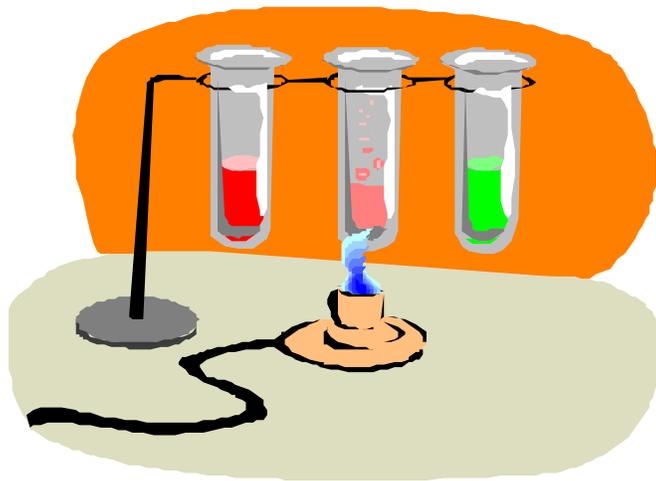


# Science 2019

Prepared by:  
Stanton Community Schools



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## **District Mission Statement**

The Stanton Community Schools exist to create, foster, and provide a positive learning environment in which all students can become responsible and productive members of the United States of America through academic, physical, social, vocational, technical, and emotional growth.

## **Goals**

The students will:

1. Engage in a 21st century learning environment by
  - a. Exceeding learning standards in the core curricular areas of Language Arts, Mathematics, Science and Social Science.
  - b. Acquiring lifelong learning skills such as self-direction, adaptability, and higher-order thinking/problem solving. Also included in these learning skills are researching information & reporting results, developing inter-personal & cross cultural relationships, and utilizing the student's curiosity & creativity.
  - c. Utilizing learning technologies to explore & investigate concepts; access, manage, analyze, & synthesize information; and communicate & produce quality products.
2. Be prepared to compete in a global society following graduation.
3. Develop respect and a positive attitude for themselves and others.
4. Assume civic responsibility as a member of a family, community, nation, and world.
5. Develop an appreciation for the visual and performing arts.
6. Be provided with vocational and technological skills.
7. Have the knowledge and skills needed to maintain healthy and fit bodies throughout their lives.
8. Be provided an environment that stimulates emotional growth.
9. Assume responsibility and ownership for their education.

## **Science Mission Statement**

The mission of the Stanton Community Schools science program is to create knowledgeable, scientifically literate, and technologically capable problem solvers. The Stanton Community Schools science program fosters intellectual curiosity, inquiry, creativity, and relevant and real-world science in the classroom. Our students are capable of comprehending and analyzing the ever-changing global issues.

## **Science Vision Statement**

Stanton Community Schools strives to graduate students who are innovators, critical thinkers, problem solvers, and team players. By applying scientific rationale to the nature, limits, possibilities, issues, and history of science, students demonstrate a strong foundation in the natural sciences. At the conclusion of their primary and secondary school careers, our students recognize science as a human activity, and are capable of applying their scientific knowledge to contemporary issues and pursuing post-secondary education or careers in the fields of science.

## Science Curriculum Guides

### Kindergarten Science Curriculum

**Purpose Statement:** By the end of Kindergarten, students will be able to interact in their environment using foundational skills of Science that connect to everyday applications.

**Focus:** My world and me.

**Outcome Sc.K.01:** Students will identify and demonstrate healthy personal care habits.

- Sc.K.1.1 Identify healthy foods.
- Sc.K.1.2 Distinguish between healthy foods and non-healthy foods.
- Sc.K.1.3 Demonstrates hand-washing technique.
- Sc.K.1.4 Identify tools for dental care.

**Outcome Sc.K.02:** Students will illustrate and explain fire safety rules for home and school.

- Sc.K.2.1 Demonstrate stop, drop, and roll.
- Sc.K.2.2 Demonstrate stay low and crawl.
- Sc.K.2.3 Locate building exits.
- Sc.K.2.4 Explain fire hazards (matches, etc.).
- Sc.K.2.5 Practice fire drills at school.

**Outcome Sc.K.03:** Students will identify and illustrate the characteristics of the weather and climate and describe the effects on people, plants, and animals. (SC.K.12.3.A, SC.K.12.3.B, SC.K.7.2.B, SC.K.12.3.C, SC.12.4.D)

- Sc.K.3.1 Describe and record daily weather changes.
- Sc.K.3.2 Identify and illustrate the seasonal characteristics of fall, winter, spring, and summer.
- Sc.K.3.3 Describe how seasonal changes affect people, plants, and animals.
- Sc.K.3.4 Make observations to determine the effect of sunlight on the Earth's surface.
- Sc.K.3.5 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. (umbrellas, tents, trees, etc.)

**Outcome Sc.K.04:** Students will identify and classify objects as living and non-living in their environment. (SC.K.7.2.A, SC.K.7.2.C)

Sc.K.4.1 Identify that food, water, air, and shelter are the basic needs of animals.

Sc.K.4.2 Identify that water, air, sunlight, and soil are the basic needs of plants.

Sc.K.4.3 Describe how plants/animals/humans need each other. Illustrate the relationship between plants/animals and where they live.

Sc.K.4.4 Illustrate the parts of a plant (root, stem, leaf).

Sc.K.4.5 Differentiate between living and nonliving things.

**Outcome Sc.K.05:** Students will identify and classify objects that can be recycled and gather information about an environmental problem people want to solve. (K.12.3.E)

Sc.K.5.1 Identify the recycling symbol.

Sc.K.5.2 Define recycling.

Sc.K.5.3 Classify recyclable and non-recyclable items.

Sc.K.5.5 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object of tool. (recycling, trash collection, etc.)

**Outcome Sc.K.06:** Students will gather, analyze, and communicate evidence of forces and their interactions on pushes and pulls. (SC.K.1.1.A, SC.K.1.1.B)

Sc.K.6.1 Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Sc.K.6.2 Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

## **First Grade Science Curriculum**

**Purpose Statement:** By the end of first grade, students will be able to perform investigations, apply concepts of sound and light, analyze living things, and make observations using earth and space information.

### **Focus Areas:**

1. Scientific Process/Method
2. Sound and Light
3. Living Things - Plants
4. Living Things - Animals
5. Earth and Space (Seasons and the Sun, Moon, and Stars)

**Outcome Sc.1.01:** Students will plan and perform investigations using scientific tools and the scientific method to create solutions (Scientific Process/Method).

- Sc.1.1.1 Explain the scientific method.
- Sc.1.1.2 Identify and classify household and scientific tools.
- Sc.1.1.3 Demonstrate the use of scientific tools (examples include rulers, thermometer, magnifying glass, balance scales...).
- Sc.1.1.4 Discuss safety tips/precautions for when performing experiments.
- Sc.1.1.5 Inquire and evaluate using the scientific process/method: 1) observe/ question, 2) form a hypothesis, 3) research/experiment, 3) collect data 4) draw conclusions, and 5) share findings.

**Outcome Sc.1.02:** Students will explore, elaborate on, and evaluate evidence of light and sound waves (Sound and Light). (SC.1.2.1, SC.1.2.1.A, SC.1.2.1.B, SC.1.2.1.C, SC.1.2.1.D)

- Sc.1.2.1 Prove that vibrating objects/materials are able to make sound. (sound)
- Sc.1.2.2 Show that sound is able to make objects/materials vibrate; explore sound energy and sound waves. (sound)
- Sc.1.2.3 Demonstrate that objects can be seen only when lit up. (light)
- Sc.1.2.4 Identify shadows and the properties of light. (light)
- Sc.1.2.5 Investigate the effects beams of light have on different objects. (light)
- Sc.1.2.6 Build a device to show how sound or light travels (example: build a communication device like paper cup phones).

