Clearview Regional High School District
2017 Summer Assignment Coversheet

Course:	Honors Biology
Teacher(s):	Ms. Amanda McGeehan and Mr. Kyle Rosa
Due Date:	Friday, September 8, 2017
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 information about cell organelles to review their structures and functions. This information will be assessed by answering corresponding questions. They will also color the different cell organelles in both a plant and animal cell. 3. 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.
NJ Student Learning Standards:	HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
Grading/Use of Assignment: Category/Weight for Q1:	The 3 assignments will each count as a homework or daily grade for a total of 3 daily grades. Each assignment is due on Friday, September 8, 2017. The information in the summer work assignments will be assessed in a quiz or minor assessment on or about Monday, September 18, 2017.

Specific Expectations:	Students are to write in complete sentences and clearly, providing enough information in explanations. Students should color the cell organelles as indicated in the directions on Assignment #2. 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 websites may offer some additional help: Biochemistry: http://www.phschool.com/science/biology_place/biocoach/biokit/chnops.html Cell Organelles: http://www.phschool.com/science/biology_place/biocoach/cells/common.html

Graphing and Analyzing Data Practice

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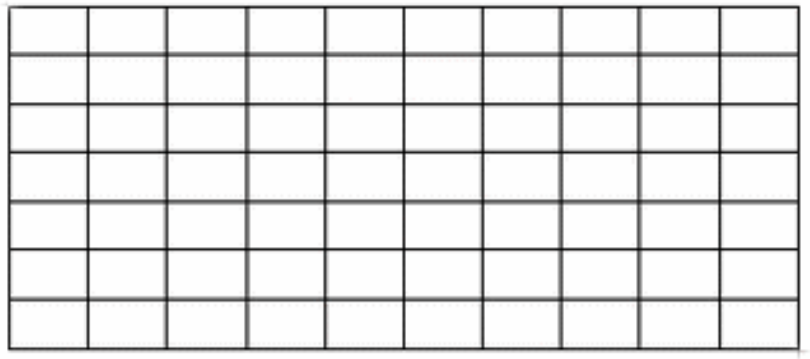
2. A type of feed claims to boost the growth rate of cows. The feed is tested on two twin newborn cows. Bessie receives the experimental feed, and Bertha receives regular corn feed. Their weights are recorded below.

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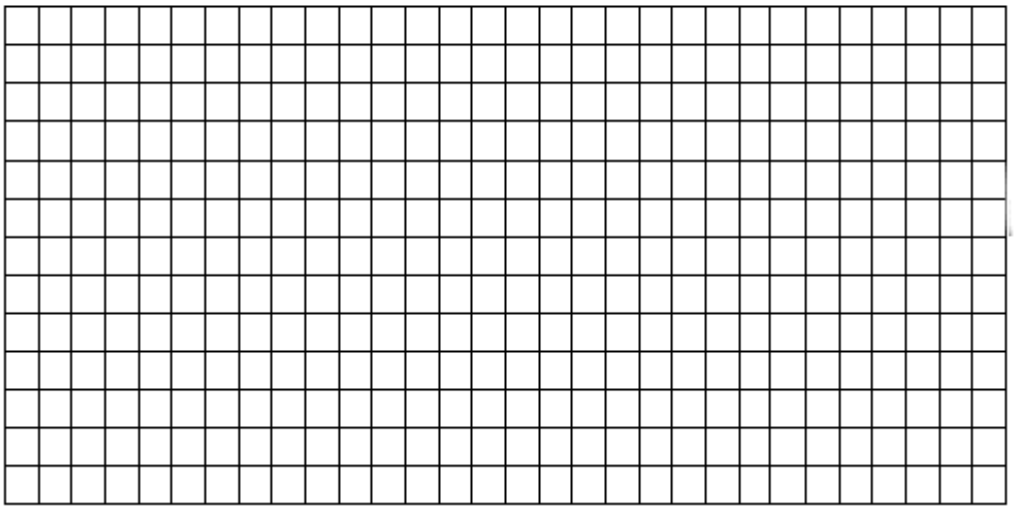
3. The population of tiger sharks off the coast of Florida was recorded over several months. Graph the tiger shark populations below.

