

2. (a) 214 3 significant figures  
 (b) 81.60 4 significant figures  
 (c) 7.03 3 significant figures  
 (d) 0.03 1 significant figure  
 (e) 0.0086 2 significant figures  
 (f) 3236 4 significant figures  
 (g) 8700 2 significant figures

3. (a)  $1.156 = \boxed{1.156 \times 10^0}$   
 (b)  $21.8 = \boxed{2.18 \times 10^1}$   
 (c)  $0.0068 = \boxed{6.8 \times 10^{-3}}$   
 (d)  $328.65 = \boxed{3.2865 \times 10^2}$   
 (e)  $0.219 = \boxed{2.19 \times 10^{-1}}$   
 (f)  $444 = \boxed{4.44 \times 10^2}$

7. To add values with significant figures, adjust all values to be added so that their exponents are all the same.

$$(9.3 \times 10^3 \text{ s}) + (8.3 \times 10^4 \text{ s}) + (0.008 \times 10^6 \text{ s}) = 9.2 \times 10^3 \text{ s} + 83 \times 10^3 \text{ s} + 8 \times 10^3 \text{ s} = 1.0 \times 10^5 \text{ s}$$

When adding, keep the least accurate value, and so keep to the “ones” place in the last set of parentheses.

11. (a) 286.6 mm  $286.6 \times 10^{-3} \text{ m}$  0.2866 m  
 (b)  $85 \mu\text{V}$   $85 \times 10^{-6} \text{ V}$  0.000085 V  
 (c) 760 mg  $760 \times 10^{-6} \text{ kg}$  0.00076 kg (if last zero is not significant)  
 (d) 60.0 ps  $60.0 \times 10^{-12} \text{ s}$  0.0000000000600 s  
 (e) 22.5 fm  $22.5 \times 10^{-15} \text{ m}$  0.0000000000000225 m  
 (f) 2.50 gigavolts  $2.5 \times 10^9 \text{ volts}$  2,500,000,000 volts

13. Assuming a height of 5 feet 10 inches, then  $5'10'' = (70 \text{ in})(1 \text{ m}/39.37 \text{ in}) = 1.8 \text{ m}$ . Assuming a weight of 165 lbs, then  $(165 \text{ lbs})(0.456 \text{ kg}/1 \text{ lb}) = 75.2 \text{ kg}$ . Technically, pounds and mass measure two separate properties. To make this conversion, we have to assume that we are at a location where the acceleration due to gravity is  $9.80 \text{ m/s}^2$ .

19. (a)  $(1 \text{ km/h})\left(\frac{0.621 \text{ mi}}{1 \text{ km}}\right) = 0.621 \text{ mi/h}$ , and so the conversion factor is  $\frac{0.621 \text{ mi/h}}{1 \text{ km/h}}$ .

(b)  $(1 \text{ m/s})\left(\frac{3.28 \text{ ft}}{1 \text{ m}}\right) = 3.28 \text{ ft/s}$ , and so the conversion factor is  $\frac{3.28 \text{ ft/s}}{1 \text{ m/s}}$ .

(c)  $(1 \text{ km/h})\left(\frac{1000 \text{ m}}{1 \text{ km}}\right)\left(\frac{1 \text{ h}}{3600 \text{ s}}\right) = 0.278 \text{ m/s}$ , and so the conversion factor is  $\frac{0.278 \text{ m/s}}{1 \text{ km/h}}$ .

23. The surface area of a sphere is found by  $A = 4\pi r^2 = 4\pi(d/2)^2 = \pi d^2$ .

(a)  $A_{\text{Moon}} = \pi D_{\text{Moon}}^2 = \pi(3.48 \times 10^6 \text{ m})^2 = 3.80 \times 10^{13} \text{ m}^2$

(b)  $\frac{A_{\text{Earth}}}{A_{\text{Moon}}} = \frac{\pi D_{\text{Earth}}^2}{\pi D_{\text{Moon}}^2} = \left(\frac{D_{\text{Earth}}}{D_{\text{Moon}}}\right)^2 = \left(\frac{R_{\text{Earth}}}{R_{\text{Moon}}}\right)^2 = \left(\frac{6.38 \times 10^6 \text{ m}}{1.74 \times 10^6 \text{ m}}\right)^2 = 13.4$

41. (a) # of seconds in 1.00 y:  $1.00 \text{ y} = (1.00 \text{ y})\left(\frac{3.156 \times 10^7 \text{ s}}{1 \text{ y}}\right) = 3.16 \times 10^7 \text{ s}$

(b) # of nanoseconds in 1.00 y:  $1.00 \text{ y} = (1.00 \text{ y})\left(\frac{3.156 \times 10^7 \text{ s}}{1 \text{ y}}\right)\left(\frac{1 \times 10^9 \text{ ns}}{1 \text{ s}}\right) = 3.16 \times 10^{16} \text{ ns}$

(c) # of years in 1.00 s:  $1.00 \text{ s} = (1.00 \text{ s})\left(\frac{1 \text{ y}}{3.156 \times 10^7 \text{ s}}\right) = 3.17 \times 10^{-8} \text{ y}$