

Unit - Properties and Structure of Matter	Pacing – 8 weeks
Standards	Eligible Content
<p><u>3.2.6.A1.</u> Distinguish the differences in properties of solids, liquids, and gases. Differentiate between volume and mass. Investigate that equal volumes of different substances usually have different masses.</p> <p><u>3.2.7.A1.</u> Differentiate between elements, compounds and mixtures. Identify groups of elements that have similar properties. Explain how materials are characterized by having a specific amount of mass in each unit of volume.</p> <p><u>3.2.8.A1</u> Differentiate between mass and weight.</p> <p><u>3.2.6.A2.</u> Compare and contrast pure substances with mixtures.</p> <p><u>3.2.7.A2.</u> Identify atoms as the basic building blocks of matter and that elements are composed of one type of atom.</p> <p><u>3.2.8.A2</u> Identify characteristics of elements derived from the periodic table.</p>	<p>S.6.C.1.1.1 Describe how characteristic physical properties of matter can be used to distinguish one substance from another (e.g. boiling point, freezing/melting points).</p> <p>S.7.C.1.1.1 Use characteristic physical or chemical properties of matter to distinguish one substance from another (e.g. density, freezing/melting points, solubility, ability to rust)</p> <p>S.6.C.1.1.2 Explain that materials are characterized by having a specific amount of mass in each unit of volume (density).</p> <p>S.7.C.1.1.2 Recognize that the atom is the basic building block for all matter.</p> <p>S.7.C.1.1.4 Describe the relationship between mass and volume as density.</p> <p>S.7.C.1.2.2 Compare the behavior of particle motion in solids, liquids, and gasses.</p> <p>S.8.C.1.1.1 Explain the differences among elements, compounds, and mixtures.</p>
Unifying Themes	Inquiry Skills
<p><u>3.2.6.A5</u> Constancy and Change – Identify characteristic properties of matter that can be used to separate one substance from the other</p>	<p>Analyze and interpret data</p> <p>Ask questions and define problems</p> <p>Construct explanations and design solutions</p> <p>Develop and use models</p> <p>Engage in argument from evidence</p> <p>Obtain, evaluate, and communicate information</p> <p>Plan and carry out investigations</p> <p>Use mathematics and computational thinking</p>

Unit – Chemical Reactions	Pacing – 4 weeks
Standards	Eligible Content
<p><u>3.2.6.A4.</u> Differentiate between physical changes and chemical changes.</p> <p><u>3.2.7.A4.</u> Describe how reactants change into products in simple chemical reactions.</p> <p><u>3.2.8.A4.</u> Compare and contrast physical and chemical changes in terms of products</p>	<p>S6.C.1.2.1 Describe how water changes from one state to another.</p> <p>S.7.C.1.2.1 Identify the reactions and products of simple chemical reactions (e.g. photosynthesis, cellular respiration)</p> <p>S.6.C.1.2.2 Identify differences between chemical and physical changes of matter.</p> <p>S.8.C.1.1.2 Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).</p> <p>S.8.C.1.1.3 Identify and describe reactants and products of simple chemical reactions.</p>
Unifying Themes	Inquiry Skills
<p>3.2.6.A5 Constancy and Change – Identify characteristic properties of matter that can be used to separate one substance from the other</p>	<p>Analyze and interpret data</p> <p>Ask questions and define problems</p> <p>Construct explanations and design solutions</p> <p>Develop and use models</p> <p>Engage in argument from evidence</p> <p>Obtain, evaluate, and communicate information</p> <p>Plan and carry out investigations</p> <p>Use mathematics and computational thinking</p>

