WILLIAMSBURG HIGH SCHOOL
for
ARCHITECTURE AND DESIGN

THE WILLIAMSBURG HIGH SCHOOL FOR ARCHITECTURE AND DESIGN

Date: June 6, 2015

Welcome Scholars!

Congratulations on making it into the Chemistry class. I understand it is hard to study during the summer. However, in preparation for an academically successful year, you will need to keep your brain active this summer. This summer while you are lazing around a pool, hiking through the mountain or gaming in your living room, take some time out of each day and develop and practice the following skills:

- Math/Algebra
- Significant Figures
- Reading Comprehension

By mastering these skills, you will be more successful in the Chemistry class. I look forward to meeting you this fall.

Sincerely,

Buihonghanh

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Chemistry Teacher
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TABLE OF CONTENT

LESSON 1 – QUANTITATIVE MEASUREMENT

PART: MATH/ALGEBRA

Name_____
Date: _____

A quantitative measurement has 2 components: 1. Numerical value 2. Unit	**EXAMPLE 1:** 12 inches Numerical value = 12 Unit = inches **EXAMPLE 1:** 28 g/mol Numerical value = 28 Unit = g/mol

INSTRUCTIONS: **Complete the blanks**

1. 10 km
    a. Numerical value = _____
    b. Unit = _____
2. 21.2 kPa
    a. Numerical value = _____
    b. Unit = _____
3. 125 J
    a. Numerical value = _____
    b. Unit = _____

4. 17 mol
    a. Numerical value = _____
    b. Unit = _____
5. 24 L
    a. Numerical value = _____
    b. Unit = _____
6. 7 atm
    a. Numerical value = _____
    b. Unit = _____
7. 89 g/mol
    a. Numerical value = _____
    b. Unit = _____
8. 2 u
    a. Numerical value = _____
    b. Unit = _____
9. 273 K
    a. Numerical value = _____
    b. Unit = _____
10. 53 g
    a. Numerical value = _____
    b. Unit = _____

LESSON 2 – ALGEBRA BASIC
PART: MATH/ALGEBRA

Name_____
Date: _____

EXAMPLE 1:	**EXAMPLE 2:**
Given the following equation: 2b + 3c Where b = 4 and c = 2 SOLUTION: 2b + 3c 2(4) + 3(2) 8 + 6 **14**	Given the following equation: 2b + 3c =35 Where b = 4 SOLUTION: 2b + 3c = 35 2(4) + 3c = 35 8 + 3c = 35 8 -8 + 3c = 35 – 8 3c = 27 3c/3 = 27/3 **c=9**

INSTRUCTIONS: Show all work and box the answer

For all problems:
a = 3
b = 4
c = 5

1. 7a + 3b	2. 8b + 2c
3. 9a + 3c	4. 10a + 3b + 6c

5. 9a + 4b + 7c	6. 12a - 4b
7. 2a + 4d = 42	8. 3a + 2b + 3d = 30
9. 4a + 5c + 3d = 50	10. 6a + 5b + 3d = 48
11. 8a + 2c + 2d = 100	12. 4b + 5c + 4d = 68

LESSON 3 – FORMULA
PART: MATH/ALGEBRA

Name_____
Date: _____

DENSITY FORMULA: $\mathbf{D = \frac{M}{V}}$ D = Density M =Mass V = Volume	EXAMPLE 1 What is the density of carbon dioxide gas if 0.196 g occupies a volume of 100 ml? Solution: $\mathbf{D = \frac{M}{V}}$ $\mathbf{D = \frac{0.196g}{100ml}}$ $\mathbf{D = 00.196\ g/ml}$

INSTRUCTIONS: Show all work and box the answer

1. What is the density of oxygen gas if 1 g occupies a volume of 20 ml?

2. What is the density of nitrogen gas if 15 g occupies a volume of 150 ml?

3. What is the density of a can of soda if 394 g occupies a volume of 355 ml?

4. What is the density of a diet can of soda if 355 g occupies a volume of 355 ml?

5. 5.0 mL of ethanol has a mass of 3.9 g, and 5.0 mL of benzene has a mass of 44 g. Which liquid is denser?

LESSON 1 – RULES
PART: SIGNIFICANT FIGURES

Name_____
Date: _____

RULES:

- Nonzero digits are always significant
  - example: 46.3 m has 3 significant figures
  - example: 6.295 g has 4 significant figures
- Zeros between nonzero digits are significant
  - example: 40.7 m has 3 significant figures
  - example: 87,009 m has 5 significant figures
- Zeroes in front of nonzero digit are not significant
  - example: 0.009587 m has 4 significant figures
  - example: 0.0009 g has 1 significant figure
- Zeroes after whole number are not significant
  - example: 850 g has 2 significant figures
  - example: 190,700 has 4 significant figures
- Zeroes to the right of a decimal point are significant
  - example: 85.00 g has 4 significant figures
  - example: 9.0700 has 5 significant figures

INSTRUCTIONS: Identify the number of significant figures

1. 89.53 = _____
2. 989.53 = _____
3. 1520 = _____
4. 1025 = _____
5. 0.002553 = _____
6. 125.250 = _____
7. 0.0212500 = _____

