Clearview Regional High School District
2018 Summer Assignment

Course:	Honors Biology
Teacher(s):	Ms. Amanda McGeehan and Mr. Kyle Rosa
Due Date:	Friday, September 7, 2018
Purpose of Assignment:	The overall goal of these assignments is to measure, maintain, and sharpen skills from previous science courses that will provide a foundation and preparation for Honors Biology. They are also intended to promote academic habits and engagement of minds required for the level of rigor for the course.
Description of Assignment:	1. Students will practice generating graphs from multiple data sets. They will interpret and analyze scientific data by answering corresponding questions. 2. Students will read about chemistry concepts that are required for certain biological topics. Knowledge of these concepts is crucial for understanding biochemistry. After reading the information, students will answer a series of practice questions using a periodic table.
Grading/Use of Assignment: Category/Weight for Q1:	This assignment will count as a homework or daily grade. This assignment is due on Friday, September 7, 2018.
Specific Expectations:	Students are to write in complete sentences and clearly, providing enough information in explanations. Students should circle concepts/questions they feel less comfortable with (however do not just leave blank).
Where to Locate Assignment:	There are hard copies of this assignment in classroom 214 (Ms. McGeehan's classroom). There are electronic copies of this assignment posted on Ms. McGeehan and Mr. Rosa's class websites: McGeehan: http://clearview.oncoursesystems.com/websites/12761614 Rosa: https://sites.google.com/a/clearviewregional.edu/mrrosascience/home
Teacher Contact Information:	Ms. McGeehan will check her e-mail weekly: mcgeehanam@clearviewregional.edu Mr. Rosa will check his e-mail weekly: rosaky@clearviewregional.edu
Additional Help/ Resource(s):	The following website may offer some additional help: Biochemistry: http://www.phschool.com/science/biology_place/biocoach/biokit/chnops.html

Graphing and Analyzing Data Practice

Directions: Please read the information below about graphing and analyzing data. Once you have read the information, you may begin to work on the problems. Refer back to the INTRODUCTION if you are having trouble with the problems.

INTRODUCTION

Graphing is an important procedure used by scientists to display the data that is collected during a controlled experiment. **Line graphs** must be constructed correctly to accurately portray the data collected. Many times the wrong construction of a graph detracts from the acceptance of an individual's hypothesis.

A graph contains five major parts:

a. **Title**
b. **The independent variable**
c. **The dependent variable**
d. **The scales for each variable**
e. **A legend**

- The **TITLE**: depicts what the graph is about. By reading the title, the reader should get an idea about the graph. It should be a concise statement placed above the graph.
- The **INDEPENDENT VARIABLE**: is the variable that can be controlled by the experimenter. It is the variable the experimenter is manipulating or changing. It usually includes time (dates, minutes, hours, etc.), depth (feet, meters), and temperature (Celsius). This variable is placed on the X axis (horizontal axis).
- The **DEPENDENT VARIABLE**: is the variable that is directly affected by the independent variable. It is the result of what happens because of the independent variable. It is the variable that the experimenter measures or the data they collect. Example: How many oxygen bubbles are produced by a plant located five meters below the surface of the water? The oxygen bubbles are dependent on the depth of the water. This variable is placed on the Y-axis or vertical axis.
- The **SCALES** for each Variable: In constructing a graph one needs to know where to plot the points representing the data. In order to do this a scale must be employed to include all the data points. This must also take up a conservative amount of space. It is not suggested to have a run on scale making the graph too hard to manage. The scales should start with 0 and climb based on intervals such as: multiples of 2, 5, 10, 20, 25, 50, or 100. The scale of numbers will be dictated by your data values.
- The **LEGEND**: is a short descriptive narrative concerning the graph's data. It should be short and concise and placed under the graph.
- The **MEAN** for a group of variables: To determine the mean for a group of variables, divide the sum of the variables by the total number of variables to get an average.
- The **MEDIAN** for a group of variables: To determine median or "middle" for an even number of values, put the values in ascending order and take the average of the two middle values. e.g. 2, 3, 4, 5, 9, 10 Add 4+5 (2 middle values) and divide by 2 to get 4.5
- The **MODE** for a group of variables: The mode for a group of values is the number that occurs most frequently. e.g. 2, 5, 8, 2, 6, 11 The number 2 is the mode because it occurred most often (twice)

PROCEDURE 1:
Using the following data, answer the questions below and then construct a line graph.

