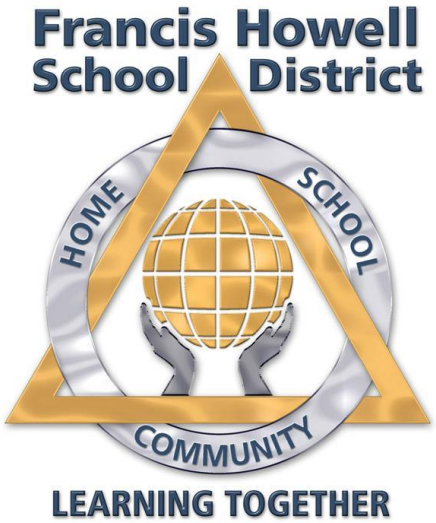
Second Grade

Science Curriculum



Board Approved:
July 19, 2018

Francis Howell School District

Mission Statement

The mission of the Francis Howell School District is to prepare students today for success tomorrow.

Vision Statement

Every student will graduate with college and career readiness skills.

Values

Francis Howell School District is committed to:

- Providing a consistent and comprehensive education that fosters high levels of academic achievement
- Operating safe and well-maintained facilities
- Providing a safe learning environment for all students
- Promoting parent, community, student, and business involvement in support of the school district
- Ensuring fiscal responsibility
- Developing responsible citizens
- Operating as a professional learning community
- Making appropriate use of technology

Francis Howell School District Graduate Goals

Upon completion of their academic study in the Francis Howell School District, students will be able to:

1. Gather, analyze and apply information and ideas.
2. Communicate effectively within and beyond the classroom.
3. Recognize and solve problems.
4. Make decisions and act as responsible members of society.

Science Graduate Goals

Upon completion of their Science study in the Francis Howell School District, students will be able to:

- Use Scientific and Engineering Practices to understand how scientific knowledge develops and the work of engineers, as well as the links between engineering and science. These practices include:
    - Asking questions (for science) and defining problems (for engineering)
    - Developing and using models
    - Planning and carrying out investigations
    - Analyzing and interpreting data
    - Using mathematics and computational thinking
    - Constructing explanations (for science) and designing solutions (for engineering)
    - Engaging in argument from evidence
    - Obtaining, evaluating, and communicating information
- Develop an understanding of, and be able to explain, concepts that bridge disciplinary boundaries, including:
    - Patterns
    - Cause and effect: Mechanism and explanation
    - Scale, proportion, and quantity
    - Systems and system models
    - Energy and matter: Flows, cycles, and conservation
    - Structure and function
    - Stability and change
- Use scientific knowledge to understand the world in four major domains:
    - Physical sciences (Matter and its interactions, Motion and Stability, Energy, Waves and Their Applications)
    - Life sciences (From Molecules to Organisms, Ecosystems, Heredity, Biological Evolution)
    - Earth and space sciences (Earth's Place in the Universe, Earth's Systems, Earth and Human Activity)
    - Engineering, technology, and the applications of science (Engineering Design, Links among Engineering, Technology, Science, and Society)

Rationale for Elementary Science

Science, engineering, and technology permeate nearly every facet of modern life, and they also hold the key to meeting many of humanity's most pressing current and future challenges. The overarching goal of science education is to ensure that all students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and engineering to engage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside of school; and have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology. Elementary science in Francis Howell School District will develop student understandings and skills which are necessary for them to function productively as problem-solvers in a scientific and technological world, cultivate students' scientific and engineering habits of mind, develop their capability to engage in scientific and engineering practices, and teach them how to reason in the contexts of science, engineering, and technology.

Second Grade Science Course Description

Second Grade Science is designed to explore Structures and Properties of Matter, Interdependent Relationships in Ecosystems, and Processes that Shape Earth. Students develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students also compare the diversity of life in different habitats. They develop an understanding of observable properties of materials through analysis and classification of different materials. Students apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. They use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In second grade, students are expected to demonstrate grade appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

