TRUMBULL PUBLIC SCHOOLS
Trumbull, Connecticut

Science Curriculum
Grade 5
Next Generation
September 1, 2022

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SCIENCE - NEXT GENERATION
Grade 5

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The Trumbull Board of Education will continue to take Affirmative Action to ensure that no persons are discriminated against in its employment

NEXT GENERATION SCIENCE
Grade 5

APPENDICES

CORE VALUES AND BELIEFS

The Trumbull School Community engages in an environment conducive to learning which believes that all students will **read** and **write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

The Connecticut State Board of Education, in its 2008 Position Statement on Science Education, calls for a systematic approach to ensuring that every student in Connecticut receives a rich and coordinated PK-12 education in science. Science learning should focus simultaneously on developing an understanding of core concepts, as well as knowing how scientists work collaboratively to test ideas, analyze evidence and solve problems. The realization of this vision is critical for our students' futures, as well as for Connecticut's place in a globally competitive economy.

In 2015, the Connecticut State Board of Education adopted the Next Generation Science Standards which embodies the National Research Council's *Framework for K-12 Education: Practices, Crosscutting Concepts, and Core Ideas* (2011); and furthermore developed a 5-year Implementation Plan of the Next Generation Science Standards (NGSS) for transitioning curriculum, instruction, and assessment. (Appendix B). The NGSS architecture was designed to provide information to teachers and curriculum and assessment developers beyond the traditional one line standard and uses Science and Engineering Practices along with various components of the Disciplinary Core Ideas and Crosscutting Concepts to make up the performance expectations for students.

The Board offers guidelines to support the establishment of collaborations among various stakeholders to build a coordinated science education system. (SDE, 2008).
As developed by the writers of the *Framework for K-12 Science Education* (Council, 2011), a core idea for K-12 science instruction should:

1. "Have broad importance across multiple sciences or engineering disciplines or be a key organizing principle of a single discipline."
2. "Provide a key tool for understanding or investigating more complex ideas and solving problems."
3. "Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge."
4. "Be teachable and learnable over multiple grades at increasing levels of depth and sophistication." (Council, 2011)

The Trumbull Public School's Grade 5 science curriculum addresses the Next Generation Science Standards as listed with each unit of study.

SAFETY FIRST

The Trumbull Public School System follows the recommended guidelines for student safety in the classroom as represented in the National Science Education Standards, State Science Frameworks and NGSS, the National Science Teachers Association, and OSHA and as outlined in subsections of Policy 6000 in regards to Instruction. We encourage and foster a hands-on, process and inquiry-based approach to science instruction with student safety always first and foremost in mind. The use of lab safety guidelines are supported throughout the district.

COURSE GOALS

The course goals derive from the 2013 Next-Generation Science Standards. Goals are listed specific to each unit in this curriculum guide, and developed through unit lessons using the 5-E learning model (engage, explore, explain, elaborate, evaluate) in order to encourage student engagement and foster metacognitive learning strategies through a reflective process. An important role of science education is not to teach "all the facts" but rather to prepare students with sufficient core knowledge so that they can later acquire additional information on their own.

COURSE ENDURING UNDERSTANDINGS

Earth and Space Systems
Students will understand…

- The planet Earth is a tiny part of a vast universe that has developed over a huge expanse of time.
- The sun is a star that appears larger and brighter than the other stars because it is closer. Stars range greatly in their size and distance from Earth.
- The patterns of motion of objects in the solar system can be described and predicted on the basis of observations and an understanding of gravity. This Earth phenomena is used to explain day and night, seasons, tides, and phases of the moon.
- Earth's surface is a complex and dynamic set of interconnected system
- All of Earth's processes are the result of energy flow and matter cycling within and among the geosphere, hydrosphere, atmosphere, and biosphere interacting over a wide range of temporal and spatial scales.
- Earth's surface processes affect and are affected by human activities.
- Natural hazards and other geological events can significantly alter human populations and activities.
- Humans depend on all the planet's systems for a variety of resources, some of which are renewable or replaceable and some of which are not.

Structures and Properties of Matter
Students will understand…

- Matter can be understood in terms of the types of atoms present and the interactions both between and within them.
- Matter is anything that takes up space and has mass.
- There are three main states of matter - each have unique properties.

- Mass is a measurement of the amount of matter something contains; weight is the measure of the pull of gravity on an object.
- Energy can cause matter to change state however matter can neither be destroyed or created as it simply changes from one state to another.
- Chemical changes cause matter to change in identity, while physical changes may only change in shape, color, or state.

Matter and Energy in Ecosystems
Students will understand…

- All organisms are made of cells.
- Plants and animals have both internal and external structures that serve functions in growth, survival, behavior, and reproduction.
- Plants and animals have unique and diverse life cycles that include being born (sprouting plants), growing, developing into adults, reproducing, and eventually dying.
- Ecosystems are natural systems of living things. Biotic factors (living things) interact with each other and with abiotic factors (non living things) in their environment.
- Energy and matter are essential for the survival of all living things.
- Organisms can survive only in environments in which their particular needs are met.
- The cycling of matter and the flow of energy within ecosystems occur through interactions among different organisms and between organisms and the physical environment.

COURSE ESSENTIAL QUESTIONS

- What is the universe, and what is Earth's place in it?
- How are stars formed, and why do they appear in different positions during the night?
- What are the predictable patterns caused by Earth's movement in the solar system?
- How do Earth's major systems interact?
- How do humans depend on Earth's resources?
- How do natural disasters affect individuals and societies?

- How do living organisms alter Earth's processes and structures?
- How can one explain the structure, properties, and interactions of matter?
- How do particles combine to form the variety of matter one observes?
- How do substances combine or change (react) to make new substances?
- How does one characterize and explain these reactions and make predictions about them?

- How do organisms obtain and use matter and energy they need to live and grow?
- How do organisms interact with the living (biotic) and nonliving (abiotic) environments to obtain matter and energy?
- How do matter and energy move through an ecosystem?
- How do food and fuel provide energy?
- If energy is conserved, why do people say it is produced or used?

