ELEMENTARY SCIENCE CURRICULUM | 4TH GRADE

Course Information - K-12 Science

Fourth Grade Science

CURRICULUM/CONTENT AREA	COURSE LENGTH
Science	1 year
GRADE LEVEL	**DATE LAST REVIEWED**
4th	2023
PREREQUISITE(s) ***if applicable***	**BOARD APPROVAL DATE**
NA	02/2024
PRIMARY RESOURCE ***if applicable***	
Carolina Building Blocks of Science	

Desired Results

COURSE DESCRIPTION AND PURPOSE

Elmbrook's elementary science programming is designed to introduce students to the basic principles and concepts of science. It provides a foundation for scientific thinking and inquiry by exploring various scientific disciplines such as physical, life, and earth and space sciences. Overall, our elementary science programming aims to instill a love for science, nurture critical thinking skills, and lay the groundwork for further scientific study as students progress through their education. It provides a solid foundation for understanding the natural world and fosters a scientific mindset that can be applied to various aspects of life.

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS
CC1: Patterns	SCI.CC1.3-5 Students identify similarities and differences in order to sort and classify natural objects and designed products. They identify patterns related to time, including simple rates of change and cycles, and use these patterns to make predictions.	• Where do you get your energy? • How are an organism's structures adapted for its environment?
CC2: Cause and	SCI.CC2.3-5 Students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity may or may not signify a	

Effect	cause-and-effect relationship.
CC3: Scale, Proportion, and Quantity	SCI.CC3.3-5 Students recognize natural objects and observable phenomena exist from the very small to the immensely large. They use standard units to measure and describe physical quantities such as mass, time, temperature, and volume
CC4: Systems and System Models	SCI.CC4.3-5 Students understand a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. They also describe a system in terms of its components and their interactions.
CC5: Energy and Matter	SCI.CC5.3-5 Students understand matter is made of particles and energy can be transferred in various ways and between objects. Students observe the conservation of matter by tracking matter flows and cycles before and after processes, recognizing the total mass of substances does not change. Note: In this grade band, students are not expected to be able to differentiate between mass and weight.
CC6: Structure and Function	SCI.CC6.3-5 Students understand different materials have different substructures, which can sometimes be observed, and substructures have shapes and parts that serve functions.
CC7: Stability and Change	SCI.CC7.3-5 Students measure change in terms of differences over time and observe that change may occur at different rates. They understand some systems appear stable, but over long periods of time they will eventually change.

- What are Earth's layers?

Kindergarten			First Grade			Second Grade			Third Grade			Fourth Grade			Fifth Grade		
UNIT 1 Push, Pull, Go	UNIT 2 Living Things and Their Needs	UNIT 3 Weather and Sky	UNIT 1 Light and Sound Waves	UNIT 2 Exploring Organisms	UNIT 3 Sky Watchers	UNIT 1 Matter	UNIT 2 Ecosystem Diversity	UNIT 3 Earth Materials	UNIT 1 Forces and Interactions	UNIT 2 Life and Ecosystems	UNIT 3 Weather and Climate Patterns	UNIT 1 Energy Works	UNIT 2 Plant and Animal Structures	UNIT 3 Changing Earth	UNIT 1 Structures and Properties of Matter	UNIT 2 Matter and Energy in Ecosystems	UNIT 3 Earth and Space Systems

Science Standards by Unit and Grade Level Band	Grade Band	Unit 1	Unit 2	Unit 3
Cross Cutting Concepts				
Standard SCI.CC1 - Patterns Students use science and engineering practices, disciplinary core ideas, and patterns to make sense of phenomena and solve problems	K-2	1, 2	K, 1	K-2
	3-5	3, 4	3, 5	3-5
Standard SCI.CC2 - Cause and Effect Students use science and engineering practices, disciplinary core ideas, and cause and effect relationships to make sense of phenomena and solve problems.	K-2	K-2	K, 2	K
	3-5	3-5	3-5	3-5
Standard SCI.CC3 - Scale, Proportion, and Quantity Students use science and engineering practices, disciplinary core ideas, and an understanding of scale, proportion, and quantity to make sense of phenomena and solve problems.	K-2			K, 1
	3-5	5	3	5
Standard SCI.CC4 - Systems and System Models Students use science and engineering practices, disciplinary core ideas, and an understanding of systems and system models to make sense of phenomena and solve problems.	K-2		K	
	3-5		3-5	5
Standard SCI.CC5 - Energy and Matter Students use science and engineering practices, disciplinary core ideas, and an understanding of energy and matter to make sense of phenomena and solve problems.	K-2	2		
	3-5	4	5	
Standard SCI.CC6 - Structure and Function Students use science and engineering practices, disciplinary core ideas, and an understanding of structure and function to make sense of phenomena and solve problems.	K-2		1, 2	
	3-5		3	
Standard SCI.CC7 - Stability and Change Students use science and engineering practices, disciplinary core ideas, and an understanding of stability and change to make sense of phenomena and solve problems.	K-2			2
	3-5			3
Science and Engineering Practices				
Standard SCI.SEP1 - Asking Questions and Defining Problems Students ask questions and define problems, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2	K		K
	3-5	3-5	5	
Standard SCI.SEP2 - Developing and Using Models Students develop and use models, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2		K-2	K, 2
	3-5	3-5	3-5	4, 5

Standard SCI.SEP3 - Planning and Conducting Investigations Students plan and conduct investigations, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2	K-2	2	K-2
	3-5	3, 4	5	4
Standard SCI.SEP4 - Analyze and Interpret Data Students analyze and interpret data, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2	K-2	K	K, 1
	3-5	5	3, 5	3-5
Standard SCI.SEP5 - Mathematics and Computational Thinking Students use mathematics and computational thinking, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2		K	
	3-5	3, 5		5
Standard SCI.SEP6 - Construct Explanations and Design Solutions Students construct explanations and design solutions, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.	K-2	1,2	1	K, 2
	3-5	3, 4	3-5	3, 4, 5
Standard SCI.SEP7 - Engage in Arguments Students engage in argument from evidence, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomenon and solve problems.	K-2	2	K-2	
	3-5	5	3-5	3, 5
Standard SCI.SEP8 - Obtain, evaluate, and Communication Information Students obtain, evaluate, and communicate information, in conjunction with using cross cutting concepts and disciplinary core ideas, to make sense of phenomenon and solve problems.	K-2		K-2	1, 2
	3-5	3, 4		5
Disciplinary Core Ideas				
Life Science				
Standard SCI.LS1 Students use science and engineering practices, crosscutting concepts, and an understanding of structures and processes (on a scale from molecules to organisms) to make sense of phenomena and solve problems.	K-2		K-2	
	3-5		3-5	
Standard SCI.LS2 Students use science and engineering practices, crosscutting concepts, and an understanding of interactions, energy, and dynamics within ecosystems to make sense of phenomena and solve problems.	K-2		K, 2	
	3-5		3, 5	
Standard SCI.LS3 Students use science and engineering practices, crosscutting concepts, and an understanding of heredity to make sense of phenomena and solve problems.	K-2		1	
	3-5		3, 5	
Standard SCI.LS4 Students use science and engineering practices, crosscutting concepts, and an understanding of biological evolution to make sense of phenomena and solve problems.	K-2		K, 2	
	3-5		3	
Physical Science				
Standard SCI.PS1 Students use science and engineering practices, crosscutting concepts, and an understanding of matter and its interactions to make sense of phenomena and solve problems.	K-2	2		2
	3-5	5		
Standard SCI.PS2 Students use science and engineering practices, crosscutting concepts, and an understanding of forces, interactions, motion, and stability to make sense of phenomena and solve problems.	K-2	K		
	3-5	3		5