K-3 Science Curriculum Team

Curriculum Committee

Sara Abney	Central Elementary
Melissa Barth	Harvest Ridge
Becky Bee	Fairmount
Brittany Booth	Fairmount
Samantha Calise-Moody	Daniel Boone
Teresa Gilstrap	Becky-David
Robyn Heimburger	Castlio
Melissa Kirchoff	Fairmount
Christie Kolath	Becky-David
Katie Lenz	Daniel Boone
Rebecca Lewis	Harvest Ridge
Kim Ostertag	Independence
Rainah Pray	Becky-David
Kelly Peterson	Central Elementary
Angela Regan	Harvest Ridge
Karen Ruzicka	Warren
Arica Vester	Warren
Rebecca Weaver	John Weldon
Rachael Wilcox	Independence
Kayla Willbrand	Central Elementary
Robyn Heimburger	Castlio Elementary

Academics and Administration

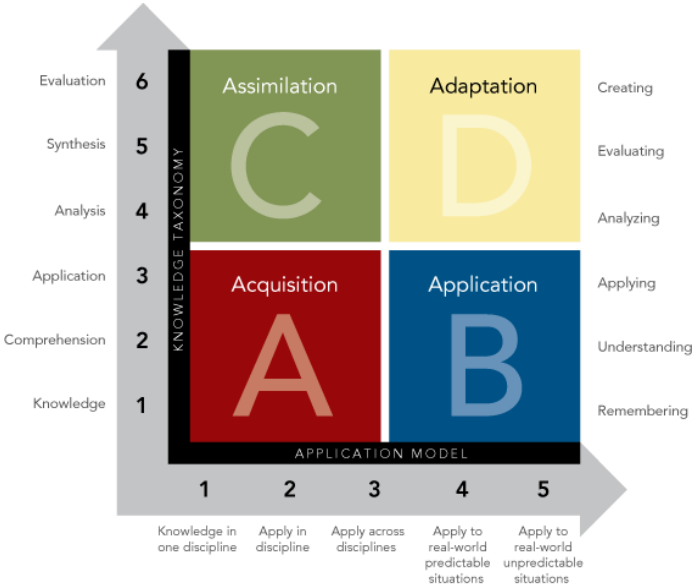
Science & Math Content Leader	Dr. Sherri Lorton
ELA, Social Studies, & Health Content Leader	Carrie Hepburn
Director of Student Learning	Dr. Chris Greiner
Chief Academic Officer	Nicole Whitesell
Superintendent	Dr. Mary Hendricks-Harris

Curriculum Notes

All FHSD performance tasks and sample learning activities are aligned not only to understandings and standards, but also the Rigor and Relevance Framework and 21st Century Skills. Information on these two things is provided below or by clicking on the hyperlinks.

Rigor and Relevance Framework

The Rigor/Relevance Framework is a tool developed by the International Center to examine curriculum, instruction, and assessment along the two dimensions of higher standards and student achievement.



The Rigor/Relevance Framework has four quadrants.
Quadrant A represents simple recall and basic understanding of knowledge for its own sake. Examples of Quadrant A knowledge are knowing that the world is round and that Shakespeare wrote Hamlet.

Quadrant C represents more complex thinking but still knowledge for its own sake. Quadrant C embraces higher levels of knowledge, such as knowing how the U.S. political system works and analyzing the benefits and challenges of the cultural diversity of this nation versus other nations.

Quadrants B and D represent action or high degrees of application. Quadrant B would include knowing how to use math skills to make purchases and count change. The ability to access information in wide-area network systems and the ability to gather knowledge from a variety of sources to solve a complex problem in the workplace are types of Quadrant D knowledge.

A	B	C	D
Students gather and store bits of knowledge and information. Students are primarily expected to remember or understand this knowledge.	Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply knowledge to new and unpredictable situations.	Students extend and refine their acquired knowledge to be able to use that knowledge automatically and routinely to analyze and solve problems and create solutions.	Students have the competence to think in complex ways.

21st Century Skills

These skills have been pared down from 18 skills to what are now called the 4Cs. The components include critical thinking, communication, collaboration, and creativity. Critical thinking is focused, careful analysis of something to better understand and includes skills such as arguing, classifying, comparing, and problem solving. Communication is the process of transferring a thought from one mind to others and receiving thoughts back and includes skills such as choosing a medium (and/or technology tool), speaking, listening, reading, writing, evaluating messages. Collaboration is working together with others to achieve a common goal and includes skills such as delegating, goal setting, resolving conflicts, team building, decision-making, and managing time. Creativity is expansive, open-ended invention and discovery of possibilities and includes skills such as brainstorming, creating, designing, imagining, improvising, and problem-solving.