COURSE KNOWLEDGE AND SKILLS

Crosscutting scientific and engineering concepts as outlined in the Next Generation Science Standards(NGSS):

Students will know…

- Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
- Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.
- Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measurements of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.
- Systems and system models. Defining the system under study-specifying its boundaries and making explicit a model of that system provides tools for understanding and testing ideas that are applicable throughout science and engineering.
- Energy and matter: flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems possibilities and limitations.
- Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
- Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Students will be able to …

- Ask questions (for science) and define problems (for engineering)
- Develop and use models
- Plan and carry out investigations
- Analyze and interpret data
- Use mathematics and computational thinking
- Construct explanations (for science) and design solutions (for engineering)
- Engage in arguments from evidence
- Obtain, evaluate, and communicate information

Scope and Sequence

September to December	Bundle 1: Earth's Place in the Universe: Earth and Space Systems
January to mid-April	Bundle 2: Matter and Its Interactions: Structure and Properties of Matter
mid-April to June	Bundle 3: Molecules to Organisms: Matter and Energy in Ecosystems

BUNDLE 1:

Earth's Place in the Universe:
Earth and Space Systems

Unit Overview:

Systems of matter and energy are present around Earth and across space. Interactions within and between these systems produce observable and predictable patterns. Earth is composed of interconnected systems and is also part of a larger system in space. Students explore the interaction between Earth's systems and its role as part of larger systems. Students investigate the components that make up our solar system, and explore the apparent brightness of stars, including the Sun, as well as patterns in constellations in the sky. Students use models to observe the rotation and revolution of Earth and the Moon to explore patterns in day and night, shadows, seasons, and Moon phases. Students investigate the interconnected systems on Earth and describe how the systems depend on and affect one another. Students then model how water in the hydrosphere is distributed on Earth, and how humans benefit from and can influence Earth's systems.

Unit Goals

NGSS: 5-ESS1-1:	Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth**.**
NGSS: 5-ESS1-2:	Represent data in graphical displays to reveal patterns of daily changes in length and directions of shadows, day and night, and the seasonal appearance of some stars in the night sky.
NGSS: 5-ESS2-1:	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
NGSS: 5-ESS2-2:	Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
NGSS: 5-ESS3-1:	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
NGSS: 5-PS2-1:	Support an argument that the gravitational force exerted by Earth on objects is directed down.

The following course goals derive from the 2010 Connecticut Core Standards.

ELA-Literacy

CCS.ELA-Literacy.RI.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. *(5-ESS1-1)*
CCS.ELA-Litearcy.RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. *(5-ESS1-1)*
CCS.ELA-Literacy.RI.5.8	Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). *(5-ESS1-1)*
CCS.ELA-Literacy.RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS1-1)
CCS.ELA-Literacy.W.5.1	Write opinion pieces on topics or texts supporting a point of view with reasons and information. (5-ESS1-1)
CCS.ELA-Literacy.SL.5.5	Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. *(5-ESS1-2)*

Mathematics

CCS.Mathematics.MP.2	Reason abstractly and quantitatively. *(5-ESS1-1)*,(5-ESS1-2)
CCS.Mathematics.MP.4	Model with mathematics.

The following standards derive from the 2013 Next-Generation Science (NGSS) Middle School Engineering Design Standards.

NGSS.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.

BUNDLE 1: Earth and Space Systems

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data When possible and feasible, digital tools should be used. ● Represent data in graphical displays (bar	ESS1.A: The Universe and its Stars ● The sun is a star that appears larger and brighter than other stars because it is closer. Stars	Patterns ● Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates

graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on ● Support an argument with evidence, data, or a model. (5-ESS1-1) ● Support an argument with evidence, data, or a model. (5-PS2-1) Obtaining, Evaluating, and Communicating Information ● Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) Constructing Explanations and Designing Solutions ● Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	range greatly in their distance from Earth. (5-ESS1-1) ESS1.B: Earth and the Solar System ● The orbits of Earth around the sun and the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) ESS2.A: Earth Materials and Systems ● Wind and water can change the shape of the land. (2-ESS2-1) ESS2.B: Plate Tectonics and Large-Scale System Interactions ● Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) ESS3.C: Human Impacts on Earth Systems ● Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1) PS2.B: Types of Interactions	of change for natural phenomena. (5-ESS1-2) ● Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3) Scale, Proportion, and Quantity ● Natural objects exist from the very small to the immensely large. (5-ESS1-1) Stability and Change ● Things may change slowly or rapidly. (2-ESS2-1) *Systems and System Models* ● *A system can be described in terms of its components and their interactions. (5-ESS3-1)* *Connections to Engineering,Technology and Applications of Science* Influence of Engineering, Technology, and Science on Society and the Natural World ● Developing and using technology has impacts on the natural world. (2-ESS2-1) ● People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) ● Engineers improve existing technologies or develop new ones to

	● The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1) ETS1.B: Developing Possible Solutions ● 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. (3-5-ETS1-2) ● 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. (3-5-ETS1-2) ● Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)	increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2) *Connections to Nature of Science* Science Addresses Questions About the Natural and Material World ● Scientists study the natural and material world. (2-ESS2-1) ● Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1) Cause and Effect ● Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

Unit Essential Questions

- What is the universe, and what is Earth's place in it?
- How are stars formed, and why do they appear in different positions during the night?
- What are the predictable patterns caused by Earth's movement in the solar system?
- How do Earth's major systems interact?
- How do humans depend on Earth's resources?
- How do natural disasters affect individuals and societies?

Scope and Sequence of Bundle 1:

Lesson 1: Earth's Place in Space
Lesson 2: Stars
Lesson 3: Sun, Earth, and Moon
Lesson 4: Earth's Systems
Lesson 5: Protecting Earth's Systems

Phenomenon: Systems of matter and energy are present around Earth and across space. Interactions within and between these systems produce observable and predictable patterns—night and day, seasons, tides, weather and climate. Earth is composed of interconnected systems and is also part of a larger system in space.

