ordinary middle-aged man is in the hospital for a routine checkup. The nurse writes "200" on the patient's medical chart but forgets to include the units. Which of these quantities could the 200 plausibly represent? The patient's (a) mass in kilograms; (b) height in meters; (c) height in centimeters; (d) height in millimeters; (e) age in months.

(a)

$$200\,\text{kg}\left(\frac{2.205\,\text{lb}}{1\,\text{kg}}\right) = 441.0\,\text{lb; No} \tag{1}$$

(b)

$$200\,\text{m}\left(\frac{3.281\,\text{ft}}{1\,\text{m}}\right) = 656.2\,\text{ft; No} \tag{2}$$

(c)

$$200\,\text{cm}\left(\frac{1\,\text{m}}{100\,\text{cm}}\right)\left(\frac{3.281\,\text{ft}}{1\,\text{m}}\right) = 6.562\,\text{ft; No} \tag{3}$$

(d)

$$200\,\text{mm}\left(\frac{1\,\text{m}}{1000\,\text{mm}}\right)\left(\frac{3.281\,\text{ft}}{1\,\text{m}}\right) = 0.6562\,\text{ft; No} \tag{4}$$

(e)

$$200\,\text{mo}\left(\frac{1\,\text{y}}{12\,\text{mo}}\right) = 16\frac{2}{3}\,\text{y; No} \tag{5}$$

1.19. How many times does a typical person blink her eyes in a lifetime?

$$80\,\text{y}\left(\frac{365.24\,\text{days}}{1\,\text{y}}\right)\left(\frac{24\,\text{hrs}}{1\,\text{day}}\right)\left(\frac{60\,\text{mins}}{1\,\text{hr}}\right)\left(\frac{60\,\text{s}}{1\,\text{min}}\right)\left(\frac{1\,\text{blink}}{6\,\text{s}}\right) \approx 4\times10^8\,\text{blinks} \tag{6}$$

1.21. In the Wagner's opera *Das Rheingold*, the goddess Freia is ransomed for a pile of gold just tall enough and wide enough to hide her from sight. Estimate the monetary value of this pile. The density of gold is 19.3 g/cm^3, and take its value to be about \$10 per gram.

$$19.3\,\text{g/cm}^3\left(\frac{\$10}{1\,\text{g}}\right)(154\,\text{cm})^3 \approx \$70\,\text{million} \tag{7}$$

1.23. You are using water to dilute small amounts of chemicals in the laboratory, drop by drop. How many drops of water are in a 1.0-L bottle? (*Hint:* Start by estimating the diameter of a drop of water.)

$$1.0\,\text{L}\left(\frac{1000\,\text{cm}^3}{1\,\text{L}}\right)\left(\frac{10\,\text{mm}^3}{1\,\text{cm}^3}\right)\left(\frac{1\,\text{drops}}{0.05\,\text{mm}^3}\right) = 2\times10^5\,\text{drops} \tag{8}$$