Norfolk Public Schools
Science Learning in Place Plan: Science 7 Honors Lessons

Week 7: April 27 – May 1, 2020 (Review: Scientific Investigation)

Monday	Tuesday	Wednesday	Thursday	Friday
Reading & Concept Analysis: • Read the passage on the worksheet entitled **"The Scientific Method, Cross-Curricular: Scientific Investigation"** • Answer the questions on the worksheet	Reading & Concept Analysis: • Read and answer the questions for "Experimental Scenario 1" on the worksheet entitled **"Scientific Method Practice Scenarios"**	Reading & Concept Analysis: • Read and answer the questions for "Experimental Scenario 2" on the worksheet entitled **"Scientific Method Practice Scenarios"**	Reading & Concept Analysis: • Read and answer the questions for "Experimental Scenario 3" on the worksheet entitled **"Scientific Method Practice Scenarios"**	Reading & Concept Analysis: • Complete the graphic organizer for "Experimental Scenario 4"

Week 8: May 4 – 8, 2020 (Review: Atomic Structure)

Monday	Tuesday	Wednesday	Thursday	Friday
Reading & Text Annotation: • Read **"The Modern Model of Atomic Structure"** • Use *Critical Reading Strategies* to make note of the key points in the passage	Concept Analysis: • Review the passage **"The Modern Model of Atomic Structure"** • Answer the questions on the handout **" The Modern Model of Atomic Structure Analysis Questions"**	Reading & Concept Analysis: • Read the passage on the worksheet entitled, **"The Atoms Family Album"** • Answer the questions on the worksheet	Reading & Concept Analysis: • Review the passage **"Modern Model of Atomic Structure"** • In the space provided, create a timeline to depict the development of the atomic structure. ○ Your timeline should include time, scientists, and their contribution.	Concept Analysis: • Analysis the image entitled, **"Parts of an Atom"** • Answer the questions on the worksheet

Week 9: May 11 – 15, 2020 (Review: The Periodic Table of Elements)

Monday	Tuesday	Wednesday	Thursday	Friday

Reading Comprehension:
• Read the passage entitled, **"Background Information – The First Periodic Table"**
• Use the after-reading strategy "Somebody Wanted but So" to complete the handout.
	Reading & Text Annotation:
	• Review the passage entitled, **"The Periodic Table of Elements"**
	• Use *Critical Reading Strategies* to make note of the key points in the passage.
		Reading & Concept Analysis:
		• Review the passage **"The Periodic Table of Elements"**
		• Answer the questions on the worksheet
			Concept Analysis:
			• On the handout on **"IF 42 – Elements and their Symbols"** Complete the following items:
			  ○ #1 – 10
			  ○ #21 – 30
				Concept Analysis:
				• On the handout on **"IF 42 – Elements and their Symbols"** Complete the following items:
				  ○ #11 – 20
				  ○ #31 – 40

The Scientific Method

Cross-Curricular Focus: Science Investigation

Name:

Scientists study the world and learn about how it works. As they study the world, the scientists use a process called the scientific method. They ask important questions and search for the answers. Sometimes they make amazing discoveries! There are times when a scientist is unable to answer his own question. If he has taken good notes, another scientist may come along later and use his notes to find the answer. Every year there is new knowledge.

The scientific method is a step-by-step process. You can use it to **conduct** an **experiment**. You start by making **observations** about something that interests you. Based on your observations, you make a hypothesis. A hypothesis is a smart guess you make by using what you know. You guess what you think could happen. Now you are ready to begin your experiment.

During your experiment you should take notes. These notes are your experiment data. You constantly make observations during this time. You may discover things that make you to revise your experiment. Eventually, you conclude your experiment. Next, you begin to look over your notes. You decide what you found out in your experiment. You make a final statement about whether or not your hypothesis was correct. You use reasons and evidence to support your statement.

Using the scientific method can be challenging. However, it can also be rewarding. All the steps are organized in a process. When you provide observations and data as evidence to support your conclusion, your ideas are more likely to be accepted.

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 scientific method?

2) When you find something that interests you, how do you make a hypothesis?

3) Why it is important to take good notes when you are conducting an experiment?

4) What is the last step in the scientific method?

5) Name one thing you might like to investigate this year for a science project.

Scientific Method Practice Scenarios

Experiment Scenario 1: A Biology student wants to conduct a study of how the amount of sunlight affects the length of sleep for mice. She sets up four cages with a mouse in each cage.

