Cherokee County School District

Teaching & Learning Standards

8th GRADE

Science

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Science

Course Description

The Eighth Grade Cherokee Teaching & Learning Standards for Science are designed to give all students an overview of common strands in physical science including, but not limited to, the nature of matter, conservation of energy, energy transformations, conservation of matter, kinematics, and dynamics. Students keep records of their observations, use those records to analyze the data they collect, recognize patterns in the data, use simple charts/graphs to represent the relationships they see, and find ways to interpret their findings. They develop conceptual understanding of the laws of conservation of matter and conservation of energy, can explain the characteristics of the motion of an object (speed, acceleration) and the way that forces may change the state of motion of an object. They use what they observe to explain the difference between physical and chemical changes and cause and effect relationships between force, mass, and the motion of objects. Students construct explanations based on evidence on the difference and similarities between electromagnetic and mechanical waves. They plan and carry out investigations, describe observations, and show information in graphical form. The students replicate investigations and compare results to find similarities and differences.

Science standards integrate the three dimensions of **Science and Engineering Practices (SEPs)**, **Crosscutting Concepts (CCCs)**, and **Disciplinary Core Ideas (DCIs)** to provide a comprehensive framework that emphasizes active engagement, interdisciplinary connections, and core scientific principles. Together, they show how science standards engage *students* in obtaining, evaluating, and communicating information.

Science and Engineering Practices	Crosscutting Concepts	Disciplinary Core Ideas
Asking Questions (Science) and Defining Problems (Engineering)	Patterns	Engineering, Technology, and the Application of Science (TLS)
Developing and Using Models	Cause and Effect: Mechanism and Explanation	
Planning and Carrying Out Investigations	Scale, Proportion, and Quantity	Physical Science (P)
Analyzing and Interpreting Data	Systems and System Models	
Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation	Life Science (L)
Constructing Explanations (Science) and Designing Solutions (Engineering)		
Engaging in Argument from Evidence	Structure and Function	Earth and Space Science (E)
Obtaining, Evaluating, and Communicating Information	Stability and Change	

Science and Engineering Practices are fundamental approaches that scientists and engineers use to investigate the natural world and solve practical problems. **Crosscutting Concepts** in science are overarching themes that bridge various disciplines, helping students and researchers see connections and deepen their understanding of the natural world. **Disciplinary Core Ideas** are fundamental concepts that students need to understand to develop a deep knowledge of science across various disciplines.

Semester 1 (August – December)

Unit 0: Thinking Like a Scientist (1.5 weeks)

In this unit, students in eighth grade will advance their scientific thinking skills through engaging in the scientific method, critical analysis, and collaborative investigations. Students will expand their understanding of scientific terms and concepts, formulate hypotheses based on research questions, utilize tools to conduct investigations, analyze data, and collaborate to interpret experimental results. Thinking Like a Scientist standards should continue to be embedded and developed throughout the course across the entire school year. By the end of the year, students will have developed a deeper understanding of the scientific method, enhanced their critical thinking skills, and strengthened their ability to collaborate effectively in scientific investigations. They will be prepared to apply these skills to more complex scientific challenges and inquiries in subsequent grade levels and beyond.

Overarching Standard for Unit 0

TLS6-8: Advance scientific thinking through the scientific method, critical analysis, and collaborative investigations.

Supporting Standards for Student Mastery in Unit 0

TLS6-8.a: Master and apply scientific vocabulary and concepts.

TLS6-8.b: Develop and test hypotheses using systematic observations and experiments.

TLS6-8.c: Use advanced tools and technology (e.g., sensors, probes, software) for data collection and analysis.

TLS6-8.d: Collaborate to analyze findings and present detailed scientific arguments and reports.

Unit 1: Properties of Matter (4 weeks)

In this unit, students will explore fundamental concepts related to the structure and properties of matter. They will learn to analyze and interpret physical and chemical changes in substances, understand the movement of particles in different states of matter, and investigate the physical and chemical properties of matter through hands-on experiments and model development.

Overarching Standard for Unit 1

P1: Obtain, evaluate, and communicate information about the structure and properties of matter.

P1.d: Construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical.

(*Clarification statement*: Evidence could include ability to separate mixtures, development of a gas, formation of a precipitate, change in energy, color, and/or form.)

