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| **1st Six Weeks**     | *Define chemistry and differentiate among its traditional divisions*  
                        *List several reasons to study chemistry*  
                        *Summarize ways in which chemistry affects your daily life*  
                        *Describe the impact of chemistry on various fields of science*  
                        *Describe the steps involved in the scientific method*  
                        *Distinguish between a theory and scientific law*  
                        *Explain why learning chemistry requires daily effort*  
                        *Describe the importance of writing in the study of chemistry*  
                        *Identify the characteristics of matter and substances*  
                        *Differentiate among the three states of matter*  
                        *Define physical property and list several common physical properties of substances*  
                        *Categorize a sample of matter as a substance or mixture*  
                        *Distinguish between a homogeneous and heterogeneous samples of matter*  
                        *Explain the difference between an element and a compound*  
                        *Identify the chemical symbols of common elements, and name common elements when given their symbols*  
                        *Differentiate between physical and chemical changes in matter*  
                        *Apply the law of conservation of mass*  
|                       | PS: 1.1, 1.2, 1.3, 1.4; 2.1, 2.3, 2.4; 3.1, 3.2, 3.4; 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3, 6.1  
                        S: 1.1, 1.2; 2.1, 2.2, 2.3, 2.4 | |
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| 1st Six Weeks        | *Distinguish between quantitative and qualitative measures  
* Convert measurements to scientific notation  
* Distinguish among the accuracy, precision, and error of a measurement  
* Identify the number of significant figures in a measurement and in the result of a calculation  
* List SI units of measurement and common SI prefixes  
* Distinguish between the mass and weight of an object  
* Calculate the density of an object from experimental data  
* List some useful applications of the measurement of specific gravity  
* Convert between the Celsius and Kelvin temperature scales                                                                                                      | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3, 2.4                                                                                                                                                                                                                       |
| 2nd Six Weeks        | * Summarize Dalton’s Atomic Theory  
* Describe the size of an atom  
* Distinguish among protons, electrons, and neutrons in terms of relative mass and charge  
* Describe the structure of an atom, including the location of the protons, electrons, and neutrons with respect to the nucleus  
* Explain how the atomic number identifies an element  
* Use the atomic number and mass number of an element to find the numbers of protons, electrons, and neutrons  
* Explain how isotopes differ and why the atomic masses of elements are not whole numbers  
* Calculate the average atomic mass of an element from isotope data                                                                                           | PS: 1.1, 1.2, 1.3, 1.4; 2.1; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.2  
S: 7.1, 7.2; 8.1, 8.2, 8.3, 8.4                                                                                                                                                                                                                       |
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| 2<sup>nd</sup> Six Weeks | *Summarize the development of atomic theory  
*Explain the significance of quantized energies of electrons as they relate to the quantum mechanical model of the atom  
*Apply the Aufbau principle, the Pauli exclusion principle, and Hund’s rule in writing the electron configurations of elements  
*Explain why the electron configurations for some elements differ from those assigned using the Aufbau principle  
*Calculate the wavelength, frequency, or energy of light, given two of these values  
*Explain the origin of the atomic emission spectrum of an element  
*Describe the origin of the periodic table  
*Identify the position of groups, periods, and the transition metals in the periodic table  
*Explain why you can infer the properties of an element based on those of other elements in the periodic table  
*Use electron configurations to classify elements as noble gases, representative elements, transition metals, or inner transition metals  
*Interpret group trends in atomic radii, ionic radii, ionization energies, and electronegativities  
*Interpret period trends in atomic radii, ionic radii, ionization energies, and electronegativities | PS: 1.1, 1.2, 1.3, 1.4; 2.1, 2.3, 2.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.1, 6.2, 6.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3, 2.4 |
| 3<sup>rd</sup> Six Weeks | *Use the periodic table to infer the number of valence electrons in an atom, and draw it’s electron dot structure  