Depth in meters	Number of Bubbles / minute Plant A	Number of Bubbles / minute Plant B
2	**29**	**21**
5	**36**	**27**
10	**45**	**40**
16	**32**	**50**
25	**20**	**34**
30	**10**	**20**

1. What is the dependent variable and why?

2. What is the independent variable and why?

3. What title would you give the graph?

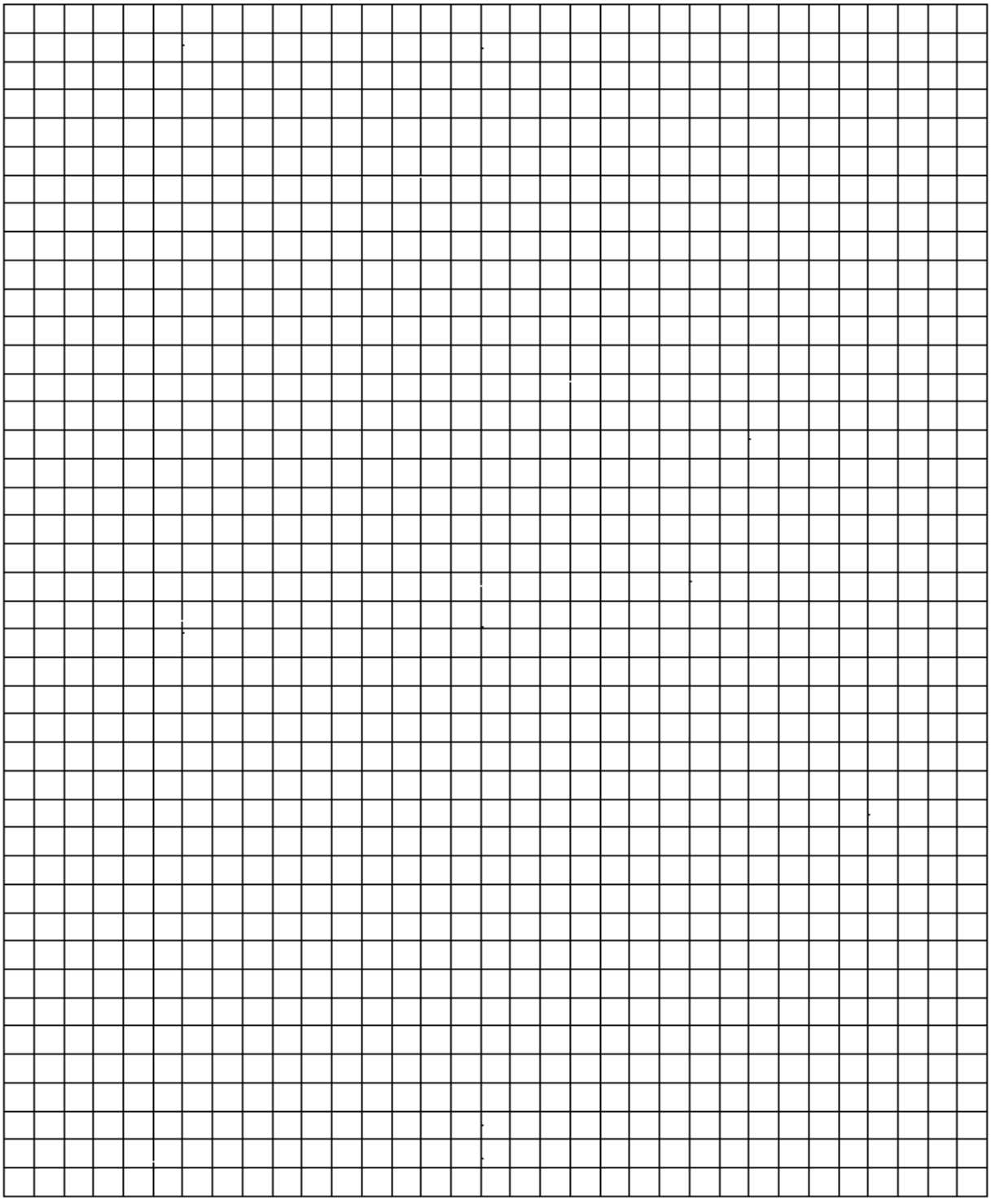
4. What are the mean, median, and mode of all 3 columns of data? Please show your work for the MEAN in the space below each problem.

a). Depth : Mean_____Median_____Mode_____

b). Bubble Plant A.: Mean _____Median_____Mode_____

c). Bubbles Plant B: Mean _____Median_____Mode_____

Title: _____



LEGEND:

PROCEDURE 2:

Diabetes is a disease affecting the insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose (sugar) in the blood will remain high. A blood glucose level above 140 for an extended period of time is not considered normal. This disease, if not brought under control, can lead to severe complications and even death.

