Unit 1 Chemical Math – Guided Notes

Scientif	ic Method	List the steps to the scientific method	
	1.		
	2.		
	3.		
	4. 5		
	5. 6.		
Types o	f Observatio	ions	
	o Qu	ualitative:	
	o Qu	uantitative:	
Significa	ant Figures	7	
•		is a common type of meas	surement. The measurement is
•	In science.	and can be expressed measurements should only have	degree of uncertainty (or
		estimated digit).	
•	Significant	figures:	
•	Exactness i	is also called	
•	5 Rules for	Significant Figures:	·
	1.		
	2.		
	3.		
	4.		
	5.		
•	"Cheat She	eet"/ Atlantic-Pacific Method:	
•	Learning Cl	heck:	
		0,4760 b. 0.00476 c. 4760	
	2) All the	zeros are significant in	
	a.	0.00307 b. 25.300 c. 2.050 x 10	3
	3) 534,67	75 rounded to 3 significant figures is	

4) In which set(s) do both numbers contain the *same* number of significant figures?

- a. 22.0 and 22.00
- b. 400.0 and 40
- c. 0.000015 and 150,000

State the number of significant figures in each of the following:

- 5) 0.030 m
- 6) 4.050 L
- 7) 0.0008 g
- 8) 3.00 m
- 9) 2,080,000 bees

Calculations with Sig Figs

- A calculated answer cannot be.....
- Adding and Subtracting:
 - o Rule:
 - Example: 25.2
 - + 1.34
 - \circ $\:$ Learning Check: In each calculation, round the answer to the correct number of significant figures.

1) 235.05 + 19.6 + 2.1 =

- 2) 58.925 18.2 =
- Multiplying and Dividing:
 - o Rule:
 - Example: 15.7 x 0.63 =
 - Learning Check:
 1) 2.19 X 4.2 =
 - 2) 4.311 ÷ 0.07 =
 - 3) <u>2.54 X 0.0028</u> = 0.105 .060

Scientific Notation

- What is Scientific Notation?
- What numbers are best for scientific notation?
- Scientific Notation consists of two parts: N x 10^x
- When you divide by a number that is in scientific notation, use ______
- Standard Form to Scientific Notation
 - Place the decimal point so that there is one non-zero digit to the left of the decimal point.
 - Count the number of decimal places the decimal point has "moved" from the original number. This will be the exponent on the 10.
 - If the original number was less than 1, then the exponent is negative. If the original number was greater than 1, then the exponent is positive.
 - Examples:
 - 289,800,000
 - 0.000567
- Scientific Notation to Standard Form
 - Simply move the decimal point to the right for positive exponent 10.
 - Move the decimal point to the left for negative exponent 10. (Use zeros to fill in places.)
 - Examples:
 - 5.093 x 10⁶
 - 1.976 x 10⁻⁴
- Learning Check: Express these numbers in Scientific Notation:
 - 1) 405789
 - 2) 0.003872
 - 3) 300000000
 - 4) 2
 - 5) 0.478260

Measurements

- In every measurement there is a ______ followed by a ______
 from a measuring device
- The number should also be as ______ as the measurement.
- Use the SI units- based on the metric system
 - o Length
 - o Mass
 - \circ Volume
 - o Time
 - Temperature

Period: _____

- Which tool(s) would you use to measure:
 - Temperature
 - Volume
 - Time
 - weight
- Learning Check: Indicate what is being measured: Length, Mass, or Volume
 - 1) A bag of tomatoes is 4.6 kg.
 - 2) A person is 2.0 m tall._____
 - 3) A medication contains 0.50 g Aspirin. _____
 - 4) A bottle contains 1.5 L of water.
- What are some U.S. units that are used to measure each of the following?
 - o length
 - o volume
 - \circ weight
 - o temperature
- Can you hit the bull's eye?

Three targets with three arrows each to shoot.