Standards

Standards aligned to this course can be found:

Science Standards

http://www.nextgenscience.org/overview-topics

https://dese.mo.gov/sites/default/files/curr-mls-standards-sci-k-5-sboe-2016.pdf

National Educational Technology Standards

http://www.iste.org/standards/standards/for-students-2016

Units & Standards Overview

Quarter 1 **Quarter 2** **Quarter 3** **Quarter 4**

Unit 1: Change Matters	Unit 2: Changing Ecosystems	Unit 3: A Changing Earth
NGSS 2-PS1-1/MO 2.PS1.A.1 NGSS 2-PS1-2/MO 2.PS1.A.2 NGSS 2-PS1-3 NGSS 2-PS1-4/MO 3.PS1.B.1 CCC1 CCC2 CCC5 SEP1 SEP2 SEP3 SEP4 SEP6 SEP7	NGSS 2-LS2-1 NGSS 2-LS2-2/MO 2.LS2.A.2 NGSS 2-LS4-1 CCC2 CCC6 SEP1 SEP2 SEP3	NGSS 2-ESS1-1/MO 2.ESS1.C.1 NGSS 2-ESS2-1/MO 2.ESS2.A.1 NGSS 2-ESS2-2/MO 2.ESS2.B.1 NGSS 2-ESS2-3/MO 2.ESS2.C.1 CCC2 CCC6 SEP1 SEP2 SEP6 SEP8
PE Assessment:	**PE Assessment:**	**PE Assessment:**
Structure and Properties of Matter Assessment	Changing Ecosystems Assessment	Changing Earth Performance Task

Course Map

	Unit Description	PE Standards
Unit 1: Change Matters **20 days**	In this unit students will be investigating matter. We will explore the properties of matter, how it changes, and why it changes. Students will understand that changes can be both reversible and non-reversible and that matter can be put together and taken apart to make new things.	**2-PS1-3** **CCC5** (energy and matter) **SEP6** (constructing explanations and designing solutions)
Unit 2: Changing Ecosystems **20 days**	In this unit we will be learning about biodiversity. Students will explore how to create biodiversity in areas that need it. Students will understand the relationships between living things and how they affect one another as well as how to engineer solutions when one component is missing.	**2-LS2-2** **CCC6** (structure and function) **SEP2** (developing and using models)
Unit 3: A Changing Earth **20 days**	In this unit we will learn about different types of changes in the earth and how to prevent or slow down these changes. Students will understand slow and fast changes and understand how to problem solve/engineer ways to prevent or slow down these changes.	**2-ESS1-1** **2-ESS2-1** **CCC7** (stability and change) **SEP6** (construct explanations and design solutions)

Unit 1: Change Matters

Content Area: Science	Course: Second Grade	UNIT: Change Matters

Unit Description:	Unit Timeline:
In this unit students will be investigating matter. We will explore the properties of matter, how it changes, and why it changes. Students will understand that changes can be both reversible and non-reversible and that matter can be put together and taken apart to make new things. **Link to anchor chart**	20 days

DESIRED Results

Transfer Goal - ***Students will be able to independently use their learning to……***

1. **Ask questions define problems**: Ask and/or identify questions that can be answered by an investigation.
2. **Develop and use models:** Compare models to identify common features and differences.
3. **Plan and carry out investigations:** Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
4. **Analyze and interpret data:** Analyze data from tests of an object or tool to determine if it works as intended.
6. **Construct explanations and design solutions:** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.
7. **Engage in arguments from evidence**: Construct an argument with evidence to support a claim.

Understandings – *Students will understand… (Big Ideas)*

1. (Patterns) Patterns in the natural and human designed world can be observed.
2. (Cause and Effect) Events have causes that generate observable patterns. Simple tests can be designed to gather evidence to support or refute student ideas about causes.
5. (Energy and Matter) Objects may break into smaller pieces and be put together into larger pieces, or change shapes.

Essential Questions: ***Students will keep consider:***

- What patterns in the natural and human designed world can we observe?
- What events have causes that generate observable patterns?
- What simple tests can be designed to gather evidence to support or refute student ideas about causes?
- How can objects break into smaller pieces and be put together into larger pieces, or change shape?
- How could knowledge of the natural world help in the design of human-made products?
- How can matter be described and classified?
- Why are different properties better suited for different purposes?
- What are some examples of observable changes that can be caused as a result of heating or cooling a substance?

