Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_

**Physical Science Honors**

First Semester Exam Study Guide

**NATURE OF SCIENCE**

1. Identify the INDEPENDENT VARIABLE and the DEPENDENT VARIABLE by reading the research question or a brief description of a CONTROLLED EXPERIMENT.
2. Explain why it is important to use CONTROLLED VARIABLES in an EXPERIMENT.
3. Describe how a SCIENTIFIC THEORY and a SCIENTIFIC LAW can be related to one another.
4. Explain why a SCIENTIFIC THEORY represents the most powerful explanation scientists have to offer and why it can never become a LAW.
5. Explain the role of SCIENTIFIC CONFIRMATION.
6. Identify examples of REPETITION and REPLICATION; describe how they are useful in confirming results.
7. How does an investigator know whether he/she has performed enough TRIALS in their investigation?
8. How are scientific CLAIMS affected by the concept of scientific CONFIRMATION?
9. Explain the difference between DATA and EVIDENCE.
10. Describe various types of MODELS used in science to test or communicate an idea.
11. Discuss the benefits of using SCIENTIFIC MODELS as well as the possible drawbacks, or limitations, of models.
12. Why do we describe SCIENTIFIC KNOWLEDGE as “TENTATIVE”? List better alternatives to the word, “prove”.
13. Describe the six characteristics of science and discuss its limitations.
14. How does PSEUDOSCIENCE compare to science? How can you tell the difference?

**PROPERTIES OF MATTER**

1. Why do we say that “everything” is made of “MATTER”? What role do atoms play?
2. Identify and compare the three types of matter.
3. Identify examples of each type of matter.
4. Identify and describe common PHYSICAL PROPERTIES of matter.
5. Differentiate materials known as “CONDUCTORS” from those known as “INSULATORS”. What role does density play?
6. Identify and describe common CHEMICAL PROPERTIES of matter.
7. How are the chemical properties of substances observed?
8. How does thermal energy influence the motion of the particles in a substance? How does this influence their PHYSICAL STATE, or PHASE?
9. Compare the characteristics of shape and volume among SOLIDS, LIQUIDS, GASSES, and PLASMAS.
10. How can you use the term, “VISCOSITY,” to describe a liquid?
11. Explain how DENSITY is calculated (*What measurements do you need?*) and be able to use the formula to calculate the density of a substance.
12. Why is density useful in helping us identify unknown samples of a substance?

**PROPERTIES OF WATER**

1. What type of matter is WATER?
2. Describe the structure of a water molecule. Why is it called a “POLAR MOLECULE”?
3. Describe the properties of COHESION and ADHESION that result from the hydrogen bonds between water molecules.
4. Discuss the density of water. Explain why ice floats and discuss how the density of water affects how other objects sink or float in water.
5. Identify some of the special properties of water that make it so unique and so important to life on Earth.

**PROPERTIES OF GASES**

1. Describe BOYLE’S LAW (*include the mathematical relationship and a rough sketch of a line graph*).
2. Describe CHARLES’ LAW (*include the mathematical relationship and a rough sketch of a line graph*).
3. Describe GAY-LUSSAC’S LAW (*include the mathematical relationship*).
4. Describe AVOGADRO’S LAW (*include the mathematical relationship*).
5. Explain how the four gas laws above combine into the IDEAL GAS LAW (*include the equation and discuss the relationships between temperature, pressure, and volume for an ideal gas*).

**ATOMS**

1. Interpret/describe a model of the ATOM and its parts (*the modern electron cloud model*).
2. What is the atom mostly made of? Where does basically all of its mass come from?
3. Describe the characteristics of the three SUB ATOMIC PARTICLES, including size (mass), charge, and location.
4. Discuss the role of sub atomic particles in the formation of different ELEMENTS (*ie: ATOMIC NUMBER, ATOMIC MASS, ISOTOPES, AND IONS*).
5. Discuss the evolution of the atomic model, including the discovery of ELECTRONS, the NUCLEUS, PROTONS, NEUTRONS, and VALENCE ELECTRONS.

**PERIODIC TABLE**

1. Explain how the modern PERIODIC TABLE is slightly different than the one Mendeleev created. (*Why didn’t he use atomic number?*)
2. What is “PERIODIC” about the periodic table?
3. Interpret the information included in the boxes of elements on the periodic table including atomic number, atomic mass, element symbol, classification, standard state, and natural vs. synthetic.
4. Explain the importance of the ATOMIC NUMBER to an element.
5. Differentiate between GROUPS and PERIODS on the periodic table.
6. Describe the patterns that are present in the periodic table, both among the periods and the groups.
7. Explain the role of electrons in the structure of the periodic table. (*electron configuration*)
8. Explain the OCTET RULE and why it is important.
9. Create and/or interpret various element diagrams such as ELECTRON CONFIGURATION, BOHR DIAGRAMS, or ELECTRON-DOT DIAGRAMS.