Updates

- Added Homework assignment
  ⟹ from textbook
  do on paper, scan & Submit on Canvas
  due date Sun night
- Canvas online assignment
  due on sunday
- Quiz on Chapter 1 due Monday

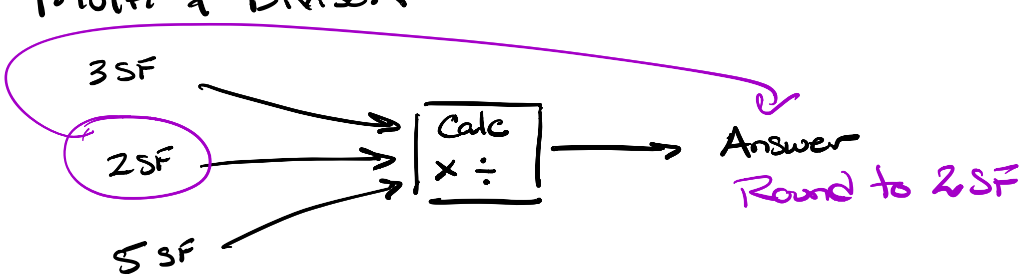
- Finish Chapter 1.5 w/ Look applying sig figs in Calc
- Look 1.6 and Dimensional Analysis (Conversions)

1.5 Sig fig Rules

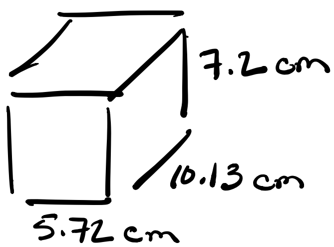
different Rules for

1. $+ -$
2. $\times \div$
3. Logs ⟸ Later

Multi & Divison



Example



$$\text{Density} = \frac{\text{mass}}{\text{vol}}$$

$$\text{vol} = l \times w \times h$$

$$\text{Density} = \frac{\text{mass}}{l \times w \times h}$$

mass = 432.79 g

$$\text{Density} = \frac{\overset{5}{432.79\,g}}{\underset{3}{5.72\,cm} \times \underset{4}{10.13\,cm} \times \underset{2}{7.2\,cm}} =$$

2 smallest

$$432.79 \div 5.72 \div 10.13 \div 7.2 = 1.037383286\,89\ g/cm^3$$

$$432.79 \div (5.72 \times 10.13 \times 7.2) =$$

$$= \boxed{1.0\ g/cm^3}$$

Rules for sigfig in + & −

±0.1 ~4SF~

±0.01 ~3SF~

± 1 ~5SF~

±0.1 ~4SF~

Calc
±

Requires alignment by place value

Result
± 1

Rounding to ones position

#SF can go up or can go down

Example

7.32 cm   0.9 cm   51.26 cm   3.921 cm

		SF	uncertainty
	7.32	~~3~~	± 0.01
	0.9	~~1~~	± 0.1
	51.26	~~4~~	± 0.01
+	3.921	~~4~~	± 0.001
	63.401		

$\boxed{= 63.4 \text{ cm}}$

3 SF   ± 0.1 cm

Chapter 1.6 Dimensional Analysis

System for solving problems that utilizes conversion factors (equalities) to convert one unit of measure into another.

Book has table 1.6 with 12 conversion factors ⟹ Ignor these

* memorize Jason's 3 keys

Length	1 in = 2.54 cm (def)	* Exact
mass	1 lb = 453.6 g (4 SF)	measured
Vol	1 gal = 3.785 L (4 SF)	measured

System of Dimensional Analysis

$$\text{Given } \cancel{\text{Unit}} \times \underbrace{\frac{\text{Value Desired Unit}}{\text{Value Given } \cancel{\text{Unit}}}}_{\text{Conversion factor}} = \text{Desired Unit}$$

Equality: Value Desired Unit = Value Given Unit

Question

Desired

How many inches are in 67.3 ft?

Given

Equality $12\,in = 1\,ft$ definition

Road Map

$$ft \xrightarrow[12in=1ft]{Equality} in$$

3 def

$$67.3\,\cancel{ft} \times \frac{12\ in}{1\ \cancel{ft}} = 807.6\ in$$

$$= \boxed{808\ in} \pm 1\,in \quad 3SF$$

Steps to problem Solving

1. Parce the word problem
   - Identify the given, the desired, and any equalities that may be in the problem
2. Develop a Road map for Solving the problem
3. Find (lookup) or Remember Required equalities ⟹ 3 keys
4. write out Calculation
5. perform Calculation
6. Apply Sig figs
7. Box in the answer

Ex Calculate how many Seconds are in 52.2 years ? (desired: how many Seconds; Given: 52.2 years)

No equalities provide.

