

Unit	Matter Energy and Change	Atomic Structure	Periodic Table	Naming and Bonding	Chemical Reactions and Quantities	Solutions	Acid/Bases and Salts	Electrochemistry	Nuclear	Organic	Kinetics and Eq	Gas Laws
Unit Length	3-4 Weeks	3 Weeks	2-3 Weeks	4 Weeks	4 Weeks	3-4 Weeks	3 Weeks	2-3 Weeks	1-2 Weeks	1-2 Weeks	1-2 Weeks	1-2 Weeks
Performance Task	Equipment Lab How to use a Bunsen Burner Observations Lab Density of an Unknown Metal Lab Heating Curve Lab Calorimetry Lab Chemical and Physical Changes Charles's Law	Atomic History Project Atomic Model Project Isotope (Benium) Lab Models of the Atom Lab Flame Test Electronic Nature Lab Bright Line Spectrum Lab	"Scallion" Project Periodic Project Metals, nonmetals and metaloids Lab Trends in the Periodic Table Lab	Mole Project Lewis Electron Dot Diagrams Lab 3-D Models of Molecular Compounds Lab Properties of Ionic and Molecular Solids Lab Observing Multiple Oxidation States for Iron Lab Percent Composition by mass. Nuts and bolts of matter Lab The Mole Lab	Determining Charges Lab Reacton Cartoon Project	Concentration Lab Types of Solutions Lab Table G Lab Freezing Point Depression Lab Flint Michigan Research Project	Titration Lab Acid-Base Properties Lab Table M Lab	Penny Plating Lab Penny Dissolving Lab Battery Design Lab Electrochem Test	Nuclear Decay Lab Nuclear Uses Jigsaw Nuclear Test	Slime Polymerization Lab Esterification Lab Organic Quiz	Le Chatliers Lab Reaction Rate Lab Unit Exam	Boyle's Law Lab Charles Law Lab Gas Collection Lab Cartesian Diver Video Project

Enduring Understanding	<ul style="list-style-type: none"> Students will understand that problem solving includes planning and employs strategies for success. Students will understand that matter can be classified into various types and phases. Students will know the definition of dimensional analysis. Students will know when to use SI prefixes and units. Students will know that characteristics of the three phases of matter. Students will know the differences between the types of matter. Students will know the names of each phase transition. Students will know the definitions and evidence of physical and chemical changes. 	<ul style="list-style-type: none"> Students will understand the development of the atomic theory. Students will understand that the atomic masses on the Periodic Table represent weighted averages. Students will understand the charges and relative positions of the subatomic particles in the atom. Students will know the names and symbols for common atoms and polyatomic ions. Students will know a brief history of atomic theory. Students will know the five main aspects of Dalton's atomic theory. Students will know the relevant experiments that led to the identification of subatomic particles. Students will know the parts of the atom. Students will know the difference between isotopes and ions. 	<ul style="list-style-type: none"> Students will understand that there are regular observable pattern across the elements on the Periodic Table. Students will understand the structural differences that cause trends in ionization energy, electronegativity and atomic radius. Students will understand how changing electrons changes the size of an atom/ion. Students will know the periodic law. Students will know that the trends on the Periodic Table contain exceptions. Students will know that noble gasses are stable because they already have a full octet. Students will know the term isoelectronic. Students will know the definition of ionic and covalent bonds. Students will know the energy, atomic radius and electronegativity. Students will know the terms paramagnetic and diamagnetic. Students will know that elements in the same group have similar chemical properties. 	<ul style="list-style-type: none"> Students will understand that chemical bonds are formed to make atoms more stable. Students will understand that resonance makes chemical compounds more stable. Students will understand that ionic bonding and covalent bonding are at two ends of a sliding scale of bond type. Students will understand that polar compounds have partial positive and negative charges. Students will understand how chemical bonding affects observable physical and chemical properties. Students will understand the difference between bond polarity and molecular polarity. Students will understand the factors that affect bond strength. Students will know the similarities and differences between intra and intermolecular bonds. Students will know the definition of ionic and covalent bonds. Students will know the formula for formal charge. Students will know the definition of electronegativity and how electronegativity affects bonding. Students will know the definition of sigma and pi bonds. Students will know the different types of orbital hybridization. Students will know the properties of ionic solids 	<ul style="list-style-type: none"> Students will understand and be able to use, state symbols as part of chemical equation writing. Students will understand why balancing chemical equations are important. Students will understand the concept of percentage by mass. Students will understand how the coefficients from a balanced equation can be used as the molar ratio between chemical species. Students will know the difference and similarities between physical and chemical changes. Students will know the Law of conservation of mass and how it applies to balancing equations. 	<ul style="list-style-type: none"> Students will understand that any solution has different parts, solute and solvent. Students will understand that solutions can be classified as saturated, unsaturated and super saturated. Students will understand the designation of a solution as a homogeneous mixture. Students will understand that forming a solution results in either a gain or loss of energy. Students will understand the factors that affect solubility including molecular polarity and ionic charge. Students will understand how the factors that affect solubility including molecular polarity and ionic charge. Students will understand the factors that affect dissolved substances including solid salts and molecular gasses. Students will understand that in order to properly describe a solution the concentration must be determined. Students will understand that dissolved particles can change the properties of a solvent. 	<ul style="list-style-type: none"> Students will understand the usefulness and limitations of acid-base indicators. Students will understand that acids are proton-donors and the amount of deprotonation determines the acid strength. Students will understand that a neutral solution represents an equal concentration of H⁺ and OH⁻ not simply a pH of 7. Students will know the three different definitions of acids and bases. Students will know that when acids combine with bases a salt and water are produced. Students will know the list of common strong acids and bases. Students will know the titration equation. 	