STANDARDS ADDRESSED		
Students who demonstrate understanding can: 2-PS1-1/MO 2.PS1.A.1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.] 2-PS1-2/MO 2.PS1.A.2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. * [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.] **2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.] 2-PS1-4/MO 3.PS1.B.1: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]		
Disciplinary Core Ideas **Students will know...**	**Cross Cutting Concepts** **Students will understand…**	**Science and Engineering Practice** **Students will be able to...**
PS1.A: Structure and Properties of Matter Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)	<u>CCC1: Patterns</u> ● Patterns in the natural and human designed world can be observed. (2-PS1-1)	<u>SEP3: Planning and Carrying Out Investigations</u> Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)
		ISTE 3c: Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
PS1.A: Structure and Properties of Matter Different properties are suited to	<u>CCC2: Cause and Effect</u> ● Simple tests can be designed to gather	<u>SEP4: Analyzing and Interpreting Data</u> Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

different purposes. (2-PS1-2, 2-PS1-3)	evidence to support or refute student ideas about causes. (2-PS1-2) **CCC5: Energy and Matter** ● Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)	● Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)
PS1.A: Structure and Properties of Matter A great variety of objects can be built up from a small set of pieces. (2-PS1-3)	**CCC5: Energy and Matter** ● Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)	SEP1: Asking Questions and Defining Problems Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. ● Ask and/or identify questions that can be answered by an investigation. (2-PS1-3) **SEP2: Developing and Using Models** Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ● Compare models to identify common features and differences. **SEP6: Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)
PS1.B: Chemical Reactions Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	CCC2: Cause and Effect Events have causes that generate observable patterns. (2-PS1-4)	SEP7: Engaging in Argument from Evidence Engaging in argument from evidence in K-2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). ● Construct an argument with evidence to support a claim. (2-PS1-4)

Unit 1 (Change Matters): Assessment

EVIDENCE of LEARNING

Understanding	Standards	**Unit Performance Assessment**	**R/R Quadrant/ 21 C Skills**
5	**2-PS1-3** **CCC5** (energy and matter) **SEP6** (constructing explanations and designing solutions)	**Description of Assessment Performance Task(s):** Structure and Properties of Matter Assessment **Scoring Guide:** see Structure and Properties of Matter Assessment	A, B Critical Thinking, Communication, Creativity

Unit 1 (Change Matters): Sample Activities

SAMPLE LEARNING PLAN
Pre-assessment: On the whiteboard, with chart paper, or on the smartboard ask students these 2 questions and record their responses: 1. What are the types of matter? 2. How can matter change?
Anchoring Phenomena for this Unit: Watts Tower
This curriculum is based on the Next Generation Science Standards. For clarification on the standards, please visit the Wonder of Science website. Go to the standards tab to find your grade level and unit. After clicking on the unit, you will see a list of standards students should learn that you can click. After clicking on the standard then the evidence link, you will find a clarification statement as well as the practices you should take the standard through. Also included are observable features of student performance by the end of the grade that will help indicate whether or not the student has met the standard. This document outlines how to take one of the content objectives from each unit through a specific inquiry process using the 3-dimensional learning outlined in our standards and gives sample activities that would ensure the objective is taught to students. Many of the sample activities in these units have *Asking Questions and Defining Problems* and *Developing a Model* in addition to the other scientific practices found in the evidence section. We added these two practices to use as a pre-assessment and to see what the students already know and understand about the standard to guide our instruction. It will be up to you to look at the objectives that are not addressed in this document and make plans accordingly.