Answer the following questions concerning the data below and then graph it.

Time After Eating hours	Glucose ml / Liter of Blood Person A	Glucose ml / Liter of Blood Person B
0.5	170	180
1	155	195
1.5	140	230
2	135	245
2.5	140	235
3	135	225
4	130	200

1. What is the dependent variable and why?

2. What is the independent variable and why?

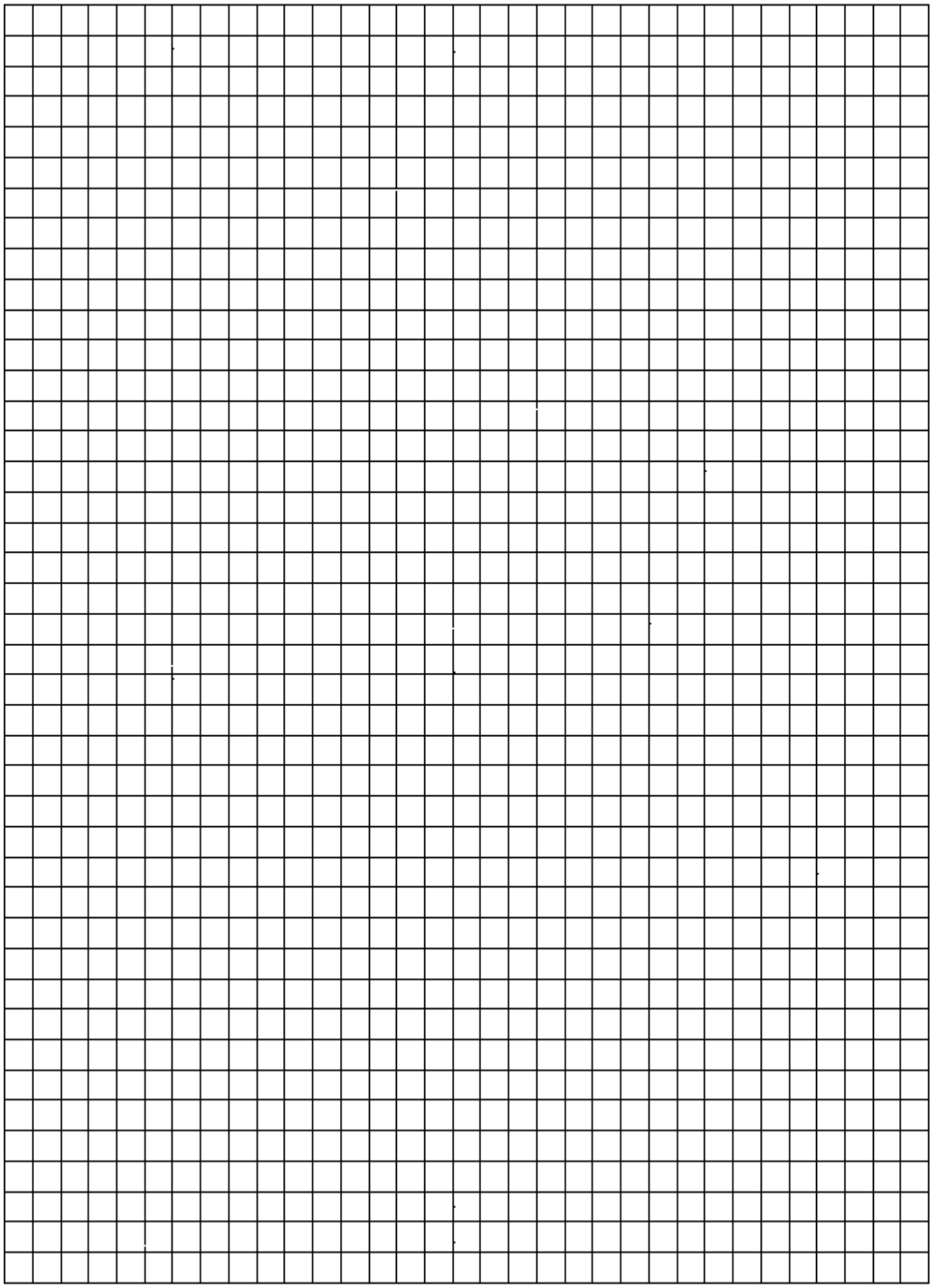
3. What title would you give the graph?

