Final Exam - Monday 12/19/16

150 points

80 points cumulative =

- chapter 1 - introduction to science
- chapter 2 - matter
- chapter 3 - atoms and the periodic table
- chapter 4 - the structure of matter

70 points chapter 5 =

- 5.1 - the nature of chemical reactions
- 5.2 - reaction types

Study Guide

Physical Science

Chapter 1: Introduction to Science

- **Objectives**
  - **1.1: The Nature of Science**
    - Identify and apply lab safety rules and procedures
    - Identify common lab equipment and its uses
    - Use common lab equipment to make measurements with the precision of the instrument reflected in the value reported.
    - Differentiate between and identify theories, beliefs, laws, hypothesis, and facts.
  - **1.2: The Way Science Works**
    - Summarize, use, and apply the scientific method in experimentation.
    - Differentiate between independent and dependent variables
    - Identify experimental controls
    - Differentiate between control and experimental groups
    - Differentiate between and make qualitative and quantitative data and observations.
    - Make metric measurements based on the precision of the measurement tool.
- **Vocabulary**
  - **1.1: The Nature of Science**
    - Belief
    - Fact
    - Hypothesis
    - Law
    - Theory
    - Graduated cylinder
    - Beaker
    - Erlenmeyer flask
  - **1.2: The Way Science Works**
    - Mass
    - Scientific method

- Variables
  - Independent variable
  - Dependent variable
- Experimental controls
- Control group
- Experimental group
- Qualitative data
- Quantitative data
- Precision
- Accuracy

Physical Science Study Guide

Chapter 2 – Matter

- **2.1: What is Matter?**
  - **Objectives**
    - Define and identify what is classified as matter
    - Define and identify what is classified as not matter
    - Discuss dark matter and its presence in the universe (How much of the universe is composed of dark matter) – Ted Ed Video
    - Categorize materials as pure substances or mixtures
      - Distinguish between elements and compounds
      - Distinguish between homogeneous and heterogeneous mixtures
  - **Vocabulary**
    - Matter
      - Mass
      - Volume
    - Energy
    - Dark matter
    - Pure substance
      - Element
      - Compound
    - Mixture
      - Heterogeneous mixture
      - Homogeneous mixture
- **2.2: Matter and Energy**
  - **Objectives**
    - State the three principles of kinetic theory
    - Use the kinetic theory to describe the properties and structures of the different states of matter (what types have more kinetic energy)
    - Distinguish between chemical and physical properties of matter
    - Describe the energy transfers involved in changes of state (melting, freezing, evaporating, sublimation, de-sublimation, and condensation) and classify them as endothermic or exothermic.
    - Read, label, and interpret heating and cooling curve graphs

        - Identify boiling/condensating and melting/freezing points.
    - Describe the relative kinetic energy in and give an example of a plasma.
- **Vocabulary**
    - Kinetic energy
    - Solid
    - Liquid
    - Gas
    - Plasma
    - Phase Change
        - Endothermic
            - Melting
            - Evaporation
            - Sublimation
        - Exothermic
            - Condensation
            - Freezing
            - Desublimation

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Chapter 3: Atoms and the Periodic Table

- Objectives
  - Explain Dalton's atomic theory, and describe why it was more successful than Democritus's theory.
  - State the charge, mass, and location of each part of an atom according to the modern model of an atom.
  - Compare and contrast Bohr's model with the modern model of the atom.
  - Relate the organization of the periodic table to the arrangement of electrons within an atom.
  - Explain why some atoms gain or lose electrons to form ions.
  - Determine how many protons, neutrons, and electrons an isotope has, given its symbol, atomic number, and mass number.
  - Describe how the abundance of isotopes affect an element's average atomic mass.
  - Locate alkali metals, alkaline-earth metals, and transition metals in the periodic table.
  - Locate semiconductors, halogens, and noble gases in the periodic table.
  - Relate an element's chemical properties to the electron arrangement of its atoms.
- Vocabulary
  - Nucleus
  - Proton
  - Neutron
  - Electron
  - Energy level
  - Orbital
  - Valence electron
  - Periodic law
  - Period
  - Group
  - Ionization
  - Ion
  - Cation
  - Anion
  - Atomic number
  - Mass number
  - Isotopes

- Atomic mass unit (amu)
- Average atomic mass
- Metals
- Nonmetals
- Semiconductors
- Alkali metals
- Alkaline-earth metals
- Transition metals
- Halogens
- Noble gasses

Resources: Periodic table (w/ charges, groups, valence electrons, and covalent bonding prefixes)

Physical Science Study Guide

Chapter 4 Test: The Structure of Matter

- **4.1: Compounds and Molecules**
  - **Vocabulary**
    - Chemical bond
    - Chemical structure
    - Bond length
    - Bond angle
  - **Objectives**
    - Distinguish between compounds and mixtures
    - Relate the chemical formula of a compound to the relative numbers of atoms or ions present in the compound
    - Use models to visualize a compound's chemical structure
    - Describe how the chemical structure of a compound affects its properties

- **4.2: Ionic and Covalent Properties**
  - **Vocabulary**
    - Ionic bond
    - Metallic bond
    - Covalent bond
  - **Objectives**
    - Explain why atoms sometimes join to form bonds
    - Explain why some atoms transfer their valence electrons to form ionic bonds, while other atoms share valence electrons to form covalent bonds
    - Differentiate between ionic, covalent, and metallic bond in terms of composition and what is happening with valence electrons
    - Compare the properties of substances with different types of bonds properties including relative melting point, ability to conduct electricity as a solid , and ability to conduct electricity when dissolved in water

- **4.3: Compound Names and Formulas**
  - **Vocabulary**
    - Ion

        - Covalent compound
        - Ionic compound
    - **Objectives**
        - Distinguish between ionic and covalent compounds when given the name or formula of a compound
        - Name and write formulas for monoatomic ions
        - Name and write formulas for simple binary ionic compounds
        - Name and write formulas for binary covalent compounds

- **4.4: Organic and Biochemical Compounds**
    - **Vocabulary**
        - Monomer
        - Polymer
    - **Objectives**
        - Relate the chemical structure of a polymer (ex: cross-linked chains of monomers) to its properties (ex: elasticity)
        - List 3 examples of synthetic polymers
        - List 3 examples of naturally occurring polymers

Chapter 5 Test – Chemical Reactions

- **5.1: The Nature of Chemical Reactions**
  - Objectives
    - Recognize some signs that a chemical reaction is taking place.
    - Explain chemical changes in terms of the structure and motion of atoms and molecules
    - Describe the differences between endothermic and exothermic reactions
    - Identify situations involving chemical energy
  - Vocabulary
    - Reactant
    - Product
    - Chemical energy
    - Exothermic reaction
    - Endothermic reaction
- **5.2: Reaction Types**
  - Objectives
    - Distinguish among five general types of chemical reactions
    - Predict the products of some reactions based on the reaction type
    - Describe reactions that transfer or share electrons between molecules, atoms, or ions
  - Vocabulary
    - Synthesis reaction
    - Decomposition reaction
      - Electrolysis
    - Combustion reaction
    - Single-displacement reaction
    - Double-displacement reaction