Understanding	Standards	Major Learning Activities:	Instructional Strategy:	R/R Quadrant: 21C:
5	**2-PS1-3** A great variety of objects can be built up from a smaller set of pieces **CCC5** (energy and matter) SEP1 (asking questions)	**Sample Activity 1** **Title:** Asking Questions **Objective:** Students will ask questions about energy and matter as they consider how a variety of objects can be built up from a small set of pieces. **Description:** 1. Teacher will show video and/or pictures to students. 2. Students will generate 10-15 questions that they have about pictures/videos on their own. Remind students that when they are looking at the picture/video their questions should be deeper level thinking. Questions should also be testable. a. Students should not be talking together at this time. It is important for them to explore the phenomena on their own to pique their curiosity. 3. Students will share their questions with a small group/partner. Students should be looking for questions that the group/partnership have in common. 4. The group/partnership will select the 5 questions that they are most curious about and share their questions to the whole class. **Alternate Questioning Activity:** 1. In small groups, with one person as recorder, ask students to write down questions they have about what they observed. (5 minutes) Rules for Producing Questions: a. Ask as many questions as you can. b. Do not stop to discuss, judge or answer the questions. c. Write down every question exactly as it is stated. d. Change any statement into a question. 2. Categorize Your Questions (5 minutes) In your list, you might have the two types of questions previously mentioned: closed-ended and open-ended. Here are working definitions for closed and open-ended questions: Closed-ended questions can be answered with “yes” or	Setting Objectives Nonlinguistic Representation Cooperative Learning Questioning	B Critical thinking Collaboration Communication

		"no" or with one word. Open-ended questions require an explanation and cannot be answered with "yes" or "no" or with one word. Review your list of questions and identify closed and open-ended questions. Mark the open-ended questions with an O and the closed-ended questions with a C. THEN, change questions from one type to another. Go back to your list of questions and change one closed-ended question into an open-ended, and change one open-ended question into a closed-ended one. Make the changes right on the list. 3. Choose the three most important questions from your list. Mark them with an "X" and discuss your reasons for selecting those three. **Appendix Documents and Resources:** Question Formulation Technique from rightquestion.org		
5	**2-PS1-3** A great variety of objects can be built up from a smaller set of pieces **CCC5** (energy and matter) SEP2 (developing and using models)	**Sample Activity 2** **Title:** Developing & Using a Model **Objective:** Students will develop and use a model about energy and matter as they consider how a variety of objects can be built up from a small set of pieces. **Description:** 1. Show students a group of 5 - 6 objects (cups, manipulatives, etc.). 2. Ask - What new creation could you make with these objects? 3. Have students draw what they could make out of the objects that you have shown.	Setting Objectives Nonlinguistic Representation	C Communication Creativity
5	**2-PS1-3** A great variety of objects can be built up from a smaller set of pieces **CCC5** (energy and matter) SEP3	**Sample Activity 3** **Title:** Planning Investigation **Objective:** Students will plan an investigation about energy and matter as they consider how a variety of objects can be built up from a small set of pieces. **Description:** Students will compare their drawing from the previous lesson with other students. 1. Compare their drawing with their group/partners and notice differences in how they arranged the objects. *(Emphasis on the fact that they could still go back and*	Identify Similarities and Differences	C Critical thinking Collaboration Communication Creativity

	(planning and carrying out investigations)	*make another structure because the objects can be arranged in many different ways.)* 2. Students will determine a plan for building their structure using ideas from all members of the groups or agreeing about the design as a group. 3. Together, students will draw an agreed upon model for the structure they will create.		
5	**2-PS1-3** A great variety of objects can be built up from a smaller set of pieces **CCC5** (energy and matter) SEP3 (planning and carrying out investigations) ISTE 3c	**Sample Activity 4** **Title:** Carrying Out Investigations **Objective:** Students will carry out an investigation about energy and matter as they consider how a variety of objects can be built up from a small set of pieces. **Description:** 1. Groups/partners will go back and test to see if their structure (using teacher-provided/suggested objects from Activity 2) will hold the way they drew it. 2. Students could use an iPad, phone, or digital camera to document each of their structures. These pictures could be used during the next step when they are discussing with peers. 3. Students will discuss why or why not their structure held up or fell down and revise if necessary.	Setting Objectives Cooperative Learning	B Critical thinking Collaboration Communication Creativity
5	**2-PS1-3** A great variety of objects can be built up from a smaller set of pieces **CCC5** (energy and matter) **SEP6** (construct explanations and design solutions)	**Sample Activity 5** **Title:** Constructing Explanations **Objective:** Students will construct an explanation about energy and matter as they consider howa variety of objects can be built up from a small set of pieces. **Description:** 1. Students will identify what about their structure met the criteria and allowed it to stand. Students will construct an explanation that describes how their structure fits the criteria of being able to be made into multiple different things with the same materials. The student should provide examples as details to make their explanation clear and help to support the findings. 2. Students can explain to a partner, small group, or whole class.	Setting Objectives Summarizing	C Critical thinking Communication