Supporting Standards for Student Mastery in Unit 1

P1.b: Develop and use models to describe the movement of particles in solids, liquids, gases, and plasma states when thermal energy is added or removed.

P1.c: Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter.

Milestones Achievement Level Descriptors for Unit 1

Beginning	Developing	Proficient	Distinguished
Can recognize the movement of particles in solids, liquids, gases & plasma states. Can recognize a phase change when thermal energy is added or removed.	Can use provided models to describe the movement of particles in solids, liquids, gases & plasma states when thermal energy is added or removed.	Can develop & use models to describe the movement of particles in solids, liquids, gases & plasma state when thermal energy is added or removed.	Can compare models that illustrate the movement of particles in solids, liquids, gases & plasma states when thermal energy is added or removed.
Can identify chemical and physical properties of matter.	Can compare & contrast chemical and physical properties of matter.	Can plan & carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter.	Can refine investigations that compare and contrast chemical and physical properties of matter.
Can recognize that when a change in a substance occurs, it can be classified as either chemical or physical.	Can explain a given argument based on observational evidence that when a change in a substance, occurs, it can be classified as either chemical or physical.	Can construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical.	Can evaluate arguments based on observational evidence to determine which best supports a claim that when a change in a substance occurs, it can be classified as either chemical or physical.

Unit 2A: Structure of Matter: Atomic Model (2 weeks)

In this unit, students will investigate the principles of the conservation of matter during chemical reactions and the atomic-level structure of matter. Students will learn to explain that matter is conserved in chemical reaction, develop models to illustrate atomic and molecular structures, and analyze patterns within the periodic table to understand the properties and behaviors of elements and compounds.

Overarching Standard for Unit 2A

P1: Obtain, evaluate, and communicate information about the structure and properties of matter.

P1.f: Construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.

(*Clarification statement*: Evidence could include models such as balanced chemical equations.)

Supporting Standards for Student Mastery in Unit 2A

P1.e: Develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, and electrons) and simple molecules.

- Create models of an atom (including the size, charge, number and location of subatomic particles) and simple molecules.

Milestones Achievement Level Descriptors for Unit 2A

Beginning	Developing	Proficient	Distinguished
Can identify patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms and simple molecules.	Can use provided models to identify and analyze patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms and simple molecules.	Can develop models (e.g., atomic level models, including drawings, computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, and electrons) and simple molecules.	Can evaluate models that represent patterns of the periodic table that illustrate the structure, composition, and characteristics of atoms and simple molecules.
Can recognize an example of the conservation of matter in a chemical reaction.	From provided evidence, can construct a limited explanation that describes the concept of the conservation of matter in a chemical reaction.	Can construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.	Can evaluate an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.

Unit 2B: Structure of Matter: Elements, Compounds, and Mixtures (2 weeks)

In this unit, students will explore the conservation of matter in chemical reactions and the classification of matter into pure substances and mixtures. Students will construct explanations based on evidence for how matter is conserved in chemical reactions and use models to differentiate between elements, compounds, and mixtures.

Overarching Standard for Unit 2B

P1: Obtain, evaluate, and communicate information about the structure and properties of matter.

P1.f: Construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.

(*Clarification statement*: Evidence could include models such as balanced chemical equations.)

Supporting Standards for Student Mastery in Unit 2B

P1.a: Develop and use a model to compare and contrast pure substances (elements and compounds) and mixtures (heterogeneous and homogenous).

(*Clarification statement*: Types of bonds and compounds will be addressed in high school physical science.)

Milestones Achievement Level Descriptors for Unit 2B

Beginning	Developing	Proficient	Distinguished
Can identify pure substances and mixtures.	Can compare and contrast models of pure substances (elements, compounds) and mixtures.	Can develop and use a model to compare and contrast pure substances (elements and compounds) and mixtures.	Can justify models used to compare and contrast pure substances and mixtures.
Can recognize an example of the conservation of matter in a chemical reaction.	From provided evidence, can construct a limited explanation that describes the concept of the conservation of matter in a chemical reaction.	Can construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.	Can evaluate an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.

