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**Comp. Science 3 (8th Grade) Advanced**

First Semester Exam Study Guide

**PRACTICE OF SCIENCE**

**SC.8.N.1.1 – Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.**

**SC.8.N.1.2 – Design and conduct a study using repeated trials and replication.**

**SC.8.N.1.3 – Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.**

**SC.8.N.1.4 – Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.**

**SC.8.N.1.5 – Analyze the methods used to develop a scientific explanation as seen in different fields of science.**

**SC.8.N.1.6 – Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.**

1. Be able to 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. Explain the difference between DATA and EVIDENCE.
4. How is a HYPOTHESIS related to a PREDICTION?
5. What is the value of a hypothesis, even if it does not turn out to be supported by the data?
6. Explain the role of SCIENTIFIC CONFIRMATION.
7. Be able to identify examples of REPETITION and REPLICATION; describe how they are useful in confirming results.
8. How does an investigator know whether he/she has performed enough TRIALS in their investigation?
9. How are scientific CLAIMS affected by the concept of scientific CONFIRMATION?

**SCIENTIFIC KNOWLEDGE**

**SC.8.N.2.1 – Distinguish between scientific and pseudoscientific ideas.**

**SC.8.N.2.2 – Discuss what characterizes science and its methods.**

**SC.8.N.3.1 – Select models useful in relating the results of their own investigations.**

**SC.8.N.3.2 – Explain why theories may be modified but are rarely discarded.**

**SC.8.N.4.1 – Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.**

1. What is EMPIRICAL EVIDENCE and how does it influence SCIENTIFIC EXPLANATIONS?
2. Explain why science does not offer conclusive “proof” for an explanation. Offer more appropriate alternatives to using the words, “prove”, “proven”, or “proved”.
3. Describe how a SCIENTIFIC THEORY and a SCIENTIFIC LAW can be related to one another.
4. Explain why a THEORY can never become a LAW.
5. Explain why SCIENTIFIC THEORIES are often changed but rarely discarded.
6. Why do we describe SCIENTIFIC KNOWLEDGE as “TENTATIVE”?
7. Discuss the benefits of using SCIENTIFIC MODELS as well as the possible drawbacks, or limitations, of models.
8. Describe the characteristics of science (CONPTT).
9. How does PSEUDOSCIENCE compare to science? How can you tell the difference?

**PROPERTIES OF MATTER**

**SC.8.P.8.2 – Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.**

**SC.8.P.8.3 – Explore and describe the densities of various materials through measurement of their masses and volumes.**

**SC.8.P.8.4 – Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.**

**SC.8.P.8.1 – Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.**

**SC.8.P.8.9 – Distinguish among mixtures (including solutions) and pure substances.**

1. Distinguish between mixtures and pure substances (*include the three types of matter*).
2. Identify and describe common physical properties of matter.
3. How are the chemical properties of substances observed?
4. Compare the characteristics of shape and volume among solids, liquids, and gasses.
5. How can you use the term, “viscosity,” to describe a liquid?
6. Explain how “weight” and “mass” are different from each other, but also related to one another.
7. Explain how density is calculated (*What measurements do you need?*) and be able to use the formula to calculate the density of a substance.
8. How can density be used to make predictions about a sample (*its identity and its ability to float*)?

**ATOMS**

**SC.8.P.8.7 – Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).**

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).

**PERIODIC TABLE**

**SC.8.P.8.6 – Recognize that elements are grouped in the periodic table according to similarities of their properties.**

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.
4. Explain the importance of the atomic number to an element.
5. Differentiate between groups and periods on the periodic table.

**CHEMICAL REACTIONS**

**SC.8.P.8.5 – Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.**

**SC.8.P.9.1 – Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.**

**SC.8.P.9.2 – Differentiate between physical changes and chemical changes.**

**SC.8.P.9.3 – Investigate and describe how temperature influences chemical changes.**

1. Differentiate between an element and a compound. How can you interpret a chemical formula to determine the elements that make up a molecule of a substance?
2. What causes atoms to form compounds/molecules (*discuss the octet rule*)?
3. Describe physical signs that a chemical reaction has occurred.
4. Identify the reactants and products in a chemical reaction. How are they shown in a chemical equation?
5. How do the atoms present in the reactants compare to those present in the products? Why is this important?
6. How is the law of conservation of mass observed during an actual chemical reaction?
7. Describe and explain the effect of temperature on the rate of a chemical reaction.