Unit – Forces and Interactions	Pacing – 6 weeks
Standards	Eligible Content
<p><u>3.2.6.B1.</u> Explain how changes in motion require a force.</p> <p><u>3.2.7.B1.</u> Describe how unbalanced forces acting on an object change its velocity. Analyze how observations of displacement, velocity, and acceleration provide necessary and sufficient evidence for the existence of forces.</p> <p><u>3.2.8.B1.</u> Explain how inertia is a measure of an object’s mass. Explain how momentum is related to the forces acting on an object.</p> <p><u>3.2.6.B4.</u> Describe how electric current produces magnetic forces and how moving magnets produce electric current. Derive Ohm’s Law through investigation of voltage, current, and resistance.</p> <p><u>3.2.7.B4.</u> Explain how electrical current is produced by the flow of electrons. Explain and demonstrate how electric current produces magnetic forces and how moving magnets produce electric current.</p> <p><u>3.2.8.B4.</u> Compare and contrast atomic properties of conductors and insulators</p>	<p>S.6.C.3.1.1 Compare speed and velocity.</p> <p>S.7.C.3.1.1 Describe how unbalanced forces acting on an object change its velocity</p> <p>S.8.C.3.1.1 Describe forces acting on objects (e.g. friction, gravity, balanced versus unbalanced)</p> <p>S.6.C.3.1.2 Explain why gravitational force depends on how much mass the objects have and the distance between them.</p> <p>S.6.C.3.2.1 Describe how moving electric charges produce magnetic forces and moving magnets produce electric forces.</p> <p>S.6.C.3.2.2 Describe the relationships between voltage, current, and resistance (Ohm’s Law).</p> <p>S.6.C.3.2.3 Distinguish between gravity and electromagnetism.</p> <p>S.7.C.3.1.3 Explain the mechanical advantages of simple machines.</p> <p>S8.C.3.1.3 Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g. simple machines, hydraulic systems)</p>
Unifying Themes	Inquiry Skills
<p>3.2.6.B6 <u>Energy</u> – Demonstrate that heat moves in predictable ways from warmer objects to cooler ones.</p> <p>3.2.7.B6 <u>Energy</u> – Demonstrate that heat is often produced as energy is transformed through a system.</p> <p><u>Energy</u> – Demonstrate how the transfer of heat energy causes temperature changes.</p> <p>3.2.6.B6 <u>Scale</u> – Investigate that materials may be composed of parts too small to be seen without magnification.</p> <p>3.2.8.B6 <u>Patterns</u> – Explain how physics principles underlie everyday phenomena and important technologies.</p>	<p>Analyze and interpret data</p> <p>Ask questions and define problems</p> <p>Construct explanations and design solutions</p> <p>Develop and use models</p> <p>Engage in argument from evidence</p> <p>Obtain, evaluate, and communicate information</p> <p>Plan and carry out investigations</p> <p>Use mathematics and computational thinking</p>

Unit - Energy	Pacing – 6 weeks
Standards	Eligible Content
<p><u>3.2.6.A3.</u> Explain and give examples of how mass is conserved in a closed system.</p> <p><u>3.2.7.A3.</u> Explain how energy transfer can affect the chemical and physical properties of matter.</p> <p><u>3.2.8.A3.</u> Explain how changes in matter are accompanied by changes in energy.</p> <p><u>3.2.6.B2</u> Describe energy as a property of objects associated with heat, light, electricity, magnetism, mechanical motion and sound. Differentiate between potential and kinetic energy.</p> <p><u>3.2.7.B2.</u> Describe how energy can be changed from one form to another (transformed) as it moves through a system or transferred from one system to another system</p> <p><u>3.2.8.B2.</u> Identify situations where kinetic energy is transformed into potential energy, and vice versa.</p>	<p>S.6.C.2.1.3 Compare various energy sources (i.e. oil, coal, natural gas, solar, wind, and moving water) and describe how these energy sources are transformed into useful forms of energy.</p> <p>S.7.C.2.1.3 Describe energy transformations within an ecosystem.</p> <p>S.8.C.2.1.3 Describe how one form of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy</p> <p>S.7.C.2.1.1 Describe how energy is obtained and used by organisms throughout their lives.</p> <p>S.8.C.2.1.1 Distinguish among forms of energy (e.g. electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e. renewable and nonrenewable energy)</p> <p>S.7.C.2.1.2 Describe how energy is transferred and conserved in a closed system.</p> <p>S.8.C.2.2.1 Describe the Sun as the major source of energy that impacts the environment.</p> <p>S.8.C.2.2.2 Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.</p> <p>S.8.C.2.2.3 Describe the waste (i.e. kind and quantity) derived from the use of renewable resources and their potential impact on the environment.</p> <p>S.8.C.3.1.2 Distinguish between kinetic and potential energy</p>
Unifying Themes	Inquiry Skills
<p><u>3.2.6.B6 Energy</u> – Demonstrate that heat moves in predictable ways from warmer objects to cooler ones.</p> <p><u>3.2.7.B6 Energy</u> – Demonstrate that heat is often produced as energy is transformed through a system.</p> <p><u>Energy</u> – Demonstrate how the transfer of heat energy causes temperature changes.</p> <p><u>3.2.6.B6 Scale</u> – Investigate that materials may be composed of parts too small to be seen without magnification.</p> <p><u>3.2.8.B6 Patterns</u> – Explain how physics principles underlie everyday phenomena and important technologies.</p>	<p>Analyze and interpret data</p> <p>Ask questions and define problems</p> <p>Construct explanations and design solutions</p> <p>Develop and use models</p> <p>Engage in argument from evidence</p> <p>Obtain, evaluate, and communicate information</p> <p>Plan and carry out investigations</p> <p>Use mathematics and computational thinking</p>

