Chapter 5 end-of-chapter problems, p. 148

(2) $4.512 \times 10^3 = 4.512 \times 1000 = 4512$

(4) (a) $0.000067 = 6.7 \times 10^{-5}$ (-5)

(b) $9,331,442 = 9.331442 \times 10^6$ (6)

(c) $1/10{,}000 = 0.0001 = 10^{-4}$ (-4)

(d) $163.1 \times 10^2 = 16310 = 1.631 \times 10^4$ (4)

(5) (a) $9,367,421 = 9.367421 \times 10^6$

(c) $0.0005519 = 5.519 \times 10^{-4}$

(f) $6139 \times 10^{-2} = 61.39 = 6.139 \times 10^1$

(h) $0.721 = 7.21 \times 10^{-1}$

(6) (a) $4.83 \times 10^2 = 483$

(c) 6.1 (remember, $10^0 = 1$)

(e) 4.221×10^6 $4,221,000 = 4,221,000$

(g) $9.999 \times 10^3 = 9,999$

(i) $1.016 \times 10^5 = 101600 = 101,600$

(k) 9.71×10^4

(7) (a) $142.3 \times 10^3 = 142.3 \times 1000 = 142300. = 1.423 \times 10^5$

(c) $22.7 \times 10^3 = 2.27 \times 10^1 \times 10^3 = 2.27 \times 10^4$

(e) $0.0251 \times 10^4 = 2.51 \times 10^{-2} \times 10^4 = 2.51 \times 10^2$

(g) $0.00009.7752 \times 10^6 = 9.7752 \times 10^{-5} \times 10^6 = 9.7752 \times 10^0$

(8) (a) $1/0.00032 = 3,125 \times 10^3$ (c) $\frac{10^3}{10^3} = 1 = 1 \times 10^0$ (e) $\frac{10^5 \cdot 10^4 \cdot 10^{-4}}{10^{-2}} = 10^7 = 1 \times 10^7$

(8) (g) $\frac{4.32 \times 10^{-5}}{432} = \frac{4.32 \times 10^{-5}}{4.32 \times 10^{2}} = 1 \times 10^{-7}$

$= 1.00 \times 10^{-7}$

(9) (a) 1000 of something, 10^{3} (b) 10^{-2}; 1/100 of something (c) 1/1000 of something 10^{-3}

(e) nano = 1 billionth of something = 10^{-9}

(10) (a) mega; M (c) nano; n (e) centi-, c

(11) 100 miles; 1 mile is about 1.6 km

(12) quart

(14) $1.62\ m \times \frac{39.37\ in}{1\ m} = 63.8$ inches = 5 ft. 3.8 inches.

The woman who is 5'6" is taller because the man is only 5'4".

(16) d 1 liter is about 1 qt.

(18) d km are kind of like miles; they are shorter than miles but closer to miles than the other choices.

(20) According to p. 120, 1 quarter is 2.5 cm across.

$1\ m \times \frac{100\ cm}{1\ m} \times \frac{1\ quarter}{2.5\ cm} = 40$ quarters.

(23) P. 122: The ruler is marked off in increments of 0.1 cm. Therefore, the length must be recorded to the nearest 0.01 cm – nothing more nor less. ("2.850 cm" implies that the ruler used to make the measurement was demarcated to the nearest 0.001 cm, which would require estimating to the nearest 0.00

24 (a) 1442 → 4 sig figs

(c) 1.004×10^5 → 4 sig figs; doesn't count; shows size only

(c) 200. ← decimal point at end. → 3 sig figs, Should be written "2.00×10^3"

(g) 435.662 → 6 sig figs

25 (a) 2 (c) exact definition, so I would say ∞. On p. 130, it looks like 4 sig figs, → Don't worry about this one.

26 (a) 1,566,311 ⇒ 1,570,000 (c) 84,692 ⇒ 84,600

27 (g) 0.00034159 ⇒ 0.000342 ⇒ 3.42×10^{-4}

(c) 17.9915 ⇒ 17.992 ⇒ 1.7992×10^1

29 5 on top / 3 on bottom ⇒ answer will have 3 s.f.

31 10434 − 9.3344 ⇒ answer can only have zero to the right of the decimal place.
↓ zero to the right; ↓ 4 to the right

32 (a) 212.2 + 26.7 + 402.09 = 640.99 = 641.0

(c) 52.331 + 26.01 − 0.9981 = 77.3429 = 77.34

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(33) (a) $\dfrac{4.031 \times 0.08206 \times 373.1}{0.995} = 124$

(c) $\dfrac{.500}{44.02} = 0.0114$

(34) (a) $2.0944 + .0003233 + 12.22 = 14.3147233$

but the answer is only known to 2 sig figs to the right, so the numerator only has 4 s.f. total

4 on top → $\dfrac{14.3147233}{7.001} = 2.045$ ← answer rounded to 4 sig figs

4 on bottom →

* only round your answers <u>once</u> at the <u>end</u> *

(c) $\dfrac{9.762 \times 10^{-3}}{143 + 45.1} = \dfrac{9.762 \times 10^{-3}}{188.1} = 5.19 \times 10^{-5}$

4 s.f. on top

but this sum in the denominator is only known to the ones place, so 3 s.f. on bottom

3 s.f. total

(38) you know this ↓

$\$2.00 \times \dfrac{1 \text{ lb}}{0.79 \text{ \$}} = \_\_\_\_ \text{ lb}$ ← find this

use $\dfrac{1 \text{ pound}}{0.79 \text{ dollars}}$

Chapter 5, P. 150

(39) (a) $2.23\ m \times \frac{1.094\ yds}{1\ m} = \underline{2.44}\ yds$

see P. 130, bottom left corner

(c) $292\ cm \times \frac{1\ in}{2.54\ cm} = \underline{115}\ in$

(e) $1043\ km \times \frac{1000\ m}{1\ km} \times \frac{1.094\ yds}{1\ m} \times \frac{1\ mile}{1760.\ yds} = \underline{\quad 648.3 \quad}\ miles$

4 s.f. ∞ s.f. 4 s.f. 4 s.f.