	Mouse 1	Mouse 2	Mouse 3	Mouse 4
Size of cage	30cm x 30cm	30cm x 30cm	30cm x 30cm	30cm x 30cm
Amount of Water per Day	50 mL	50 mL	50 mL	50 mL
Amount of food per day	1 serving per day, 25 grams	1 serving per day, 25 grams	1 serving per day, 25 grams	1 serving per day, 25 grams
Temperature in cage	20 °C	20 °C	20 °C	20 °C
Amount of Sunlight per Day	12 hours	8 hours	15 hours	18 hours
Exercise wheel?	Yes	yes	Yes	yes

What are the constants (variables that stay the same- also called controlled variables)?

_____

What is the independent variable?_____

What is the dependent variable? _____

What data do you need to collect during this experiment? _____

_____

Experiment Scenario 2: A Biology student wants to conduct a study of how the amount of food affects the weight gain for mice. He sets up four cages with a mouse in each cage. Fill in the boxes that would allow the biology student to complete the study correctly.

	Mouse 1	Mouse 2	Mouse 3	Mouse 4
Size of cage	30cm x 30cm			
Amount of Water per Day	50 mL			
Amount of food per day	4 servings per day, 25 grams each			
Temperature in cage	20 °C			
Amount of Sunlight per Day	12 hours			
Exercise wheel?	yes			

What are the constants (variables that stay the same- also called controlled variables)?

_____

What is the independent variable?_____

What is the dependent variable? _____

What data do you need to collect during this experiment? _____

_____

Experiment Scenario 3: A biologist set up an experiment to study nine mice. On day 1 of the study, the mice were measured for a variety of characteristics. Then the mice were put into individual cages and kept under the following conditions:

Mice 1, 2, 3	Mice 4, 5, 6, 7	Mice 8, 9
14 hours of light per day	14 hours of light per day	14 hours of light per day
Food one time/day – 5 oz.	Food one time/day – 5 oz	Food one time/day – 5 oz
Temp. 70 ° F	Temp. 85 ° F	Temp. 50 ° F
Wheel for exercise	Wheel for exercise	Wheel for exercise
Cage size: 3 feet by 1 foot	Cage size: 3 feet by 1 foot	Cage size: 3 feet by 1 foot

After the study, which lasted for 28 days, the same data about the mice was collected. Some of the data is given below:

	Weight (grams)		Length (cm)	
Mouse Number	Before	After	Before	After
1	352	392	24.7	25.4
2	346	395	25.1	25.8
3	355	410	24.9	25.4
4	353	385	24.9	25.3
5	359	382	25.0	25.7
6	357	386	24.8	25.3
7	349	378	25.0	25.3
8	345	365	22.9	22.9
9	352	361	24.3	24.5

What are the constants (variables that stay the same- also called controlled variables)?

_____

What is the independent variable?_____

What is the dependent variable? _____

What data do you need to collect during this experiment? _____

_____

What flaw in the design of the experiment can you find? Explain.

_____

_____

What conclusion(s) can be drawn from the data? Explain, using data to support your conclusion(s).

_____

_____

_____

Experimental Scenario 4

Directions: Read the experimental scenario in the center box. Then, provide the experimental components listed in each of the four surrounding boxes.

Problem:

Hypothesis:

Independent (Manipulated) Variable:

Dependent (Responding) Variable:

Control Group:

Constants:

Joe wants to find out which type of bubble bath keeps its bubbles the longest--Mr. Bubble, Magic Bubble, or Bubble-Matic. He uses 2 cap-fulls of bubble bath in 25 gallons of water during each test. He tests each brand 3 times.

Data Table

Graph

CRITICAL READING *strategies*

Marking the Text

- # → Number the paragraphs
- → Circle key terms
- → Underline essential info
  (...based on the reading purpose)
- → Box new vocab words
  (...and define them in the margins)

Additional Ways to Mark the Text

- → [Bracket] information
  (when underlining has been used for another purpose)
- → Write labels in the margins
  (double underline labels to stand out from other marks)

The Modern Model of Atomic Structure

Since ancient times, men have been studying and questioning the world of matter around them. Over two thousand years ago, a Greek philosopher by the name of Democritus put forth a theory about matter. His theory proposed that all substances were composed of very small particles, or *atomos*, that were too small to be seen by the human eye. Today we define matter as anything that has mass and volume. Let's explore the **contributions** of some important scientists and how their work led to the **modern model of atomic structure**.