Unit - Heat	Pacing – 4 weeks
Standards	Eligible Content
<p>3.2.6.B3. Give examples of how heat moves in predictable ways, normally flowing from warmer objects to cooler ones until they reach the same temperature. Explain the effect of heat on particle motion by describing what happens to particles during a phase change.</p> <p>3.2.7.B3. Differentiate among convection, conduction, and radiation. Explain why heat energy consists of the random motion and vibrations of the particles of matter.</p> <p>3.2.8.B3. Explain how changes in temperature are accompanied by changes in kinetic energy.</p>	<p>S.6.C.2.1.1 Describe how heat moves in predictable ways from warmer objects to cooler ones until they reach the same temperature.</p> <p>S.6.C.2.1.2 Describe the effect of heat on particle motion during phase changes.</p> <p>S.8.C.2.1.2 Explain how energy is transferred from one place to another through convection, conduction, or radiation.</p>
Unifying Themes	Inquiry Skills
<p>3.2.6.B6 <u>Energy</u> – Demonstrate that heat moves in predictable ways from warmer objects to cooler ones.</p> <p>3.2.7.B6 <u>Energy</u> – Demonstrate that heat is often produced as energy is transformed through a system.</p> <p><u>Energy</u> – Demonstrate how the transfer of heat energy causes temperature changes.</p> <p>3.2.6.B6 <u>Scale</u> – Investigate that materials may be composed of parts too small to be seen without magnification.</p> <p>3.2.8.B6 <u>Patterns</u> – Explain how physics principles underlie everyday phenomena and important technologies.</p>	<p>Analyze and interpret data</p> <p>Ask questions and define problems</p> <p>Construct explanations and design solutions</p> <p>Develop and use models</p> <p>Engage in argument from evidence</p> <p>Obtain, evaluate, and communicate information</p> <p>Plan and carry out investigations</p> <p>Use mathematics and computational thinking</p>

## The Nature of Science Eligible Content

### Reasoning and Analysis

- S.8.A.1.1.1.** Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices.
- S.8.A.1.1.2 Explain how certain questions can be answered through scientific inquiry and/or technological design
- S.8.A.1.1.3** Use Evidence, such as observations or experimental results, to support inferences about a relationship.
- S.8.A.1.1.4** Develop descriptions, explanations, predictions and models using evidence
- S.8.A.1.2.1** Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g. air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence,

lasers, organ transplants)

**S.8.A.1.2.2** Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations).

**S.8.A.1.2.3** Describe fundamental scientific or technological concepts that could solve practical problems (e.g. Newton's laws of motion, Mendelian genetics).

**S.8.A.1.2.4** Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g. transportation, processing, production, storage)

**S.8.A.1.3.1** Use ratio to describe change (e.g. percents, parts per million, grams per cubic centimeter, mechanical advantage).

**S.8.A.1.3.2** Use evidence, observations, or explanations to make inferences about change in systems over time (e.g. carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.

**S.8.A.1.3.3** Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.

**S.8.A.1.3.4** Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems

### Processes, Procedures, and Tools of Scientific Investigations

**S.8.A.2.1.1** Use evidence, observations, or a variety of scales (e.g. mass, distance, volume, temperature) to describe relationships

**S.8.A.2.1.2** Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.

**S.8.A.2.1.3** Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.

**S.8.A.2.1.4** Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.

**S.8.A.2.1.5** Use evidence from investigations to clearly communicate and support conclusions.

**S.8.A.2.1.6** Identify a design flaw in a simple technological system and devise possible working solutions.

**S.8.A.2.2.1** Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.

**S.8.A.2.2.2** Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

**S.8.A.2.2.3** Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.

### Systems, Models, and Patterns

**S.8.A.3.1.1** Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.

**S.8.A.3.1.2** Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].

**S.8.A.3.1.3** Distinguish among system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational).

**S.8.A.3.1.4** Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.

**S.8.A.3.1.5** Explain how components of natural and human-made systems play different roles in a working system.

**S.8.A.3.2.1** Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).

**S.8.A.3.2.2** Describe how engineers use models to develop new and improved technologies to solve problems.

**S.8.A.3.2.3** Given a model showing simple cause and-effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis,

DRAFT