

MONTH	CONTENT	NYS STANDARD/KEY IDEA/PERFORMANCE INDICATOR	LAB THEMES	SKILLS	ASSESSMENTS
September	Introduction to Chemistry Scientific Method Dimensional Analysis Scientific Notation Significant Figures Metric conversions Accuracy and Precision Percent Error Practical Applications Nanoscale	S 2.1-4 S 3.1-5	Linear measurement Mass measurement Volume measurement Density measurement Accuracy and Precision Uncertainty of Measurement	Use algebraic and geometric representations to describe and compare data to solve problems. Organize, graph, and analyze data from lab activities. Use reasoning to reach mathematical conclusions. Recognize and convert metric scales of volume, length, and mass	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions
	Matter Elements Compounds Mixtures Chemical and Physical Reactions Chemical and Physical Properties Homogeneous Heterogeneous Chemical Symbols and Formulas Phases of Matter Conservation of Matter and Energy	3.1q 3.1a.V.20 3.1 s, t 3.2 a 3.1 r 3.1dd 3.1nn 3.1s, t 4.1a 3.1kk 3.1r 3.1 u	Gum Lab Physical and Chemical Changes Chromatography Conservation of Matter	Define, identify, classify, and differentiate between elements, mixtures, and compounds in equations and models. Distinguish between chemical and physical reactions. Give examples of each. Distinguish between chemical and physical properties. Give examples of each. Identify and distinguish between solid, liquid, and gas phase. Describe the processes and uses of filtration, distillation, and chromatography as separation techniques for mixtures.	Quizzes Projects and Presentations

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September (cont.)					Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

Text: Chemistry, Prentice Hall

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October	Atomic Concepts History of the atom Expanded Nanotech and chemistry Subatomic Particles Atomic number Atomic Mass Mass number Isotopes	3.1a-n	Conservation of Matter Candium	Recognize and explain the Plum pudding, Bohr, and Modern Theory of the atom. Describe Dalton's atomic theory Know the charge, location and mass of the proton, neutron, and electron. Interpret and write isotopic notation Calculate atomic mass using relative abundance and mass of isotopes. Manipulate mass number atomic number to calculate neutrons.	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's
	Electron Configuration Valence Electrons Principle Energy Levels Electron sub-levels Hund's Rule Pauli Exclusion Principle Excited/Ground State Atomic spectrum	3.1 H I.7	Edible atoms	Using particle models and diagrams to differentiate between atoms, elements, compounds, and mixtures. Explain the various experiments used to develop the atomic theory	Homework Question and Answer sessions Quizzes
	Atomic Theories Periodic Table Periodic Trends Groups Periods Orbital Blocks	3.1aa, bb, g, v, w, x, y, z 5.2j 5.3k	Interpreting graphing Chemical properties of halides Alkaline Earth Metals	Distinguish between valence and nonvalence electrons for any atom or in any electron configuration. Identify Principle Energy Level by using electron configuration and period on Periodic Table. Distinguish between ground & excited states. Explain how an electron moves from ground to excited and back to ground state, what is happening at each stage. Identify elements by comparing bright-line spectrum to given. Use the diagonal rule to fill sub-Orbitals with electrons	Projects and Presentations

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October (cont.)				<p>Calculate the wave length of a photon of light produced when electrons fall from the excited state back to the ground state. Differentiate & explain differences between Thomson (Plum pudding), Rutherford, Bohr, and Modern (Quantum mechanical model) of atoms.</p> <p>Define orbital.</p> <p>Classify elements as metals, nonmetals, metalloids, or noble gases by their location on Periodic Table and their properties.</p> <p>Compare/contrast properties of elements within a period or group 1, 2, 13-18 on periodic table.</p> <p>Predict group of an element given chemical formula.</p> <p>Predict group of an element by knowing its electron configuration.</p> <p>Explain placement of an unknown element in Periodic Table based on properties.</p> <p>Know periodic trends for electronegativity, ionization energy, atomic radius, ionic radius, & reactivity of metals & nonmetals.</p> <p>Identify the type of element given it's occupied sub-levels.</p>	<p>Lab write-ups</p> <p>Exams with regents questions (examgen)</p> <p>Resource provided with textbook</p> <p>Various CD's</p> <p>Homework</p> <p>Question and Answer sessions</p> <p>Quizzes</p> <p>Projects and Presentations</p>