<ul style="list-style-type: none"> Students will understand that electrochemical cells represent a cycle. Students will understand the purpose of the salt bridge. Students will understand the design and usefulness of electrolytic cells. Students will know a definition of oxidation and reduction in terms of electrons. Students will know a definition of oxidation and reduction in terms of oxidation number. Students will know the types and parts of electrochemical cells. Students will know the similarities and differences between electrolytic and voltaic cells. 	<ul style="list-style-type: none"> Students will understand that nuclear reactions include natural and artificial transmutation, fission, and fusion. There are benefits and risks associated with fission and fusion reactions. Students will understand that nuclear reactions can be represented by equations that include symbols which represent atomic nuclei (with the mass number and atomic number), subatomic particles (with mass number and charge), and/or emissions such as gamma radiation. Students will understand that energy released in a nuclear reaction (fission or fusion) comes from the fractional amount of mass converted into energy. Students will understand that nuclear changes convert matter into energy. Energy released during nuclear reactions is much greater than the energy released during chemical reactions. Students will understand that here are inherent risks associated with radioactivity and the use of radioactive isotopes. Risks can include biological exposure, long-term storage and disposal, and nuclear accidents. Students will understand that radioactive isotopes have many beneficial uses. Radioactive isotopes are used in medicine and industrial chemistry, e.g., radioactive dating, tracing chemical and biological processes, industrial measurement, nuclear power, and detection and power, and treatment of diseases. 	<ul style="list-style-type: none"> Students will understand that organic compounds contain carbon atoms which bond to one another in chains, rings, and networks to form a variety of structures. Students will understand that organic compounds can be named using the IUPAC system. Students will understand that hydrocarbons are compounds that contain only carbon and hydrogen. Students will understand that saturated hydrocarbons contain only single carbon-carbon bonds. Students will understand that unsaturated hydrocarbons contain at least one multiple carbon-carbon bond. Students will understand that organic acids, alcohols, esters, aldehydes, ketones, ethers, halides, amines, amides, and amino acids are types of organic compounds that differ in their structures. Students will understand that functional groups impart distinctive physical and chemical properties to organic compounds. Students will understand that isomers of organic compounds have the same molecular formula, but different structures and properties. Students will understand that in a multiple covalent bond, more than one pair of electrons are shared between two atoms. Students will understand that unsaturated organic compounds contain at least one double or triple bond. Students will understand that types of organic reactions include: addition, substitution, polymerization, esterification, fermentation, saponification, and combustion. 	<ul style="list-style-type: none"> Students will understand collision theory and how to speed up chemical reactions. Students will understand why only some collisions result in reactants becoming products. Students will understand the term dynamic equilibrium. Students will understand that equilibriums are established in a finite amount of time and re-established after a stress. 	<ul style="list-style-type: none"> Students will understand that ideal gas laws were created as a way to help study gasses. Students will understand that ideal gasses do not exist but many gasses behave ideally under lab conditions. Students will understand KMT and how particle movement effects gas pressure, temperature and volume. Students will know the basic relationships in the ideal gas laws. Students will know Dalton's combined gas law. Students will know that there are many equations used to predict the behavior of gases. Students will know that real gasses behave most ideally under conditions of temperature and pressure. Students will know STP.
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Essential Questions	<ul style="list-style-type: none"> What questions can be asked to better understand and solve a problem? What are the various states and types of matter? What information is needed to convert between different units? Why are significant figures necessary? 	<ul style="list-style-type: none"> Where does the modern understanding of the atom come from? What are the parts of the atom and how do they interact in elements and compounds? 	<ul style="list-style-type: none"> What can be learned from the Periodic Table? What laws control the structure and arrangement of the atom? How can the elements be categorized? Why is it useful to categorize the elements? 	<ul style="list-style-type: none"> Why are chemical compounds formed? How are covalent compounds different than ionic compounds? Why are Lewis structures useful? How does bonding between atoms affect observable physical and chemical properties? 	<ul style="list-style-type: none"> Why are chemical equations necessary? How can balanced chemical equations be used to relate chemical quantities? What is the law of conservation of mass? 	<ul style="list-style-type: none"> What are the parts of a solution? How can a solution be classified? What are the factors that determine solubility? What information is necessary to completely describe a solution? Why does the concentration of a solute change the properties of the solution? 	<ul style="list-style-type: none"> What is an acid? Base? What rules govern the strength of acids? How can the pH of a weak acid-base solution be calculated? When is titration useful? 	<ul style="list-style-type: none"> What must happen in order for an electrochemical cell to operate? How does electrolysis work? 	<ul style="list-style-type: none"> What are the common uses of nuclear material? What is a half-life and how can it be useful in dating? 	<ul style="list-style-type: none"> How does the shape of an organic molecule affect its properties? How does the type of bonding affect the way in which organic molecules react? How are isomers related to each other in terms of properties? How are isomers different in terms of properties? 	<ul style="list-style-type: none"> What are the factors that affect the speed of chemical reactions? How can concentration be used to predict chemical reaction rate? What role do catalysts play in speeding up or slowing down chemical reactions? What does it mean for a reaction to be in equilibrium? What predictions can be made about systems approaching equilibrium or re-establishing equilibrium? 	<ul style="list-style-type: none"> What are the gas laws? When can they be used? What environmental factors affect gas behavior? How do gasses move?
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