Standard SCI.PS3 Students use science and engineering practices, crosscutting concepts, and an understanding of energy to make sense of phenomena and solve problems.	K-2	K		
	3-5	3, 4		
Standard SCI.PS4 Students use science and engineering practices, crosscutting concepts, and an understanding of waves and their applications in technologies for information transfer to make sense of phenomena and solve problems.	K-2	1		
	3-5	4	4	
Earth and Space Science				
Standard SCI.ESS1 Students use science and engineering practices, crosscutting concepts, and an understanding of earth's place in the universe to make sense of phenomena and solve problems.	K-2			1, 2
	3-5			4, 5
Standard SCI.ESS2 Students use science and engineering practices, crosscutting concepts, and an understanding of earth's systems to make sense of phenomena and solve problems.	K-2		K	K, 2
	3-5		5	3-5
Standard SCI.ESS3 Students use science and engineering practices, crosscutting concepts, and an understanding of earth and human activity to make sense of phenomena and solve problems.	K-2		K	K
	3-5	4	5	3-5
Engineering and Technical Science				
Standard SCI.ETS1 Students use science and engineering practices, crosscutting concepts, and an understanding of engineering design to make sense of phenomena and solve problems.	K-2	K-2	K-2	K, 2
	3-5	3-5	3-5	3, 4
Standard SCI.ETS2 Students use science and engineering practices, crosscutting concepts, and an understanding of links among engineering, technology, science, and society to make sense of phenomena and solve problems.	K-2	K-2	K-2	K-2
	3-5	3-5	4, 5	3-5
Standard: SCI.ETS3: Students use science and engineering practices, crosscutting concepts, and an understanding of the nature of science and engineering to make sense of phenomena and solve problems.	K-2	K-2	K-2	K-2
	3-5	3-5	4, 5	4, 5

Physical Science: Energy Works

DESIRED RESULTS

Essential Questions
Students will keep considering...

Where do you get your energy?

Unit Priority Standards and Learning Targets
Students will know and be able to...

Disciplinary Core Ideas

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SCI.PS3.A: Definitions of Energy	SCI.PS3.A.4 Moving objects contain energy. The faster the object moves, the more energy it has.	Grade 4: Stored and Motion Energy	I can explain how to change the amount of energy in an object. SCI.PS3.A.4
SCI.PS3.B: Conservation of Energy and Energy Transfer	SCI.PS3.B.4 Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents. Energy can be converted from one form to another form.	Grade 4: Stored and Motion Energy Grade 4: Energy Transfers and Transformations	I can demonstrate how energy is converted from one form to another. SCI.PS3.B.4
SCI.PS3.C: Relationships Between Energy and Forces	SCI.PS3.C.4 When objects collide, contact forces transfer energy so as to change objects' motions.	Grade 4: Stored and Motion Energy Grade 4: Energy Moves in Waves	I can explain how contact forces transfer energy when two objects collide, resulting in a change in the objects' motions. SCI.PS3.C.4
SCI.PS3.D: Energy in Chemical Processes and Everyday Life	SCI.PS3.D.4, 5 Plants capture energy from sunlight which can be used as fuel or food. Stored energy in food or fuel can be converted to usable energy.	Grade 4: Energy Sources are Everywhere	I can explain that energy comes from the sun and impacts the food cycle. SCI.PS3.D.4, 5
SCI.PS4.A: Wave Properties	SCI.PS4.A.4 Waves are regular patterns of motion, which can be made in water by disturbing the surface. Waves of the same type can	Grade 4: Energy Moves in Waves	I can investigate how waves are created and which factors can affect their appearance. SCI.PS4.A.4

	differ in amplitude and wavelength. Waves can make objects move.		I can examine how energy moves in waves as it is transferred. SCI.PS4.A.4
SCI.PS4.C: Information Technologies and Instrumentation	SCI.PS4.C.4 Patterns can encode, send, receive, and decode information.	Grade 4: Energy Moves in Waves	I can create messages and communicate using patterns. SCI.PS4.C.4
SCI.ESS3.A: Natural Resources	SCI.ESS3.A.4 Energy and fuels humans use are derived from natural sources, and their use affects the environment. Some resources are renewable over time, others are not.	Grade 4 : Recycling Energy	I can explain the different types of alternative energy and how they are used. SCI.ESS3.A.4
SCI.ETS1.A: Defining and Delimiting Engineering Problems	SCI.ETS1.A.3-5 Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	Grade 4 Energy Works	I can think up an engineering "problem" that needs to be fixed; I can list rules for possible solutions. SCI.ETS1.A.3-5
SCI.ETS1.C: Optimizing the Design Solution	SCI.ETS1.C.3-5 Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	Grade 4 Energy Works	I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. SCI.ETS1.C.3-5
SCI.ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World	SCI.ETS2.B.3-5 People's needs and wants change over time, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. When new technologies become available, they can bring about changes in the way people live and interact with one another.	Grade 4 Energy Works	I can define a simple design problem reflecting a need or a want that includes specific criteria for success. SCI.ETS2.B.3-5
SCI.ETS3.A: Science and Engineering Are Human Endeavors	SCI.ETS3.A.3-5 Science and engineering knowledge have been created by many cultures. People use the tools and practices of science and engineering in many different situations (e.g. land managers, technicians, nurses and welders). Science and engineering affect everyday life.	Grade 4 Energy Works	I can recognize that different cultures have contributed to science and engineering advancements. SCI.ETS3.A.3-5 I can recognize that people use tools and practices of science in many different professions. SCI.ETS3.A.3-5 I can understand that science and engineering impact everyday life. SCI.ETS3.A.3-5