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November	Intramolecular Bonding Ionic compounds Naming Ionic Compounds Covalent compounds Naming Covalent compounds VSEPR and Molecular Geometry Hybridization	5.2n 5.2d 5.2h	Molecular model lab	Distinguish between ionic, polar covalent, nonpolar covalent, and metallic bonding Compare physical properties of substances based on chemical bonds & intermolecular forces: conductivity, malleability, solubility, hardness, melting & boiling point. Determine noble gas configuration an atom will achieve by bonding. Draw & interpret Lewis dot diagrams for atoms, ionic, and molecular compounds. Demonstrate bonding concepts using Lewis dot structures representing valence electrons: transferred (ionic bonding), shared (covalent bonding), and in a stable octet. Distinguish between ionic, molecular (covalent), and metallic substances given location on Periodic Table or properties. Use VSEPR to determine the shape of a molecule. Explain the bonding tendencies of various elements using hybridization.	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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November (cont.)				<p>Write chemical compound names from formulas.</p> <p>Write chemical formulas from names using the appropriate naming system.</p> <p>Differentiate usage of stock system, and prefix in naming by type of atoms combined.</p> <p>Name and write formulas for both binary and ternary acids.</p>	<p>Lab write-ups</p> <p>Exams with regents questions (examgen)</p> <p>Resource provided with textbook</p> <p>Various CD's</p> <p>Homework</p> <p>Question and Answer sessions</p> <p>Quizzes</p> <p>Projects and Presentations</p>

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December	Polyatomic bonding Metallic Intermolecular Bonding Dipoles Nonpolar Molecules Van der Waals Self Assembly Hydrogen Bonding Molecule-ion Attraction Chemical Reactions Chemical Equations and balancing Type of chemical reactions Law of definite composition Law of multiple proportions Net Ionic equations	3.1a 3.1e 3.1g 3.1dd 5.2 1 5.2 I, m, n 3.1cc 3.3c	Paper Chromatography of food dyes Snow Globe Types of Chemical Reactions Formation of precipitates Decomposition of hydrogen peroxide	Know polyatomic ions all covalently bonded. Explain vapor pressure, evaporation rate, & phase changes in terms of intermolecular forces. Know that intermolecular forces are weaker than intramolecular forces Compare and contrast the types of intermolecular forces. Identify reactants and products in a chemical reaction. Write balanced chemical reactions given either the word or formula for reactants and products. Determine a missing reactant or product in a balanced equation. Identify types of chemical reactions: synthesis (direct combination), analysis (decomposition), single replacement, double replacement, combustion. Predict products of single replacement reactions using activity series from Periodic Table (Table J) Interpret balanced chemical equations in terms of Conservation of matter. Apply the rules for predicting the products of a double replacement reaction. Determine which ions are spectator ionic in a double replacement reaction.	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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December (cont.)					Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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January	Moles Formula Mass Avogadro's number STP Molar Volume Percentage Composition Empirical and Molecular Formulas	3.1ee III.1 3.3c 3.3f 3.3d 3.3a, III.4 3.3c 3.2b	Composition of Hydrates Cat Chemistry Percent Composition Determination of Empirical Formulas	Define and manipulate the mole to find particles, atoms, ions, molecules, liters and back to moles. Memorize and manipulate Avogadro's Number and molar volume to find moles, molecules, atoms, mass and liters. Define and calculate molecular formula mass, molecular formula, empirical formula by knowing the other two. Define, differentiate between and calculate molar mass, atomic mass, molecular mass, formulas mass using the Periodic Table. Differentiate between empirical and molecular formulas. Calculate the empirical formula given the percent composition	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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January (cont.)					Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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February	Stoichiometry Molar Mass Mole-Mole Mole-Mass Mass-Mass Volume-Volume Limiting reagent Kinetic theory Vapor Pressure Boiling points Melting points Sublimation Deposition Allotropes Phase Diagrams Nano-particle behavior	3.1cc 3.3c 4.2c V.19 5.2 f II.6 5.2 jj V.22	Mass/Mass relationship Analysis of Baking Soda Mole and Mass relationship	Calculate molar mass from a chemical formula. Determine the number of moles of a substance given its mass. From a balanced chemical formula, calculate mole-mole, mass-mass, volume-volume and mass-mole problems. Determine the limiting reagent in a chemical reaction Recognize and define allotropes Distinguish between endothermic and exothermic reactions, using energy terms in an equation, ΔH , potential energy diagrams: PE of reactant, PE of product, PE of activated complex (intermediate product), activation energy for both forward and reverse reactions both with and without catalysts. Explain vapor pressure, evaporation rate, and phase change in terms of intermolecular forces. Use phase diagrams to determine the phase of a compound given its temperature and pressure.	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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February (cont.)					Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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March	Gas Laws Combined Gas Law Ideal Gas Law Dalton's Law Avagadro's Law Gay-lussac's Law Grahams Law Units of Pressure	3.4a, b, c, d 3.1 oo 3.1 pp	Carbon dioxide from antacid tablets Electrolytes Making a Solution Acid/base Filtration Cabbage Patch Chemistry Hydrolysis of a Salt Rates of Reactions Solubility of a Salt Reactions of acids with carbonates Calorimetry Fusion of Ice Crystallization of Wax	Recognize and convert temperature units from °C to K and K to °C Know that all temperature units must be in Kelvin for all gas law calculations. Identify direct and indirect(inverse) relationships between pressure, temperature and volume. Manipulate Combined Gas Law to solve for missing variable. Manipulate the Ideal Gas Law Dalton's Law, Avagadro's Law, Gay-lussac's Law, and Grahams Law to solve for missing variables. Use dimensional analysis to covert between units of pressure including, kPa, atm, Torr and mmHg. Identify the parts of a solution. Describe a solution as unsaturated, saturated, or supersaturated. Describe the preparation of a solution, given the molarity Interpret solution concentration data Calculate solution concentrations in molarity (M), molality, percent mass, parts per billion (ppb), and parts per million (ppm) Determine the solubility of various compounds Calculate freezing point depression and boiling point elevation	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations
	Solutions Solute/ Solvent Saturated Unsaturated Supersaturated Solubility Rules Solubility Graphs Factors Affecting Solubility Molarity Molality Water of hydration Percent by Volume Parts Per Million Parts Per Billion Colligative Concepts Freezing point depression Boiling point elevation				

