Measurement/Data Analysis

Notes #2

Chapter 2

Objectives

- Distinguish between a quantity, and a unit
- Define SI units for length, mass, time, and temperature
- You will convert data into scientific notation and from one unit to another using dimensional analysis and the “staircase”
- You will round off answers to the correct degree of certainty – significant figures
- Perform density calculations

International System of Units (SI)

- Quantity – #, quantity of something
- Units –comes after the number (usually abbreviations)
- Example – 1 tsp. The quantity represented by a teaspoon is volume. Teaspoon is the unit of measurement.

	Q	U
30 meters		
40º Celsius		
40 cm^3		

International System of Units (SI)

Quantity	Quantity symbol	Unit name	Unit abbreviation
Length	l	meter	m
Mass	m	gram	g
Time	t	second	s
Volume	v	liter	L
Temperature	T	kelvin	K

SI Prefixes pg. 26

m

c

d

M

D

H

K

Conversion Factors

- Convert the following:

1. 35mL=_____dL

2.950g = _____kg

3. **.**025cm =___Dm

- Work on metric practice problems

Dimensional Analysis

- Bridge method
- Uses conversion factors

8. Convert 75 years to seconds
9. 3 hours = _____seconds
10. 2.5yds. = _____ in.

Solve practice problems on pg. 34

Derived SI Units –unit defined by combination of base units

- Volume – amount of space occupied by an object
- V = l x w x h
- Units = cm^3, m^3, mL, L

- Density - mass divided by volume
- $D = \frac{m}{V}$
- Units = kg/m^3 or g/mL
- Practice problems pg. 29

Density Problems

1. What is the density of an object with a mass of 60.00g and a volume of 2.00$cm^{3?}$
2. If you have a gold brick that is 2.00cm by 3.0cm by 4.00cm and has a density of 19.3 $g/cm^{3,}$ what is its' mass?
3. If a block of wood has a density of 0.60g/cm^3 and a mass of 120g, what is its volume?
4. What is the mass of an object that has a volume of 34.0 cm^3 and a density of 6.0 $cm^{3?}$

Accuracy vs. Precision

- Accurate – how close #’s are to accepted value
- Precision – how repeatable several measurements are

Scientific notation

- Expresses numbers as a multiple of a number between 1 and 10 and ten raised to an exponent
- Ex. 2.4×10^4
- Standard notation would be the number written out in long format
- Ex. 24000

Scientific notation

11. 68,900
12. .000589
13. 45,000,000

Multiplying and Dividing sci. not.

- Multiplying

X #'s

carry down power of 10 and **add** exponents

14. $(5.5 \times 10^{5})(2 \times 10^{8})$
15. $(3 \times 10^{-4})(2 \times 10^{6})$

- Dividing

divide #'s

carry down power of 10 and **subtract** exponents

16. $(4 \times 10^{9})/(2 \times 10^{7})$
17. $(2 \times 10^{-4})/(2 \times 10^{-3})$

Pgs. 32-33 #'s 12,13(all),15,16(c,d)

Adding & Subtracting

-exponents must be the same. If not, change one of the #'s to make same

- add or subtract #'s

- carry down power of 10 with exponent

18. $1.26 \times 10^4 kg + 2.5 \times 10^3 kg$

Pg. 32 #14 c,d

Significant Figures/Rounding Rules

- Pg.39 Sig. figures
- Notes #2 pp Pg.39 31-32
- Pg. 40 Rounding rules
- Pp. pg. 41 #’s 33,34
- http://www.chem.sc.edu/faculty/Morgan/resources/sigfigs/index.html

Caclulations/ Sig. figs.

Sig. Fig.

1. When adding and subtracting, report answer to **fewest decimal places** to the right out of all #'s
2. When x or /, has to do with fewest **total #** of sig. fig.

Practice

19. 52.0 cm + 48.53cm + 2.25cm =
20. 4.50cm x 2.2cm =

Measurement Activity

- Find the mass of
- Find the weight of
- Find the volume of the box
- Find the volume of the rock
- Find the density of the

Graphing

Graphing Steps

Choose a title for your graph – what relationship your graph is going to show y vs. x

Label each axis including units ( ). X axis is independent variable and y axis is dependent variable

Determine the horizontal and vertical scales for your graph. Write in values and tick marks for scales on graph.

Plot the points

Connect the points, or draw best fit straight line.

6. Analyze what the graph tells you.