Scientists have continued to study matter and the tiny particles called **atoms** using **models** to help explain the structure of the atom. In the 1800s, an English chemist and school teacher by the name of **John Dalton** published an **atomic theory**. His theory, based on experimental evidence, stated that all substances were composed, or made of small particles called atoms that could not be divided or destroyed. It also proposed that all atoms within an element were the same and the atoms of different elements were different. In addition, Dalton believed that atoms could join with each other to create new substances. Dalton's model of an atom consisted of a **simple, solid sphere**.

Toward the end of the nineteenth century, Dalton's atomic theory was revised in order to better understand and explain new scientific observations and discoveries. In the late 1800s, an English scientist by the name of **Joseph John Thomson** found an error in Dalton's theory. His experiments showed that atoms were not solid, undividable spheres but actually contained smaller, negatively charged particles. His model became known as the **plum pudding model**, a popular English dessert, because it looked like a ball of pudding with small pieces of plum scattered evenly throughout. The pudding represented the positively charged part of the atom and the plum pieces represented the negatively charged corpuscles, or **electrons** as they are called today.

In 1909, another English scientist by the name of Earnest **Rutherford** revised Thomson's atomic theory. The results of his experiments led him to believe that the plum pudding model of atomic structure was incorrect. His atomic model consisted of a positively charged, extremely dense region in the center of the atom called the **nucleus**. Surrounding the nucleus was an area of empty space that contained the electrons.

The Modern Model of Atomic Structure

Four years later, the atomic model was revised once again. Niels **Bohr**, a Danish scientist, believed that an atom's electrons travel in fixed orbits or paths around the nucleus. He believed that these paths were located at different distances from the nucleus, and later proposed that electrons could jump from one path to another. James Chadwick, a student of Earnest Rutherford, proposed that positive particles called *protons* and neutral particles called *neutrons* made up the nucleus. Eventually these discoveries were combined and resulted in **Bohr's model**, which is also known as the "planetary model." In this model, **three subatomic particles** are present. They include **protons, neutrons, and electrons**.

Protons are positively charged particles located in the nucleus. Protons have a mass of 1 atomic mass unit. **Atomic mass unit** or **amu** is a unit of measure developed by scientists to represent the relative mass of the tiny particles inside of atoms. Also located within the nucleus are **neutrons**. Neutrons have no charge. They are neutral. Although they are slightly larger than protons, neutrons are also given a mass of 1 amu. Protons and neutrons are made up of even smaller particles called **quarks**. Located outside of the nucleus are the negatively charged **electrons**. Electrons are given an amu of zero because of their tiny size. It would take 1,800 electrons to equal the mass of one proton! Size at the atomic level is measured on a **nanoscale**.

The modern model of atomic structure is called the **"electron cloud" model**. **Edwin Schrodinger**, an Austrian physicist, proposed that electrons do not travel in static, or fixed paths. Instead, electrons travel in regions called electron clouds. An electron cloud is an area around the nucleus where electrons are most likely to be found.

As scientists continue to study the atom, their understanding of its structure continues to evolve. The two atomic models most commonly used are the Bohr model and the electron cloud (Quantum Mechanics) model. Although the **Bohr model** does not represent the three-dimensional characteristics of the atom and has the electrons traveling in fixed orbits, it is used because it allows the atom to be easily shown in two dimensions. Scientists believe that the **electron cloud model** better supports our current understanding of the structure of the atom and its role as the basic building block of matter.

The Modern Model of Atomic Structure Reading Concept Analysis Question

Directions: Answer and justify each question. Justify your answer by indicating the paragraph that supports your answer.

Questions	Justifications
1. How did the modern model of atomic structure come about?	1.
2. What do scientist use to explain the structure of the atom?	2.
3. What did John Dalton's theory state?	3.
4. Describe Dalton's model of atomic structure.	4.
5. What was the name of Thomson's model?	5.
6. Describe Thomson's model.	6.
7. What did Bohr believe about the paths of electrons?	7.
8. What did James Chadwick propose?	8.
9. What is the modern model of atomic structure called?	9.
10. What are the two most used atomic models?	10.