**Outcome Sc.1.03:** Students will recognize the characteristics of plants (structure and function), and they will apply their knowledge as they design related solutions, create drawings/models, and make observations Living Things – Plants. (SC.1.6.2, SC.1.6.2.A, SC.1.6.2.B, SC.1.6.2.C, SC.1.6.2.D)

- Sc.1.3.1 Identify the difference between living and nonliving things.
- Sc.1.3.2 Create a model of plant parts.
- Sc.1.3.3 Identify how plants move, breathe, grow, and obtain food in their habitat.
- Sc.1.3.4 Describe how plants change as they grow.
- Sc.1.3.5 Make observations to construct an evidence-based account that young plants are like, but not exactly like, their parents.
- Sc.1.3.6 Design something that could solve a human problem or need, keeping the fact in mind that plants and animals likewise have physical characteristics that help them survive (i.e. adaptations). (A student could design clothing to protect humans from weather elements - just like a turtle uses a shell to protect itself from weather and intruders. Students could also design a model of a house for protection.)

**Outcome Sc.1.04:** Students will recognize the characteristics of animals (structure and function), and they will apply their knowledge as they design related solutions, create drawings/models, and make observations (Living Things - Animals). (SC.1.6.2, SC.1.6.2.A, SC.1.6.2.B, SC.1.6.2.C, SC.1.6.2.D)

- Sc.1.4.1 Evaluate parts of animals.
- Sc.1.4.2 Model how the shape of an object helps it work (example: the quills on a porcupine protect the porcupine from enemies) - could draw or create a physical model to illustrate.
- Sc.1.4.3 Classify animals as mammals, insects, or birds using the following characteristics: body parts, reproduction, body coverings, and how they feed their offspring.
- Sc.1.4.4 Describe how animals change as they grow.
- Sc.1.4.5 Compare and contrast animals that hibernate and migrate.
- Sc.1.4.6 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- Sc.1.4.7 Read texts and use media to determine patterns in a behavior of parents and offspring that help offspring survive.
- Sc.1.4.8 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

**Outcome Sc.1.05:** Students will collect, examine, and share evidence of patterns and cycles of space systems (Earth and Space (Space Systems: Patterns and Cycles)). (SC.1.11.3, SC.1.11.3.A, SC.1.11.3.B)

- Sc.1.5.1 Define and recognize day and night.
- Sc.1.5.2 Identify the objects in the sky: sun, moon, and stars.
- Sc.1.5.3 Describe daily and seasonal weather changes: temperature and sky conditions.
- Sc.1.5.4 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- Sc.1.5.5 Make observations at different times of the year to relate the amount of daylight to the time of year.

## **Second Grade Science Curriculum**

**Purpose Statement:** The purpose of second grade science is to provide experiences in the natural world for students to identify, classify, and organize scientific knowledge in the following focus areas:

### **Focus Areas:**

1. Relationships in Ecosystems
2. Earth's Systems
3. Structure and Property of Matter
4. Animal Groups and Characteristics
5. Sources of Energy

**Outcome Sc.2.01:** Gather, analyze, and communicate evidence on the relationships in different ecosystems. (Sc.2.7.2 A-C)

- Sc.2.1.1 Differentiate between living and non-living things.
- Sc.2.1.2 Identify the basic needs of living things (food, water, air, space, and shelter).
- Sc.2.1.3 Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- Sc.2.1.4 Construct a model to show how seeds and pollen are scattered. (wind, animals, people, and water).
- Sc.2.1.5 Label parts of a plant (stem, root, leaf, flower, and seed).
- Sc.2.1.6 Observe plants and animals in different habitats.

**Outcome Sc.2.02:** Gather, analyze, and communicate evidence on the processes that shape the earth. (Sc.2.13 A-D)

- Sc.2.2.1 List events that occur quickly or slowly to alter the earth. (volcano, flooding, wind erosion, weather events)
- Sc.2.2.2 List multiple solutions designed to slow or prevent soil erosion.
- Sc.2.2.3 Compare multiple solutions designed to slow or prevent soil erosion. (dikes, windbreaks, rock walls, terraces, plants, roots)
- Sc.2.2.4 Construct a model to show shapes and kinds of land and bodies of water in an area. (map of Nebraska)
- Sc.2.2.5 Obtain information to identify where water is found on Earth and that it can be solid or liquid.

- Outcome Sc.2.03:** Gather, analyze, and communicate evidence of the properties and states of matter. (Sc.2.3.1 A-E)
- Sc.2.3.1 Observe and identify the physical properties of matter (color, shape, size, weight, sink and float, texture, hardness, flexibility).
  - Sc.2.3.2 Sort objects by physical properties (as listed above).
  - Sc.2.3.3 Identify and observe the states of matter (solid, liquid, and gas).
  - Sc.2.3.4 Analyze data gathered from testing different materials to determine which materials are best suited for an intended purpose. (example: which material is best suited for cleaning up a water spill)
  - Sc.2.3.5 Test two objects and analyze the data to compare the strengths and weaknesses to solve the same problem. (example: paper towel vs. wash cloth for cleaning up a water spill)
  - Sc.2.3.6 Construct and reconstruct an object made of small pieces. (physical change)
  - Sc.2.3.7 Observe that some changes made from heating and cooling can be reversed and some cannot. (physical and chemical change)
- Outcome Sc.2.04:** Students will compare and contrast various animal groups and characteristics.
- Sc.2.4.1 List characteristics of mammals, birds, amphibians, fish, reptiles, and insects.
  - Sc.2.4.2 Identify the basic needs of living things (food, water, air, space, shelter)
  - Sc.2.4.3 Classify animals into groups by characteristics.
  - Sc.2.4.4 Compare and Contrast different animal groups.
  - Sc.2.4.5 Illustrate and label seasonal changes in animals.
- Outcome Sc.2.05:** Students will identify light, heat, and sound as sources of energy.
- Sc.2.5.1 Define energy.
  - Sc.2.5.2 Identify the sources of light. (sun, fire, electricity).
  - Sc.2.5.3 List sources of heat. (fire, sun, friction).
  - Sc.2.5.4 Demonstrate that sound is produced when something vibrates.
  - Sc.2.5.5 Distinguish between volume and pitch.

## **Third Grade Science Curriculum**

**Purpose Statement:** Students in third grade will communicate evidence of forces and their interactions they encounter in their daily lives. They will examine the relationships between organisms and their ecosystems. They will examine the life cycles of organisms to determine advantages in survival and reproduction. The students will analyze the effects of climates around the world to help evaluate a solution to weather-related hazards. The students will use the scientific method and thinking to solve real-world problems. The students will identify the main components of the solar system and will conduct a report on a planet.

**Focus Areas:**

1. Physical
2. Life
3. Earth

**Outcome Sc.3.01:** Students will explain that energy creates a force that, when applied to an object, changes direction or speed. (SC.3.1.1.A-D)

- Sc.3.1.1 Describe work, speed, energy, and forces, such as friction, gravity, static electricity, and magnetism.
- Sc.3.1.2 Describe the position and motion of an object.
- Sc.3.1.3 Compare an object's position to another object.
- Sc.3.1.4 Interpret how gravity and friction affect an object.
- Sc.3.1.5 Demonstrate how force makes an object move by pushing and pulling.
- Sc.3.1.6 Demonstrate how magnetism and static electricity are forces that have non-contact interactions.
- Sc.3.1.7 Predict an object's motion based on data collected during measurement.
- Sc.3.1.8 Construct a solution to a simple design problem using magnets.

