# Physical Science (9th Grade)

| Topic | Priority Standard | Learning Targets (LT) | Unit | Term Taught | Term(s) Reinforced |
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| Properties of Matter<br><br>28-32 days | **PS1.A.1**<br>Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms<br><br>*Clarification Statement:<br>Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and | **LT.1:** Students will be able to identify and describe particles that comprise atoms.<br>● Protons, Electrons, Neutrons, and the Nucleus<br>● Explain the Bohr atom model<br><br>**LT.2:** Students will be able to identify the recurring patterns in the periodic table that influence the behavior and properties of elements.<br>● Define periodicity and identify examples<br>● Identify metals, semimetals (metalloids), and nonmetals<br>● Differentiate between physical and chemical properties of elements<br>● Differentiate electrical and thermal conductivity of metals and nonmetals<br>● Predict properties of an element based on its position on the periodic table<br><br>**LT.3:** Students will be able to infer the relationship between the number of valence electrons and an element's ability to form specific types of chemical bonds and react with other elements.<br>● Draw Lewis diagrams to represent the valence electrons of atoms. | Unit 1 | Terms 1-2 | |

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| | reactions with oxygen.<br><br>**Vocab or Pre-requisite skills needed:** | **LT.4:** Students will determine the relative reactivity of metals by analyzing their positions in the periodic table, focusing on the number of valence electrons.<br>● Alkali, Alkaline Earth, Transition Metals, Post-Transition Metals(Poor Metals), Actinoids, Lanthanides<br><br>**LT.5:** Students will use the arrangement of electrons in the outermost energy level to predict the type of chemical bonds (ionic, covalent, or metallic) that elements are likely to form.<br>● Ionic vs Covalent Bonds | | | |
| Matter and Its Interactions<br><br>22-26 days | **<u>9-12.PS1.A.2</u>**<br>Construct and revise an explanation for the products of a simple chemical reaction based on the outermost electron states of atoms,trends in the periodic table, and knowledge of the patterns of chemical properties | **LT.1:** Students will be able to identify common reaction types (combustion, synthesis, decomposition, single replacement, and double replacement) and describe how electron transfer or sharing occurs during each type.<br><br>**LT.2:** Students will be able to draw Lewis dot structures for elements, ionic compounds, and covalent molecules, demonstrating how the octet rule guides the formation of chemical bonds.<br><br>**LT.3:** Students will investigate how the periodic table can be used to predict the reactions of elements with oxygen, including the likelihood of oxidation or combustion. | Unit 2 | Terms 2-3 | |

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| | *Clarification Statement:<br>Examples of chemical reactions could include the reaction of sodium and chlorine, or of oxygen and hydrogen.<br><br>**Vocab or Pre-requisite skills needed:** | | | | |
| Mathematical Calculations and Chemical Change<br><br>18-22 days | **9-12.PS1.B.3**<br>Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.<br><br>*Clarification statement: | **LT.1:** Students will be able to define and explain the law of conservation of mass, including how mass is conserved during chemical reactions at the atomic level.<br><br>**LT.2:** Students will be able to balance chemical equations, demonstrating that the number of atoms for each element is conserved during the reaction. | | Term 3 | |

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| | Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques. | | | | |

| | **Vocab or Pre-requisite skills needed:** | | | | |
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| Motion and Force<br><br>28-32 days | **<u>PS2.A.2</u>**<br>Use mathematical representations to support and verify the concepts that the total momentum of a system of objects is conserved when there is no net force on the system.<br><br><u>*Clarification Statement:</u><br>Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle. | **LT.1:** Students will be able to explain and define the meaning of 'motion'.<br><br>**LT.2:** Students will be able to describe an object's position, relative to a reference point.<br><br>**LT.3:** Students will be able to use and apply the speed formula.<br><br>**LT.4:** Students will be able to describe the difference between speed and velocity.<br><br>**LT.5:** Students will be able to construct and analyze graphs of position versus time.<br><br>**LT.6:** Students will be able to construct and analyze graphs of speed versus time.<br><br>**LT.7:** Students will be able to recognize and explain how the slope of a line describes the motion of an object.<br><br>**LT.8:** Students will be able to determine acceleration by mathematical and graphical means.<br><br>**LT.9:** Students will be able to explain the role of acceleration in describing curved motion and | | | |

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| | **Vocab or Pre-requisite skills needed:** | objects in free fall.<br><br>**LT.10:** Students will be able to define force as a vector and describe how it is measured.<br><br>**LT.11:** Students will be able to explain how forces are created.<br>● Compare and contrast types of force<br>● Define friction<br>● Causes of friction<br><br>**LT.12:** Students will know and be able to apply Newton's Laws.<br>● Define equilibrium<br>● Define net force<br>● Calculate net force<br>● Newton's Laws of Motion<br>● Apply Newton's second law quantitatively<br><br>**LT.13:** Students will be able to describe action-reaction force pairs.<br>● Apply the law of conservation of momentum when describing the motion of colliding objects. | | | |
| Energy<br><br>14-18 days | **<u>9-12.PS3.A.2</u>**<br>Develop and use models to illustrate that energy at the macroscopic scale can be accounted | **LT.1:** Students will be able to define energy as a description of an object's ability to change or cause change.<br><br>**LT.2:** Students will be able to identify and discuss multiple examples of forms of energy. | | | |

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| | for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).<br><br><u>*Clarification Statement:</u><br>Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, the energy stored due to position of an object above the earth, and the energy stored between two electrically-charge d plates. Examples | **LT.3:** Students will be able to distinguish between kinetic and potential energy.<br><br>**LT.4:** Students will be able to apply formulas to solve problems related to energy.<br><br>**LT.5:** Students will be able to describe how energy changes as systems change.<br><br>**LT.6:** Students will be able to identify multiple examples of when energy transformation occurs.<br><br>**LT.7:** Students will be able to identify and explain when energy is conserved.<br><br>**LT.8:** Students will be able to use energy conservation rules to solve real world problems. | | | |

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| | of models could include diagrams, drawings, descriptions, and computer simulations.<br><br>**Vocab or Pre-requisite skills needed:** | | | | |