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March (cont.)	Thermochemistry Exothermic Endothermic Heat Capacity Calorimetry Heating/Cooling Curve Gibbs free energy			<p>Know heat flows from hot to cold. Explain heat in terms of kinetic molecular theory. Distinguish between heat energy and temperature. Explain phase change in terms of changes in kinetic and molecular energy.</p> <p>Interpret heating and cooling curves in terms of changes in kinetic and potential energy, heat of vaporization, heat of fusion, and phase change. Calculate heat involved in a phase or temperature change for a sample of matter. Understand concepts of specific heat and heat capacity. Manipulate and solve problems using three different heat formulas: $Q = m c \Delta T$, $Q = m H_f$, and $Q = m H_v$ Label a heating a cooling curve for phases, phase changes, kinetic and potential energy changes. Calculate Gibbs free energy Determine if a reaction will occur spontaneously, using heat flow and Gibbs free energy</p>	<p>Lab write-ups</p> <p>Exams with regents questions (examgen)</p> <p>Resource provided with textbook</p> <p>Various CD's</p> <p>Homework</p> <p>Question and Answer sessions</p> <p>Quizzes</p> <p>Projects and Presentations</p>

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April	Rte of Reactions Collision Theory Factors affecting rate Equilibrium Solution/Phase Equilibrium Catalyst Reversible Reaction Potential Energy Diagrams LeChatelier's Principle Entropy Haber Process Equilibrium constant	3.4 I V 1.6 3.4j 4.1c V 1.6 4.1d 3.4g 3.4d, h, f 3.1 II VI 9 3.1 mm	Enthalpy and Entropy LeChatelier's Lab	Use collision theory to explain how various factors, such as temperature, surface area, and concentration, influence the rate of reaction. Identify examples of physical equilibria as solution equilibrium and phase equilibrium, including the concept that a saturated solution is at equilibrium. Describe the concentration of particles and rates of opposing reactions in an equilibrium system. Qualitatively describe the effect of stress on equilibrium, using LeChatelier's principle. Read and interpret potential energy diagrams: PE of reactants and products, activation energy (with or without a catalyst), heat of reaction. Calculate the K_{eq} for a system at equilibrium	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations
	Acid Base Theory Arrhenius Properties Revisit Naming of Acids PH Indicators Titration Neutralization Hydrolysis Conjugate acid base pairs Amphiprotic substances Ionization constant of acids and bases (K_a and K_b) Ionization constant of water (K_w)	3.1 uu, ww, tt, xx, vv, zz, yy	Hydrogen ion with strong and weak acids The neutralizing power of antacids Titration	Identify substances as Arrhenius acids or Arrhenius bases. Identify solutions as acid, base, or neutral based upon the pH. Know how to name both binary and ternary acids.	

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April (cont.)				<p>Use powers of ten notation to understand the exponential function of the pH scale.</p> <p>Interpret changes in acid-base indicator color.</p> <p>Write neutralization reactions for mono, di, and triprotic acids and mono, di, and trihydroxy bases.</p> <p>Calculate concentration (M) or volume of a solution using titration data.</p> <p>Determine conjugate acid base pairs</p> <p>Determine the relative strength of various conjugate acid base pairs.</p> <p>Use the formulas for calculating pH and pOH to find missing variables.</p> <p>Calculate the ionization constants for water, acids, and bases (K_a, K_b, and K_w)</p>	<p>Lab write-ups</p> <p>Exams with reagents questions (examgen)</p> <p>Resource provided with textbook</p> <p>Various CD's</p> <p>Homework</p> <p>Question and Answer sessions</p> <p>Quizzes</p> <p>Projects and Presentations</p>

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May	Redox Reduction Oxidation Oxidation Numbers Reducing/Oxidizing agents Balancing Half Reactions Conservation of Energy Activity Series Electrochemical Cells Electroplating Batteries Half cell potentials Cell voltage Electrolysis Organic Chemistry Naming Homologous series Saturated/Unsaturated Isomers Functional Groups Organic Reactions Benzene series	3.2 d VIII.1 3.2 d-h 3.2 I 3.3b 3.2 j-I 3.1 ff V.II 1 3.1 gg Vii.2 3.1 hh VII.3 3.1 II VII.4 3.2 c VII.5 5.2 e VII.5	Penny Lab Oxidize the color away Bleach It! Half-Reactions Molar Mass of butane Making of slime Making of an ester	Write, balance, and label half-reactions for oxidation and reduction of free elements and their monatomic ions. Recognize and label reducing and oxidizing agents. Predict and identify oxidation numbers for atoms and ions in compounds. Identify and label the parts of a voltaic cell: cathode, anode, and salt bridge, as well as the direction of electron flow given the equation for the reaction. Identify and label the parts of an electrolytic cell : cathode, anode, and power source, as well as the direction of electron flow given the equation for the reaction. Know electrolytic cells take electrical energy and force a chemical reaction that would not occur spontaneously and that these reactions are commonly used for plating. Know voltaic cells (galvanic and Danielle cells) use chemical reactions to make electrical energy and we call these devices batteries. Compare and contrast voltaic and electrolytic cells. Determine whether a redox reaction is spontaneous. Calculate the voltage of a half cell and full cell	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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May (cont.)				<p>Draw and name structural and molecular formulas for alkanes, alkenes, and alkynes containing a maximum of 10 carbon atoms.</p> <p>Classify an organic compound based on its structural or condensed structural formula.</p> <p>Draw and give IUPAC names to structural formulas with the functional group(s) on a straight chain hydrocarbon.</p> <p>Identify organic reactions.</p>	<p>Lab write-ups</p> <p>Exams with regents questions (examgen)</p> <p>Resource provided with textbook</p> <p>Various CD's</p> <p>Homework</p> <p>Question and Answer sessions</p> <p>Quizzes</p> <p>Projects and Presentations</p>

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June	Nuclear Chemistry Fusion Fission Natural/Artificial Transmutation Half-life Proton-neutron ratio Stability Nuclear reactors Radioisotopes Fission Reactors	3.1 o 4.4a 5.3a 3.1p 4.4b, f, c 5.3 b-c 4.4 d-e	Penny Lab (statistical())	Interpret and write isotopic notation. Determine decay mode and write nuclear equations to show both artificial and natural transmutation of alpha and beta decay. Explain the benefits and risks of radioactivity. Calculate the initial amount, the fraction remaining, or the half-life of a radioactive isotope, given two or the three variables Compare and contrast fusion and fission reactions. Complete nuclear equations: predict missing particles from nuclear equations Identify specific uses of some common radioisotopes: C-12 to C-14 ratio in dating living things,. I-131 in diagnosing and treating thyroid disorders, U-238 to PB-206 ratio in dating geological formations, and Co-60 in treating cancer. Identify and label the parts of a fission reactor.	Lab write-ups Exams with regents questions (examgen) Resource provided with textbook Various CD's Homework Question and Answer sessions Quizzes Projects and Presentations

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