- Outcome Sc.3.02:** Students will communicate their understanding of interdependent relationships between organisms and environments in different ecosystems. (SC.3.7.2.A-E)
- Sc.3.2.1 Describe different habitats, environments and ecosystems around the world.
  - Sc.3.2.2 Describe and communicate interdependent relationships within ecosystems.
  - Sc.3.2.3 Describe how organisms survive in their environments.
  - Sc.3.2.4 Construct an argument why organisms survive in certain ecosystems better than in other ecosystems.
  - Sc.3.2.5 Analyze problems that are affecting the interdependent relationship between organisms and their environments.
  - Sc.3.2.6 Construct and support a solution to a problem within an ecosystem that is affecting the relationship between an organism and its environment.
- Outcome Sc.3.03:** Students will summarize how living things grow and change throughout their life cycles. (SC.3.9.3.A-D)
- Sc.3.3.1 Compare and Contrast characteristics of living and nonliving things.
  - Sc.3.3.2 Describe how life cycle stages of organisms are unique and diverse.
  - Sc.3.3.3 Identify how structures of organism function to meet their basic needs.
  - Sc.3.3.4 Identify inherited characteristics of organisms.
  - Sc.3.3.5 Analyze how adaptations may be influenced by environmental factors.
  - Sc.3.3.6 Describe specific advantages of adaptations of organisms that allow them to survive and reproduce.
- Outcome Sc.3.04:** Students will describe the effects of climates in different regions of the world. (SC.3.12.4.A-C)
- Sc.3.4.1 Describe the Sun's warming effect on the land and water.
  - Sc.3.4.2 Observe, measure and record changes in weather (temperature, wind direction and speed and precipitation).
  - Sc.3.4.3 Recognize the differences between weather, climate and seasons.
  - Sc.3.4.4 Make relevant observations and measurements.
  - Sc.3.4.5 Describe climates in different regions of the world.
  - Sc.3.4.6 Evaluate a real-life solution to a real weather-related hazard. (Ex. How well will a new tornado shelter work?)

## **Fourth Grade Science Curriculum**

**Purpose Statement:** Students in fourth grade acquire mastery in science concepts, vocabulary, and inquiry skills at their developmental level. They will observe, define, illustrate, and demonstrate the properties of sound, light, heat, and magnetism. Students will apply and understand plants and animals' structures and functions. They will be able to express how electricity will flow from one object to another.

### **Focus Areas:**

1. Physical
2. Earth
3. Life

**Outcome Sc.4.01:** Students will construct a visual display of electricity and magnetism.

- Sc.4.1.1 Define static electricity.
- Sc.4.1.2 Define current electricity.
- Sc.4.1.3 Demonstrate and explain electrical safety.
- Sc.4.1.4 Explore magnetism and describe attraction and repulsion.
- Sc.4.1.5 Recognize the transfer of electricity in an electrical circuit (open and closed).
- Sc.4.1.6 Analyze and express how electrical currents travel from object to object.

**Outcome Sc.4.02:** Students will analyze how Earth's materials are used (fuels and building materials). (SC.4.13 A-D)

- Sc.4.2.1 Describe and classify the characteristics of rocks, minerals, soil, water, and the atmosphere.
- Sc.4.2.2 Justify why scientists use fossils to study organisms of long ago.
- Sc.4.2.3 Explain erosion and design a plan illustrating method to control erosion.
- Sc.4.2.4 Compare and contrast how weathering and erosion changes Earth's surface.
- Sc.4.2.5 Produce a visual, demonstrating the differences between slow processes (erosion, weathering, deposition) and rapid processes (volcanic eruptions, earthquakes, and landslides).
- Sc.4.2.6 Compare multiple solutions on how humans prepare for Earth's natural disasters (earthquakes, floods, tornadoes, tsunamis, etc.).
- Sc.4.2.7 Analyze and interpret data from maps to describe patterns of Earth's features (topographic maps of land and ocean floors, continental boundaries, etc.)

- Outcome Sc.4.03:** Students will compare/contrast and summarize the properties of energy (sound, light, and heat). (SC.4.2.1 A-B, SC 4.4.2 A-F)
- Sc.4.3.1 Recognize and demonstrate how sound is produced from vibrating objects.
  - Sc.4.3.2 Examine the pitch of sound using vibration as a variable.
  - Sc.4.3.3 Identify materials that act as thermal conductors or insulators.
  - Sc.4.3.4 Identify and apply reflection and refraction as light travels.
  - Sc.4.3.5 Develop a model to show how light reflects.
  - Sc.4.3.6 Investigate how light can travel through materials (transparent, translucent, and opaque).
  - Sc.4.3.7 Analyze and express how heat, light, and sound travels from one object to another.
  - Sc.4.3.8 Construct an explanation of the relationship between the speed of an object and the energy of that object.
  - Sc.4.3.9 Infer outcomes about the changes in energy that occur when objects collide.
  - Sc.4.3.10 Analyze the origin of energy and fuels which are derived from natural resources and how their use affects the environment. (wind, water, sunlight)

- Outcome Sc.4.04:** Students will apply and understand plant and animals' structure and functions (life cycles, classifications, pollination, and fertilization). (SC 4.6.3 A-C)
- Sc.4.4.1 Classify plant structure (flowers, seeds, fruits, stems and roots).
  - Sc.4.4.2 Identify plant functions (life cycles, groups, pollination, and fertilization).
  - Sc.4.4.3 Define photosynthesis.
  - Sc.4.4.4 Describe methods of reproduction.
  - Sc.4.4.5 Illustrate and label the components of photosynthesis.
  - Sc.4.4.6 Describe the differences between plants and animals on how their structure helps them survive in their habitats.
  - Sc.4.4.7 Role Play (model) to describe that animals use their senses to process information.

**Outcome Sc.4.05:** Students will apply their knowledge of amplitude and wavelength to generate solutions for a given problem dealing with a given piece of information.

Sc.4.5.1 Identify types of waves.

Sc.4.5.2 Define amplitude.

Sc.4.5.3 Explain how to measure a wavelength.

Sc.4.5.4 Describe patterns of waves in terms of amplitude and wavelength.

Sc.4.5.5 Generate two different solutions for a given problem that uses patterns to transmit a given piece of information (e.g., picture or message, Morse code, cell phones, and light signals over long distances)

## **Fifth Grade Science Curriculum**

**Purpose Statement:** Students will discover how science works, the limitations of science, and scientific ways of thinking.

**Focus Areas:**

1. Properties of Matter
2. Interactions of Living Things
3. Earth and its Resources
4. Stars and the Solar System
5. Motion and Energy

**Outcome Sc.5.01:** Students will determine that all things are made of matter.

- Sc.5.1.1 Describe the composition of matter.
- Sc.5.1.2 Describe matter and the three states of matter.
- Sc.5.1.3 Produce a chemical change by mixing substances.
- Sc.5.1.4 Measure and calculate density.
- Sc.5.1.5 Summarize changes that occur with matter.

**Outcome Sc.5.02:** Students will define, compare and contrast the organisms within ecosystems.

- Sc.5.2.1 Determine the Sun is the energy source for almost all organisms on Earth.
- Sc.5.2.2 Illustrate the energy in a food chain starts with the Sun.
- Sc.5.2.3 Prove that producers build sugar molecules out of carbon dioxide and water.
- Sc.5.2.4 Order the locations for producers and consumers on a food chain.
- Sc.5.2.5 Explain that many organisms are part of a food web.

**Outcome Sc.5.03:** Students will analyze Earth's systems.

- Sc.5.3.1 List the steps in the water, carbon, and nitrogen cycles.
- Sc.5.3.2 Discriminate between fresh water and saltwater in various locations.
- Sc.5.3.3 Prioritize recycling to reduce the amount of used natural resources.
- Sc.5.3.4 Establish that resources cannot be replaced.
- Sc.5.3.5 Develop an interaction model of Earth's systems.