4. Which, if any, of the above individuals (A or B) has diabetes?

5. What data do you have to support your hypothesis?

6. If the time period were extended to 6 hours, what would the expected blood glucose level for Person B?

Title: _____



LEGEND:

SUMMARY:

1. What conclusions can be determined from the data in graph 1?

2. What conclusions can be determined from the data in graph 2?

3. Can the data in each of these graphs be used to construct other types of graphs?

4. If so, what other graph types can be constructed?

Directions: Please review the following data sets and answer the questions that follow.

1. An experiment studies the effects of an experimental drug on the number of offspring a mother mouse has. 10 female mice are given the drug and then impregnated. The number of mice in their litters is compared to the litters of mice that did not take the drug.

Number of Babies in Litter										
Group A (drug)	5	6	4	8	5	2	7	12	12	8
Group B (control – no drug)	4	4	6	6	5	6	4	7	5	3

Based on the data, what would you conclude about the drug, did it work? Explain.

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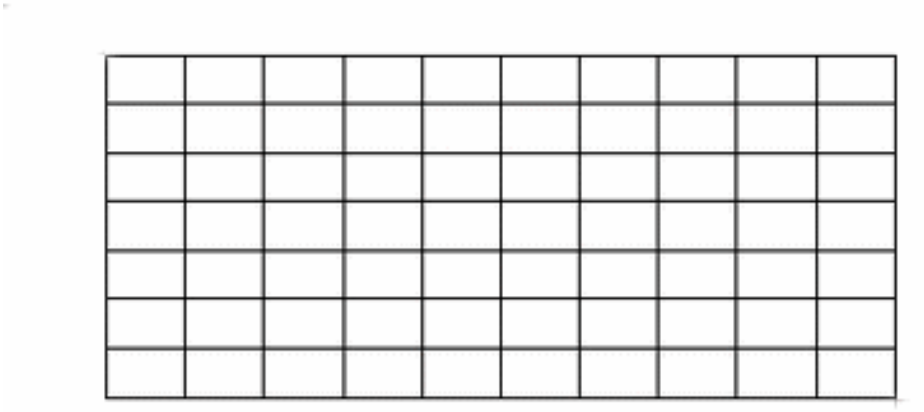
2. A type of feed claims to boost the growth rate of cows. The feed is tested on two twin newborn cows. Bessie receives the experimental feed, and Bertha receives regular corn feed. Their weights are recorded below.

Month	April	May	June	July	Aug
Bessie	150 lbs	210 lbs	260 lbs	320 lbs	400 lbs
Bertha	150 lbs	250 lbs	290 lbs	340 lbs	400 lbs

Graph the data; use a dotted line for Bessie and a straight line for Bertha. Make sure you label the X and Y axis.



Both cows ended at the same weight, but did the experimental feed change the way they gained weight at all? Describe your conclusions about the experimental feed and explain why it is important that the experiment used twin cows?

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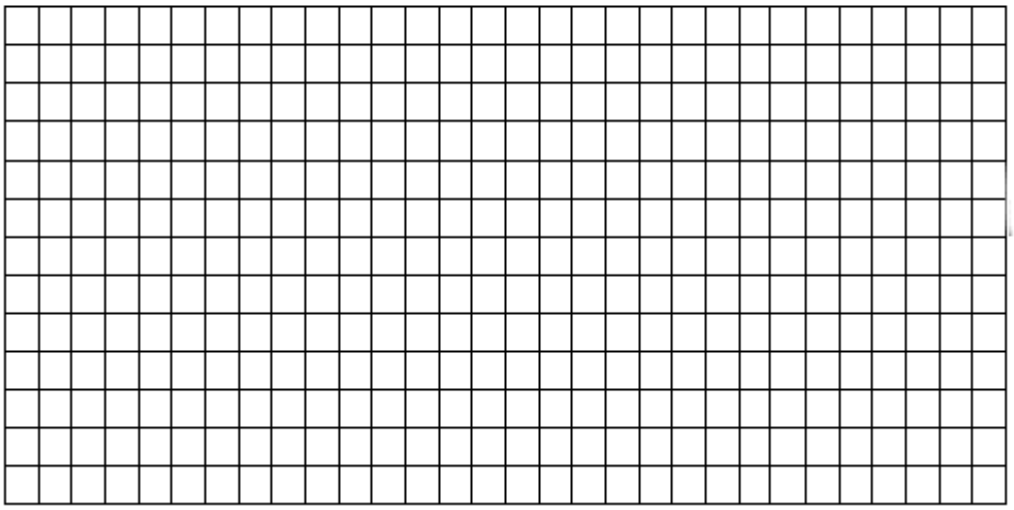
3. The population of tiger sharks off the coast of Florida was recorded over several months. Graph the tiger shark populations below.