UNIT RESOURCES
Teacher Resources: ● Watts Tower Video ● Watts Tower Picture ● Whiteboard, chart paper, or smartboard (for pre - assessment) ● Question Formulation Technique from rightquestion.org ● *STEM Sims simulations*
Student Resources: ● Paper ● Pencil ● Group of 5 - 6 objects to build with (ex: cups, math manipulatives, blocks, etc.)
Vocabulary: Compare - to examine two or more (objects, ideas, people, etc.) in order to note similarities and differences Creation - the act of producing or causing to exist Energy - available power Investigation - searching, inquiry for facts Matter - the substance of any physical object

Unit 2: Changing Ecosystems

Content Area: Science	Course: Second Grade	UNIT: Changing Ecosystems

Unit Description:	Unit Timeline:
In this unit we will be learning about biodiversity. Students will explore how to create biodiversity in areas that need it. Students will understand the relationships between living things and how they affect one another as well as how to engineer solutions when one component is missing. **Link to anchor chart**	20 days

DESIRED Results

Transfer Goal - ***Students will be able to independently use their learning to……***

1. **Ask questions define problems** Ask questions based on observations to find more information about the natural and/or designed world(s).
2. **Develop and use models**: Develop a simple model based on evidence to represent a proposed object or tool.
3. **Plan and carry out investigations**: Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Understandings – *Students will understand that… (Big Ideas)*

1. (Patterns) Events have causes that generate observable patterns.
2. (Cause and Effect)
6. (Structure and Functions) The shape and stability of structures of natural and designed objects are related to their function(s).

Essential Questions: *Students will keep considering…*

- What are some events that have causes that generate observable patterns?
- How is the stability and shape of natural structures or designed objects related to their function?
- What are some things that plants are dependent on in order to grow within an ecosystem?
- What are some examples of biodiversity that exist on land or in water?
- How can designs, drawings, and models be useful in communicating solutions and ideas to other people?

STANDARDS ADDRESSED		
Students who demonstrate understanding can: 2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Assessment is limited to testing one variable at a time.] **2-LS2-2/MO 2.LS2.A.2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.** 2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]		
Disciplinary Core Ideas **Students will know...**	**Cross Cutting Concepts** **Students will understand…**	**Science and Engineering Practice** **Students will be able to...**
LS2.A: Interdependent Relationships in Ecosystems Plants depend on water and light to grow. (2-LS2-1)	CCC1: Patterns ● Events have causes that generate observable patterns. (2-LS2-1)	SEP3: Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
		ISTE 2d: Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
LS2.A: Interdependent Relationships in Ecosystems Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	**CCC6: Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)	**SEP2: Developing and Using Models** Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ● Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)	CCC2: Cause and Effect ● Events have causes that generate observable patterns.	SEP3: Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. ● Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)
ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)	**CCC6: Structure and Function** ● The shape and stability of structures of natural and designed objects are related to their function(s).	SEP1: Asking Questions and Defining Problems Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. ● Ask questions based on observations to find more information about the natural and/or designed world(s).

Unit 2 (Changing Ecosystems): Assessment

EVIDENCE of LEARNING			
Understanding	Standards	**Unit Performance Assessment**	**R/R Quadrant 21 Century**
6	**2-LS2-2** **CCC6** (structure and function) **SEP2** (developing and using models)	**Description of Assessment Performance Task(s):** Changing Ecosystems Assessment **Scoring Guide:** see Changing Ecosystems Assessment	C Critical thinking Communication Creativity

Unit 2 (Changing Ecosystems): Sample Activities

SAMPLE LEARNING PLAN
Pre-assessment: Ask students the following questions and have them signify either a yes or no answer (thumb up/thumb down, yes or no cards, develop a simple quiz, etc.) 1. Does sunlight impact the growth of a plant? 2. Does water impact the growth of a plant? 3. Do animals play a role in helping pollination? 4. Can different living things survive in different environments?
Anchoring Phenomena for this Unit: **First two lessons: Seed Dispersal and Seed Pollination** **Last three lessons: Plant Growth**
This curriculum is based on the Next Generation Science Standards. For clarification on the standards, please visit Wonder of Science website. Go to the standards tab to find your grade level and unit. After clicking on the unit, you will see a list of standards students should learn that you can click. After clicking on the standard then the evidence link, you will find a clarification statement as well as the practices you should take the standard through. Also included are observable features of student performance by the end of the grade that will help indicate whether or not the student has met the standard.