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?

Cells and Their Organelles

Directions: Read the information in this activity to answer the questions. You will need colored pencils in order to color the parts of the plant and animal cell.

The **cell** is the basic unit of life. The following is a glossary of animal cell terms. All cells are surrounded by a **cell membrane.** The cell membrane is **semipermeable**, allowing some substances to pass into the cell and blocking others. It is composed of a double layer of **phospholipids** and **embedded proteins**. ***Color and label*** the cell membrane tan. Plant cells have an additional layer surrounding them called the cell wall. The cell wall is made of nonliving material called cellulose. ***Color and label*** the cell wall brown. The **centrosome** (also called the "microtubule organizing center") is a small body located near the nucleus. The centrosome is where **microtubules** are made. During **cell division (mitosis),** the centrosome divides and the two parts move to opposite sides of the dividing cell. The **centriole** is the dense center of the centrosome. Only animal cells have centrosomes. ***Color and label*** the centrioles purple. Microtubules are shaped like soda straws and give the nucleus and cell its shape***. Label*** the microtubules inside the nucleus.

1. At what level of organization does life begin?

2. What surrounds all cells?

3. What is meant by semipermeable?

4. What 2 things make up the cell membrane?

5. The cell membrane is also called the
   _P_ ___ ___ ___ ___ ___ membrane.
6. Centrioles are found inside of what type of cell?

7. What additional layer is found around the outside of plant cells and bacteria?

8. Centrioles are found at the center of the
   _C_ ___ ___ ___ ___ ___ ___ ___ ___ ____. How do they help the cell?

The **nucleus** in the center of a cell is a spherical body containing the **nucleolus** that makes **ribosomes**. The nucleus controls many of the functions of the cell (by controlling protein synthesis). It also contains **DNA** assembled into **chromosomes**. The nucleus is surrounded by the **nuclear membrane**. ***Color and label*** the nucleolus dark blue, the nuclear membrane yellow, and the nucleus light blue. Materials can move from the nucleus to the cytoplasm through nuclear pores in the membrane around the nucleus. ***Label*** the nuclear pores. **Cytoplasm** is the jellylike material outside the cell nucleus in which the organelles are located. ***Color and label*** the cytoplasm pink. All cells, even prokaryotes contain small bodies called **ribosomes**. ***Label*** the ribosomes. Proteins are made here by a process called **protein synthesis**.

9. Where is DNA found inside a cell?

10. What cell process is controlled by the nucleus?

11. DNA coils tightly during division and assembles into visible
    _C_ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___.

12. Where are organelles located?

13. Where are proteins made in a cell?

14. Do all cells need ribosomes?

15. The process of making proteins is called _____
    _____.

Rough endoplasmic reticulum (rough ER) is a vast system of interconnected, membranous, infolded and convoluted sacks that are located in the cell's cytoplasm. The ER is continuous with the outer nuclear membrane. **Rough ER** is covered with ribosomes that give it a rough appearance. ***Color and label*** the rough ER violet. Rough ER transports materials through the cell and produces proteins in sacks called cistern which are sent to the **Golgi body**, or inserted into the cell membrane. The Golgi apparatus or Golgi complex is a flattened, layered, sac-like organelle that looks like a stack of pancakes. The Golgi body modifies & packages proteins and carbohydrates into membrane-bound **vesicles** for "export" from the cell. ***Color and label*** the Golgi export vesicles red. **Smooth ER** does NOT have ribosomes on its

surface. It makes proteins and lipids that will be exported by the cell. It also controls the Calcium level in muscles and detoxifies poisons, alcohol, and drugs. ***Color and label*** the smooth ER light green.