Unit 3: Principles of Energy and Matter (6 weeks)

In this unit, students will study the law of conservation of energy and how energy transforms from one form to another within various systems. Students will analyze, interpret, and create graphical displays to understand the relationships between kinetic and potential energy, investigate energy transformations, and examine the effects of heat transfer on molecular motion.

Overarching Standard for Unit 3

P2: Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system.

P2.c: Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].

Supporting Standards for Student Mastery in Unit 3

P2.a: Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.

P2.b: Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.).

P2.d: Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).

Milestones Achievement Level Descriptors for Unit 3

Beginning	Developing	Proficient	Distinguished
Can recognize relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.	Can explain relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.	Can analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.	Can make inferences and/or predictions based on graphical displays and explain the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.
Can explain the transformation between kinetic and potential energy within a system.	Can carry out a provided investigation to explain the transformation between kinetic and potential energy within a system.	Can plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands).	Can refine investigations to explain the transformation between kinetic and potential energy within a system.
Can identify energy transformations within a system.	Can construct a limited argument based on observational evidence to make a claim about the type of energy transformations that occur within a system.	Can construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].	Can evaluate arguments used to support a claim about the type of energy transformations within a system.
Can identify the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	Can carry out a provided investigation to identify the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or gas (convection).	Can plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	Can refine investigations exploring the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).

Unit 4: Waves: Motion of Energy (2.5 weeks)

In this unit, students will learn about the distinct behavior and properties of electromagnetic (light) waves and mechanical (sound) waves. Students will explore the similarities and differences between these types of waves, understand the electromagnetic spectrum, and investigate practical applications of wave phenomena in various technologies. They will also develop and use models to study wave interactions with different materials and predict wave behavior based on wave properties and media density.

Overarching Standard for Unit 4

P4: Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves.

P4.a: Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves.

(*Clarification statement*: Include transverse and longitudinal waves and wave parts such as crest, trough, compressions, and rarefactions.)

Supporting Standards for Student Mastery in Unit 4

P4.b: Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

P4.c: Design a device to illustrate practical applications of the electromagnetic spectrum (e.g., communication, medical, military).

P4.d: Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.

(*Clarification statement*: Include echo and how color is seen but do not cover interference and scattering.)

P4.e: Analyze and interpret data to predict patterns in the relationship between density of media and wave behavior (i.e., speed).

P4.f: Develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, and wavelength) and energy.

P4.g: Develop and use models to demonstrate the effects that lenses have on light (i.e., formation an image) and their possible technological applications.

Milestones Achievement Level Descriptors for Unit 4

Beginning	Developing	Proficient	Distinguished
Can recognize the similarities and differences between electromagnetic and mechanical waves.	Can compare the similarities and differences between electromagnetic and mechanical waves.	Can ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves.	Can evaluate questions used to develop explanations about the similarities and differences between electromagnetic and mechanical waves.
Can use data to illustrate the relationship between the electromagnetic spectrum and energy.	Can construct a simple explanation using data to illustrate the relationship between the electromagnetic spectrum & energy.	Can construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.	Can evaluate graphical display or other model to illustrate the relationship between the electromagnetic spectrum & energy.
Can recognize that the electromagnetic spectrum can be used to help make devices used in communication, the medical field, and technology.	Can explain how the electromagnetic spectrum is used in practical applications in devices.	Can design a device to illustrate practical applications of the electromagnetic spectrum (e.g., communication, medical, military).	Can refine the design of a device used to illustrate practical applications of the electromagnetic spectrum.
Can recognize that light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can use a provided model to describe how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can refine models used to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.
Can recognize that a relationship exists between density of media and wave behavior (i.e., speed).	Can use provided data to describe patterns in the relationship between density of media and wave behavior (i.e., speed).	Can analyze and interpret data to predict patterns in the relationship between density of media and wave behavior (i.e., speed).	Can create graphical displays used to predict patterns in the relationship between density of media and wave behavior (i.e., speed).
Can identify some properties of waves.	Can use provided models describe the relationships between wave properties and energy.	Can develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, wavelength) and energy.	Can critically analyze models used to predict and describe the relationships between wave properties and energy.
Can recognize the effects that lenses have on light.	Can use provided models to describe the effects that lenses have on light and their possible technological applications.	Can develop and use models to demonstrate the effects that lenses have on light (i.e., formation an image) and their possible tech applications.	Can critically analyze models to demonstrate the effects that lenses have on light and their possible technological applications.