SCI.ETS3.B: Science and Engineering Are Unique Ways of Thinking with Different Purposes	SCI.ETS3.B.3-5 Science and engineering are both bodies of knowledge and processes that add new knowledge to our understanding. Scientific findings are limited to what can be supported with evidence from the natural world. Basic laws of nature are the same everywhere in the universe (e.g. gravity, conservation of matter, energy transfer, etc.). Engineering solutions often have drawbacks as well as benefits	Grade 4 Energy Works	I can explain that scientific findings need to be supported with evidence from the natural world. SCI.ETS3.B.3-5 I can recognize that basic laws of nature are the same everywhere in the universe. SCI.ETS3.B.3-5 I can understand that engineering solutions can have drawbacks and benefits. SCI.ETS3.B.3-5
SCI.ETS3.C: Science and Engineering Use Multiple Approaches to Create New Knowledge and Solve Problems	SCI.ETS3.C.3-5 The products of science and engineering are not developed through one set "scientific method" or "engineering design process." Instead, they use a variety of approaches described in the Science and Engineering Practices. Science explanations are based on a body of evidence and multiple tests, and describe the mechanisms for natural events. Science explanations can change based on new evidence. There is no perfect design in engineering. Designs that are best in some ways (e.g. safety or ease of use) may be inferior in other ways (e.g. cost or aesthetics).	Grade 4 Energy Works	I can realize that science and engineering products utilize a variety of approaches to determine a solution. SCI.ETS3.C.3-5 I can recognize that science explanations can change based on new evidence and that designs are always changing and improving. SCI.ETS3.C.3-5

Crosscutting Concepts

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
CC1: Patterns	SCI.CC1.3-5 Students identify similarities and differences in order to sort and classify natural objects and designed products. They identify patterns related to time, including simple rates of change and cycles, and use these patterns to make predictions.	Grade 4 Energy Works	I can identify and use patterns. SCI.CC1.3-5
CC2: Cause and Effect	SCI.CC2.3-5 Students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity may or may not signify a cause-and-effect relationship.	Grade 4 Energy Works	I can test energy transfers and explain why some work and some don't. SCI.CC2.3-5
CC5: Energy and Matter	SCI.CC5.3-5 Students understand matter is made of particles and energy can be transferred in various ways and between objects. Students observe the conservation of matter by tracking matter flows and cycles before and after processes, recognizing the total mass of substances does not change. Note: In this	Grade 4 Energy Works	I can demonstrate energy transfers. SCI.CC5.3-5

	grade band, students are not expected to be able to differentiate between mass and weight.		

Science and Engineering Practices

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SEP1.A: Asking Questions	SCI.SEP1.A.3-5 Students ask questions that specify qualitative relationships. This includes the following: Ask questions about what would happen if a variable is changed. Identify scientific (testable) and non-scientific (non testable) questions. Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	Grade 4 Energy Works	I can ask questions in a science experiment. SCI.SEP1.A.3-5
SEP1.B: Defining Problems	SCI.SEP1.B.3-5 Students use prior knowledge to describe and define simple design problems that can be solved through the development of an object, tool, process, or system. They include several criteria for success and constraints on materials, time, or cost.	Grade 4 Energy Works	I can state a problem and design a simple way to address it. SCI.SEP1.B.3-5
SEP2: Developing and Using Models	SCI.SEP2.3-5 Students build and revise simple models and use models to represent events and design solutions. This includes the following: Identify limitations of models. Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. Develop and/or use models to describe or predict phenomena. Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.	Grade 4 Energy Works	I can develop or revise and use a model to represent an event. SCI.SEP2.3-5 I can use a model to design and test a possible solution. SCI.SEP2.3-5
SEP3: Planning and Conducting Investigations	SCI.SEP3.3-5 Students plan and carry out investigations that control variables and provide evidence to support explanations or design solutions. This includes the following: Collaboratively plan and conduct an investigation to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. Evaluate appropriate methods and tools for collecting data. Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. Make predictions about what would happen if a variable changes. Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.	Grade 4 Energy Works	I can plan and try an investigation and use evidence to support whether or not it is viable. SCI.SEP3.3-5
SEP6.A:	SCI.SEP6.A.3-5 Students use evidence to construct explanations that	Grade 4 Energy	I can use evidence to support my explanations.