16. How does rough ER differ from smooth ER?

17. Rough ER is connected to the _____ membrane and to _____ER.

18. Proteins made by rough ER travel to the Golgi in sacks called _____. Golgi _____ and _____ proteins for export out of the cell.

19. Give 3 jobs for smooth ER.
    a.
    b.
    c.

Chloroplasts are elongated or disc-shaped organelles containing **chlorophyll** that trap sunlight for energy. **Photosynthesi**s (in which energy from sunlight is converted into chemical energy - food) takes place in the chloroplasts. Only plant cells, not animal cells, can make their own food. ***Color and label*** the chloroplasts dark green. Cells also contain fluid-filled sacs called **vacuoles**. The vacuole fills with food being digested and waste material that is on its way out of the cell. In plant cells, a large **central vacuole** takes up most of the space in the cell. ***Color and label*** the vacuoles purple. **Mitochondria** are spherical to rod-shaped organelles with a double membrane. The inner membrane is infolded many times, forming a series of projections called **cristae**. The mitochondrion converts the energy stored in glucose into ATP (adenosine triphosphate) for the cell. ***Color and label*** the mitochondria orange. Both plant and animal cells have double membranes and their own DNA. Cells also contain spherical organelles called **lysosomes** that contain **digestive enzymes**. Nutrients are digested by the cell here, as well as, old cell organelles that are going to be recycled. ***Color and label*** the lysosomes tan.

20. What process takes place inside chloroplasts?

21. What is the energy for this process?

22. What pigment traps the energy?

23. Chloroplasts are found in what type of cell(s)?

24. Both chloroplasts and mitochondria are like in that they both have _____ membranes and their own _____.

25. Food, water, and wastes are stored inside _____.

26. Digestion takes place inside _____ containing _____.

27. The largest organelle in plants is the _____ _____.

28. What organelle breaks down and recycles worn out cells?

Figure 1 - Animal Cell

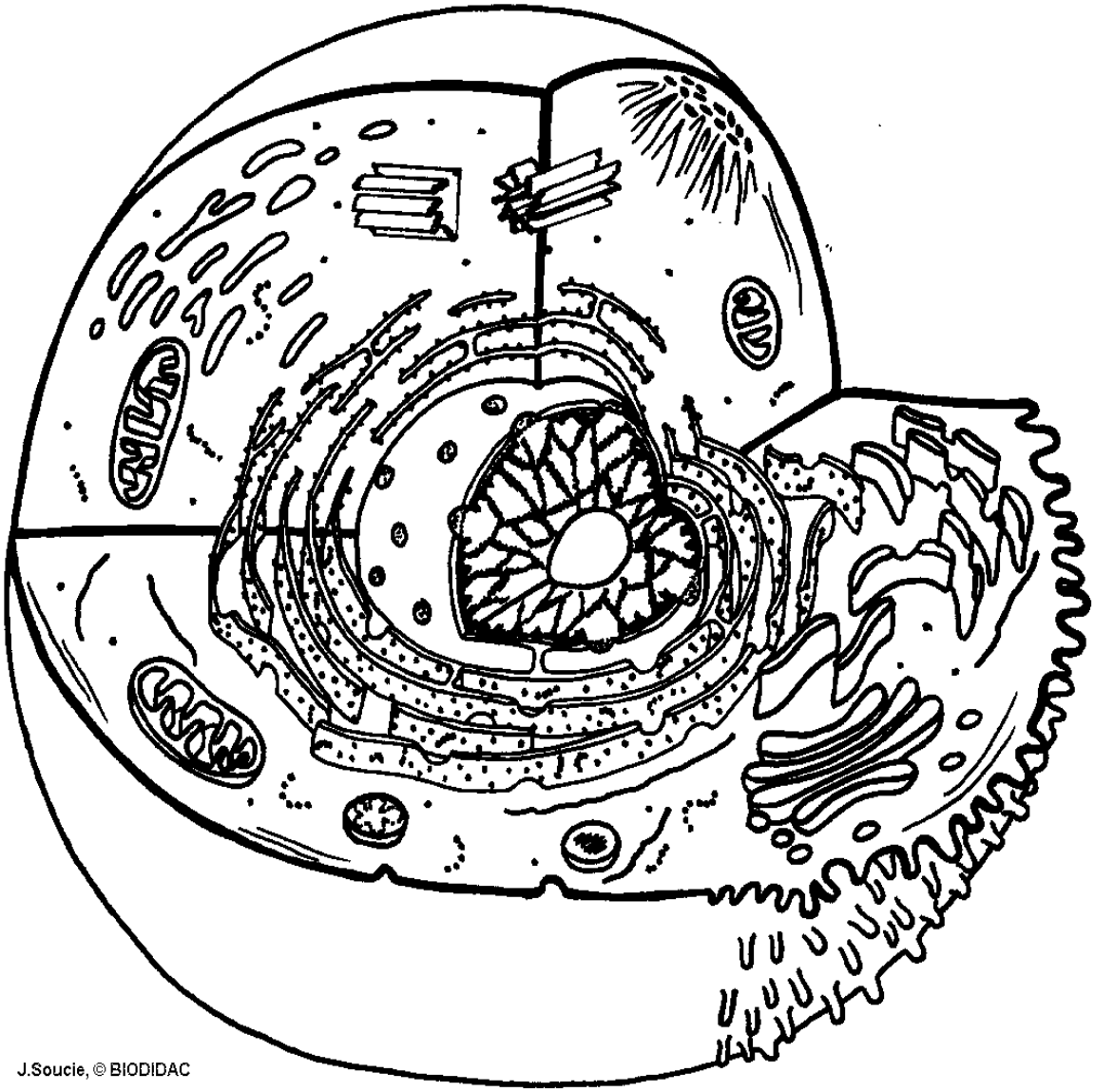
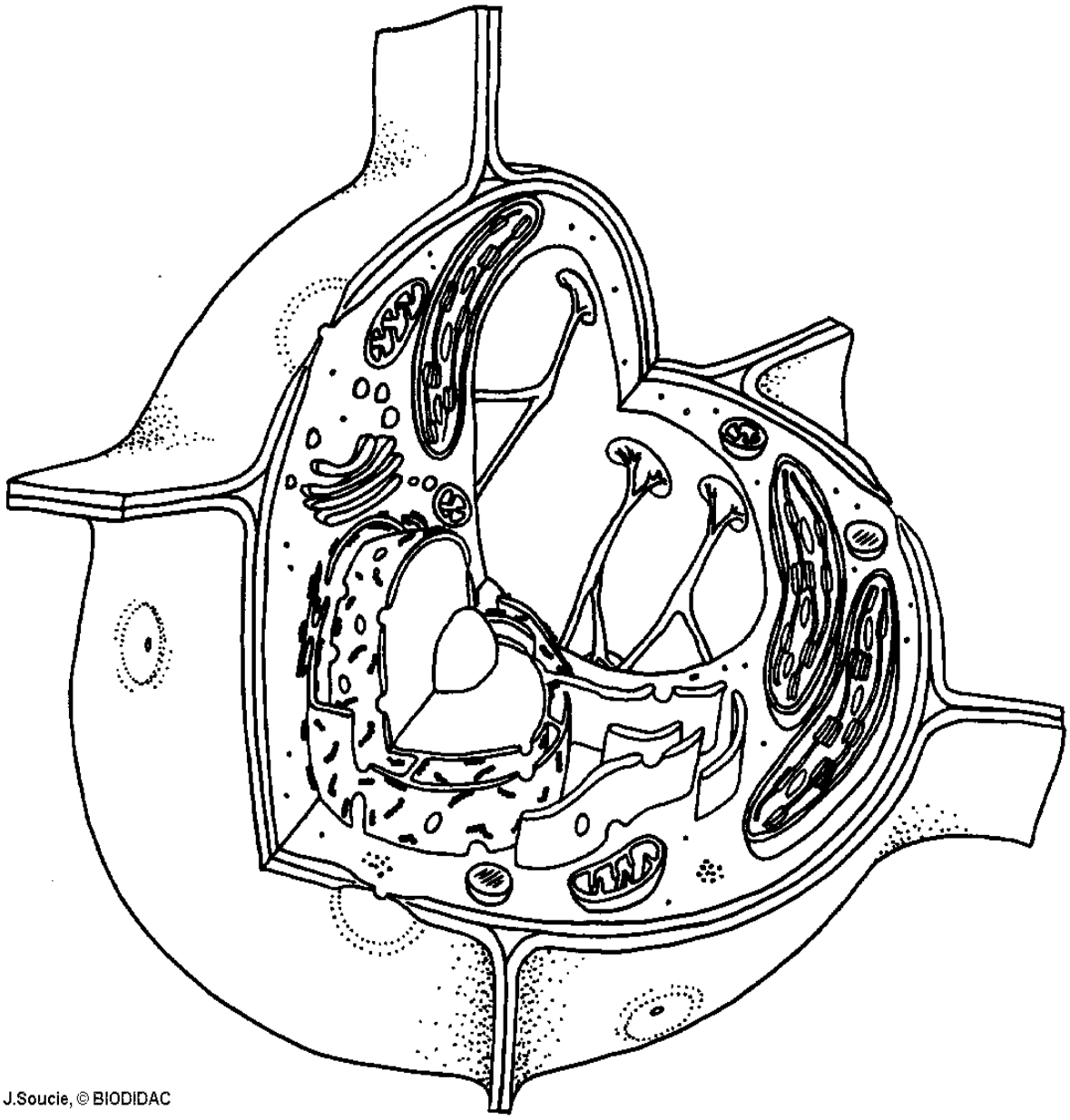