The Atoms Family Album

Name _____

In the center of Matterville, there is a place called the Nucleus Arcade, where two members of the Atoms Family like to hang out. Perky Patty Proton, like her sisters, is quite large with a huge smile and eyes that sparkle (+). Patty is always happy and has a very positive personality. Nerdy Nelda Neutron is large like Patty, but she has a boring, flat mouth and eyes with zero expression (o). Her family is very apathetic and neutral about everything. Patty, Nelda, and their sisters spend all their time at the arcade.

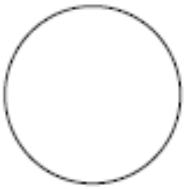
Around the Nucleus Arcade, you will find a series of roadways that are used by another member of the Atoms Family, Enraged Elliott Electron. Elliott races madly around the Arcade on his bright red chrome-plated Harley-Davidson. He rides so fast that no one can be sure where he is at any time. Elliott is much smaller than Patty and Nelda and he is always angry because these bigger relatives will not let him in the Arcade. He has a frown on his face, eyes that are squinted with anger, and a very negative (-) attitude.

The first energy street can only hold only two Electron brothers. The second energy street, called the Energy Freeway, can hold 8 brothers. The third energy street, called the Energy Superhighway, can hold 18 of the brothers.

The morale of Matterville is stable as long as each negative Electron brother is balanced out by one positive Proton sister. The number of residents in Matterville depends on the Proton and Neutron families.

Challenge: What would happen to the morale of Matterville if one Elliott Electron was kidnapped?

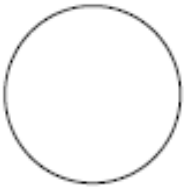
Name:



Description:

Favorite Activity:

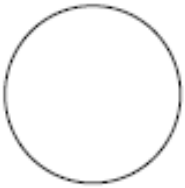
Name:



Description:

Favorite Activity:

Name:



Description:

Favorite Activity:

Name_____ Date_____

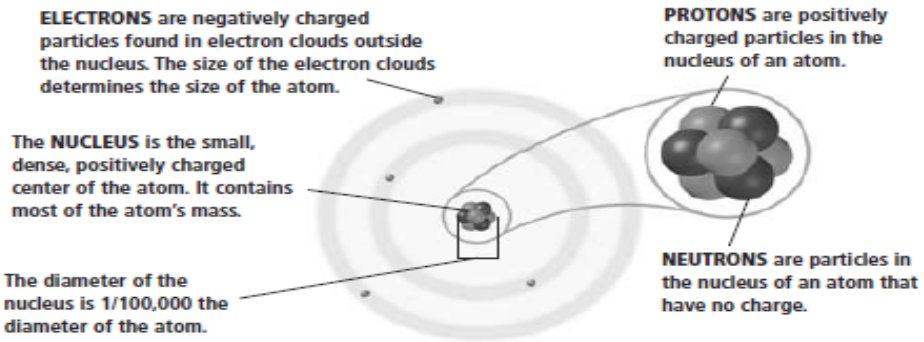
PHYSICAL SCIENCE

Modern Model of Atomic Structure

Except for one element (hydrogen), the atoms of all the elements are made of the same three particles: protons, neutrons, and electrons. Protons are the positively charged particles of the nucleus. Neutrons are the particles of the nucleus that have no electric charge. Neutrons are a little more massive than protons. Protons and neutrons are the most massive particles in an atom. The volume of the nucleus is very small. So, the nucleus is very dense.

Electrons are the negatively charged particles in atoms. Compared with protons and neutrons, electrons have a very small mass. It takes more than 1,800 electrons to equal the mass of one proton. In fact, the mass of an electron is so small that the mass is usually thought of as almost zero. The modern model of an atom still proposes that electrons travel around the nucleus. However, the electrons do not travel in definite paths or orbits. Rather, there are regions around the nucleus where an electron is likely to be found. Such a region is called an electron cloud. All you can say about an electron is that it is somewhere in that cloud. The diagram below shows how the model of atomic structure has changed since Dalton first proposed his theory over 200 years ago.