Semester 2 (January – May)

Unit 4 continued: Waves: Motion of Energy (5 weeks)

In this unit, students will learn about the distinct behavior and properties of electromagnetic (light) waves and mechanical (sound) waves. Students will explore the similarities and differences between these types of waves, understand the electromagnetic spectrum, and investigate practical applications of wave phenomena in various technologies. They will also develop and use models to study wave interactions with different materials and predict wave behavior based on wave properties and media density.

Overarching Standard for Unit 4

P4: Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves.

P4.a: Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves.

(*Clarification statement*: Include transverse and longitudinal waves and wave parts such as crest, trough, compressions, and rarefactions.)

Supporting Standards for Student Mastery in Unit 4

P4.b: Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

P4.c: Design a device to illustrate practical applications of the electromagnetic spectrum (e.g., communication, medical, military).

P4.d: Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.

(*Clarification statement*: Include echo and how color is seen but do not cover interference and scattering.)

P4.e: Analyze and interpret data to predict patterns in the relationship between density of media and wave behavior (i.e., speed).

P4.f: Develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, and wavelength) and energy.

P4.g: Develop and use models to demonstrate the effects that lenses have on light (i.e., formation an image) and their possible technological applications.

Milestones Achievement Level Descriptors for Unit 4

Beginning	Developing	Proficient	Distinguished
Can recognize the similarities and differences between electromagnetic and mechanical waves.	Can compare the similarities and differences between electromagnetic and mechanical waves.	Can ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves.	Can evaluate questions used to develop explanations about the similarities and differences between electromagnetic and mechanical waves.
Can use data to illustrate the relationship between the electromagnetic spectrum and energy.	Can construct a simple explanation using data to illustrate the relationship between the electromagnetic spectrum & energy.	Can construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.	Can evaluate graphical display or other model to illustrate the relationship between the electromagnetic spectrum & energy.
Can recognize that the electromagnetic spectrum can be used to help make devices used in communication, the medical field, and technology.	Can explain how the electromagnetic spectrum is used in practical applications in devices.	Can design a device to illustrate practical applications of the electromagnetic spectrum (e.g., communication, medical, military).	Can refine the design of a device used to illustrate practical applications of the electromagnetic spectrum.
Can recognize that light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can use a provided model to describe how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.	Can refine models used to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted or transmitted through various materials.
Can recognize that a relationship exists between density of media and wave behavior (i.e., speed).	Can use provided data to describe patterns in the relationship between density of media and wave behavior (i.e., speed).	Can analyze and interpret data to predict patterns in the relationship between density of media and wave behavior (i.e., speed).	Can create graphical displays used to predict patterns in the relationship between density of media and wave behavior (i.e., speed).
Can identify some properties of waves.	Can use provided models describe the relationships between wave properties and energy.	Can develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, wavelength) and energy.	Can critically analyze models used to predict and describe the relationships between wave properties and energy.
Can recognize the effects that lenses have on light.	Can use provided models to describe the effects that lenses have on light and their possible technological applications.	Can develop and use models to demonstrate the effects that lenses have on light (i.e., formation an image) and their possible tech applications.	Can critically analyze models to demonstrate the effects that lenses have on light and their possible technological applications.

Unit 5A: Forces and Motion: Speed, Velocity, and Acceleration (2-3 weeks)

In this unit, students will explore the relationships between force, mass, and the motion of objects. They will learn to analyze and interpret data to identify patterns in speed, distance, velocity, and acceleration without performing calculations. By studying motion graphs, students will gain a deeper understanding of how these variables interact and influence one another.

Overarching Standard for Unit 5A

P3: Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects.

P3.a: Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. (*Clarification statement*: Students should be able to analyze motion graphs, but students should not be expected to calculate velocity or acceleration.)

Milestones Achievement Level Descriptors for Unit 5A

Beginning	Developing	Proficient	Distinguished
Can recognize patterns in the relationships between speed and distance, and velocity and acceleration.	Can use provided data to describe patterns in the relationships between speed and distance, and velocity and acceleration.	Can analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration.	Can construct arguments supported by evidence related to the patterns in the relationships between speed and distance, and velocity and acceleration.