Figure 2 – Plant Cell



Complete the following table:

Organelle	Plant/Animal/Both	Function
Cell membrane		
Cell wall		
Cytoplasm		
Vacuole		
Ribosome		
Golgi		
Rough ER		
Smooth ER		
Central Vacuole		
Chloroplast		
Mitochondria		
Nucleus		
Nucleolus		
Nuclear membrane		
Centrosome		
Lysosomes		

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

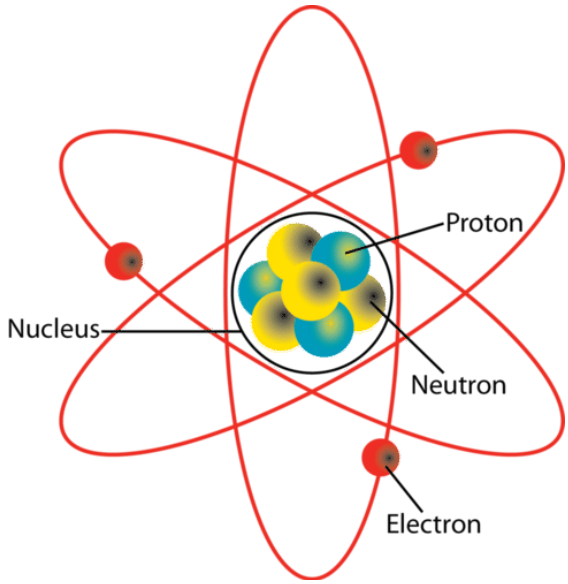
There are two parts to an atom: the **nucleus** and the **electron cloud**. Each of these parts is made up of subatomic particles. There are three main subatomic particles: **protons**, **neutrons**, and **electrons**. (See Figure below).