Parts of an Atom



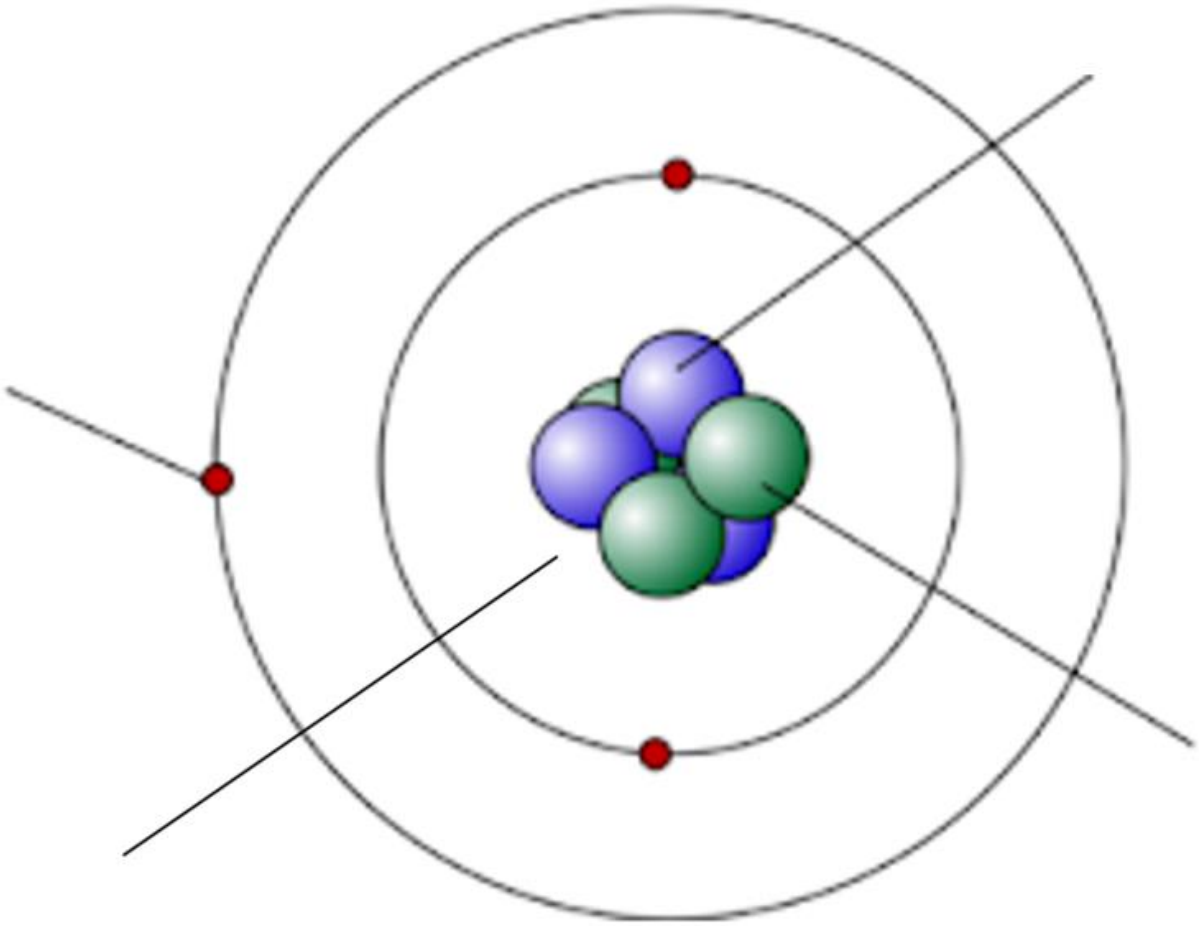
KEY CONCEPTS

- **In 1803, John Dalton proposed his atomic theory.**
- **In 1897, J. J. Thompson discovered that an atom contained smaller particle called electrons.**
- **In 1911, Ernest Rutherford discovered that an atom contains a positively charged central mass called a nucleus.**
- **In 1913, Niels Bohr proposed that the electrons circle the nucleus in distinct orbits.**
- **Today the model of the atom states that the electrons are found in electrons clouds that surround the nucleus, which consists of protons and neutrons.**

Directions: Create a timeline to depict the development of the atomic structure. Your timeline should include time, scientists, and their contribution.

1803				Today
			Niels Bohr	
	electrons			

Parts of an Atom



Directions:

1. Label the parts of an atom on the image above.
2. Provide a description for each part of the atom in the space below.

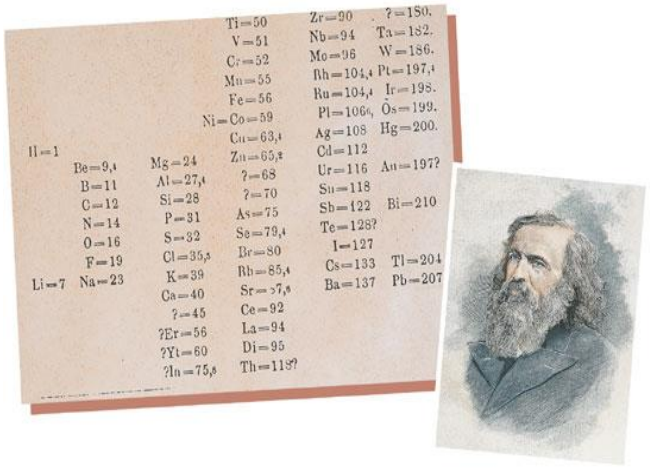
Protons	
Neutrons	
Electrons	
Nucleus	

Reading Comprehension – An After Reading Strategy
"Somebody Wanted But So"

Background Information

The First Periodic Table

Dmitri Ivanovich Mendeleev (1834 – 1907) was the last of 17 children in his family. Because he was born in Siberia, he was refused admission to the university in Moscow and the university in St. Petersburg. He eventually enrolled in a school for teachers. When he finished school, Mendeleev supported himself by editing and writing scientific papers. In time, he became a professor of general chemistry at the University of St. Petersburg. Because he could not find a textbook he liked, Mendeleev wrote his own. While writing the textbook, Mendeleev began to look for a way to classify the elements based on their properties. Ultimately, he seized on the idea of atomic mass and began to develop his periodic table.



Somebody Wanted But So…

Somebody (Character)	
Wanted (Goal/Motivation)	
But (Conflict)	
So (Resolution)	

The Periodic Table of Elements Concept Analysis

Directions: Answer and justify each question. Justify your answer by indicating the paragraph that supports your answer.

Questions	Justifications
1. What does the periodic table of elements do?	1.
2. What are the horizontal rows called on the periodic table of elements?	2.
3. What are the horizontal columns called on the periodic table of elements?	3.
4. What does each box contain?	4.
5. How are the elements arranged?	5.
6. What does the stair-step line on the right of the table help us locate?	6.
7. What do metals tend to lose?	7.
8. What do nonmetals tend to lose?	8.
9. What do the elements in a vertical group have in common?	9.
10. Why are vertical groups called families?	10.

The Periodic Table of Elements

In the late 1800s, a Russian scientist by the name of Dmitri Medeleev began to look at the properties of known elements in order to organize them. The result was the **periodic table of elements**. Let's investigate the organization of the periodic table of elements and how scientists use it today.

The periodic table of elements is a tool that we can use to organize information about the elements. It is made up of horizontal rows called **periods** and vertical columns called **groups** or **families**. Each box in the table contains information about the structure of an element. The elements in each box are arranged according to their **atomic numbers** and properties. An atom's identity is directly related to its atomic number, or the number of protons in its nucleus. As you read from left to right along a period, the elements are arranged in increasing order of atomic number.

The elements become increasingly nonmetallic as you move from left to right across the table. A stair-step line on the right side of the table helps us locate the three classifications or groups of elements: metals, nonmetals, and metalloids.

Metals are those elements located to the left of the stair-step line. They tend to lose electrons in chemical reactions to form positive ions – any element that gains or losses electrons becomes an **ion**.

Metalloids border the stair-step line and have some properties of both metals and nonmetals.

Nonmetals are located to the right of the stair-step line. They tend to gain electrons in chemical reactions to form negative ions.

The Periodic Table of Elements

The vertical columns on the periodic table contain elements that have the same number of electrons in their outermost energy level. Electrons can be found in zones or areas around the nucleus called energy levels. Electrons located in energy levels closest to the nucleus contain lower amounts of energy than those located in energy levels farther from the nucleus. This similar arrangement of electrons causes the elements in a vertical group to have similar chemical and physical properties such as boiling points and reactivity. Vertical groups are often called families because they are "related" by their similar properties. This similarity of properties in the vertical groups causes a repetitive or repeating pattern of physical and chemical properties as you move across the periods on the table.

We can obtain a lot of information about the elements and their atoms by using the periodic table of elements. First of all, by counting the number of boxes that make up the periods and groups, we find that there are more than 110 known elements. Of these, only 92 are found naturally on the Earth. The remaining elements, called synthetic elements, are artificially produced in laboratory settings.