Focus questions

- What is the universe, and what is Earth's place in it?
- What do we know about Earth and Space systems?
- How can we describe planets in our solar system?
- How do the Sun, Earth, Moon make a system?
- How are stars formed, and why do they appear in different positions during the night?
- What does the brightness of a STAR tell us?
- What is the role of gravity in our solar system?
- How does gravity play a role in the shapes of planets and their orbits?
- What are the predictable patterns caused by Earth's movement in the solar system?
- Can patterns in the Daytime Sky tell me more about Earth?
- How do Earth's major systems interact?
- What can we notice about the patterns of the Moon?
- How can the Moon affect patterns on Earth?
- How do humans depend on Earth's resources?
- How can communities use Science to protect Earth's resources and environments?
- How do natural disasters affect individuals and societies?

Assured Assessments

Formative/Skills:

- Student Investigation Sheets
- Science Notebook Entries
- Whole group check-in discussions
- Monitoring during Turn and Talk
- Student responses during class discussions
- Review students' questions about the investigative phenomenon from the beginning of the lesson.
- Tell Me More Extension - responses

Summative/Content:

- Lesson 1: Earth's Place in Space Snapshot Assessment
- Lesson 2: STARS Snapshot Assessment
- Lesson 3: Sun, Earth, and Moon Snapshot Assessment
- Lesson 4: IAB Watershed Activity

Resources

Core

- Building Blocks of Science® 3D: Earth and Space Systems (©2019) Carolina Biological Supply Company. Burlington, NC.
- Building Blocks of Science Literacy Series™: Earth and Space Systems. Carolina Biological Supply Company. Print.

Supplemental

- Online resources will be listed with lesson outlines on “Pacing Chart”.
- Delta Science Reader: EARTH, MOON, and SUN. Print. 2011
- Classroom and Learning Commons content related libraries

Time Allotment

- Bundle 1: Earth and Space Systems - Trimester 1

BUNDLE 2:

Matter and Its Interactions:
Structures and Properties of Matter

Unit Overview

Matter makes up everything around us, but students may struggle to understand this given that they cannot see certain types of matter, like gases, and that they may not recognize when matter is a mixture or a solution. Students study the states of matter and make connections to physical and chemical properties, including volume, mass, freezing point, melting point, boiling point, and the ability to form mixtures and solutions. Students will learn to describe matter and predict its interactions with other types of matter. As students are exposed to different materials, they use physical properties to draw distinctions between types and kinds of matter. They learn that physical properties are not solely descriptors of observable characteristics like color and size, but can be tested for, such as hardness, buoyancy, magnetism, and viscosity. Understanding the physical properties of matter is helpful to be able to predict the interactions that will occur when matter is mixed. Students compare mixtures and solutions and attempt to separate them into their individual components. The concept of chemical changes is explored; by attempting to separate mixtures that have undergone chemical changes, students realize that matter can transform. In a culminating activity, students act as engineers to apply what they have learned to design a water filtration procedure.

Unit Goals

NGSS: 5-PS1-1:	Develop a model to describe that matter is made of particles too small to be seen.
NGSS: 5-PS1-2:	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
NGSS: 5-PS1-3:	Make observations and measurements to identify materials based on their properties.
NGSS: 5-PS1-4:	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

The following course goals derive from the 2010 Connecticut Core Standards.

ELA-Literacy

CCS.ELA-Liteacy.RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. *(5-PS1-1)*

CCS.ELA-Literacy.W.5.7	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. *(5-PS1-2),(5-PS1-3),*(5-PS1-4)
CCS.ELA-Literacy.W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. *(5-PS1-2),(5-PS1-3),*(5-PS1-4)
CCS.ELA-Literacy.W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. *(5-PS1-2),(5-PS1-3),(5-PS1-4)*

Mathematics

CCS.Mathematics.MP.2	Reason abstractly and quantitatively. *(5-ESS1-1)*,(5-ESS1-2)
CCS.Mathematics.MP.4	Model with mathematics.
CCS.Mathematics.MP.5	Use appropriate tools strategically.
CCS.MATH.C.5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

The following standards derive from the 2013 Next-Generation Science (NGSS) Middle School Engineering Design Standards.

NGSS.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.

BUNDLE 2: Structures and Properties of Matter

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models ● Develop a model to describe phenomena. (5-PS1-1) Planning and Carrying Out Investigations ● Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables	PS1.A: Structure and Properties of Matter ● Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including	Cause and Effect ● Cause and effect relationships are routinely identified and used to explain change. (5-PS1-4) Scale, Proportion, and Quantity ● Natural objects exist from the very small to the immensely large. (5-PS1-1)

are controlled and the number of trials considered. (5-PS1-4) ● Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3) Using Mathematics and Computational Thinking ● Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2	the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) ● The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) ● Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) PS1.B: Chemical Reactions ● When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) ● No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2) 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	● Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3) *Connections to Nature of Science* Scientific Knowledge Assumes an Order and Consistency in Natural Systems ● Science assumes consistent patterns in natural systems. (5-PS1-2)

Unit Essential Questions:

- How can one explain the structure, properties, and interactions of matter?
- How do particles combine to form the variety of matter one observes?
- How do substances combine or change (react) to make new substances?
- How does one characterize and explain these reactions and make predictions about them?

Scope and Sequence of Bundle 2:

Lesson 1: Matter all Around Us
Lesson 2: Energy and States of Matter
Lesson 3: Physical Properties of Matter
Lesson 4: Making Mixtures and Solutions
Lesson 5: Physical and Chemical Changes
Lesson 6: Separating Matter

Phenomenon: There are many different types of bread. Most are made using different combinations of flour, water, salt, and yeast. When you mix the ingredients, they form a soft, sticky dough. An important step in making bread is allowing the dough to rise for a long period of time. After about an hour of rising, you should notice that the dough takes up more space in its bowl.

Essential/Focus questions

- Why does matter matter?
- How can you find an object's mass and calculate its volume?
- How can you prove that gases have mass and volume?
- How do particles of matter behave?
- Are evaporation and condensation observable?
- Is matter conserved when it changes states?
- How can I use physical properties to identify properties?
- How do the properties of liquids vary?
- What evidence indicates a chemical change?
- Is evidence of chemical change observable?
- How is contaminated water cleaned?
- How does a filtration system remove contaminants from water?