Constructing an Explanation	specify variables that describe and predict phenomena. This includes the following: Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard). Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation. Identify the evidence that supports particular points in an explanation.	Works	SCI.SEP6.A.3-5
SEP6.B: Designing Solutions	SCI.SEP6.B.3-5 Students use evidence to create multiple solutions to design problems. This includes the following: Apply scientific ideas to solve design problems. Generate multiple solutions to a problem and compare how well they meet the criteria and constraints.	Grade 4 Energy Works	I can come up with more than one way to solve a problem. SCI.SEP6.B.3-5
SEP8: Obtaining, Evaluating, and Communicating Information	SCI.SEP8.3-5 Students evaluate the merit and accuracy of ideas and methods. This includes the following: Read and comprehend grade-appropriate complex texts and other reliable media to summarize and obtain scientific and technical ideas, and describe how they are supported by evidence. Compare and/or combine information across complex texts and other reliable media to support the engagement in scientific and engineering practices. Combine information in written text with that contained in corresponding tables, diagrams, or charts to support the engagement in other scientific and engineering practices. Obtain and combine information from books or other reliable media to explain phenomena or solutions to a design problem. Communicate scientific and technical information orally or in written formats, including various forms of media, which may include tables, diagrams, and charts.	Grade 4 Energy Works	I can research to find the best possible solution to a problem. SCI.SEP6.B.3-5

Anchoring Phenomenon

Recognizing the Sun as Earth's ultimate source of energy.

Assessment Evidence

Performance is evaluated in terms of…
Students will show their learning by…

Performance Expectations

- ***4-PS3-1:*** *Use evidence to construct an explanation relating the speed of an object to the energy of that object.*
- ***4-PS3-2:*** *Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.*
- ***4-PS3-3:*** *Ask questions and predict outcomes about the changes in energy that occur when objects collide.*
- ***4-PS3-4:*** *Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*
- ***4-PS4-1:*** *Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.*
- ***4-PS4-3:*** *Generate and compare multiple solutions that use patterns to transfer information.*
- ***4-ESS3-1:*** *Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.*

- ***3-5-ETS1-2:*** *Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.*
- ***3-5-ETS1-3:*** *Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.*

Key Feedback & Assessment Strategies:

- ➔ *Conferring/Strategy Groups: Using current evidence of standards & skills, feedback is scaffolded based on student strengths, needs & goals*
- ➔ *Assessment of Unit Skills - Examples for Targeted Data Collection*
  - ◆ *Assess unit vocabulary terms*
  - ◆ *Evaluate student investigation tasks*
  - ◆ *Assess key unit concepts (Unit summative assessment)*

- ➔ *Extensions may include:*
  - ◆

Life Science: Plant and Animal Structures

DESIRED RESULTS

Essential Questions
Students will keep considering…

How are an organism's structures adapted for its environment?

Unit Priority Standards and Learning Targets
Students will know and be able to…

Disciplinary Core Ideas

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SCI.LS1.A: Structure and Function	SCI.LS1.A.4 Plants and animals have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.	Grade 4: Animal Structures Grade 4: Plant Structures	I can identify the structures in plants and animals that allow for growth, survival, behavior and reproduction. SCI.LS1.A.4
SCI.LS1.D: Information Processing	SCI.LS1.D.4 Different sense receptors are specialized for particular kinds of information; animals use their perceptions and memories to guide their actions.	Grade 4: Using the Senses	I can describe how animals use their different senses to process information. SCI.LS1.D.4
SCI.PS4.B: Electromagnetic Radiation	SCI.PS4.B.4 Objects can be seen when light reflected from their surface enters our eyes.	Grade 4: Exploring the Eye Grade 4: Structure and Function	I can explain how the eye works. SCI.PS4.B.4
SCI.ETS1.B: Developing Possible Solutions	SCI.ETS1.B.3-5 Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	Grade 4 Plant and Animal Structures	I can test different solutions for an engineering problem; I can tell you if an idea will work, fail, or just needs improvement. SCI.ETS1.B.3-5

	Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.		
SCI.ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World	SCI.ETS2.B.3-5 People's needs and wants change over time, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. When new technologies become available, they can bring about changes in the way people live and interact with one another.	Grade 4 Plant and Animal Structures	I can define a simple design problem reflecting a need or a want that includes specific criteria for success. SCI.ETS2.B.3-5
SCI.ETS3.B: Science and Engineering Are Unique Ways of Thinking with Different Purposes	SCI.ETS3.B.3-5 Science and engineering are both bodies of knowledge and processes that add new knowledge to our understanding. Scientific findings are limited to what can be supported with evidence from the natural world. Basic laws of nature are the same everywhere in the universe (e.g. gravity, conservation of matter, energy transfer, etc.). Engineering solutions often have drawbacks as well as benefits	Grade 4 Plant and Animal Structures	I can explain that scientific findings need to be supported with evidence from the natural world. SCI.ETS3.B.3-5 I can recognize that basic laws of nature are the same everywhere in the universe. SCI.ETS3.B.3-5 I can understand that engineering solutions can have drawbacks and benefits. SCI.ETS3.B.3-5
SCI.ETS3.C: Science and Engineering Use Multiple Approaches to Create New Knowledge and Solve Problems	SCI.ETS3.C.3-5 The products of science and engineering are not developed through one set "scientific method" or "engineering design process." Instead, they use a variety of approaches described in the Science and Engineering Practices. Science explanations are based on a body of evidence and multiple tests, and describe the mechanisms for natural events. Science explanations can change based on new evidence. There is no perfect design in engineering. Designs that are best in some ways (e.g. safety or ease of use) may be inferior in other ways (e.g. cost or aesthetics).	Grade 4 Plant and Animal Structures	I can realize that science and engineering products utilize a variety of approaches to determine a solution. SCI.ETS3.C.3-5 I can recognize that science explanations can change based on new evidence and that designs are always changing and improving. CI.ETS3.C.3-5

Crosscutting Concepts

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target

CC2: Cause and Effect	SCI.CC2.3-5 Students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity may or may not signify a cause-and-effect relationship.	Grade 4 Plant and Animal Structures	I can identify internal and external structures and explain how they work together to improve an organism's growth, survival, or reproduction. SCI.CC2.3-5
CC4: Systems and System Models	SCI.CC4.3-5 Students understand a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. They also describe a system in terms of its components and their interactions.	Grade 4 Plant and Animal Structures	I understand a living thing is made of smaller, related parts that work together, and each of those parts has a different role. SCI.CC4.3-5

Science and Engineering Practices

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SEP2: Developing and Using Models	SCI.SEP2.3-5 Students build and revise simple models and use models to represent events and design solutions. This includes the following: Identify limitations of models. Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. Develop and/or use models to describe or predict phenomena. Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.	Grade 4 Plant and Animal Structures	I can develop or revise and use a model to represent an event. SCI.SEP2.3-5 I can use a model to design and test a possible solution. SCI.SEP2.3-5
SEP6.A: Constructing an Explanation	SCI.SEP6.A.3-5 Students use evidence to construct explanations that specify variables that describe and predict phenomena. This includes the following: Construct an explanation of observed relationships (e.g., the distribution of plants in the backyard). Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation. Identify the evidence that supports particular points in an explanation.	Grade 4 Plant and Animal Structures	I can use evidence to support my explanations. SCI.SEP6.A.3-5
SEP6.B: Designing Solutions	SCI.SEP6.B.3-5 Students use evidence to create multiple solutions to design problems. This includes the following: Apply scientific ideas to solve design problems. Generate multiple solutions to a problem and compare how well they meet the criteria and constraints.	Grade 4 Plant and Animal Structures	I can come up with more than one way to solve a problem. SCI.SEP6.B.3-5
SEP7: Arguing from Evidence	SCI.SEP7.3-5 Students critique the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world. This includes the following: Compare and refine arguments based on an evaluation of the evidence presented.	Grade 4 Plant and Animal Structures	I can respectfully provide and receive critiques using scientific evidence. SCI.SEP7.3-5

	Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation. Respectfully provide and receive critiques from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions. Construct and/or support an argument with evidence, data, or a model. Use data to evaluate claims about cause and effect. Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.		