**Outcome Sc.5.04:** Students will analyze the components of Earth's stars and solar system.

- Sc.5.4.1 Observe that gravity is the force between any two objects.
- Sc.5.4.2 Determine that the movement of Earth causes day and night.
- Sc.5.4.3 Distinguish how distance from Earth affects the apparent brightness of a star.
- Sc.5.4.4 Explain how Earth's movements cause the seasons, and day and night.
- Sc.5.4.5 Justify that as Earth revolves around the Sun, sunlight strikes different parts of Earth at different angles.

**Outcome Sc.5.05:** Students will determine how forces move objects.

- Sc.5.5.1 Identify the relationship between position, motion, velocity, and acceleration.
- Sc.5.5.2 Identify the six types of simple machines.
- Sc.5.5.3 Calculate velocity and acceleration.
- Sc.5.5.4 Observe how gravity and friction affect motion.
- Sc.5.5.5 Explain how to apply Newton's three laws of motion.
- Sc.5.5.6 Give examples of work and energy.

## **Sixth Grade Science Curriculum**

**Purpose Statement:** Students will demonstrate a basic knowledge of science by explaining the foundations of Earth science, life science, and physical science.

**Focus:**

1. Scientific Investigation
2. Energy
3. Structure and Function and Information Processing
4. Growth, Development, and Reproduction of Organisms
5. Weather and Climate
6. Earth's Systems

**Outcome Sc.6.01** Students will experience inquiry, practice skills related to the nature of science, and utilize technology.

- Sc.6.1.1 Formulate testable questions that guide students through scientific investigations.
- Sc.6.1.2 Design and conduct scientific investigations that can be replicated.
- Sc.6.1.3 Manipulate measurements with the International System of Units.
- Sc.6.1.4 Record and report data.
- Sc.6.1.5 Operate an electronic device to perform the desired outcome.

**Outcome Sc.6.02** Students will examine and evaluate energy transformations that occur when one form of energy changes into another form of energy. (SC.6.4.1)

- Sc.6.2.1 Describe how energy is conserved, through transformation between different forms.
- Sc.6.2.2 Differentiate potential and kinetic energy.
- Sc.6.2.3 Relate the temperature of a substance to the kinetic energy of its particles.
- Sc.6.2.4 Analyze how energy is related to work.
- Sc.6.2.5 Distinguish the relationships among the energy transferred, the types of matter, and the mass.
- Sc.6.2.6 Analyze how the different types of energy are used.

**Outcome Sc.6.03:** Students will distinguish how organisms are classified based on similar characteristics, including cell structure and function in living things. (SC.6.6.2)

- Sc.6.3.1 Analyze evidence proving that living things are made of cells.
- Sc.6.3.2 Investigate how living things are classified.
- Sc.6.3.3 Identify the needs of living things.
- Sc.6.3.4 Examine the parts and functions of a cell.
- Sc.6.3.5 Appraise the functions of the human body systems.
- Sc.6.3.6 Assess the sensory receptors response to stimuli.

**Outcome Sc.6.04:** Students will evaluate how inherited mutations can lead to variations, which can become adaptations through natural selection over many generations. (SC.6.9.3)

- Sc.6.4.1 Identify how mutations cause variations.
- Sc.6.4.2 Explain how natural selection leads to adaptations in species.
- Sc.6.4.3 Examine and summarize the ways in which adaptations help species survive in their environment.
- Sc.6.4.4 Examine inheritance and determine the role genes have in inheritance.
- Sc.6.4.5 Validate how environmental factors and mutations influence traits.

**Outcome Sc.6.05:** Students will analyze climate and weather variables used to describe weather and climate conditions. (SC.6.12.4)

- Sc.6.5.1 Examine weather and climate and the variables used to describe them.
- Sc.6.5.2 Distinguish the two types of pressure systems and how they drive weather patterns.
- Sc.6.5.3 Determine how the ocean affects the climate.
- Sc.6.5.4 Evaluate how climate has varied over time.
- Sc.6.5.5 Express how computer models are used to predict weather and climate changes.
- Sc.6.6.6 Formulate and create a model indicating how human activities affect the climate.

**Outcome Sc.6.06:** Students will verify that earth is a unified system that is divided into four interacting subsystems: the biosphere, the atmosphere, the hydrosphere, and the geosphere. (SC.6.13.5)

- Sc.6.5.1 Identify the Earth's systems.
- Sc.6.5.2 Examine the composition and the structure of the atmosphere.
- Sc.6.5.3 Evaluate how water is distributed in the hydrosphere.
- Sc.6.5.4 Analyze the composition and the structure of the geosphere.
- Sc.6.5.5 Determine how the water cycle shows interactions of Earth systems.
- Sc.6.5.6 Discriminate how weather shows relationships to Earth's systems.
- Sc.6.5.7 Infer how the rock cycle shows interactions of Earth's systems.

## **Seventh Grade Science Curriculum**

**Purpose Statement:** Students will demonstrate a basic knowledge of science by explaining the foundations of chemistry, ecosystems, and Earth's interactive processes.

**Focus:**

1. Structure and Processes
2. Structure and Properties of Matter
3. Chemical Reactions
4. Ecosystems
5. Earth's Systems
6. Earth's History

**Outcome Sc.7.01:** Students will examine structure and processes of a cell that enable it to survive.

- Sc.7.1.1 Identify basic substances that make up a cell.
- Sc.7.1.2 Compare and contrast prokaryotic and eukaryotic cells.
- Sc.7.1.3 Show the phases of the cell cycle.
- Sc.7.1.4 Summarize the differences between unicellular and multi-cellular organisms.
- Sc.7.1.5 Distinguish between mitosis and meiosis.
- Sc.7.1.6 Explain the types of asexual reproduction.

**Outcome Sc.7.02:** Students will determine what processes enable plants to survive and reproduce. (SC.7.8.4)

- Sc.7.2.1 Describe how plants perform photosynthesis.
- Sc.7.2.2 Describe how organisms perform cellular respiration.
- Sc.7.2.3 Determine how materials move through plants.
- Sc.7.2.4 Examine how plants respond to environmental stimuli and chemical stimuli.
- Sc.7.2.5 Contrast how seedless and seed plants reproduce.

**Outcome Sc.7.03:** Students will explain how living things interact with each other and depend on resources from the ecosystem to survive. (SC.7.7.3, SC.7.8.4)

- Sc.7.3.1 Describe ecosystems.
- Sc.7.3.2 Contrast biomes.
- Sc.7.3.3 Relate what happens when environments change.
- Sc.7.3.4 Generalize how individuals and groups of organisms interact.
- Sc.7.3.5 Compare symbiotic relationships.
- Sc.7.3.6 Relate how energy and matter move in ecosystems.
- Sc.7.3.7 Model the movement of energy in an ecosystem.

**Outcome Sc.7.04:** Students will deduce what matter is and how it changes. (SC.7.3.1, SC.7.5.2)

- Sc.7.4.1 Discriminate among atoms of different elements.
- Sc.7.4.2 Distinguish between mixtures and substances.
- Sc.7.4.3 Examine physical properties of matter.
- Sc.7.4.4 Relate how a change in energy affects the state of matter.
- Sc.7.4.5 Determine what happens when something dissolves.
- Sc.7.4.6 Conclude why chemical equations are useful.
- Sc.7.4.7 Assess signs of chemical change.

**Outcome Sc.7.05:** Students will illustrate how Earth systems recycle Earth materials. (SC.7.13.5)

- Sc.7.5.1 Describe the Earth's systems.
- Sc.7.5.2 State how Earth systems interact by exchanging matter and energy.
- Sc.7.5.3 Discuss the materials of the geosphere.
- Sc.7.5.4 Distinguish between the carbon cycle and the phosphorus cycle.
- Sc.7.5.5 Analyze the layered structure of the geosphere.

**Outcome Sc.7.06:** Students will analyze how natural processes change the Earth's surface over time. (SC.7.14.6)

- Sc.7.6.1 Recall scientific evidence that supports the theory of plate tectonics.
- Sc.7.6.2 Restate how the forces created by plate motion change Earth's surface.
- Sc.7.6.3 Determine what causes earthquakes and formation of volcanoes.
- Sc.7.6.4 Examine how earthquakes and volcanoes change Earth's surface.
- Sc.7.6.5 Point out the change in Earth's surface from weathering, erosion, and deposition.

**Outcome Sc.7.07:** Students will relate how people protect Earth's resources.  
(SC.7.3.1, SC.7.7.3, SC. 7.13.5)

- Sc.7.7.1 Describe natural resources.
- Sc.7.7.2 Contrast the three types of natural resources.
- Sc.7.7.3 Formulate the effects of pollution on air, water, and land resources.
- Sc.7.7.4 Generalize how people monitor resource use.
- Sc.7.7.5 Assess how people conserve resources.

## **Eighth Grade Science Curriculum**

**Purpose Statement:** Students will demonstrate appropriate foundational skills of science in the areas of motion, waves, energy, traits, natural selection, solar system and Earth's history.

**Focus:**

1. Newton's Laws of Motion
2. Waves
3. Energy
4. Traits
5. Natural Selection
6. Solar System
7. History of Earth

**Outcome Sc.8.01:** Students will interpret how forces change the motion of objects. (SC.8.1.1)

- Sc.8.1.1 Explain the law of universal gravitation.
- Sc.8.1.2 Describe how Newton's first law of motion relates to balanced and unbalanced forces.
- Sc.8.1.3 Relate Newton's laws of motion.
- Sc.8.1.4 Calculate force using Newton's second law equation.
- Sc.8.1.5 Illustrate the law of conservation of momentum.

**Outcome Sc.8.02:** Students will analyze how waves travel and interact with matter. (SC.8.2.2)

- Sc.8.2.1 Describe how light interacts with different types of matter.
- Sc.8.2.2 Correlate the relationship between wavelength and frequency of waves.
- Sc.8.2.3 Differentiate characteristics of light waves and sound waves.
- Sc.8.2.4 Diagram the electromagnetic spectrum.
- Sc.8.2.5 Interpret how sound waves travel is affected by different materials.

**Outcome Sc.8.03:** Students will explain how energy causes change. (SC.8.4.3)

- Sc.8.3.1 Define energy.
- Sc.8.3.2 Explain the law of conservation of energy.
- Sc.8.3.3 Compare different forms of energy.
- Sc.8.3.4 Diagram the electromagnetic spectrum.
- Sc.8.3.5 Correlate the relationship between energy, work, and machines.

**Outcome Sc.8.04:** Students will describe how species adapt to new environments by the natural selection process overtime. (SC.8.9.4, SC.8.10.5)

- Sc.8.4.1 Identify patterns of inheritance.
- Sc.8.4.2 Explain how traits are inherited.
- Sc.8.4.3 Describe natural selection and how it relates to adaptation.
- Sc.8.4.4 Relate how mutations play a role in the inheritance of disease.
- Sc.8.4.5 Distinguish between structural, functional, and behavioral adaptations.

**Outcome Sc.8.05:** Students will explain the interactions among bodies in space. (SC.8.11.6)

- Sc.8.5.1 Identify bodies that make up the solar system.
- Sc.8.5.2 Discuss why seasons change as the Earth moves around the sun.
- Sc.8.5.3 Explain how the solar system formed.
- Sc.8.5.4 Distinguish different phases of the moon based on position relative to Earth.
- Sc.8.5.5 Compare and contrast solar and lunar eclipses.

**Outcome Sc.8.06:** Students will describe the Earth's past by studying rocks and fossils. (SC.8.14.7)

- Sc.8.6.1 Recognize what fossils reveal about Earth's past.
- Sc.8.6.2 Explain how radioactive decay is used to date rocks.
- Sc.8.6.3 Illustrate the geologic time scale.
- Sc.8.6.4 Diagram position of rock layers based on age.
- Sc.8.6.5 Distinguish between the Paleozoic, Mesozoic, and Cenozoic eras.

## **Ninth Grade Science Curriculum**

**Purpose Statement:** The student will experiment and analyze the relationships among motion, forces, work, power, and simple machines, as well as evaluate energy transfer and basic chemistry.

**Focus:**

1. Basic Physics
2. Basic Chemistry

**Outcome Sc.9.01:** Identify cause and effect relationships with forces when compared to changes in motion. (SC.HS.1.1)

- Sc.9.1.1 Calculate, graph, and compare constant velocity of two objects.
- Sc.9.1.2 Calculate and graph acceleration.
- Sc.9.1.3 Interpret motions from graphs.
- Sc.9.1.4 Apply Newton's laws of motion to everyday experiences.
- Sc.9.1.5 Compare the momentum of objects in motion.

**Outcome Sc.9.02:** Characterize different forms of energy. (SC.HS.2.2, SC.HS.4.4)

- Sc.9.2.1 Distinguish between kinetic and potential energy.
- Sc.9.2.2 Measure and analyze energy changes of a system.
- Sc.9.2.3 Identify energy transformations within a system.
- Sc.9.2.4 Identify characteristics of waves.
- Sc.9.2.5 Apply wave concepts to sound and light.
- Sc.9.2.6 Explain radiation and radioactive dating.
- Sc.9.2.7 Perform the outcome.

**Outcome Sc.9.03:** The student will design and assemble materials for experimentation with magnetism and electricity. (SC.HS.1.1)

- Sc.9.3.1 Examine the principles of electrostatic force.
- Sc.9.3.2 Explain electric current.
- Sc.9.3.3 Compare and contrast series to parallel circuits.
- Sc.9.3.4 Describe the relationship between electricity and magnetism.
- Sc.9.3.5 Demonstrate applications of electromagnetism as they pertain to generators and motors.

**Outcome Sc.9.04:** Students will explain how the structure of the atom and the use of basic chemistry apply to self and community. (SC.HS.3.3, SC.HS.5.5)

Sc.9.4.1 Identify parts of the atom and the atom's structure.

Sc.9.4.2 Categorize elements by their atomic structure.

Sc.9.4.3 Describe chemical bonding and how elements can form compounds.

Sc.9.4.4 Differentiate between ionic and covalent bonding.

Sc.9.4.5 Compare and contrast properties of the elements as opposed to the same element in compounds.

Sc.9.4.6 Categorize and compare the five basic chemical reactions.

**Outcome Sc.9.05:** Students will explain the relationship between radioactivity and nuclear reactions.

Sc.9.5.1 Identify forces that hold the atomic nucleus together.

Sc.9.5.2 Distinguish between alpha particles, beta particles, and gamma rays.

Sc.9.5.3 Relate radioactive atomic nuclei to stable nuclei.

Sc.9.5.4 Calculate energy from mass.

Sc.9.5.5 Explain the difference between nuclear fission and nuclear fusion.

## **Tenth Grade Science Curriculum**

**Purpose Statement:** Students will demonstrate appropriate foundational skills of science in the areas of ecology, evolution, cellular biology, genetics, and human body.

**Focus:**

1. Scientific Inquiry
2. Diversity
3. Energy
4. Homeostasis
5. Change

**Outcome Sc.10.01:** Students will demonstrate how scientific methods, knowledge, and technology are used to study and explain the natural world.

- Sc.10.1.1 Compare different methods used in scientific investigation.
- Sc.10.1.2 Differentiate among hypothesis, theory, and law.
- Sc.10.1.3 Compare and contrast quantitative and qualitative research.
- Sc.10.1.4 Explain why science and technology cannot solve all problems.
- Sc.10.1.5 Demonstrate safe techniques needed for conducting scientific experiments.

**Outcome Sc.10.02:** Students will describe how humans and other organisms affect populations, the biodiversity, and the cycling of renewable resources that are found within an ecosystem. (SC.HS.7.2, SC.HS.8.3)

- Sc.10.2.1 Explain the difference between a niche and a habitat.
- Sc.10.2.2 Compare the different levels of biological organization and living relationships important in ecology.
- Sc.10.2.3 Analyze how nutrients are cycled in the abiotic and biotic parts of the biosphere.
- Sc.10.2.4 Trace the path of energy and matter in an ecosystem.
- Sc.10.2.5 Describe strategies used in conservation biology.
- Sc.10.2.6 Relate various threats to the loss of biodiversity.
- Sc.10.2.7 Relate success in protecting an endangered species to the methods used to protect it.

**Outcome Sc.10.03:** Students will explain how sub-cellular structure relates to function. (SC.HS.6.1, SC.HS.8.3)

- Sc.10.3.1 Analyze the structure of DNA.
- Sc.10.3.2 Determine how the structure of DNA enables it to reproduce itself accurately.
- Sc.10.3.3 Categorize the different kinds of mutations that occur in DNA.
- Sc.10.3.4 Compare cellular photosynthesis and respiration.
- Sc.10.3.5 Relate the structure of chloroplasts to the events in photosynthesis.
- Sc.10.3.6 Explain how cells obtain energy from cellular respiration.
- Sc.10.3.7 Sequence the steps involved in protein synthesis.

**Outcome Sc.10.04:** Students will explain the history and patterns of heredity and the effect of these patterns on an organism's health. They will explain how knowledge of these patterns and the use of genetic technology can advance human knowledge. (SC.HS.9.4)

- Sc.10.4.1 Compare codominance, multiple allelic, sex-linked, and polygenic patterns of inheritance in humans.
- Sc.10.4.2 Determine human genetic disorders that are caused by inheritance of recessive alleles.
- Sc.10.4.3 Give examples of applications and benefits of genetic engineering.
- Sc.10.4.4 Infer how meiosis leads to variation in a species.
- Sc.10.4.5 Analyze how the effort to completely map and sequence the human genome will advance human knowledge for the future.
- Sc.10.4.6 Evaluate the importance of plant and animal breeding to humans over time.
- Sc.10.4.7 Predict the possible offspring of a genetic cross by using a Punnett square.

**Outcome Sc.10.05:** Students will explain how natural selection influences the structural, physiological, and behavioral adaptations of organisms. (SC.HS.10.5)

- Sc.10.5.1 Summarize Darwin's theory of natural selection.
- Sc.10.5.2 Explain how the structural and physiological adaptations of organisms relate to natural selection.
- Sc.10.5.3 Distinguish among the types of evidence for evolution.
- Sc.10.5.4 Distinguish among the types of innate behavior and their causes.
- Sc.10.5.5 Distinguish among the types of learned behavior and their causes.
- Sc.10.5.6 Perform the outcome.

**Outcome Sc.10.06:** Students will describe systems of the human body and how they interact with one another. (SC.HS.6.1)

- Sc.10.6.1 Identify the structures and functions of the skeletal system.
- Sc.10.6.2 Compare structures and functions of the dermis and epidermis.
- Sc.10.6.3 Classify the three types of muscles.
- Sc.10.6.4 Explain the mechanics of breathing.
- Sc.10.6.5 Summarize the negative feedback mechanism controlling hormone levels in the body.
- Sc.10.6.6 Outline the pathway that food follows through the digestive system.
- Sc.10.6.7 Analyze how nerve impulses travel within the nervous system.

## **Integrated Science Curriculum**

**Purpose Statement:** Students will explore the individual science disciplines of physics, chemistry, and Earth science, plus areas where these disciplines overlap.

**Focus:**

1. Motion
2. Electricity, Magnetism, Waves
3. Matter
4. Chemical Reactions
5. Land and Atmosphere

**Outcome Sc.IS.01:** Students will describe the characteristics of motion. (SC.HSP.1.1)

- Sc.IS.1.1 Discuss information needed to describe the motion of an object.
- Sc.IS.1.2 Interpret a graph to understand the motion an object.
- Sc.IS.1.3 Compare speed, velocity, and acceleration.
- Sc.IS.1.4 Contrast speed, velocity, and acceleration.
- Sc.IS.1.5 Establish that gravity is not unique to Earth.
- Sc.IS.1.6 Illustrate Newton's laws of motion.
- Sc.IS.1.7 Examine the relationship between momentum and energy.

**Outcome Sc.IS.02:** Students will explain electricity, magnetism, and sound and light waves. (SC.HSP.2.2, SC.HSP.16.4)

- Sc.IS.2.1 Describe the nature and range of electromagnetic waves.
- Sc.IS.2.2 Establish the rule for the attraction and repulsion of magnetic poles.
- Sc.IS.2.3 Distinguish between negative and positive electric charges.
- Sc.IS.2.4 Compare the gravitational field to the electric field.
- Sc.IS.2.5 Correlate current, voltage, and resistance in electric circuits.
- Sc.IS.2.6 Relate magnetic field strength to magnetic field patterns.
- Sc.IS.2.7 Distinguish among amplitude, wavelength, frequency, and period.

**Outcome Sc.IS.03:** Students will describe the makeup and nature of matter.  
(SC.HSP.3.1)

- Sc.IS.3.1 Recognize the elements of the periodic table as the fundamental building blocks of matter.
- Sc.IS.3.2 Describe the structure of the atomic nucleus and how the atomic mass of an element is calculated.
- Sc.IS.3.3 Describe how the strong nuclear force acts to hold nucleons together in the atomic nucleus.
- Sc.IS.3.4 Describe how the process of nuclear fusion leads to the production of energy such as occurs in the Sun.
- Sc.IS.3.5 Conclude the molecule is a fundamental unit of matter.
- Sc.IS.3.6 Contrast compounds with the elements from which they are created.

**Outcome Sc.IS.04:** Students will evaluate transformations during chemical reactions as atoms rearrange to create one or more new compounds.  
(SC.HSP.5.3)

- Sc.IS.4.1 Demonstrate how a catalyst can speed up a chemical reaction.
- Sc.IS.4.2 Show how electrons behave as though they are arranged in a series of shells around the centered atomic nucleus.
- Sc.IS.4.3 Analyze bonding patterns that hold atoms together.
- Sc.IS.5.4 Formulate the requirements that must be met in order for a chemical reaction to occur.
- Sc.IS.6.5 Predict when a chemical undergoes oxidation or reduction.

**Outcome Sc.IS.05:** Students will examine how Earth's land and atmosphere affects the planet and life upon it. (SC.HS.12.2, SC.HS.13.3, SC.HS.14.4)

- Sc.IS.5.1 Describe the basic chemical composition of each of Earth's compositional layers.
- Sc.IS.5.2 Cite Wegener's evidence of continental drift.
- Sc.IS.5.3 Summarize the theory of plate tectonics.
- Sc.IS.5.4 Differentiate among the six elements of weather.
- Sc.IS.5.5 Examine the layers of the atmosphere and describe their principal characteristics.
- Sc.IS.5.6 Judge how the greenhouse effect and solar radiation warm the atmosphere.
- Sc.IS.5.7 Predict what happens when a cold air mass meets a warm air mass.
- Sc.IS.5.8 Interpret how the evaporation and condensation of water produce weather conditions.

**Outcome Sc.IS.06:** Students will investigate the behavior of the solar system as objects bound to the Sun. (SC.HS.11.1)

- Sc.IS.6.1 Recognize features of the Sun.
- Sc.IS.6.2 Examine the major properties of the four inner planets: Mercury, Venus, Earth, and Mars.
- Sc.IS.6.3 Examine the major properties of the four outer planets: Jupiter, Saturn, Uranus, and Neptune.
- Sc.IS.6.4 Compare and contrast asteroids and the Oort cloud.
- Sc.IS.6.5 Prioritize and summarize phases of the Moon.

## **Physics Science Curriculum**

**Purpose Statement:** Students will describe and make predictions about the world by using basic physical science concepts, equations, and assumptions.

**Focus:**

1. Mathematical Processes
2. Motion and Vectors
3. Energy
4. Electricity
5. Waves and Electromagnetic Radiation

**Outcome Sc.P.01:** Students will use mathematics to analyze and evaluate experimental data.

- Sc.P.1.1 Develop the skills to use significant digits in computation.
- Sc.P.1.2 Interpret mathematical relationships from graphs.
- Sc.P.1.3 Compare and contrast the linear, inverse, and quadratic relationships.
- Sc.P.1.4 Analyze linear, inverse, and quadratic relationships.
- Sc.P.1.5 Describe motion, velocity, and acceleration using graphs.

**Outcome Sc.P.02:** Students will evaluate the different types of motion. (SC.HSP.1.1)

- Sc.P.2.1 Describe the various types of motion.
- Sc.P.2.2 Analyze constant velocity.
- Sc.P.2.3 Analyze acceleration.
- Sc.P.2.4 Analyze projectile motion.
- Sc.P.2.5 Analyze circular motion.
- Sc.P.2.6 Analyze periodic motion.
- Sc.P.2.7 Analyze harmonic motion.

**Outcome Sc.P.03:** Students will evaluate vector diagrams to represent forces and motion. (SC.HSP.1.1)

- Sc.P.3.1 Describe and construct vectors.
- Sc.P.3.2 Apply vector diagrams to force resolutions.
- Sc.P.3.3 Create a motion diagram.
- Sc.P.3.4 Compare and contrast distance and displacement.
- Sc.P.3.5 Relate data from position-time graphs to the motion of an object.

**Outcome Sc.P.04:** Students will defend the law of universal gravitation. (SC.HSP.1.1, SC.HSP.16.4)

- Sc.P.4.1 Measure the value of gravitational acceleration.
- Sc.P.4.2 Demonstrate Kepler's laws of planetary motion.
- Sc.P.4.3 Apply Newton's law of universal gravitation.
- Sc.P.4.4 Apply Kepler's and Newton's laws to current space technology.
- Sc.P.4.5 Compare and contrast gravitational mass and inertial mass.

**Outcome Sc.P.05:** Students will apply momentum and impulse principles to interactive matter. (SC.HSP.1.1)

- Sc.P.5.1 Demonstrate the properties of momentum.
- Sc.P.5.2 Describe the relationship of force and momentum by including impulse.
- Sc.P.5.3 Formulate the concept of momentum conservation in a system.
- Sc.P.5.4 Contrast conservation of momentum for elastic and inelastic collisions.
- Sc.P.5.5 Demonstrate conservation of energy within elastic collisions.
- Sc.P.5.6 Demonstrate conservation of energy within inelastic collisions.

**Outcome Sc.P.06:** Students will apply the concepts of work and energy to the use of simple machines. (SC.HSP.4.3)

- Sc.P.6.1 Calculate work, power, mechanical advantage and efficiency of machines.
- Sc.P.6.2 Identify and also use simple machines.
- Sc.P.6.3 Analyze energy transfers in simple machines.
- Sc.P.6.4 Relate work and energy.
- Sc.P.6.5 Describe components of a compound machine.

**Outcome Sc.P.07:** Students will develop the relationship between waves and energy transfer. (SC.HSP.2.2)

- Sc.P.7.1 Differentiate wave properties and interactions.
- Sc.P.7.2 Compare and contrast transverse and compression waves.
- Sc.P.7.3 Apply principles of wave interactions to sound.
- Sc.P.7.4 Demonstrate, through experimentation, the application of reflection and transmission of light with a variety of shapes and substances.
- Sc.P.7.5 Relate speed, wavelength, and frequency of a wave.

**Outcome Sc.P.08:** Students will differentiate between the properties and uses of electromagnetic fields. (SC.HSP.16.4)

- Sc.P.8.1 Identify electric field forces and their interactions and applications.
- Sc.P.8.2 Compare circuits and their applications to energy transfer.
- Sc.P.8.3 Analyze the properties of electromagnetic devices and their applications in society.
- Sc.P.8.4 Compare and contrast a generator and an electric motor.
- Sc.P.8.5 Explain what affects the induced electromotive force and current produced by changing magnetic field.

## **Chemistry Science Curriculum**

**Purpose Statement:** The student will experiment and investigate the properties of matter and the changes that matter can undergo.

**Focus:**

1. Basic Chemistry Review
2. Stoichiometry
3. Chemical Bonding
4. Acids/Bases
5. Solution Equilibrium
6. Gas Laws

**Outcome Sc.C.01:** Students will describe the structure of matter as it is understood today. (SC.HSP.3.1)

- Sc.C.1.1 Compare elements, compounds, and mixtures.
- Sc.C.1.2 Differentiate between the parts and order of the structure of atoms as related to the current atomic theory.
- Sc.C.1.3 Describe the current atomic structure as described by quantum mechanics.
- Sc.C.1.4 Relate the structure of the elements with their positions on the periodic table.
- Sc.C.1.5 Classify elements and their properties according to periodic trends.

**Outcome Sc.C.02:** Students will compare and contrast the different types of chemical bonds. (SC.HSP.3.1)

- Sc.C.2.1 Identify compounds according to type.
- Sc.C.2.2 Apply proper nomenclature when referring to different compounds.
- Sc.C.2.3 Write the correct symbols and/or formulas for given substances.
- Sc.C.2.4 Describe the characteristics of a metallic bond.
- Sc.C.2.5 Relate the octet rule and the formation of chemical bonds.

**Outcome Sc.C.03:** Students will assemble the proper symbols and formulas for chemical reactions and differentiate between the different classes of reactions. (SC.HSP.5.3)

- Sc.C.3.1 Relate the law of conservation of mass/atoms to chemical reactions.
- Sc.C.3.2 Describe the 5 basic types of reactions.
- Sc.C.3.3 Practice balancing equations.
- Sc.C.3.4 Demonstrate the law of conservation of mass with experiments.
- Sc.C.3.5 Predict whether reactions in aqueous solutions will produce a precipitate, water, or a gas.

**Outcome Sc.C.04:** Students will perform quantitative analysis of chemical reactions using stoichiometry. (SC.HSP.4.2, SC.HSP.5.3)

- Sc.C.4.1 Describe the concept of the mole.
- Sc.C.4.2 Apply multidimensional analysis to predict chemical products and reactants.
- Sc.C.4.3 Determine the heat of reaction using calorimetry.
- Sc.C.4.4 Apply Hess's law to a series of reactions.
- Sc.C.4.5 Explain how heat is absorbed or released in a chemical reaction.

**Outcome Sc.C.05:** Students will calculate equilibrium constants from concentration data. (SC.HSP.5.3)

- Sc.C.5.1 Prepare solutions of given concentrations.
- Sc.C.5.2 Recognize characteristics of chemical equilibrium.
- Sc.C.5.3 Predict equilibrium in concentrations for chemical reactions.
- Sc.C.5.4 Explain how Le Chatelier's principle applies to equilibrium systems.
- Sc.C.5.5 Describe how solubility of a compound is calculated from its solubility product constant.

