Pre-AP Chemistry I – CHARLES PAGE HIGH SCHOOL

PASS Skills aligned to schedule

Period in School Year	Chapter in Textbook and Objectives	Oklahoma PASS Skills covered
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	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; 6.2 S: 1.1, 1.2; 2.1, 2.2, 2.4
	*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, 4.5, 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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2nd 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	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, 2.4
	*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, 3.4; 4.1, 4.2, 4.3, 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, 2.4
3rd 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

Period in School Year	Chapter in Textbook and Objectives	Oklahoma PASS Skills covered
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	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
	*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; 2.1, 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

Period in School Year	Chapter in Textbook and Objectives	Oklahoma PASS Skills covered
3rd Six Weeks	*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	
	*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	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
4th 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	PS: 1.1, 1.2, 1.3, 1.4; 2.3, 2.4; 3.1, 3.2; 4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8; 5.1, 5.2, 5.3; 6.1, 6.3 S: 1.1, 1.2; 2.1, 2.2, 2.3

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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	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 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, 3.4; 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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	*Explain how colloids and suspensions differ from solutions *Describe the Tyndall effect	
5th Six Weeks	*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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	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	
6th Six Weeks	*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	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
	*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, 3.3, 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)