Anchoring Phenomenon

Internal and external structures are used for survival, growth, and reproduction of plants and animals.

Assessment Evidence

Performance is evaluated in terms of…
Students will show their learning by…

Performance Expectations

- ***4-LS1-1:*** *Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.*
- ***4-LS1-2:*** *Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.*
- ***4-PS4-2:*** *Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.*
- ***3-5-ETS1-2:*** *Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.*

Key Feedback & Assessment Strategies:

- ➔ *Conferring/Strategy Groups: Using current evidence of standards & skills, feedback is scaffolded based on student strengths, needs & goals*
- ➔ *Assessment of Unit Skills - Examples for Targeted Data Collection*
  - ◆ *Assess unit vocabulary terms*
  - ◆ *Evaluate student investigation tasks*
  - ◆ *Assess key unit concepts (Unit summative assessment)*
- ➔ *Extensions may include:*
  - ◆

Earth and Space Science: Changing Earth

DESIRED RESULTS

Essential Questions
Students will keep considering...

What are Earth's layers?

Unit Priority Standards and Learning Targets
Students will know and be able to...

Disciplinary Core Ideas

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SCI.ESS1.C: The History of Planet Earth	SCI.ESS1.C.4 Certain features on Earth can be used to order events that have occurred in a landscape.	Grade 4: Rock Formations and Patterns Grade 4: Changing Earth	I can explain what the different layers of rock mean. SCI.ESS1.C.4
SCI.ESS2.A: Earth Materials and Systems	SCI.ESS2.A.4,5 Four major Earth systems interact. Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, organisms, and gravity break rocks, soils, and sediments into smaller pieces and move them around.	Grade 4: Weathering and Erosion Grade 4: Life on a Changing Earth	I can model weathering and erosion by water, ice, wind, and other organisms. SCI.ESS2.A.4,5
SCI.ESS2.B: Plate Tectonics and Large-Scale System Interactions	SCI.ESS2.B.4 Earth's physical features occur in patterns, as do earthquakes and volcanoes. Maps can be used to locate features and determine patterns in those events.	Grade 4: Earth's Layers and Plates Grade 4: Mapping Earth	I can use maps to locate features. SCI.ESS2.B.4 I can use maps to determine patterns of earth's physical features. SCI.ESS2.B.4
SCI.ESS2.E: Biogeology	SCI.ESS2.E.4 Living things can affect the physical characteristics of their environment.	Grade 4: Changing Earth	I can describe how living things can affect the physical characteristics of their environment. SCI.ESS2.E.4
SCI.ESS3.B:	SCI.ESS3.B.3,4	Grade 4: Life on a	I can explain how to prevent and minimize

Natural Hazards	A variety of hazards result from natural processes; humans cannot eliminate hazards but can reduce their impacts.	Changing Earth	damage from weather disasters. SCI.ESS3.B.3,4
SCI.ESS3.C: Human Impacts on Earth Systems	SCI.ESS3.C.5 Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.	Grade 4: Life on a Changing Earth	I can find and use information about how to protect the Earth's resources and environment. SCI.ESS3.C.5
SCI.ETS1.B: Developing Possible Solutions	SCI.ETS1.B.3-5 Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.	Grade 4 Changing Earth	I can test different solutions for an engineering problem; I can tell you if an idea will work, fail, or just needs improvement. SCI.ETS1.B.3-5
SCI.ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World	SCI.ETS2.B.3-5 People's needs and wants change over time, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. When new technologies become available, they can bring about changes in the way people live and interact with one another.	Grade 4 Changing Earth	I can define a simple design problem reflecting a need or a want that includes specific criteria for success. SCI.ETS2.B.3-5
SCI.ETS3.B: Science and Engineering Are Unique Ways of Thinking with Different Purposes	SCI.ETS3.B.3-5 Science and engineering are both bodies of knowledge and processes that add new knowledge to our understanding. Scientific findings are limited to what can be supported with evidence from the natural world. Basic laws of nature are the same everywhere in the universe (e.g. gravity, conservation of matter, energy transfer, etc.). Engineering solutions often have drawbacks as well as benefits	Grade 4 Changing Earth	I can explain that scientific findings need to be supported with evidence from the natural world. SCI.ETS3.B.3-5 I can recognize that basic laws of nature are the same everywhere in the universe. SCI.ETS3.B.3-5 I can understand that engineering solutions can have drawbacks and benefits. SCI.ETS3.B.3-5
SCI.ETS3.C: Science and	SCI.ETS3.C.3-5 The products of science and engineering are not developed	Grade 4 Changing Earth	I can realize that science and engineering products utilize a variety of approaches to