This document outlines how to take one of the content objectives from each unit through a specific inquiry process using the 3-dimensional learning outlined in our standards and gives sample activities that would ensure the objective is taught to students. Many of the sample activities in these units have *Asking Questions and Defining Problems* and *Developing a Model* in addition to the other scientific practices found in the evidence section. We added these two practices to use as a pre-assessment and to see what the students already know and understand about the standard to guide our instruction. It will be up to you to look at the objectives that are not addressed in this document and make plans accordingly.

Understanding	Standards	Major Learning Activities:	Instructional Strategy:	R/R Quadrant/ 21C:
1,2	**2-LS2-2** (develop model to mimic pollination) **CCC6** (structure and function) SEP1 (asking questions and defining problems)	**Sample Activity 1** **Title:** Asking Questions **Objective:** Students will ask questions about the structures and functions of plants, seeds, and growth. **Description:** 1. Teacher will show Seed Dispersal/Pollination Phenomena 2. As students watch the video, they will generate 10-15 questions that they have about the video on their own. Remind students that when they are looking at the video their questions should be deeper level thinking. Questions should also be testable. a. Students should not be talking together at this time. It is important for them to explore the phenomena on their own to peak their curiosity. 3. Before sharing out, the teacher will prompt students to read through their questions to ensure they are questions that will help clarify their understanding. If they have any that do not, allow students to cross them out and add any new ones they may have come up with. 4. Students will share their questions with a small group/partner. Students should be looking for questions that the group/partnership have in common. 5. The group/partnership will select the 5 questions that they are most curious about and share their questions to the whole class. -If students do not write any questions that center around seed dispersal/pollination as this is the end goal, you may want to try some of	Setting Objectives Nonlinguistic representation Cues, Questions, and organizers	B Critical thinking Collaboration Communication

		the following prompts: - What was similar about what all of the animals in the video were doing? -How did the animals do that similar activity differently from one another? -When the animals move to another location what happens as they move from one place to another? *As the group shares their questions, the teacher can chart common questions that are said. * Some good questions might include: - What is the bird getting from the flower? - Why is the bug inside of the flower? - What is all over the bee? - What is the bat getting from the flower? - What are the butterflies taking with them as they fly away? After the question discussion, highlighting the concepts of pollination and seed dispersal, take time to introduce and define these with the class. (Note-teacher may want to watch the video again and point out the seed dispersal at this point as it is more difficult to see in the video, the bee segment is the most obvious dispersal in the video)		
2,6	**2-LS2-2** (develop model to mimic pollination) **CCC6** (structure and function) SEP2 (developing and using models)	**Sample Activity 2** **Title:** Making a Model **Objective**: Students will make a model to show the relationship between structure and function of plants during seed dispersal and pollination. **Description:** 1. Review the concept of seed dispersal and pollination. 2. Watch the video about pollination and seed dispersal 3. Have students create a model (drawing) on their own to show and explain how seed dispersal and pollination work 4. Have students share their models with a partner and revise their models to make one model that they agree upon to show the concept of seed dispersal and pollination 5. Have the students take a gallery walk to look at the models that other students have created. After the gallery walk, discuss what students noticed and found helpful in the model to explain the process of seed dispersal and pollination. Allow students to revise their own models again to best show their understanding. 6. At this time, if you notice that the student's models do not show a clear representation of seed dispersal and pollination then create a model together as a class in order to clarify understanding before the next lesson.	Setting objectives Nonlinguistic representation Cooperative learning	D Critical thinking Collaboration Communication Creativity