*Describe the formation of cations from metals, and of anions from nonmetals | PS: 1.1, 1.2, 1.3, 1.4; 2.2, 2.3, 2.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.2  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
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| 3rd Six Weeks         | *List the characteristics of an ionic bond  
*Use the characteristics of ionic compounds to explain the electrical conductivity of ionic compounds when melted and when in aqueous solutions  
*Use the theory of metallic bonds to explain the physical properties of metals  
*Describe the arrangement of atoms in some common metal crystal structures  
*Use electron dot structures to show the formation of single, double, and triple covalent bonds  
*Describe and give examples of coordinate covalent bonding, resonance structures, and exceptions to the octet rule  
*Use VSEPR theory to predict the shapes of simple covalently bonded molecules  
*Use electronegativity to classify a bond as nonpolar covalent, polar covalent, or ionic  
* Name and describe the weak attractive forces that hold groups of molecules together  
*Distinguish between ionic and molecular compounds  
*Define cation and anion, and relate them to metal and nonmetal  
*Distinguish among chemical formulas, molecular formulas, and formula units  
*Use experimental data to show that a compound obeys the law of definite proportions  
*Use the periodic table to determine the charge on an ion  
*Define a polyatomic ion and give the names and formulas of the most common polyatomic ions  
*Apply the rules for naming and writing formulas for binary ionic compounds | PS: 1.1, 1.2, 1.3, 1.4; 2.2, 2.3, 2.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.1, 6.2, 6.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |

PS: 1.1, 1.2, 1.3, 1.4; 2.1, 2.3, 2.4; 3.1, 3.2, 3.4; 4.1, 4.2, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.2  
S: 1.1, 1.2; 2.2, 2.3, 2.4
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|                       | *Apply the rules for naming and writing formulas for ternary ionic compounds  
*Apply the rules for naming and writing formulas for binary molecular compounds  
*Name and write formulas for common acids | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
| **3\(^{rd}\) Six Weeks** | *Describe how Avogadro’s number is related to a mole of any substance  
*Calculate the mass of a mole of any substance  
*Use the molar mass to convert between mass and moles of a substance  
*Use the mole to convert among measurements of mass, volume, and number of particles  
*Calculate the percent concentration of a substance from its chemical formula or experimental data  
*Derive the empirical formula and molecular formula of a compound from experimental data | **4\(^{th}\) Six Weeks**  
*Write equations describing chemical reactions using appropriate symbols  
*Write balanced chemical equations when given the names or formulas of the reactants and products in a chemical reaction  
*Identify a reaction as combination, decomposition, single-replacement, double-replacement, or combustion  
*Predict the products of combination, decomposition, single-replacement, double-replacement, or combustion  
*Write and balance net ionic equations  
*Use solubility rules to predict the precipitate formed in double-replacement reactions | **4\(^{th}\) Six Weeks** |
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| 4th Six Weeks         | *Calculate the amount of reactants required or product formed in a non-chemical process  
*Interpret balanced chemical equations in terms of interacting moles, representative particles, masses, and gas volume at STP  
*Construct mole ratios from balanced chemical equations, and apply these ratios in mole-mole stoichiometric calculations  
*Calculate stoichiometric quantities from balanced chemical equations using units of moles, mass, representative particles, and volumes of gases at STP  
*Identify and use the limiting reagent in a reaction to calculate the maximum amount of product(s) produced and the amount of excess reagent  
*Calculate theoretical yield, actual yield, or percent yield given appropriate information | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3, 2.4 |
|                       | *Describe the motion of gas particles according to the kinetic theory  
*Interpret gas pressure in terms of kinetic theory  
*Describe the nature of a liquid in terms of the attractive forces between the particles  
*Differentiate between evaporation and boiling of a liquid, using kinetic theory  
*Describe how the degree of organization of particles distinguishes solids from gases and liquids  
*Distinguish between a crystal lattice and a unit cell  
*Explain how allotropes of an element differ  
*Interpret the phase diagram of water at any given temperature and pressure  
*Describe the behavior of solids that change directly to the vapor state and recondense to solids without passing through the liquid state | PS: 1.1, 1.2, 1.3, 1.4; 2.2, 2.3, 2.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.2  
S: 1.1, 1.2; 2.1, 2.2 |
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| 5th Six Weeks         | *Describe the properties of gas particles  
*Explain how the kinetic energy of gas particles relates to Kelvin temperature  
*Explain how the amount of gas and the volume of the container affect gas pressure  
*Infer the effect of temperature changes on the pressure exerted by a contained gas  