- 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)

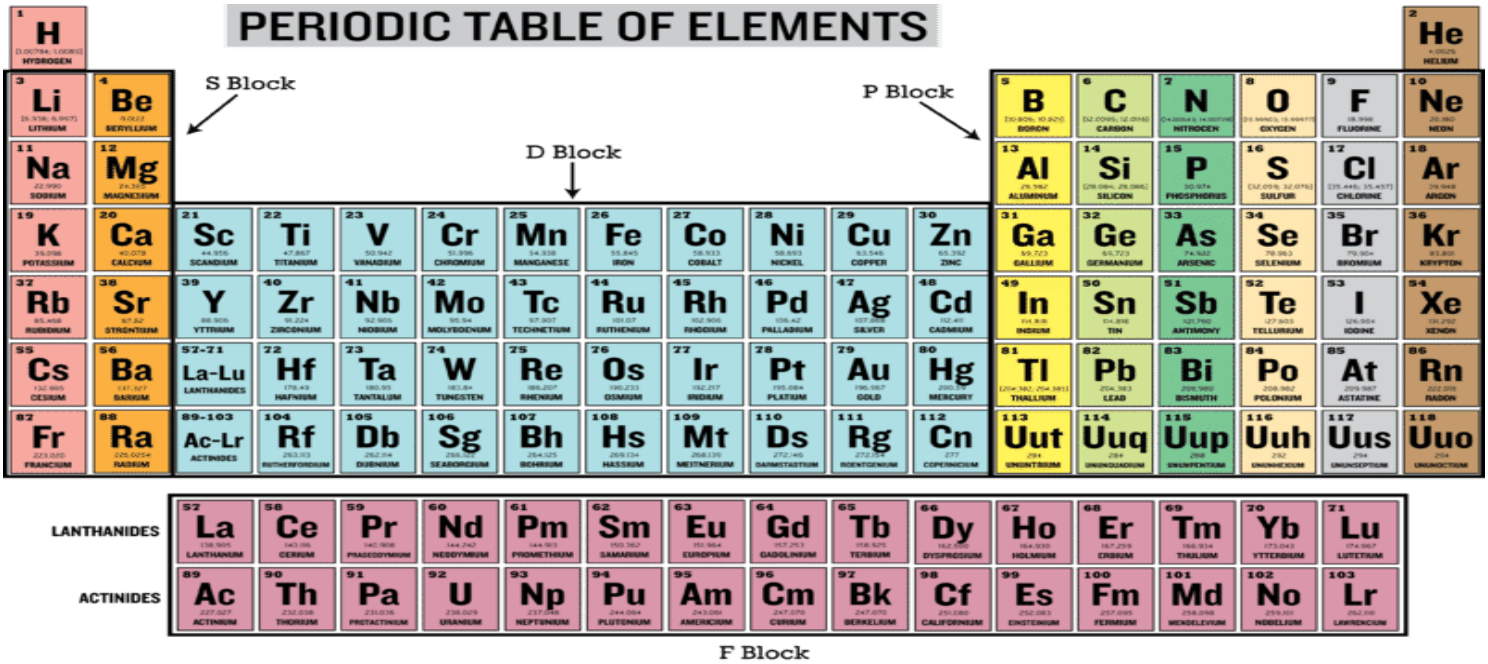
The atomic number represents the number of protons in an atom of a particular element, and is the number that arranges the elements on the periodic table.

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

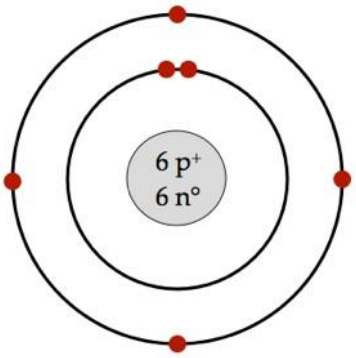
Because electrons are minuscule compared with protons and neutrons, the number of protons plus neutrons gives the atom its **atomic mass**. All atoms of a given element always have the same number of protons, but may differ in the number of neutrons found in the nucleus.



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.