Assured Assessments

Formative/Skills:

- Student Investigation Sheets
- Science Notebook Entries
- Whole group check-in discussions
- Monitoring during Turn and Talk
- Student responses during class discussions
- Review students' questions about the investigative phenomenon from the beginning of the lesson.
- Tell Me More Extension - responses

Summative/Content:

- Lesson 1: Mass and Volume Snapshot
- Lesson 2: Particles of Matter Snapshot
- Lesson 3: Physical Properties of Matter Snapshot
- Lesson 4: Section C: Making Mixtures and Solutions Snapshot
- Lesson 5: Chemical and Physical Changes Snapshot

Resources

Core

- Building Blocks of Science® 3D: Structures and Properties of Matter (©2019) Carolina Biological Supply Company. Burlington, NC.
- Building Blocks of Science Literacy Series™: Structures and Properties of Matter. Carolina Biological Supply Company. Print.
- Sweet, Melissa. *Balloons Over Broadway*. Houghton/Mifflin/Harcourt (2011)

Supplemental

- Online resources will be listed with lesson outlines on “Pacing Chart”.
- Classroom and Learning Commons content related libraries

Time Allotment

- Bundle 2: Matter and Its Interactions: Structure and Properties of Matter - Trimester 2

BUNDLE 3:
Molecules and Organisms:
Matter and Energy in Ecosystems

Unit Goals

NGSS: 5-:LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water..
NGSS: 5-LS2.1:	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
NGSS: 5-PS3-1:	Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) once energy from the sun.
NGSS: 5-ESS2-1:	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
NGSS.5-ESS2-1:	Obtain and combine information about ways individual communities use science ideas to protect the earth's resources and environment

The following course goals derive from the 2010 Connecticut Core Standards.

ELA-Literacy

CCS.ELA-Literacy.RI.5.1.	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. *(5-LS1-1)*
CCS.ELA-Literacy.RI.5.2	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
CCS.ELA-Liteacy.RI.5.3	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
CCS.ELA-Literacy.RI.5.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.
CCS.ELA-Literacy.RI.5.8	Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (5-ESS1-1)

CCS.ELA-Literacy.RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
CCS.ELA-Literacy.W.5.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)
CCS.ELA-Literacy.SL.5.5	Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Mathematics

CCS.Mathematics.M.P-2	Reason abstractly and quantitatively. *(5-LS1-1)*
CCS.Mathematics.M.P-4	Model with mathematics *(5-LS1-1)*
CCS.Mathematics.M.P-5	Use appropriate tools strategically. *(5-LS1-1)*
CCS.MATH.MD.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. *(5-LS1-1)*

The following standards derive from the 2013 Next-Generation Science (NGSS) Middle School Engineering Design Standards.

NGSS.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.

BUNDLE 3: Molecules and Organisms: Matter and Energy in Ecosystems

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence ● Support an argument with evidence, data, or a model. (5-LS1-1) Developing and Using Models	LS1.C: Organization for Matter and Energy Flow in Organisms ● Plants acquire their material for growth chiefly from air and water. (5-LS1-1) LS2.A: Interdependent Relationships in Ecosystems ● The food of almost any kind of animal can be traced back	Energy and Matter ● Matter is transported into, out of, and within systems. (5-LS1-1) Systems and System Models ● A system can be described in terms of its components and their

● Develop a model to describe phenomena. (5-LS2-1) *Connections to the Nature of Science* Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena ● Science explanations describe the mechanisms for natural events. (5-LS2-1) Developing and Using Models ● Use models to describe phenomena. (5-PS3-1)	to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ● Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) PS3.D: Energy in Chemical Processes and Everyday Life ● The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)	interactions. (5-LS2-1)(ESS2.1) Energy and Matter ● Energy can be transferred in various ways and between objects. (5-PS3-1) Connections to Nature of Science Science Addresses Questions About the Natural and Material World. ● Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

	ESS2.A: Earth Materials and Systems ● Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) ESS3.C: Human Impacts on Earth Systems ● Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	

Unit Essential Questions

- How do organisms obtain and use matter and energy they need to live and grow?
- How do organisms interact with the living (biotic) and nonliving (abiotic) environments to obtain matter and energy?
- How do matter and energy move through an ecosystem?
- How do food and fuel provide energy?
- If energy is conserved, why do people say it is produced or used?

Scope and Sequence of Bundle 3:

Lesson 1: Biotic and Abiotic Factors
Lesson 2: Energy flow in an Ecosystem
Lesson 3: Interactions in an Ecosystem
Lesson 4: Human Impact
Lesson 5: Protecting the Ecosystem

Phenomenon: Energy is what drives activity, growth, repair, and reproduction for all living things. All living things require an energy source to survive.

Focus questions

- What are biotic and abiotic factors?
- Why are plants important in an ecosystem?
- What do plants need to grow?
- What is photosynthesis?
- How do animals depend on plants?
- What is a food chain?
- What is a food web?
- How does competition affect an ecosystem?
- What are the four spheres of the Earth and how do they interact?
- Why is the water cycle important?
- What is an ecocolumn?
- How does water pollution impact an ecosystem?
- How do humans impact ecosystems?
- How do humans disrupt natural cycles?
- Can we model the effects of human impact?
- Can we develop solutions to decrease human impact

Assured Assessments

Formative/Skills:

- Student Investigation Sheets
- Science Notebook Entries
- Whole group check-in discussions
- Monitoring during Turn and Talk
- Student responses during class discussions
- Review students' questions about the investigative phenomenon from the beginning of the lesson.
- Tell Me More Extension - responses

Summative/Content:

- Lesson 1: Biotic and Abiotic Factors Snapshot
- Lesson 2: Interdependence of Biotic Factors in an Ecosystem Snapshot

- Lesson 3: Ecosystems: Matter and Energy in the Ecosystem Snapshot
- Lesson 4: Interdependence Between Earth's Sphere
- Lesson 5: IAB - Ecosystems

Resources:

Core

- Building Blocks of Science® 3D: Matter and Energy in Ecosystems (©2019) Carolina Biological Supply Company. Burlington, NC.
- Building Blocks of Science Literacy Series™: Matter and Energy in Ecosystems. Carolina Biological Supply Company. Print.

Supplemental

- Online resources will be listed with lesson outlines on "Pacing Chart".
- Comprehensive Science Assessments, Book 5: Options Publishing: 2005. Merrimack, NH.
- Classroom and Learning Commons content related libraries

Time Allotment

- Bundle 3: Molecules to Organisms: Matter and Energy in Ecosystems

Appendix A

Assured Lesson Outline Sample

Earth's Place in the Universe (Lesson 1)

Bundle I: Earth and Space Systems

Plan Ahead	***Read these articles from NSTA:*** ***Claims, Evidence, Reasoning (CER):*** *https://v2.luminpdf.com/viewer/5d307a775cdf5e0019eb971a* ***Interactive Word Walls:*** https://v2.luminpdf.com/viewer/5d307b998d5f9a0019c29001 Earth & Space Science Resource: https://cptv.pbslearningmedia.org/subjects/science/earth-and-space-science/weather-and-climate/ Teacher Background, Bozeman Science http://www.viewpure.com/mxI7vRv8HT0?start=0&end=0 (7:30 mins)	
Grade*:* Grade 5	***Topic:*** *Earth's Place in Space*	***Lessons: Lesson 1 of 5*** ***-approximately 9 class periods***

Performance Standard:
5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.
Crosscutting Concepts: Cause and Effects; Scale, Proportion, and Quantity
CCS.Mathematics.MP.2: Reason abstractly and quantitatively. CCS.Mathematics.MP.4: Model with mathmatics.

Students will know…

- ❏ A "System" is a group of parts that work together.
- ❏ Earth is a part of large space systems.
- ❏ The shapes and orbits of planets and their satellites are caused by the constant pull of gravity.
- ❏ Models are used to describe the sizes and distances of planets in our solar system, due to their immense scale.

Objectives…

- ❏ Begin building an age-appropriate understanding about Earth's roles in space systems
- ❏ Compare the sizes of the planets in our system and the distances of the planets from the Sun and from each other
- ❏ Explain how the pull of gravity impacts Earth's shape and path around the Sun
- ❏ Construct an argument to support concepts related to gravity

Unit Anchoring Phenomena: Investigative Phenomenon for Lesson 1 (Beginning of Lesson):
The Sun shines through your window early in the morning, and it wakes you up. You step outside and see the Moon high in the sky. You go through your day, and then you watch the Sunset on the horizon. The night sky with the Moon and stars begins to emerge. The next morning, the pattern repeats. What does this make you wonder?

Anticipated Questions from students:

- What keeps the Sun and Moon in the sky?
- How far away are the Moon and Sun from Earth?
- How many stars are in the sky?

Lesson Plan – 5 E Model

Lesson 1: Investigative Phenomena: The Sun shines through your window early in the morning, and it wakes you up. You step outside and see the Moon high in the sky. You go through your day, and then you watch the Sunset on the horizon

Essential Question(s):

- What is the universe, and what is Earth's place in it?
- How are stars formed, and why do they appear in different positions during the night?
- What are the predictable patterns caused by Earth's movement in the solar system?
- How do Earth's major systems interact?

Teacher Prep and resources: **https://carolinascienceonline.com/#/teacher/product-lines/BBS**
The Building Blocks of Science® 3D: Carolina Building Blocks of Science: Earth and Space Systems, Teacher Guide
Before beginning Lesson 1: -

- Watch Teacher Prep Video (online resource) Under Lesson 1 - Overview Objectives - scroll down to video
- Read through Unit Overview: the beginning sections of the Teacher's Guide with format and background information: pages 32 to 35.
- Familiarize yourself with the Student Reader.

Teacher Guide: LESSON OVERVIEW

- This lesson focuses on examining the systems that make up our universe. Students research the planets in our solar system. Students learn about the pull of gravity and how it shapes the Sun, Earth and Moon system.

*Essential vocabulary for Lesson 1 is listed on page 32 in the Teacher Guide and online in the Teacher Background Tab.

ENGAGE: *Opening activity – access prior learning / stimulate interest / generate questions:*

Scope and Sequence:

Anchoring Phenomena **Instructional time:** 1 class period
Session 1:

Teachers need:

- Prepare SMARTBoard/Chart Paper, and computer.
- Read section on Anchoring Phenomenon (background for teacher). Page 32 in Teacher Guide.
- Phenomena Video: Show the corresponding online digital resource video - under Lesson 1, scroll down to video (3:19 min)
- At the end of the video, create a class chart of students' questions. Save to refer to at the end.

Investigating Phenomena:
Students need: Science Notebooks
Teacher needs:

- Read (page 32): "Investigating Phenomenon for Lesson 1"
- Encourage students to record questions in their science notebooks about what they see in the video.

Investigative Phenomenon for Lesson 1 (Beginning of Lesson):
The Sun shines through your window early in the morning, and it wakes you up. You step outside and see the Moon high in the sky. You go through your day, and then you watch the Sunset on the horizon.

The night sky with the Moon and stars begins to emerge. The next morning, the pattern repeats. What does this make you wonder?