(g) $36.2\ m \times \frac{1\ km}{1000\ m} = \underline{0.0362}\ km$

(40) (a) $254.3\ g \times \frac{1\ kg}{1000\ g} = \underline{0.2543}\ kg$

(c) $2.75\ kg \times \frac{2.205\ lb}{1\ kg} = \underline{6.06}\ lb$

(e) $534.1\ g \times \frac{1\ lb}{453.6\ g} = \underline{1.177}\ lb$

(g) $8.7\ oz \times \frac{1\ lb}{16\ oz} \times \frac{453.6\ g}{1\ lb} = \underline{250}\ g$ ← round to 2 sig figs.

Chapter 5, p. 150

(42) $190 \text{ miles} \times \frac{1760 \text{ yds}}{1 \text{ mile}} \times \frac{1 \text{ m}}{1.094 \text{ yd}} = \frac{305667}{\quad} \text{ m}$

(2 sig figs)

$= 3.1 \times 10^5 \text{ meters}$

$305667 \text{ m} \times \frac{1 \text{ km}}{1000 \text{ m}} = 305.667 \text{ km} = 3.1 \times 10^2 \text{ km}$

$190 \text{ miles} \times \frac{1760 \text{ yds}}{1 \text{ miles}} \times \frac{3 \text{ ft}}{1 \text{ yd}} = \frac{1003200}{\quad} \text{ ft} = 1.0 \times 10^6 \text{ ft}$

(47) $°C + 273 = K$

(a) $-155 + 273 = 118 K$ (c) $-52 + 273 = 221 K$ (e) skip it.

(48) (a) $°C + 273 = K$

$°C + 273 = 275$

$2°C$

(c) $°C + 273 = 0 K$

$-273°C$

(e) 10,000. K (known to the ones place.)

$°C + 273 = 10{,}000. K$

$9727°C$

$= 9.727 \times 10^3 °C$

(49) (a) skip it. (c) $°C + 273 = K$

$°C + 273 = 232 K$

$-41°C$

(50) (a) skip it

(c) skip it

(54) Any amount of a pure substance has the same density.

(56) (a) $4.53 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 4.53 \times 10^3 \text{ g}$ $D = \frac{m}{V} = \frac{4.53 \times 10^3 \text{ g}}{225 \text{ cm}^3} = 20.1 \text{ g/cm}^3$

(c) mass isn't measured in pounds! $D = \frac{m}{V} = \frac{453.6 \text{ g}}{500. \text{ cm}^3} = 0.907 \text{ g/cm}^3$

(see p. 130) (3 sig figs)

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(57) $D = \frac{m}{V} = \frac{75.2\,g}{89.2\,mL} = 0.843\,g/mL$

(59) $3.51\,lb \times \frac{453.6\,g}{1\,lb} = 1587.6\,g = m$

2 Sig Figs → $1.2 \times 10^{1}\,in^3 \times \frac{16.387\,cm^3}{1\,in^3} = 196.64\,cm^3$

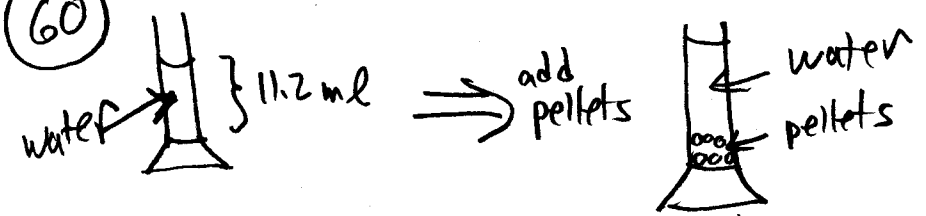
$2.54\,cm = 1\,in$

$(2.54\,cm)^3 = (1\,in)^3$

$16.387\,cm^3 = 1\,in^3$

$D = \frac{1587.6\,g}{196.64\,cm^3} = 8.1\,g/cm^3$; it will sink

(60)



volume in grad cyl will increase due to volume of silver pellets.

$11.2\,mL + \boxed{?} = \boxed{?}$

initial volume; volume of silver pellets; total, final volume.

$D = \frac{m}{V}$ $\quad 10.5\,\frac{g}{cm^3} = \frac{5.25\,g}{V} \Rightarrow V = \frac{5.25\,g}{10.5\,g/cm^3} = 0.500\,cm^3$

$11.2\,mL + 0.500\,mL = 11.7\,mL$

(62)

(a) $50.0\,cm^3 \times \frac{19.32\,g}{cm^3} = 966\,g$

(b) $50.0\,cm^3 \times \frac{7.87\,g}{cm^3} = 394\,g$

(c) $50.0\,cm^3 \times \frac{11.34\,g}{cm^3} = 567\,g$

(d) $50.0\,cm^3 \times \frac{2.70\,g}{cm^3} = 135\,g$