January - 12	May – 34	September – 72
February - 15	June – 44	October – 85
March - 25	July – 49	November – 98
April - 35	August - 55	December - 105



The number of nurse sharks was also recorded for this time period; though the person recorded the number was not as reliable as the person recording tiger shark numbers. The following data was taken on nurse sharks. Use a different color to graph the nurse shark population on the graph above.

March - 60 | April - 52 | July - 38 | August - 20 | November- 14 | December - 11

a. At what month would you expect the number of nurse sharks to equal the number of tiger sharks?

b. What does the graph tell you about the trends both shark populations?

Chemistry Concepts for Biology

Directions: You may be coming to Honors Biology after completing one year of Chemistry OR you may be taking Chemistry while you are taking Biology. Either way, there are some Chemistry concepts that you will need to know for Biology. While we separate the sciences in school, a lot of their concepts are related.

Please read the following information. Some of may be a review for you and some of it may be new information.

What is your brain made of?
Everything you can see, touch, smell, feel, and taste is made of atoms. Atoms are the basic building-block of all matter (including you and me and everything else you can touch). To know what Earth is made of, then we have to know a few things about these incredibly small objects.

Atoms

Everyday experience should convince you that matter is found in myriad forms, yet all the matter you have ever seen is made of atoms, or atoms stuck together in configurations of dizzying complexity. A chemical **element** is a substance that cannot be made into a simpler form by ordinary chemical means. The smallest unit of a chemical element is an **atom**, and all atoms of a particular element have a similar composition. There are **subatomic particles**, particles smaller than an atom, that fit together to make all atoms.

Parts of an Atom

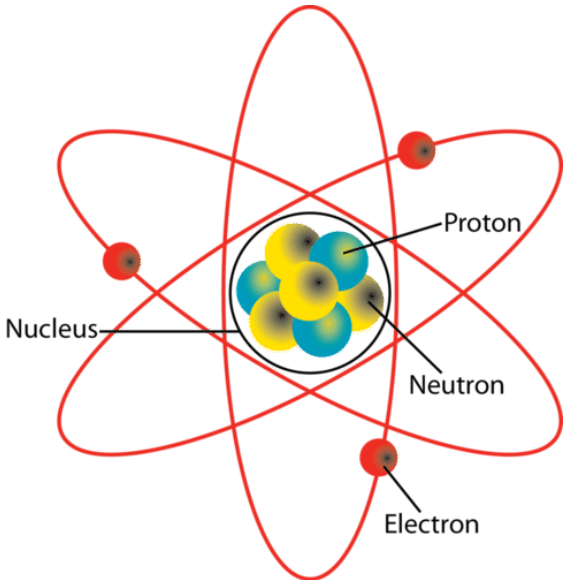
There are two parts to an atom: the **nucleus** and the **electron cloud**. Each of these parts is made up of subatomic particles. There are three main subatomic particles: **protons**, **neutrons**, and **electrons**. (See Figure below).

- At the center of an atom is a **nucleus** made up of two types of particles called protons and neutrons.
- Around the nucleus is the **electron cloud,** an area made up of electrons traveling at high speeds.

  - **Protons** have a positive electrical charge. The number of protons in the nucleus determines what element the atom is. This is the **atomic number** of the element. The atomic number represents the number of protons in an atom of a particular element, and is the number that arranges the elements on the periodic table.
  - **Neutrons** are about the size of protons but have no charge.
  - **Electrons**, much smaller than protons or neutrons, and electrons have a negative electrical charge. These tiny, negatively charged particles move at nearly the speed of light orbiting the nucleus at exact distances. This distance is dependent on their energy.

An atom has the same number of protons and electrons. It can differ in the number of neutrons.