EXPLORE: *Lesson Description – Materials needed / probing or clarifying questions / resources*

Scope and Sequence	**Materials** listed with each lesson design in Teacher Guide
Investigation A: ***What do we know about Earth and Space systems?***	**Instructional time:** 1 class period
Session 2 **Follow directions for lesson on pages 36 to top of 37.**	Materials listed on page 36: **For each student:** Science Notebook
#1. Digital Resource: The Interactive Whiteboard Activity is under Lesson 1 A: ***A-IWB:*** *Knowledge and Questions about Earth and Space Systems*	**Teacher:** 1 Pair scissors Chart Paper or SMART Board Markers
Turn & Talk: Ask: ● Do you think a pair of scissors is an example of a system? *(Answers will vary.)* ● What will happen to the scissors, if I take them apart? *(They won't work.)* ● What are other examples of systems? *(Examples will vary but may include bikes, cars, the human body, ecosystems, or game consoles.)*	**System:** A group of parts that work together.
● What are some space objects (celestial bodies) with which Earth works, interacts, or is grouped? *(Students may suggest the Sun, other planets, or the Moon.)* ● How many systems do you think Earth is a part of? What do you think those systems are called? *(Answers will vary.)*	**Celestial bodies:** A natural object which is located outside of Earth's atmosphere, such as the Moon, the Sun, an asteroid, planet, or star.
Students record responses: Online digital resource Tell Me More: (under Lesson 1: Procedure) *Earth and Space Systems: Lesson 1: Investigation A*	
Optional: Have students complete in Science Notebooks	

Investigation B: ***Can I describe features of planets in our solar system?***

Session 3

Follow the directions on pages 37 to top of 40.

Session 3
Day 1: ***#1 through #5***

#1: Review systems

#2: Introduce vocabulary:

- **Universe:** All of the contents of space including all matter, energy, and galaxies
- **Galaxy**: One of the very large groups of stars and other matter in the universe
- **Solar system:** A group of planets and other objects that move around a central star
- **Celestial Body-** a natural object outside earth's atmosphere. Examples include: sun, moon

#3: Talking questions for class discussion

- What objects did you list? *(Students may suggest planets, moons, asteroids, comets, or satellites.)*
- How far do you think the objects are from Earth? From the Sun? From each other? *(Answers will vary.)*
- How do the objects vary in size? *(Answers will vary.)*
- How do scientists gather evidence about objects in our solar system? *(Students may suggest using technology such as telescopes, space orbiters, or satellites to gather information.)*

#4: Sun and Earth:
Show students the scaled Sun and Earth cutouts you prepared from Teacher Sheet 1B.

- What do you notice about the Sun and Earth? *(The Sun is much bigger than Earth.)*
- How is the Sun different from Earth? *(Answers will vary. Students may suggest the Sun is a star, a ball of gas, very hot. They*

Instructional time: 3 class periods

MATERIALS List for 3 class sessions:
Student

- 1 Science notebook*
- 1 Student Investigation Sheet 1B.1: *What Can I Learn About a Planet in Our Solar System?*
- 1 Student Investigation Sheet 1B.2: *Can I Describe Features of the Planets in Our Solar System?*

Class

- Chart paper or poster board/paper*
- Colored pencils or markers*
- Research materials (including science books and magazines, dictionaries, and computers with Internet access as available)*

Teacher

- 1 Teacher Sheet 1B: *Scaled Images of Earth and the Sun*
- 1 Student Investigation Sheet 1B.2: *Can I Describe Features of the Planets in Our Solar System?* (Teacher's Version)
- 1 Inflatable globe
- Chart paper or whiteboard*
- Markers*

may describe Earth as solid, having water, having an atmosphere, or supporting life.) ● Why can this be called a model of the Sun and Earth? *(The cutouts are models because they are not the real objects and are not the same size as the real objects, but they can be used to describe the objects since we can't interact with them directly.)* ● If we were to make a model of our solar system, what else should we include? *(Students may suggest the Moon, other planets, their moons, asteroids, meteoroids, comets, or other small objects like satellites. Explain that in this scale model, the Moon would be about one-fourth the size of the Earth cutout.)* **#5: Turn & Talk:** ● What would you include in your model of the solar system? ● What would be the center of the solar system? ● Which planets would you include in your model? ● How would the size of the Sun compare to the other parts of the solar system? Ask students to imagine that they are designing a model of the solar system for the class. Instruct students to draw or describe in their science notebooks what their model would look like. **Session 3** **Day 2: *#6 through #8*** **#6: Use Sheet 1B.1** *What can I learn about a planet in our solar system?* **#7: Research** **https://solarsystem.nasa.gov/planets/overview/** ***EARTH, MOON, SUN* Delta Science Reader** **#8: Groups:** Students will pair to discuss what they learned and prepare a poster to share with class Part B of 1B.1 needs to be included on poster	**Model:** A representation of an object or idea. **Scale Model:** A physical representation of an object which is larger or smaller than the actual object but maintains the same proportions as the real object. **Planets:** A spherical body that moves around a star. NASA Kids Solar System Exploration NASA: **Our World: Pluto - Our First Dwarf Planet**

Session 3 **Day 3: *#9 through #11*** **#9: Sheet 1B.2** *Can I Describe the Features of the Planets in Our Solar System?* BrainPOP Planets: *https://www.brainpop.com/search/?keyword=planets* **#10:** Share posters and record on Part A of Investigation Sheet **#11 -** Individually students complete Part B & C of Sheet 1B.2.	
EXPLAIN: *Concepts explained and vocabulary defined:*	
Investigation C: ***How do the Sun, Earth, and Moon make a system?*** **Session 4** **Session 4** **Day 1: *#1 through 5*** Mini Lesson: Claims Evidence Reasoning (CER) Student Investigation Sheet 1C - Part E. #1: Review previous investigation and vocabulary. Teacher should preview sites before showing students. https://solarsystem.nasa.gov/solar-system/sun/overview/ https://staratlas.com/ http://www.spaceweather.com/ http://www.viewpure.com/1Eh5BpSnBBw?start=0&end=0 Mind Blowing: Proportional Sizes(3.33 min - video) **#2: Gravity brainstorm** **#3: Gravity Demonstration and Turn & Talk**:	**Instructional time: 2 class periods** **MATERIALS** **Student** ● 1 Science notebook* ● 1 Student Investigation Sheet 1C: *How Do the Sun, Earth, and Moon Make a System?* **Teacher** ● 1 Teacher Sheet 1C: *Sun-Earth-Moon System* ● 1 Student Investigation Sheet 1C: *How Do the Sun, Earth, and Moon Make a System?* (Teacher's Version) ● 1 Hardcover book* ● 1 Inflatable globe ● Projection system* **Gravity:** The force that attracts all objects toward each other.

