Answers to Chapter 5 Study Questions

1. a) 6.5×10^{2} b) 5×10^{-4} c) 2.07×10^{5} d) 1.0×10^{6} e) 5.0×10^{4}

2. a) liters (L) or cm^3, graduated cylinder, buret, or volumetric flask
   b) grams (g), balance c) meters (m), ruler or meterstick

3. a) 4 b) 5 c) 2 d) 3 e) 4

4. a) $1.24 \times 8.2 = 10.$ b) $6.78 - 3.3 = 3.5$
   c) $9.999 + 0.22 = 10.22$ d) $(5.67 \times 10^{3}) \times (2.1 \times 10^{-2}) = 1.2 \times 10^{2}$, or 120

5. a) $density = \dfrac{mass}{volume} = \dfrac{0.822\ g}{0.350\ cm^3} = 2.35\ g / cm^3$

   b) % accuracy error $= \dfrac{|2.70 - 2.35|}{2.70} \times 100\% = 13\%$

6. $50.0\ kg \times \dfrac{1000\ g}{1\ kg} \times \dfrac{1000\ mg}{1\ g} = 5.00 \times 10^{7}\ mg$

7. $275\ grams \times \dfrac{1\ kg}{1000\ g} \times \dfrac{2.20\ lb}{1\ kg} = 0.605\ lb$

8. $0.286\ mi \times \dfrac{1\ km}{0.621\ mi} \times \dfrac{1000\ m}{1\ km} \times \dfrac{100\ cm}{1\ m} = 4.60 \times 10^{4}\ cm$ (or convert mi → ft → in → cm)

9. $11.8\ kg \times \dfrac{1000\ g}{1\ kg} \times \dfrac{1\ cm^3}{7.87\ g} \times \dfrac{1\ mL}{1\ cm^3} \times \dfrac{1000\ \mu L}{1\ mL} = 1.50 \times 10^{6}\ \mu L$

10. $\dfrac{19.3\ g}{cm^3} \times \dfrac{1\ kg}{1000\ g} \times \dfrac{2.20\ lb}{1\ kg} \times \dfrac{1\ cm^3}{1\ mL} \times \dfrac{1000\ mL}{1\ L} \times \dfrac{1\ L}{1.06\ qt} = 40.1\ lb/qt$

11. a) Container A is the most precise because it has the most number of digits and taking into account the fact that it is off by 2 mL, it never varies by more than 0.08 mL. You might also say that Container C is the most precise because its volumes are reproducible, but you don't know whether the actual differences are more or less than Container A.
    b) Container B is the most accurate, since it is consistently closest to the actual volume.
    c) Containers A & C show a systematic error: Container A is 2 mL too high and Container C is 2 mL too low.

12. $100\ yd \times \dfrac{36\ in}{1\ yd} \times \dfrac{1\ m}{39.37\ in} \times \dfrac{1000\ mm}{1\ m} \times \dfrac{1\ ant}{5.0\ mm} = 1.8 \times 10^{4}\ ants$