Engineering Use Multiple Approaches to Create New Knowledge and Solve Problems	through one set "scientific method" or "engineering design process." Instead, they use a variety of approaches described in the Science and Engineering Practices. Science explanations are based on a body of evidence and multiple tests, and describe the mechanisms for natural events. Science explanations can change based on new evidence. There is no perfect design in engineering. Designs that are best in some ways (e.g. safety or ease of use) may be inferior in other ways (e.g. cost or aesthetics).		determine a solution. SCI.ETS3.C.3-5 I can recognize that science explanations can change based on new evidence and that designs are always changing and improving. CI.ETS3.C.3-5

Crosscutting Concepts

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
CC1: Patterns	SCI.CC1.3-5 Students identify similarities and differences in order to sort and classify natural objects and designed products. They identify patterns related to time, including simple rates of change and cycles, and use these patterns to make predictions.	Grade 4 Changing Earth	I can identify and use patterns. SCI.CC1.3-5
CC2: Cause and Effect	SCI.CC2.3-5 Students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity may or may not signify a cause-and-effect relationship.	Grade 4 Changing Earth	I can explain causes of erosion and how it affects the earth's surface. SCI.CC2.3-5

Science and Engineering Practices

Learning Element	Performance Indicator	CBB Unit Connection	Learning Target
SEP2: Developing and Using Models	SCI.SEP2.3-5 Students build and revise simple models and use models to represent events and design solutions. This includes the following: Identify limitations of models. Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. Develop and/or use models to describe or predict phenomena. Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.	Grade 4 Changing Earth	I can develop or revise and use a model to represent an event. SCI.SEP2.3-5 I can use a model to design and test a possible solution. SCI.SEP2.3-5
SEP3:	SCI.SEP3.3-5 Students plan and carry out investigations that control	Grade 4 Changing	I can plan and try an investigation and use

Planning and Conducting Investigations	variables and provide evidence to support explanations or design solutions. This includes the following: Collaboratively plan and conduct an investigation to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. Evaluate appropriate methods and tools for collecting data. Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. Make predictions about what would happen if a variable changes. Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.	Earth	evidence to support whether or not it is viable. SCI.SEP3.3-5
SEP4: Analyzing and Interpreting Data	SCI.SEP4.3-5 Students begin to use quantitative approaches to collect data and conduct multiple trials of qualitative observations. (When possible, digital tools should be used.) This includes the following: Represent data in tables or various graphical displays (bar graphs, pictographs, and pie charts) to reveal patterns that indicate relationships. Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, or computation. Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings. Analyze data to refine a problem statement or the design of a proposed object, tool, or process. Use data to evaluate and refine design solutions.	Grade 4 Changing Earth	I can analyze data and observations to compare different solutions to a problem. SCI.SEP4.3-5
SEP6.A: Constructing an Explanation	SCI.SEP6.A.3-5 Students use evidence to construct explanations that specify variables that describe and predict phenomena. This includes the following: Construct an explanation of observed relationships (e.g., the distribution of plants in the backyard). Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation. Identify the evidence that supports particular points in an explanation.	Grade 4 Changing Earth	I can use evidence to support my explanations. SCI.SEP6.A.3-5
SEP6.B: Designing Solutions	SCI.SEP6.B.3-5 Students use evidence to create multiple solutions to design problems. This includes the following: Apply scientific ideas to solve design problems. Generate multiple solutions to a problem and compare how well they meet the criteria and constraints.	Grade 4 Changing Earth	I can come up with more than one way to solve a problem. SCI.SEP6.B.3-5

Anchoring Phenomenon

Use evidence to describe how Earth's appearance has changed over time.

Assessment Evidence

Performance is evaluated in terms of…
Students will show their learning by…

Performance Expectations

- ***4-ESS1-1:*** *Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.*
- ***4-ESS2-1:*** *Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.*
- ***4-ESS2-2:*** *Analyze and interpret data from maps to describe patterns of Earth's features.*
- ***4-ESS3-2:*** *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*
- ***3-5-ETS1-2:*** *Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.*

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