An introduction to the atom can be seen on these videos
Basic Atomic Structure http://www.youtube.com/watch?v=lP57gEWcisY



Major parts of an atom. What chemical element is this? (Hint: 3 protons, 3 electrons)

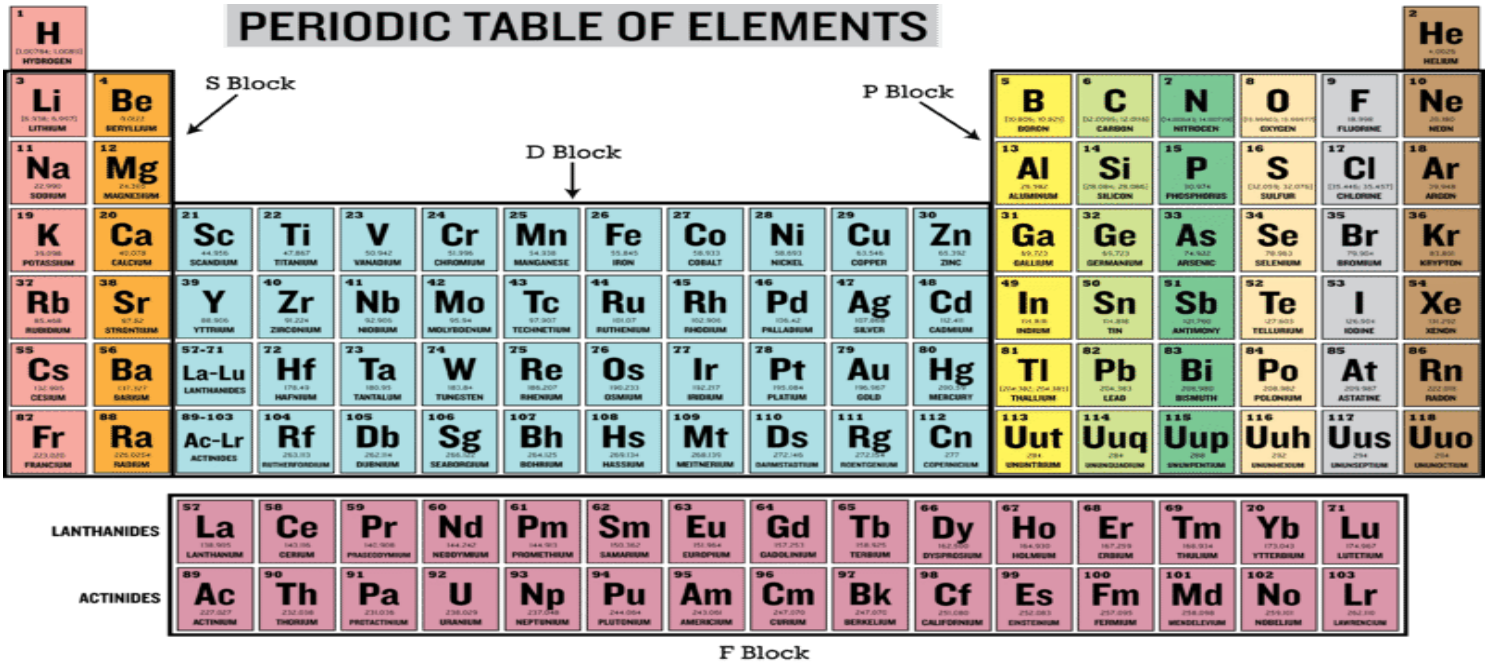
The atomic number represents the number of protons in an atom of a particular element, and is the number that arranges the elements on the periodic table.

Atomic Number

The **atomic numbe**r represents the number of protons in an atom of any particular element and is the number that arranges the elements on the periodic table.

Atomic Mass

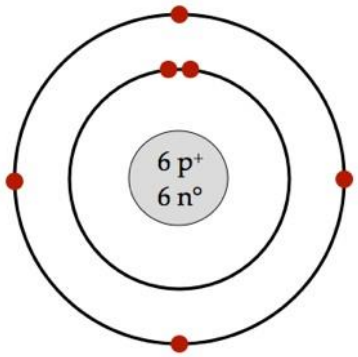
Because electrons are minuscule compared with protons and neutrons, the number of protons plus neutrons gives the atom its **atomic mass**. All atoms of a given element always have the same number of protons, but may differ in the number of neutrons found in the nucleus.



The periodic table groups the elements based on their properties.

Valence Electrons

Electrons are arranged in layers called shells or orbitals around the nucleus. The electrons on the outermost level have the greatest energy. These outermost electrons are called the valence electrons. These are the electrons that form bonds with other elements (in the main categories of elements -- transitional metals may use inner level electrons as well). In the Bohr Model of a carbon atom, there will be 6 protons and 6 neutrons in the nucleus, as well as 2 electrons on the inner layer and 4 electrons on the outer layer. These four valence electrons allow carbon to create 4 bonds. In all elements, the first layer or shell can hold 2 electrons, the second layer or shell can hold 8 electrons and the third layer or shell can also hold 8 electrons.