How do they compare? Both accurate and precise Precise but not accurate

Neither accurate nor precise

- Can you define accuracy and precision?
 - Accuracy:
 - Precision:
- Reading a Meter stick:



- Answer: _____
- In you answer, underline the certain digits and circle the uncertain digit
- Learning Check: What is the length of the line?
 - 1.

. I⁸. . . . I I⁹. . . . I I¹⁰. . cm

How does your answer compare with your neighbor's answer? Explain any differences.
 2.

How much water is in the graduated cylinders?



Metrics

- Learning check: Select the unit you would use to measure the following:
 - 1. Your height: a) millimeters b) meters c) kilometers
 - 2. Your mass: a) milligrams b) grams c) kilograms
 - 3. The distance between two cities: a) millimeters b) meters c) kilometers
 - 4. The width of an artery: a) millimeters b) meters c) kilometers
- Metric Prefixes: You MUST know these

- Metric Conversions: Convert 3.400 kiloliters to Decaliters
 - To convert using metrics:
 - 1. Determine which prefix you are starting with
 - 2. Determine which prefix you are converting to
 - 3. Count how many spaces you move when you go from step 1 to step 2
 - 4. Move the decimal over that many spaces in the same direction
- Learning Check:
 - 1) 1000 m = ___ mm
 - 2) 0.001 g = ____ kg
 - 3) 0.1 L = ____ cL
 - 4) 0.01 m = ____ dm

- 5) ? kilometer (km) = 500 meters (m)
- 6) 2.5 meter (m) = ? centimeters (cm)
- 7) 1 centimeter (cm) = ? millimeter (mm)
- 8) 1 nanometer (nm) = 1.0 x 10⁻⁹ meter

Dimensional Analysis

- What is a conversion factor?
- Example: what is the conversion factor involving inches and centimeters?
- Learning Check: Write conversion factors that relate each of the following pairs of units:
 - 1) Liters and mL
 - 2) Hours and minutes
 - 3) Meters and kilometers
- Example: How many minutes are in 2.5 hours?
 - What conversion factor are you going to use?
 - What units go in the numerator and denominator and why?
- Steps to Problem Solving:
 - 1. Write down the given amount. Don't forget the units!
 - 2. Multiply by a fraction.
 - 3. Use the fraction as a conversion factor. Determine if the top or the bottom should be the same unit as the given so that it will cancel.
 - 4. Put a unit on the opposite side that will be the new unit. If you don't know a conversion between those units directly, use one that you do know that is a step toward the one you want at the end.
 - 5. Insert the numbers on the conversion so that the top and the bottom amounts are EQUAL, but in different units.
 - 6. Multiply and divide the units (Cancel).
 - 7. If the units are not the ones you want for your answer, make more conversions until you reach that point.
 - 8. Multiply and divide the numbers. Don't forget "Please Excuse My Dear Aunt Sally"! (Order of operations)
- Examples:
 - 1. You have \$7.25 in your pocket in quarters. How many quarters do you have?
 - 2. If Jacob stands on Spencer's shoulders, they are two and a half yards high. How many feet is that?

- 3. A rattlesnake is 2.44 yards long. How long is the snake in meters? (note: 1 yard = 0.9144 meters)
- 4. How many seconds are in 1.4 days?
- 5. What is *wrong* with the following setup?

1.4 day	Х	<u>1 day</u>	х	<u>60 min</u>	x <u>60 sec</u>
		24 <u>hr</u>		1 hr	1 min

- English and Metric Conversions:
 - o If you know ONE conversion for each type of measurement, you can convert anything!
 - You must use these conversions:
 - Mass: _____ grams = _____ pound
 - Length: _____m = ____inch
 - Volume: _____ L = ____ quart
 - 6. An adult human has 4.65 L of blood. How many gallons of blood is that?

Temperature

- What are the three temperature scales?
- Which unit of temperature are we going to use most often in this class?