- How does dropping the book demonstrate gravity? *(The book fell to the floor, which demonstrates the pull of gravity.)*
- Define "gravity." *(If students do not correctly define "gravity," guide them to understand that gravity is a force that pulls all objects toward each other.)*
- How can we use force to describe what happened in this demonstration? *(Answers may vary, but students should say that gravity pulled the book to the floor.)*
- What experiences have you had with gravity? *(Answers will vary.)*

#4: Gravity: force on Earth
Brain Pop Video Gravity:
https://www.brainpop.com/science/motionsforcesandtime/gravity/

Turn & Talk:

- How do you think gravity affects objects in space? *(Answers will vary.)*

#5: Inflatable Globe: Model of Earth

- How can we describe Earth's shape? *(Round, spherical, like a ball)*
- Think about the planets in the solar system. They have the same shape as Earth. How do you think gravity plays a role in shaping planets? *(Answers will vary. Guide students to understand that the pull of gravity on each planet results in its spherical shape.)*
- Why else might gravity be important in space? *(Answers will vary. Guide students to understand that in space, every object has a gravitational pull on every other object in space. Gravity influences the orbits of planets, moons, and satellites, and it holds together galaxies.)*

Session 4
Day 2: *#6 through 11*

#6: Sheet 1C: *How Do the Sun, Earth, and Moon Make a System?* Part A.

Spherical shape: A three dimensional version of the two-dimensional circle. The ball image is a good one since the word sphere comes from very similar-sounding Greek and Latin words, both of which mean "ball."

Page xi in Front Matter of Teacher Guide:

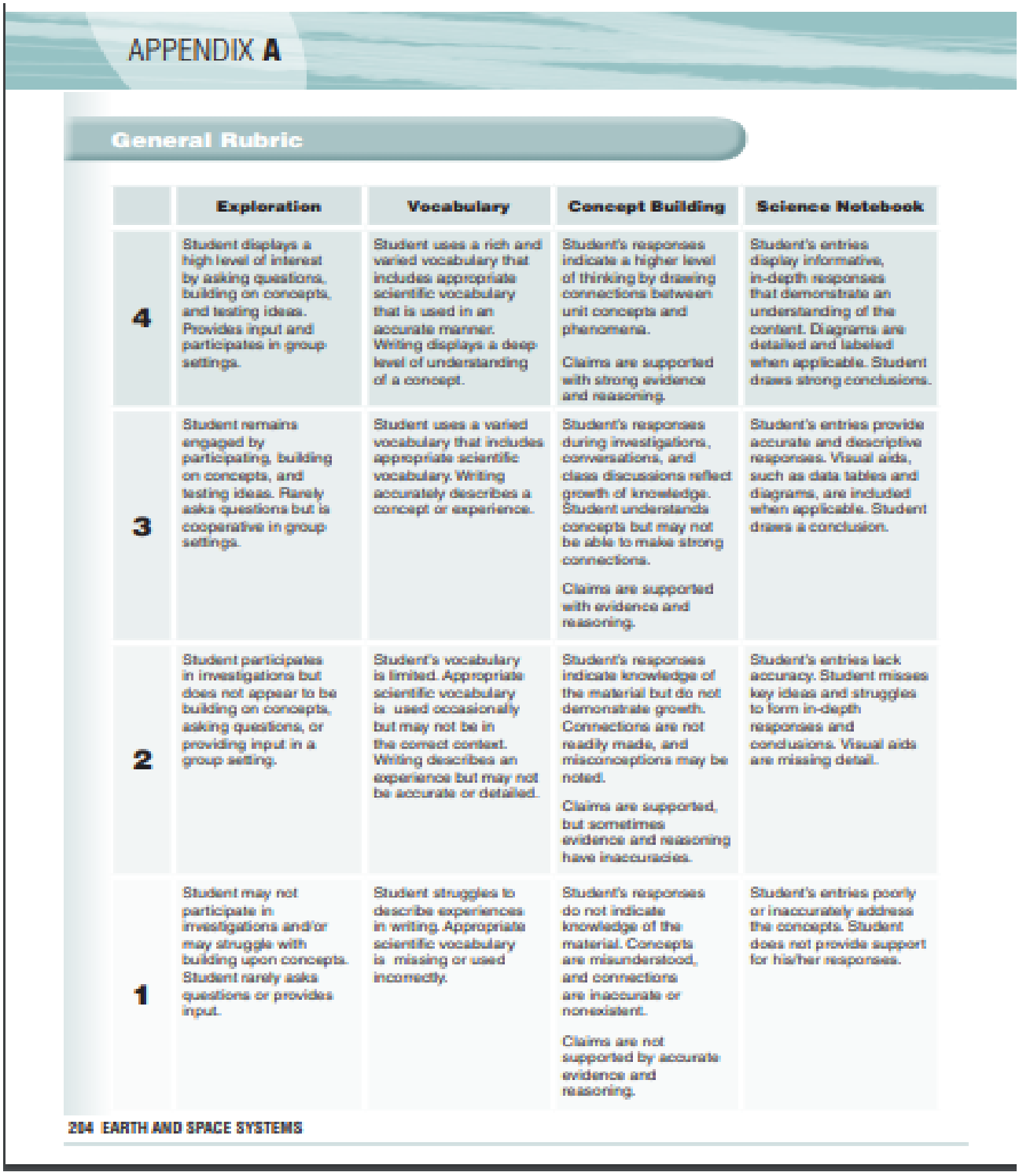
#7: Sheet 1C: Part B - Show: *Digital Tip: Sun, Earth, Moon Simulation* #8: Teacher Sheet 1C: Sun-Earth-Moon System #9: Sheet 1C: Part C #10: Claims, Evidence, Reasoning (CER) Sheet 1C: Part E. #11: Ask a few volunteers to share CER responses.	**Sensemaking: Developing Claims Supported with Evidence and Reasoning** Scientific argumentation, or evidence-based argumentation, is defined as making scientific explanations (claims) using empirical data (evidence) to justify an argument (reasoning). Scientists use this type of argumentation to make sense of phenomena and refine their ideas, explanations, and experimental designs. In the classroom, students should be introduced to scientific argumentation to guide them in sensemaking, or building an understanding of phenomena based on evidence gained through observations, investigations, and data analysis. Through sensemaking, students refine and revise their understanding as new evidence is acquired and information is shared through class discussions. Building Blocks of Science units offer multiple opportunities for students to make sense of scientific concepts by developing claims and supporting their claims with evidence and reasoning. At the start of an investigation, students are presented with a question related to a scientific concept. To make sense of a phenomenon or concept, students must draw upon their previous knowledge and experiences to develop a statement or conclusion that answers the question. To support that claim, students must provide relevant and specific data as evidence. This data may come from previous investigations, inference clues, texts, or class discussions. Students may even reference personal experience. Reasoning provides justification for why the selected evidence supports the claim. Relevant scientific principles should be incorporated into this reasoning. After the investigation, students should revisit their initial claims and determine if they are supported by newly gathered evidence. If the available evidence does not support students' initial claims, students should identify misunderstandings and present a claim that is supported. To support students who struggle with scientific argumentation, ask them to use sentence frames such as "I think ____ because ____" to help with sensemaking. Explain that the first blank is the claim and the second blank is the evidence and reasoning.
Concepts	**Essential Vocabulary:**
• A System is a group of parts that work together. • Earth is a part of large space systems. • The shapes and orbits of planets and their satellites are caused by the constant pull of gravity. • Models are used to describe the sizes and distances of planets in our solar system due to their immense scale.	• Celestial bodies • Galaxy • Gravity • Model • Planet • Revolution • Rotation • Scale model • Solar system • Star • Sun • System • Universe Essential vocabulary with definitions: https://docs.google.com/document/d/13IDorAW9vxYtYIi4oljHWrfqtYbVH_LeIXZV1FlLcuE/edit?usp=sharing
ELABORATE: *Applications and extensions*	
	Materials
Review Day **Session 5** Anchoring Phenomenon (End of Lesson):	**Instructional time: 1 class period** *Optional Extensions to Lesson 1: Page 44*