Many periodic tables also tell us an atom's atomic number, atomic mass, phase of matter at room temperature, number of outer level (valence) electrons, and chemical symbol. **Chemical symbols** usually come from the ancient or modern name of the element and consist of one, two, or three letters. The first letter is always capitalized. All others letters are lower case.

The elements on the periodic table can combine in many ways to produce compounds that make up all other substances on Earth. Compounds are formed when the atoms of elements react chemically. The number of electrons in the outermost energy levels of an atom determines the chemical properties and *reactivity* of an element. When a metallic element reacts, or bonds with a nonmetallic element, their atoms *gain* and *lose* electrons forming **ionic bonds**. When two nonmetals react, or bond, the atoms usually *share* electrons forming **covalent (molecular) bonds**. Through the gaining, losing, and sharing of electrons, atoms become chemically stable. Atoms react to form chemically stable substances that are held together by chemical bonds and are represented by **chemical formulas**.

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The Periodic Table of the Elements

1 **H** Hydrogen 1.00794																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012182											5 **B** Boron 10.811	6 **C** Carbon 12.0107	7 **N** Nitrogen 14.00674	8 **O** Oxygen 15.9994	9 **F** Fluorine 18.9984032	10 **Ne** Neon 20.1797
11 **Na** Sodium 22.989770	12 **Mg** Magnesium 24.3050											13 **Al** Aluminum 26.981538	14 **Si** Silicon 28.0855	15 **P** Phosphorus 30.973761	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.4527	18 **Ar** Argon 39.948
19 **K** Potassium 39.0983	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.955910	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.9415	24 **Cr** Chromium 51.9961	25 **Mn** Manganese 54.938049	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933200	28 **Ni** Nickel 58.6934	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.61	33 **As** Arsenic 74.92160	34 **Se** Selenium 78.96	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.80
37 **Rb** Rubidium 85.4678	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.90585	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.90638	42 **Mo** Molybdenum 95.94	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.90550	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.8682	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.60	53 **I** Iodine 126.90447	54 **Xe** Xenon 131.29
55 **Cs** Cesium 132.90545	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.9055	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.9479	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.078	79 **Au** Gold 196.96655	80 **Hg** Mercury 200.59	81 **Tl** Thallium 204.3833	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.98038	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (262)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.90765	60 **Nd** Neodymium 144.24	61 **Pm** Promethium (145)	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.92534	66 **Dy** Dysprosium 162.50	67 **Ho** Holmium 164.93032	68 **Er** Erbium 167.26	69 **Tm** Thulium 168.93421	70 **Yb** Ytterbium 173.04	71 **Lu** Lutetium 174.967
90 **Th** Thorium 232.0381	91 **Pa** Protactinium 231.03588	92 **U** Uranium 238.0289	93 **Np** Neptunium (237)	94 **Pu** Plutonium (244)	95 **Am** Americium (243)	96 **Cm** Curium (247)	97 **Bk** Berkelium (247)	98 **Cf** Californium (251)	99 **Es** Einsteinium (252)	100 **Fm** Fermium (257)	101 **Md** Mendelevium (258)	102 **No** Nobelium (259)	103 **Lr** Lawrencium (262)

1995 IUPAC masses and Approved Names from http://www.chem.qmw.ac.uk/iupac/AtWt/
masses for 107-111 from C&EN, March 13, 1995, p. 35
112 from http://www.gsi.de/z112e.html

Directions: Use the periodic table of elements to complete this assignment.

ELEMENTS AND THEIR SYMBOLS

Name _____

Write the symbols for the following elements.

1. oxygen _____
2. hydrogen _____
3. chlorine _____
4. sodium _____
5. fluorine _____
6. carbon _____
7. helium _____
8. nitrogen _____
9. copper _____
10. sulfur _____
11. magnesium _____
12. manganese _____
13. neon _____
14. bromine _____
15. phosphorus _____
16. silver _____
17. lead _____
18. iron _____
19. calcium _____
20. potassium _____

Write the name of the element that corresponds to each of the following symbols.

21. Cu _____
22. K _____
23. C _____
24. Au _____
25. Zn _____
26. Pb _____
27. Fe _____
28. Na _____
29. S _____
30. Al _____
31. Ca _____
32. Ag _____
33. P _____
34. O _____
35. I _____
36. Sn _____
37. H _____
38. F _____
39. Ni _____
40. Hg _____