8. 5 = _____

9. 50 = _____

10. 785.2500 = _____

11. 28532 = _____

12. 0.002514 = _____

13. 7589 = _____

14. 3200 = _____

15. 1002510 = _____

16. 2001 = _____

17. 300 = _____

18. 3120 = _____

19. 0.002 = _____

20. 45.236 = _____

21. 45.2500 = _____

22. 0.00120 = _____

23. 1001 = _____

24. 56.020 = _____

25. 1111 = _____

LESSON 2 – ADDING/SUBTRACTION
PART: SIGNIFICANT FIGURES

Name_____
Date: _____

RULES:	**EXAMPLE:**
1) Count the number of significant figures in the decimal portion of each number in the problem. (The digits to the left of the decimal place are not used to determine the number of decimal places in the final answer.) 2) Add or subtract in the normal fashion. 3) Round the answer to the LEAST number of places in the decimal portion of any number in the problem.	2.5 + 3.42 5.92 **5.9** **note:** 2.5 = 1 significant figure (after the decimal) 3.42 = 2 significant figures (after the decimal) So the answer has to be 1 significant figure

INSTRUCTIONS: Show work and box the answer

$+\begin{matrix}3.50\\0.01\end{matrix}$ ---------	$+\begin{matrix}3.050\\100.01\end{matrix}$ ---------
$+\begin{matrix}31.50\\20.101\end{matrix}$ ---------	$+\begin{matrix}2.80\\0.21\end{matrix}$ ---------

$+\begin{matrix}0.050\\1.01\end{matrix}$ ---	$+\begin{matrix}34.650\\0.101\end{matrix}$ ---
$+\begin{matrix}9.50\\10.01\end{matrix}$ ---	$+\begin{matrix}31.050\\21.01\end{matrix}$ ---
$+\begin{matrix}38.210\\100.01\end{matrix}$ ---	$+\begin{matrix}12.50\\0.0251\end{matrix}$ ---
$+\begin{matrix}4.50\\0.1\end{matrix}$ ---	$+\begin{matrix}123.50\\120.001\end{matrix}$ ---

LESSON 3 – MULTIPLICATION/DIVISION
PART: SIGNIFICANT FIGURES

Name_____
Date: _____

RULES:	**EXAMPLE:**
1) Count the number of significant figures in for each number in the problem 2) Multiple or divide in the normal fashion. 3) Round the answer to the LEAST number of places	2.5 x 3.42 8.55 **8.6** **note:** 2.5 = 2 significant figures 3.42 = 3 significant figures So the answer has to be 2 significant figures

INSTRUCTIONS: Show work and box the answer

$\frac{3.5}{0.1} \times$ ---	$\frac{3.050}{10.01} \times$ ---
$\frac{31.50}{20.101} \times$ ---	$\frac{2.80}{0.21} \times$ ---

$\frac{0.050}{1.01}$	$\frac{34.650}{0.101}$
$\frac{9.50}{10.01}$	$\frac{31.050}{21.01}$
$\frac{38.210}{100.01}$	$\frac{12.50}{0.0251}$
$\frac{4.50}{0.1}$	$\frac{123.50}{120.001}$

LESSON 1 - IT'S ELEMENTAL
PART: READING COMPREHENSION

Name_____
Date: _____

It's Elemental

Cross-Curricular Focus: Physical Science

All of the "stuff" around us that takes up space is called **matter.** Matter is made out of **elements**. An element cannot be taken apart chemically to make any other substances. Elements are made up of microscopic parts called **atoms.** Those atoms have all the **properties** of the element. A property is a characteristic. How is the element experienced with the senses? What does it look like, feel like, taste like, sound like, or smell like? How does it act under certain conditions? How does it act when it is mixed with other elements? When you answer these questions, you are describing an element's properties. Atoms join together to make elements. Then those elements join together to make matter. The kind of atoms that connect, and the way they join, determines the properties of each element. The whole process is like building something out of blocks that connect together.

In the early days of scientific study, scientists started writing down what they were observing about elements. There were probably as many different ways to write it all down as there were people. Just think about the differences between the way you and your friends take notes in class! It was hard for scientists to share information and build on each other's studies. Information had to be organized in a standard way that scientists could all use. Of course there were changes and adjustments along the way, but we finally ended up with a chart called the **periodic table**. In 1869, a Russian chemist named Dmitri Mendeleyev arranged all the known elements based on their properties and the number of **protons** (positively charged particles) found in one atom of each element. Mendeleyev noticed a pattern in these numbers, and was even able to use the pattern to predict future elements before scientists discovered them!

Today, we know of about 100 different elements. There are 18 elements that are found in the largest amounts on Earth. You have probably heard the names of these 18 before: Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Sodium, Magnesium, Aluminum, Silicon, Phosphorus, Sulfur, Chlorine, and Argon. When it comes down to the building blocks of matter, it's elemental!

Name:_____

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1. What is the main idea of this reading passage?

_____

_____

2. If you discovered a new element, how would you know where it should go on the periodic table of elements?

_____

_____

3. Do you think it is a good idea for all scientists to use the same periodic table of elements? Why or why not?

_____

_____

4. State the definition of an element in your own words:

_____

_____

5. Explain how atoms and elements differ from one another.

_____

_____

LESSON 2 - CHEMORPHESIS
PART: READING COMPREHENSION

Name_____
Date: _____

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