Road Map

years (time) $\xrightarrow{①}$ days $\xrightarrow{②}$ hr $\xrightarrow{③}$ min $\xrightarrow{④}$ Seconds (time)

Equalities
1. 365 days = 1 year
2. 24 hr = 1 day
3. 60 min = 1 hr
4. 60 sec = 1 min

3

$$52.2\cancel{yr} \times \overset{def}{\frac{365\ \cancel{day}}{1\ \cancel{yr}}} \times \overset{def}{\frac{24\ \cancel{hr}}{1\ \cancel{day}}} \times \overset{def}{\frac{60\ \cancel{min}}{1\ \cancel{hr}}} \times \overset{def}{\frac{60\ sec}{1\ \cancel{min}}} = 1646179200\ sec$$

$$\boxed{\begin{array}{l} = 1\,650\,000\,000\ sec \\ \text{or}\quad 1.65 \times 10^{9}\ sec \end{array}}$$

ex

Desired: How many Liters are there in a sample containing 536 fl oz (Given) of soft drink?

Found equality on label $20.\ \text{fl oz} = 591\ \text{mL}$

Road Map

$$\text{fl oz} \longrightarrow \text{mL} \longrightarrow \text{L}$$

Volume Eng | Volume SI | Volume SI

$\underbrace{\text{mL} \longrightarrow \text{L}}_{\text{Same system, Same type}}$

$$\left.\begin{aligned} 1\ \text{mL} &= 1\times10^{-3}\ \text{L} \\ 1000\ \text{mL} &= 1\ \text{L} \end{aligned}\right\} \text{equivalent}$$

$$\overset{3}{536\ \cancel{\text{fl oz}}} \times \frac{\overset{3}{591}\ \cancel{\text{mL}}}{\underset{2}{20.}\ \cancel{\text{fl oz}}} \times \overset{\text{def}}{\frac{1\times10^{-3}\ \text{L}}{1\ \cancel{\text{mL}}}} =$$

536 × 591 × 1 EE ± 3 ÷ 20 ÷ 1 = 15.8388 L

E (-)

x10

$= \boxed{16\ \text{L}}$

EE or E or 10^x

e^x natural log base 2.xx

If 10^x

536 × 591 × 1 × 10^x (±) 3)   ± or (−)

Ex

Given: Convert 3.75 miles into Kilometers (km). :Desired

(1 mi = 5280 ft)

Road Map

$$\text{miles} \xrightarrow{1} \text{ft} \xrightarrow{2} \text{in} \xrightarrow{3} \text{cm} \xrightarrow{4} \text{m} \xrightarrow{5} \text{km}$$

miles: Eng Length; in: Eng Length | cm: SI Length; km: SI Length

Equalities

1. $1\ \text{mi} = 5280\ \text{ft}$
3. $1\ \text{in} = 2.54\ \text{cm}$ 3key *def
4. $1\ \text{cm} = 1 \times 10^{-2}\ \text{m}$ or $100\ \text{cm} = 1\ \text{m}$
5. $1\ \text{km} = 1 \times 10^{3}\ \text{m}$ or $1\ \text{km} = 1000\ \text{m}$
2. $1\ \text{ft} = 12\ \text{in}$

$$\overset{3}{3.75\ \cancel{\text{mi}}} \times \overset{\text{def}}{\frac{5280\ \cancel{\text{ft}}}{1\ \cancel{\text{mi}}}} \times \overset{\text{def}}{\frac{12\ \cancel{\text{in}}}{1\ \cancel{\text{ft}}}} \times \overset{\text{def}}{\frac{2.54\ \cancel{\text{cm}}}{1\ \cancel{\text{in}}}} \times \overset{\text{def}}{\frac{1\ \cancel{\text{m}}}{100\ \cancel{\text{cm}}}} \times \overset{\text{def}}{\frac{1\ \text{km}}{1000\ \cancel{\text{m}}}} =$$

$$3.75 \times 5280 \times 12 \times 2.54 \div 100 \div 1000 = 6.03504\ \text{km}$$

$$\boxed{= 6.04\ \text{km}}$$