Review students' questions about the investigative phenomenon from the beginning of this lesson. Guide students in applying the concepts explored in this lesson and connecting them to the anchoring phenomenon: recognizing patterns that can explain the interconnectedness of the systems on Earth and in space. By the end of the lesson, students should be able to explain that: ● Earth is part of many larger systems in space. ● Models are used to describe the sizes and distances of planets in our solar system due to their immense scale. ● The shape and orbit of Earth around the Sun and the shape and orbit of the Moon around Earth are the results of the constant pull of gravity.	
EVALUATE: *Assured assessments*	
Formative Monitoring: questioning / discussion	*Summative Assessment*
● Student Investigation Sheets ● Science Notebook Entries ● Whole group check-in discussions ● Monitoring during Turn and Talk ● Student responses during class discussions ● Review students' questions about the investigative phenomenon from the beginning of the lesson. ● (Tell Me More - responses)	**1 Class Period** Lesson 1: Earth's Place in Space Assessment General Rubric: https://carolinascienceonline.com/bbs-journey/ess/ess_GeneralRubric.pdf
ELABORATE FURTHER*: Reflective / enrichment* (optional)	
*Tell Me More (Page 37)Define "system" in your own words, and give an example. Draw the system and label its parts. *Tell Me More (Page 40)The Sun, Earth, and Moon make up a system. Do you think these objects are the same size? Explain why or why not? *Tell Me More (Page 42) The Sun, Earth, and Moon work as system. Explain how Earth's distance from the Sun affects life on Earth. Describe how it would be different if Earth were closer to or farther from the Sun. See brainPOP for video explanation https://www.brainpop.com/science/space/sun/ ** "Tell Me More" questions are found under digital resources	

Appendix B

General Scoring Rubric

General Scoring Rubric



APPENDIX A

General Rubric

	Exploration	Vocabulary	Concept Building	Science Notebook
4	Student displays a high level of interest by asking questions, building on concepts, and testing ideas. Provides input and participates in group settings.	Student uses a rich and varied vocabulary that includes appropriate scientific vocabulary that is used in an accurate manner. Writing displays a deep level of understanding of a concept.	Student's responses indicate a higher level of thinking by drawing connections between unit concepts and phenomena. Claims are supported with strong evidence and reasoning.	Student's entries display informative, in-depth responses that demonstrate an understanding of the content. Diagrams are detailed and labeled when applicable. Student draws strong conclusions.
3	Student remains engaged by participating, building on concepts, and testing ideas. Rarely asks questions but is cooperative in group settings.	Student uses a varied vocabulary that includes appropriate scientific vocabulary. Writing accurately describes a concept or experience.	Student's responses during investigations, conversations, and class discussions reflect growth of knowledge. Student understands concepts but may not be able to make strong connections. Claims are supported with evidence and reasoning.	Student's entries provide accurate and descriptive responses. Visual aids, such as data tables and diagrams, are included when applicable. Student draws a conclusion.
2	Student participates in investigations but does not appear to be building on concepts, asking questions, or providing input in a group setting.	Student's vocabulary is limited. Appropriate scientific vocabulary is used occasionally but may not be in the correct context. Writing describes an experience but may not be accurate or detailed.	Student's responses indicate knowledge of the material but do not demonstrate growth. Connections are not readily made, and misconceptions may be noted. Claims are supported, but sometimes evidence and reasoning have inaccuracies.	Student's entries lack accuracy. Student misses key ideas and struggles to form in-depth responses and conclusions. Visual aids are missing detail.
1	Student may not participate in investigations and/or may struggle with building upon concepts. Student rarely asks questions or provides input.	Student struggles to describe experiences in writing. Appropriate scientific vocabulary is missing or used incorrectly.	Student's responses do not indicate knowledge of the material. Concepts are misunderstood, and connections are inaccurate or nonexistent. Claims are not supported by accurate evidence and reasoning.	Student's entries poorly or inaccurately address the concepts. Student does not provide support for his/her responses.

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Carolina Biological: Building Blocks of Science 3D Scoring Rubric (2019)