Unit 5B: Forces and Motion: Forces and Newton's Laws (3-4 weeks)

In this unit, students will discuss cause and effect relationships between force, mass, and the motion of objects. They will learn to explain the effects of balanced and unbalanced forces using Newton's Laws of Motion. The unit will also include analysis of motion data to identify patterns and construct arguments based on the relationship between force, mass, and acceleration.

Overarching Standard for Unit 5B

P3: Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects.

P3.b: Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.

Supporting Standards for Student Mastery in Unit 5B

P3.a: Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. (*Clarification statement*: Students should be able to analyze motion graphs, but students should not be expected to calculate velocity or acceleration.)

P3.c: Construct an argument from evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).

Milestones Achievement Level Descriptors for Unit 5B

Beginning	Developing	Proficient	Distinguished
Can recognize patterns in the relationships between speed and distance, and velocity and acceleration.	Can use provided data to describe patterns in the relationships between speed and distance, and velocity and acceleration.	Can analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration.	Can construct arguments supported by evidence related to the patterns in the relationships between speed and distance, and velocity and acceleration.
Can describe the effects of balanced and unbalanced forces as they relate to the motion of an object and Newton's Laws of Motion.	Can construct a simple explanation that predicts the effects of balanced and unbalanced forces as they relate to the motion of an object and Newton's Laws of Motion.	Can construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.	Can compare and evaluate examples of Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object.
Can recognize that the amount of force needed to accelerate an object is proportional to its mass (inertia).	Can construct a limited argument based on observational evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).	Can construct an argument from evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).	Can evaluate graphical displays to provide evidence in support of the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia).

Unit 5C: Forces and Motion: Forces in Nature (4-5 weeks)

In this unit, students will investigate the fundamental forces of gravity, electricity, and magnetism, learning how these forces interact and influence each other. Students will enhance their scientific inquiry skills by constructing arguments, planning investigations, and identifying factors that affect the strength of these forces.

Overarching Standard for Unit 5C

P5: Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature.

P5.a: Construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, and electric fields) exist between objects exerting forces on each other even when the objects are not in contact.

Supporting Standards for Student Mastery in Unit 5C

P5.b: Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.

(*Clarification statement*: Include conduction, induction, and friction.)

P5.c: Plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, and varying size of iron core) that affect the strength of electric and magnetic forces.

(*Clarification statement*: Including, but not limited to, generators or motors.)

Milestones Achievement Level Descriptors for Unit 5C

Beginning	Developing	Proficient	Distinguished
Can recognize that fields exist between objects exerting forces on each other even when the objects are not in contact.	Can construct a limited argument based on observational evidence to support the claim that fields exist between objects exerting forces on each other even when the objects are not in contact.	Can construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, electric fields) exist between objects exerting forces on each other even when the objects are not in contact.	Can refine an argument made using evidence to support the claim that fields exist between objects exerting forces on each other even when the objects are not in contact.
Can identify how the distribution of charge is different for conductors and insulators.	Can carry out a provided investigation to describe how the distribution of charge is different for conductors and insulators.	Can plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.	Can refine investigations used to demonstrate the distribution of charge in conductors and insulators.
Can identify the factors that affect the strength of electric and magnetic forces.	Can carry out a provided investigation to describe the factors that affect the strength of electric and magnetic forces.	Can plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, varying size of iron core) that affect the strength of electric and magnetic forces.	Can evaluate investigations used to identify the factors that affect the strength of electric and magnetic forces.

Milestones Review and Capstone Project (2-3 weeks)

This unit is designed to consolidate and reinforce the key scientific concepts and skills that eighth grade students have learned throughout the year. This review period will help prepare students for the Georgia Milestones assessment by revisiting core standards through engaging, hands-on activities and comprehensive review sessions. The capstone project will provide an opportunity for students to apply their knowledge in a real-world context, demonstrating their understanding of scientific principles and their ability to communicate information effectively.

Overarching Standards

P1. Obtain, evaluate, and communicate information about the structure and properties of matter.

P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system.

P3. Obtain, evaluate, and communicate information about cause and effect relationships between force, mass, and the motion of objects.

P4. Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves.

P5. Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature.