Sterling Upper Elementary Scope and Sequence

Internal Document

SCIENCE

Forces and Motion	
Skill Developed	**Lesson/ Materials**

• How force affects motion
• Understand force, motion and the relationship between them
• Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves.
	Physics of Simple Machines
	• Investigation of the types of machines used to improve technology,
	• Demonstrations, Models, and Experiments to introduce Simple Machines
	  o Inclined Plane
	  o Lever
	  o Wedge
	  o Screw
	  o Wheel and Axle
	  o Pulley
	• Demonstrations and Experiments to investigate concepts of friction, inertia, and composition
	• Experiments:
	  ○ Magnets and Magnetism
	  ○ Sound and Wavelength

State Standards Alignment

4.P.1 Explain how various forces affect the motion of an object.
4.P.1.1 Explain how magnets interact with all things made of iron and with other magnets to produce motion without touching them .
4.P.1.2 Explain how electrically charged objects push or pull on other electrically charged objects and produce motion .

5.P.1 Understand force, motion and the relationship between them.
5.P.1.1 Explain how factors such as gravity, friction, and change in mass affect the motion of objects .
5.P.1.2 Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel .
5.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time .
5.P.1.4 Predict the effect of a given force or a change in mass on the motion of an object

6.P.1 Understand the properties of waves and the wavelike property of energy in earthquakes, light and sound waves.
6.P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light and sound .
6.P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight .
6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound and hearing.

Matter: Properties and Change

Skill Developed	Lesson/ Materials
• Understand the composition and properties of matter before and after they undergo a change or interaction. • Understand the interactions of matter and energy and the changes that occur. • Understand the structure, classifications and physical properties of matter. • Recognize that energy takes various forms that may be grouped based on their interaction with matter. • Explain how the properties of some materials change as a result of heating and cooling. • Understand characteristics of energy transfer and interactions of matter and energy.	**Physical Science:** • **Three States of Matter** ○ Models of States of Matter ○ Demonstrations, Models, and Experiments: Temperature, Movement, and Weight Affect States of Matter ○ Characteristics of Liquids and Solids • **Motion and Forces** ○ Demonstrations and experiments ○ Laws of Attraction and Gravity ○ Demonstrations and experiments to develop ○ Investigation of Mass and Force ○ Investigation of relationship between mass, weight, and force ○ Use of tools, such as Balance, Triple Beam Balance, and Scales, including Standard and Spring Scales, to study and compare mass, weight, and force ○ Demonstrations and Experiments to show that states of matter relate with and arrange themselves according to gravity • **Electricity** ○ Conductors vs. Insulators ○ Exploration of concept of circuit ○ Types of circuits ○ Reflection/ Refraction lenses ● **Chemistry** Different Ways of Combing ○ Physical and Chemical Change ○ Combining ○ Separating ○ Saturation, Supersaturation, and Crystallization Acids and Bases ○ pH Scale ○ Litmus test **Introduction to the Periodic Table of Elements** ● Introduction to Atomic Structure with the Atom Board ● ETC Chemistry materials

State Standards Alignment

4.P.2 Understand the composition and properties of matter before and after they undergo a change or interaction.
4.P.2.1 Compare the physical properties of samples of matter (strength, hardness, flexibility, ability to conduct heat, ability to conduct electricity, ability to be attracted by magnets, reactions to water and fire) .
4.P.2.2 Explain how minerals are identified using tests for the physical properties of hardness, color, luster, cleavage and streak .
4.P.2.3 Classify rocks as metamorphic, sedimentary or igneous based on their composition, how they are formed and the processes that create them .

5.P.2 Understand the interactions of matter and energy and the changes that occur.
5.P.2.1 Explain how the sun's energy impacts the processes of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff) .
5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction .
5.P.2.3 Summarize properties of original materials, and the new material(s) formed, to demonstrate that a change has occurred .

6.P.2 Understand the structure, classifications and physical properties of matter.
6.P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements .

6.P.2.2 Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase .
6.P.2.3 Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight .

ENERGY: CONSERVATION AND TRANSFER
4.P.3 Recognize that energy takes various forms that may be grouped based on their interaction with matter.
4.P.3.1 Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change .
4.P.3.2 Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed .

ENERGY: CONSERVATION AND TRANSFER
5.P.3 Explain how the properties of some materials change as a result of heating and cooling.
5.P.3.1 Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures . (conduction, convection or radiation)
5.P.3.2 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications .

6.P.3 Understand characteristics of energy transfer and interactions of matter and energy.
6.P.3.1 Illustrate the transfer of heat energy from warmer objects to cooler ones using examples of conduction, radiation and convection and the effects that may result .
6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature .
6.P.3.3 Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators) .

Earth in the Universe

Skill Developed	Lesson/ Materials
• Explain the causes of day and night and phases of the moon. • Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe. • Understand weather patterns and phenomena, making connections to the weather in a particular place and time. • Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans. • Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.	● Great Lessons: ○ God who has no hands ○ Timeline of Life ○ Black strip ○ Clock of Eons ○ Timeline of Man ● The Sun and the Earth ○ Day and Night ○ Time Zones - Time Zone Work Chart ○ Latitude and Longitude ○ International Date Line ○ Review Cycle of Solstices, Equinoxes, Seasons ○ Tilt of the Earth's Axis and Its Effects ○ Temperature Zones ○ Temperature Variation in Climatic Zones ● Work of Air ○ Air movement ○ Heating and Cooling ○ Weather and Wind Patterns ○ Global Climate Patterns ○ Heating and Cooling Properties ○ Land and Sea Breezes ○ Cloud Formation and types ○ High and Low Pressure Areas ● Composition of the Earth ○ Continental Drift ○ Layers of the Earth ○ Relative Thickness of the Layers ○ Functions of Layers ● Plate Tectonics ○ Movements of Earth's Crust ○ Faults ○ Geysers ○ Earthquakes ○ Rock Formation ○ Rock Cycle ○ Rock Types ○ Effects of Erosion and Weathering

State Standards Alignment

4.E.1 Explain the causes of day and night and phases of the moon.
4.E.1.1 Explain the cause of day and night based on the rotation of Earth on its axis .
4.E.1.2 Explain the monthly changes in the appearance of the moon, based on the moon's orbit around the Earth .

6.E.1 Understand the earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe.
6.E.1.1 Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, tides, phases of the moon, and eclipses .
6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun .
6.E.1.3 Summarize space exploration and the understandings gained from them .

EARTH SYSTEMS, STRUCTURES AND PROCESSES
5.E.1 Understand weather patterns and phenomena, making connections to the weather in a particular place and time.

5.E.1 1 Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns .
5.E.1.2 Predict upcoming weather events from weather data collected through observation and measurements .
5.E.1.3 Explain how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation .

6.E.2 Understand the structure of the earth and how interactions of constructive and destructive forces have resulted in changes in the surface of the Earth over time and the effects of the lithosphere on humans.
6.E.2.1 Summarize the structure of the earth, including the layers, the mantle and core based on the relative position, composition and density .
6.E.2.2 Explain how crustal plates and ocean basins are formed, move and interact using earthquakes, heat flow and volcanoes to reflect forces within the earth .
6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops .
6.E.2.4 Conclude that the good health of humans requires: monitoring the lithosphere, maintaining soil quality and stewardship .

EARTH HISTORY
4.E.2 Understand the use of fossils and changes in the surface of the earth as evidence of the history of Earth and its changing life forms.
4.E.2.1 Compare fossils (including molds, casts, and preserved parts of plants and animals) to one another and to living organisms .
4.E.2.2 Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.
4.E.2.3 Give examples of how the surface of the earth changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes .

Ecosystems

Skill Developed	Lesson/ Materials

• Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
• Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.
• Understand the interdependence of plants and animals with their ecosystem
• Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.
	● Integrated with Cultural studies
	● The Ocean Ecosystem
	● Environmental Trip
	● Producers and Consumers
	● Shoe box ecosystem/ Terrarium Project
	● Riparian Ecology
	  ○ Study of River Basins of US and North Carolina
	  ○ Local Field studies to explore ecosystems
	  ○ Study of a local river Environmental Trip
	● Mountain Ecosystem
	  ○ Local Field studies to explore ecosystem
	  ○ Environmental Trip
	● Chart of Interdependencies
	  ○ Presentation of the Concept of Supranatura
	  ○ Study of Environment and Society
	● Work of Water
	● Work of Air
	● North Carolina Lessons and research.
	● Human Body Study
	  ○ The Story of the Great River and Chart
	  ○ Demonstrations, ETC Card Material Models, Experiments, and Charts of Human Body Systems
	  ○ Cells
	  ○ Microscope Studies
	  ○ The Respiratory System
	  ○ The Sensory System
	  ○ The Skeletal System
	  ○ The Digestive System
	  ○ Nutrition
	  ○ The Reproductive System and Heredity
	  ○ Genetics
	  ○ DNA/RNA
	  ○ Dominant/Recessive genes
	  ○ models of gentic predictions eg. Punnett squares.

State Standards Alignment

4.L.1 Understand the effects of environmental changes, adaptations and behaviors that enable animals (including humans) to survive in changing habitats.
4.L.1.1 Give examples of changes in an organism's environment that are beneficial to it and some that are harmful .
4.L.1.2 Explain how animals meet their needs by using behaviors in response to information received from the environment .
4.L.1.3 Explain how humans can adapt their behavior to live in changing habitats (e .g ., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion) .
4.L.1.4 Explain how differences among animals of the same population sometimes give individuals an advantage in surviving and reproducing in changing habitats .

5.L.1 Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.
5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive .
5.L.1.2 Compare the major systems of the human body (digestive, respiratory, circulatory, muscular, skeletal, and cardiovascular) in terms of their functions necessary for life .

5.L.2 Understand the interdependence of plants and animals with their ecosystem.
5.L.2.1 Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands .

5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors) .
5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem .

6.L.2 Understand the flow of energy through ecosystems and the responses of populations to the biotic and abiotic factors in their environment.
6.L.2.1 Summarize how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within food chains and food webs (terrestrial and aquatic) from producers to consumers to decomposers .
6.L.2.2 Explain how plants respond to external stimuli (including dormancy and forms of tropism) to enhance survival in an environment .
6.L.2.3 Summarizehowtheabioticfactors(suchastemperature,water,sunlight,andsoilquality) of biomes (freshwater, marine, forest, grasslands, desert, tundra) affect the ability of organisms to grow, survive and/or create their own food through photosynthesis .

Structure and Functions of Living Organisms

Skill Developed	Lesson/ Materials
● Understand the structures, processes and behaviors of plants that enable them to survive and reproduce. ● Understand food and the benefits of vitamins, minerals and exercise ● Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.	• Biology ○ Six Kingdoms of Life ○ Study of the function and evolution of life with Timeline of Life, Study of Human Evolution Timeline of Human Beings I and II, and Timeline of Human Story • Zoology ○ Vital functions ○ Independent Research Projects ○ Kingdom Animalia ○ Text and Cards ○ Folders and Circles • Botany ○ The Plant's Story ○ Demonstrations, Experiments, and Charts to explore The Needs of Plants ○ Demonstrations, Experiments, Models and Charts to study the Plant and its Vegetative and Reproductive Parts ○ Independent Research and Reports ○ Botany Activity Cards ○ Botany Command Cards ○ Scientific Classification with a Classification Scheme

State Standards Alignment

6.L.1 Understand the structures, processes and behaviors of plants that enable them to survive and reproduce.
6.L.1.1 Summarize the basic structures and functions of flowering plants required for survival, reproduction and defense .
6.L.1.2 Explain the significance of the processes of photosynthesis, respiration, and transpiration to the survival of green plants and other organisms .

MOLECULAR BIOLOGY
4.L.2 Understand food and the benefits of vitamins, minerals and exercise.
4.L.2.1 Classify substances as food or non-food items based on their ability to provide energy and materials for survival, growth and repair of the body .
4.L.2.2 Explain the role of vitamins, minerals and exercise in maintaining a healthy body .'
Evolution and Genetics

5.L.3 Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.
5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism .
5.L.3.2 Give examples of likenesses that are inherited and some that are not .