Carbon

Ions

Atoms are stable when they have a full outermost electron energy level. To fill its outermost shell, an atom will give, take, or share electrons. When an atom either gains or loses electrons, this creates an **ion**. Ions have either a positive or a negative electrical charge. What is the charge of an ion if the atom loses an electron? An atom with the same number of protons and electrons has no overall charge, so if an atom loses the negatively charged electron, it has a positive charge. What is the charge of an ion if the atom gains an electron? If the atom gains an electron, it has a negative charge.

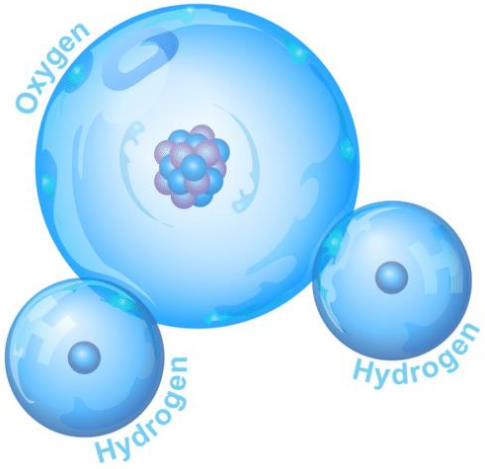
Ions are depicted with a "+" or "-" sign. Examples such as H+, Na+, K+. or Cl- have significant biological roles. This is very important in the chemistry of life, since ions are more easily dissolved in water and blood plasma (the liquid portion of blood).

Chemical Reactions

Molecules

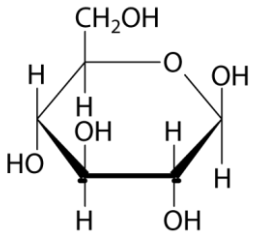
A **molecule** is any combination of two or more atoms. The oxygen in the air we breathe is two oxygen atoms connected by a chemical bond to form O_2, or molecular oxygen. A carbon dioxide molecule is a combination of one carbon atom and two oxygen atoms, CO_2. Because carbon dioxide includes two different elements, it is a compound as well as a molecule. Many atoms are more stable when they have a net charge: they are more stable as ions. When a cation (positive charge) gets close to an anion (negative charge), they link up because of their different net charges — positive charges attract negative charges and vice versa. When two or more atoms link up, they create a **molecule**. A molecule of water is made of two atoms of hydrogen (H) and one atom of oxygen (O). The **molecular mass** is the sum of the masses of all the atoms in the molecule. A collection of molecules is called a compound.

An example of a chemical compound is water. A water molecule forms when oxygen (O) and hydrogen (H) atoms react and are held together by a special type of polar covalent bonds. Like other compounds, water always has the same chemical composition: a 2:1 ratio of hydrogen atoms to oxygen atoms. This is expressed in the model of a water molecule is shown below.



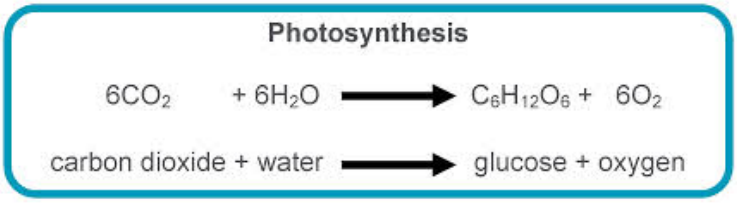
Model of a water molecule, showing the arrangement of hydrogen and oxygen atoms. The protons (8 in oxygen, 1 in hydrogen) and neutrons (8 in oxygen) are depicted in the nucleus.

Compounds that contain the element carbon are called **organic compounds.** This is because they are found mainly in living organisms. Most organic compounds are held together by covalent bonds. An example of an organic compound is glucose ($C_6H_{12}O_6$), which is shown in **Figure** below. Glucose is a simple sugar that living cells use for energy. All other compounds (with no carbon) are called inorganic compounds. Water is an example of an inorganic compound.



Chemical Reaction

A **chemical reaction** is a process that breaks or forms the bonds between atoms of molecules and compounds. For example, two hydrogens and one oxygen bind together to form water, H_2O. As mentioned before, the molecules that come together to start a chemical reaction are the **reactants**. In this example of the chemical equation for photosynthesis, carbon dioxide and water are the reactants. Glucose and oxygen are the products.
In cellular respiration, glucose and oxygen are the reactants. Carbon dioxide and water are the products.