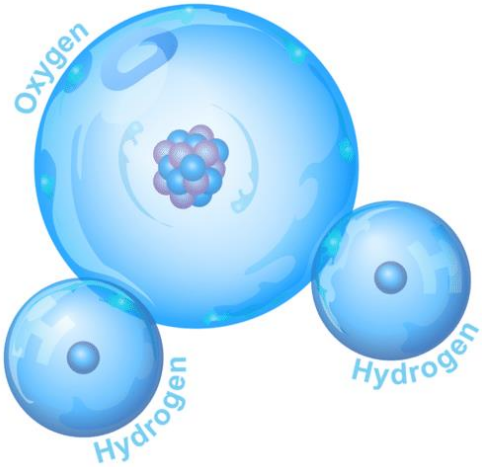
Ions are depicted with a "+" or "-" sign. Examples such as H+, Na+, K+. or Cl- have significant biological roles. This is very important in the chemistry of life, since ions are more easily dissolved in water and blood plasma (the liquid portion of blood).

Chemical Reactions

Molecules

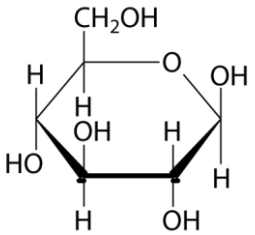
A **molecule** is any combination of two or more atoms. The oxygen in the air we breathe is two oxygen atoms connected by a chemical bond to form O_2, or molecular oxygen. A carbon dioxide molecule is a combination of one carbon atom and two oxygen atoms, CO_2. Because carbon dioxide includes two different 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.

Photosynthesis

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

carbon dioxide + water ⟶ glucose + oxygen

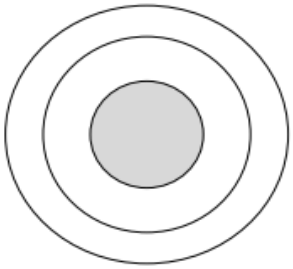
Periodic Table of the Elements

1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
hydrogen 1 **H** 1.0079																		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												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.

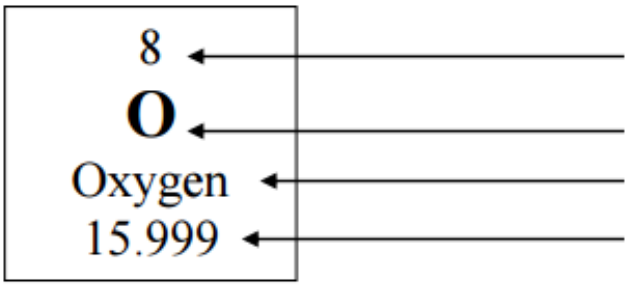
3.) Draw two electrons in the first energy level and label them with their charge.

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

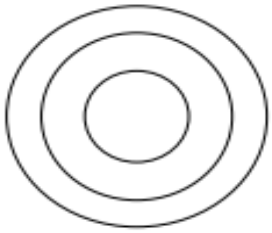
Protons = ____

Neutrons = ____

Electron = ____

Bohr Diagram

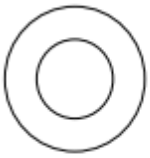
Shows all electrons



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

Atomic # = 3
Mass # = 7
# of P = ____
# of N = ____
# of E = ____

Li

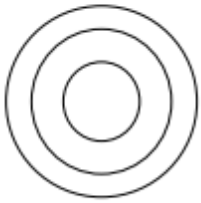


Atomic # = 10
Mass # = 20
# of P = ____
# of N = ____
# of E = ____

Ne

Atomic # = 12
Mass # = 24
# of P = ____
# of N = ____
# of E = ____

Mg



Atomic # = 17
Mass # = 35
# of P = ____
# of N = ____
# of E = ____

Cl

Atomic # = 2
Mass # = 4
# of P = ____
# of N = ____
# of E = ____

He

Atomic # = 14
Mass # = 28
# of P = ____
# of N = ____
# of E = ____

Si

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.