**Outcome Sc.C.06:** Students will describe the behavior and properties of gases. (SC.HSP.4.2)

- Sc.C.6.1 Define and measure gas pressure.
- Sc.C.6.2 Develop Boyle's law with experiments.
- Sc.C.6.3 Develop Charles's law with experiments.
- Sc.C.6.4 Distinguish between real and ideal gases.
- Sc.C.6.5 Develop the concept of the ideal gas law.

**Outcome Sc.C.07:** Students will distinguish the properties of acids and bases.

- Sc.C.7.1 Recognize the pH scale as a means of determining acid-base concentration.
- Sc.C.7.2 Understand the use of indicators in identifying acids or bases.
- Sc.C.7.3 Differentiate between acidic, basic, and neutral solutions.
- Sc.C.7.4 Explain how strength of an acid or base is related to its degree of ionization.
- Sc.C.7.5 Calculate pH and pOH of aqueous solutions.

**Outcome Sc.C.08:** Students will apply the concept of electron transfer in balancing chemical equations.

- Sc.C.8.1 Identify oxidation/reduction reactions.
- Sc.C.8.2 Determine oxidation numbers of elements and compounds.
- Sc.C.8.3 Balance redox reactions using various methods.
- Sc.C.8.4 Identify uses of redox reactions.
- Sc.C.8.5 Relate how changes in oxidation numbers are used to balance redox equations.

## Anatomy and Physiology Science Curriculum

**Purpose Statement:** Students will explain structures and functions of the human body.

**Focus:**

1. Tissues
2. Systems: Skeletal, Muscular, Nervous, Cardiovascular

**Outcome Sc.AP.01:** Students will explain how the body is organized to maintain an internal environment.

- Sc.AP.1.1 Define *anatomy* and *physiology* and explain how they are related.
- Sc.AP.1.2 List and describe the major requirements of organisms.
- Sc.AP.1.3 Describe the locations of the major body cavities.
- Sc.AP.1.4 Describe the general functions of each organ system.
- Sc.AP.1.5 Explain the levels of organization in the human body.

**Outcome Sc.AP.02:** Students will explain the four major types of tissues as they assist the physiology of organs and organ systems.

- Sc.AP.2.1 List the four major tissues types and provide examples of where each occurs in the body.
- Sc.AP.2.2 Describe the general characteristics and functions of epithelial tissues.
- Sc.AP.2.3 Describe the major functions of each type of connective tissue.
- Sc.AP.2.4 Distinguish among the three types of muscle tissues.
- Sc.AP.2.5 Describe the general characteristics and functions of nervous tissues.

**Outcome Sc.AP.03:** Students will describe the components and multifunctional aspects of the skeletal system. (SC.HSP.6.3)

- Sc.AP.3.1 Describe the macroscopic and microscopic structure of a long bone and list the functions of these parts.
- Sc.AP.3.2 Discuss the major functions of bones.
- Sc.AP.3.3 Distinguish between intramembranous and endochondral bones and explain how such bones develop and grow.
- Sc.AP.3.4 Distinguish between the axial and appendicular skeletons and name the major parts of each.
- Sc.AP.3.5 Explain how skeletal muscles produce movements at joints and identify several types of joint movements.
- Sc.AP.3.6 Illustrate six types of synovial joints.

**Outcome Sc.AP.04:** Students will distinguish between the three types of muscle of which all provide force for movement. (SC.HSP.6.4)

- Sc.AP.4.1 Name the major parts of skeletal muscle fiber and describe the function of each.
- Sc.AP.4.2 Explain the major events of skeletal muscle fiber contraction.
- Sc.AP.4.3 Compare the contraction mechanisms of skeletal and smooth muscle cells.
- Sc.AP.4.4 Compare the contraction mechanism of skeletal and cardiac muscle cells.
- Sc.AP.4.5 Explain how the attachments, locations, and interactions of skeletal muscles make possible certain movements.

**Outcome Sc.AP.05:** Students will describe structures and functions of the central and peripheral nervous systems that process a wide variety of information from the external environment. (SC.HSP.6.5)

- Sc.AP.5.1 Name the major parts and functions of the brain.
- Sc.AP.5.2 Describe the structure of the spinal cord and its major function.
- Sc.AP.5.3 Distinguish between the major parts of the peripheral nervous system.
- Sc.AP.5.4 Describe the functions of the autonomic nervous system.
- Sc.AP.5.5 Describe the general functions of the nervous system.

**Outcome Sc.AP.06:** Students will describe the blood as being vital in carrying substances between body cells and the external environment to promote homeostasis. (SC.HSP.6.6)

- Sc.AP.6.1 Explain the mechanisms that help to achieve *hemostasis*.
- Sc.AP.6.2 Explain blood typing.
- Sc.AP.6.3 Distinguish among the formed elements of blood and the liquid portion of blood.
- Sc.AP.6.4 Summarize the control of red blood cells.
- Sc.AP.6.5 Distinguish among the five types of white blood cells and give the function(s) of each type.

## **Advanced Biology Science Curriculum**

**Purpose Statement:** Students will demonstrate critical thinking skills in examining cells, genetics, evolution, and circulatory system.

**Focus:**

1. Cells
2. Genetics
3. Evolution
4. Circulatory System

**Outcome Sc.AB.01:** Students will explain structures and functions of cell parts.

- Sc.AB.1.1 State cell wall characteristics.
- Sc.AB.1.2 Compare and contrast with different electron microscopes.
- Sc.AB.1.3 Explain the functions of organelles.
- Sc.AB.1.4 Show how the cellular environment affects enzyme activity.
- Sc.AB.1.5 Summarize how membranes organize the chemical activities of cells.

**Outcome Sc.AB.02:** Students will explain the science of genetics and that DNA is the genetic material.

- Sc.AB.2.1 State how information for a trait is described.
- Sc.AB.2.2 Describe Mendel's principal of independent assortment.
- Sc.AB.2.3 Describe how the AIDS virus makes DNA on an RNA template.
- Sc.AB.2.4 Show how DNA directs the process of protein synthesis.
- Sc.AB.2.5 Demonstrate how mutations can change the meaning of genes.

**Outcome Sc.AB.03:** Students will explain evolutionary history and how populations evolve.

- Sc.AB.3.1 Describe how natural selection is the mechanism of evolution.
- Sc.AB.3.2 Compare the gradualist model and punctuated equilibrium model of evolution.
- Sc.AB.3.3 Relate a case which shows the effects of natural selection.
- Sc.AB.3.4 Analyze how continental drift has played a major role in macroevolution.
- Sc.AB.3.5 Summarize why some species often have reduced variation.

**Outcome Sc.AB.04:** Students will demonstrate the evolution of microbial life and animal diversity.

- Sc.AB.4.1 Describe the variety of prokaryotic organism shapes.
- Sc.AB.4.2 Describe how the eukaryotes probably evolved from prokaryotes.
- Sc.AB.4.3 Compare and contrast the characteristics of amphibians and reptiles.
- Sc.AB.4.4 Compare the characteristics of reptiles and birds.
- Sc.AB.4.5 Create a phylogenetic tree.

**Outcome Sc.AB.05:** Students will relate characteristics and problems associated with the circulatory system.

- Sc.AB.5.1 Describe how hemoglobin transports carbon dioxide.
- Sc.AB.5.2 Explain low blood pressure.
- Sc.AB.5.3 Explain high blood pressure.
- Sc.AB.5.4 Determine how capillaries allow the transfer of substances through their walls.
- Sc.AB.5.5 Examine the components of the blood.
- Sc.AB.5.6 Analyze a cardiovascular disease.