*State Boyle’s Law, Charles’s Law, Gay-Lussac’s Law, and the combined gas law  
*Apply the gas laws to problems involving the temperature, volume, and pressure of a contained gas  
*Calculate the amount of gas at any specified conditions of pressure, volume, and temperature  
*Distinguish between ideal and real gases  
*State Avogadro’s hypothesis, Dalton’s Law, and Graham’s Law  
*Calculate moles, masses, and volumes of gases at STP  
*Calculate partial pressures and rates of effusion  
*Describe the hydrogen bonding that occurs in water  
*Explain the high surface tension and low vapor pressure of water in terms of hydrogen bonding  
*Account for the high heat of vaporization and the high boiling point of water in terms of hydrogen bonding  
*Explain why ice floats in water  
*Explain the significance of the statement “like dissolves like”  
*Distinguish among strong electrolytes, weak electrolytes, and nonelectrolytes, giving examples of each  |
|                       | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3, 2.4 |
|                       | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.4; 4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.2, 6.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
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| 5th Six Weeks         | *Explain how colloids and suspensions differ from solutions  
                         *Describe the Tyndall effect  
                         *Identify the factors that determine the rate at which a solute dissolves  
                         *Calculate the solubility of a gas in a liquid under various pressure conditions  
                         *Solve problems involving the molarity of a solution  
                         *Describe how to prepare dilute solutions from more concentrated solutions of known molarity  
                         *Explain what is meant by percent by volume (%v/v) and percent by mass (%m/v) solutions  
                         *Explain on a particle basis why a solution has a lower vapor pressure than the pure solvent of that solution  
                         *Explain on a particle basis why a solution has an elevated boiling point and a depressed freezing point compared to the pure solvent  
                         *Calculate the molality and mole fraction of a solution  
                         *Calculate the molar mass of a molecular compound from the freezing point depression or boiling point elevation of a solution of a compound | PS: 1.1, 1.2, 1.3, 1.4; 2.3, 2.4; 3.1, 3.2, 3.4; 4.1, 4.2, 4.4, 4.5, 4.6 4.7, 4.8; 5.1, 5.2, 5.3; 6.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
| 6th Six Weeks         | *Explain the relationship between energy and heat  
                         *Distinguish between the heat capacity and specific heat  
                         *Construct equations that show the heat changes for chemical and physical processes  
                         *Calculate heat changes in chemical and physical processes  
                         *Classify, by type, the heat changes that occur during melting, freezing, boiling, and condensing  
                         *Calculate heat changes that occur during melting, | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
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| 6<sup>th</sup> Six Weeks | freezing, boiling, and condensing  
*Apply Hess’s law of heat summation to find heat changes for chemical and physical processes  
*Calculate heat changes using standard heats of formation  
*Explain what is meant by the rate of a chemical reaction  
*Using collision theory, explain how the rate of a chemical reaction is influenced by the reaction conditions  
*Predict changes in the equilibrium position due to changes in concentration, temperature, and pressure  
*Write the equilibrium constant expression for a reaction, and calculate its value from experimental data  
*Define entropy and free energy, and characterize reactions as spontaneous or nonspontaneous  
*Describe how heat change and entropy change determine the spontaneity of a reaction  
*Calculate the standard entropy changes that accompany chemical and physical processes  
*Calculate the free-energy changes that accompany chemical and physical processes  
*List the properties of acids and bases  
*Name an acid or base when given the formula  
*Given the hydrogen-ion or hydroxide-ion concentration, classify a solution as neutral, acidic, or basic  
*Convert hydrogen-ion concentrations into values of pH, and hydroxide-ion concentrations into values of pOH  
*Compare and contrast acids and bases as defined | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.4; 4.1, 4.2, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3  
S: 1.1, 1.2; 2.1, 2.2, 2.3 |
|                        | PS: 1.1, 1.2, 1.3, 1.4; 3.1, 3.2, 3.3, 3.4; 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.3  
S: 1.1, 1.2; 2.2, 2.2, 2.3 |
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| 6th Six Weeks         | by the theories of Arrhenius, Bronsted-Lowry, and Lewis  
*Identify conjugate acid-base pairs in acid-base reactions  
*Define strong acids and weak acids  
*Calculate an acid dissociation constant (Ka) from concentration and pH measurements  
*Arrange acids by strength according to their acid dissociation constants (Ka)  
*Arrange bases by strength according to their base dissociation constants (Kb) | |