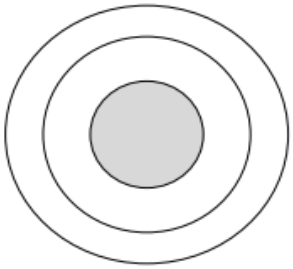


Periodic Table of the Elements

1																	18
hydrogen 1 H 1.0079	2											13	14	15	16	17	helium 2 He 4.0026
lithium 3 Li 6.941	beryllium 4 Be 9.0122											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
sodium 11 Na 22.990	magnesium 12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29
caesium 55 Cs 132.91	barium 56 Ba 137.33	57-70 ■	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]
francium 87 Fr [223]	radium 88 Ra [226]	89-102 ■	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	darmstadtium 110 Ds [271]	roentgenium 111 Rg [272]	ununbium 112 Uub [277]	ununtrium 113 Uut [284]	ununquadium 114 Uuq [289]	ununpentium 115 Uup [288]	ununhexium 116 Uuh [292]	ununseptium 117 Uus [291]	ununoctium 118 Uuo [294]

■Lanthanide series	lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
■Actinide series	actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

Atomic Basics



Part A: Atomic Structure

1.) Draw five protons in the nucleus of the atom. Label them with their charge.

2.) Draw six neutrons in the nucleus of the atom.

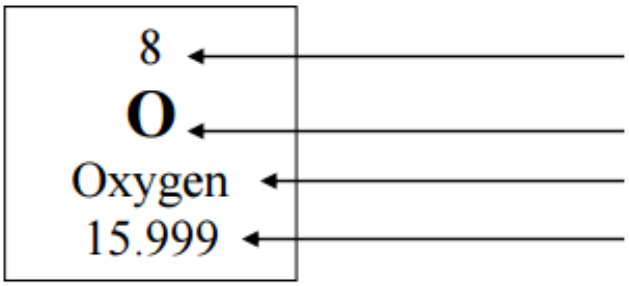
3.) Draw two electrons in the first energy level and label them with their charge.

4.) Draw three electrons in the second energy level and label them with their charge.

5.) What element is represented by the diagram? _____

Part B: Atomic Calculations

6.) Label the information provided in the periodic table.



7.) What does the atomic number represent?

_____ or _____

8.) What does the atomic mass represent?

_____ + _____

9.) How would you figure the number of protons or electrons in an atom?

10.) How would you figure the number of neutrons in an atom?

11.) Use your knowledge of atomic calculations to complete the chart.

Element	Atomic Number	Atomic Mass	Protons	Neutrons	Electrons
Li	3	7			
P	15	31			
Cl		35	17		
Ni	28			31	
K		39			19
Ag	47			61	
H		1	1		
Si				14	14
W			74	110	
Ne				10	10

Part C: Electron Configuration

12.) How many electrons can each shell hold? 1st = _____ 2nd = _____ 3rd = _____

13.) What term is used for electrons in the outermost shell or energy level? _____

14.) Scientists use two types of diagrams to show the electron configuration for atoms. Complete the information below.

Sulfur

Atomic # = 16

Atomic Mass = 32

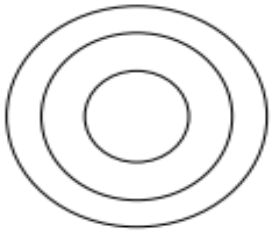
Protons = ____

Neutrons = ____

Electron = ____

Bohr Diagram

Shows all electrons



15.) Calculate the missing information and then draw the Bohr Diagram for each element.

Li

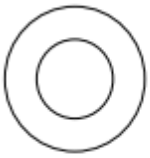
Atomic # = 3

Mass # = 7

# of P = ____

# of N = ____

# of E = ____



Ne

Atomic # = 10

Mass # = 20

# of P = ____

# of N = ____

# of E = ____

Mg

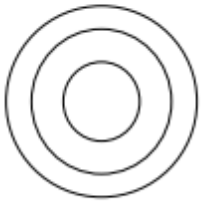
Atomic # = 12

Mass # = 24

# of P = ____

# of N = ____

# of E = ____



Cl

Atomic # = 17

Mass # = 35

# of P = ____

# of N = ____

# of E = ____

He

Atomic # = 2

Mass # = 4

# of P = ____

# of N = ____

# of E = ____

Si

Atomic # = 14

Mass # = 28

# of P = ____

# of N = ____

# of E = ____

16.) Answer the questions below based on the elements in question #15.

a.) Which elements had a filled outermost shell? _____ and _____

b.) Which element would be most likely to lose electrons in a chemical bond? _____

c.) Which element would be most likely to gain electrons in a chemical bond? _____

d.) Which elements are not likely to bond with other elements? _____ and _____ Explain why.