2,6	**2-LS2-2** (develop model to mimic pollination) 2-ETS1B (develop possible solutions) **CCC6** (structure and function) SEP6 (constructing explanations) **OR** SEP2 (developing and using models)	**Sample Activity 3** **Title:** Developing a Model to Show a Solution for the Pollination Problem **Objective:** Students will develop a model and/or construct an explanation to show the relationship between structure and function of plants during seed dispersal and pollination. **Description:** 1. Watch the video clip highlighting the problem that the students will engineer a solution for. [This is a clip from the movie "Bee Movie" (2007) where the bees have decided to stop making honey and what happens as a result.] (or use this shorter, alternate clip) 2. Have the students discuss with a partner what they noticed as the problem in the video. Then have them work together to come up with a possible solution to the problem. Teachers can give students pipe cleaners, thin paint brushes, coffee filters, cinnamon etc. to allow them to model a solution to the problem of there being no bees to pollinate the flowers. If the teacher prefers having the students draw a model to show a solution that is another option as well. 3. Have students share their models with the class explaining how the solution that they engineered would help pollination to still take place when there are no bees to pollinate flowers. 4. If you would like to show your class the bees' solution to the problem, here are a couple links you could use: Bee Movie Pollen Power Scene (3:55) Bee Movie First Flight (3:06)	Setting objectives Nonlinguistic representation Cooperative Learning	B Critical thinking Collaboration Communication Creativity
1,2	**2-LS2-2** (develop model to mimic pollination) 2-LS2-1 (investigations to determine plant needs) **CCC6** (structure and function) SEP1	**Sample Activity 4** **Title:** Asking Questions **Objective:** Students will ask questions about the structures and functions of plants. **Description:** 1. Teacher will show the Plant Growth Phenomena Video to students. 2. Students will generate 10-15 questions that they have about pictures/videos on their own. Remind students that when they are looking at the picture/video their questions should be deeper level thinking. Questions should also be testable. a. Students should not be talking together at this time. It is important for them to explore the phenomena on their own	Setting Objectives Cues, Questions Organizers Cooperative Learning	B Critical thinking Communication

	(asking questions and defining problems)	to peak their curiosity. 3. Students will share their questions with a small group/partner. Students should be looking for questions that the group/partnership have in common. 4. The group/partnership will select the 5 questions that they are most curious about and share their questions to the whole class.		
1,2	**2-LS2-2** (develop model to mimic pollination) 2-LS2-1 (investigations to determine plant needs) **CCC6** (structure and function) SEP3 (plan and carry out investigations) ISTE 2d	**Sample Activity 5** **Title:** Planning and carrying out investigation **Objective:** Students will plan and carry out an investigation about the structures and functions of plants. **Description:** 1. Teacher will prepare 4 groups for students to observe over the next several days. (one group will be the seeds that receive sunlight and water, one group will be the seeds that receive only sunlight, one group will be the seeds that receive only water, and one group will be the seeds that do not receive sunlight or water) 2. Students will collect data for the next 5-7 days. You can use the science lab report or use electronic options, such as Google sheets or an online data collection tool such as opendatakit.org. 3. On the final day of observation, students will identify what a plant needs to survive based on their findings. 4. The students will complete their science lab report. **Appendix Documents:** *Plant Lab Form*	Setting objectives Summarizing/Note - taking	D Critical thinking Collaboration Communication

Unit 2 (Changing Ecosystems): Resources

UNIT RESOURCES
Teacher Resources: ● *A Fruit is a Suitcase for Seeds* by Jean Richards *(from old units of study)* ● *Interactive Simulations* ● *STEM Sims simulations*

Student Resources:

- Baggies
- Paper towels
- Fast growing seeds (sunflowers, zinnia, lima beans)
- Black pipe cleaners
- Thin paint brushes
- Cinnamon
- Coffee filters

Vocabulary:

Dispersal- to spread apart or move in different directions
Pollination- to give (a plant) pollen from another plant of the same kind so that seeds will be produced

Unit 3: A Changing Earth

Content Area: Science	Course: Second Grade	UNIT: A Changing Earth

Unit Description: In this unit we will learn about different types of changes in the earth and how to prevent or slow down these changes. Students will understand slow and fast changes and understand how to problem solve/engineer ways to prevent or slow down these changes. **Link to anchor chart**	**Unit Timeline:** 20 days

DESIRED Results

Transfer Goal - ***Students will be able to independently use their learning to……***

1. **Ask questions define problems**: Define a simple problem that can be solved through the development of a new or improved object or tool.
2. **Develop and use models**: Develop a model to represent patterns in the natural world.
6. **Construct explanations and design solutions**: Make observations from several sources to construct an evidence-based account for natural phenomena. Compare multiple solutions to a problem.
8. **Obtain, evaluate, and communicate information**: Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.

Understandings – *Students will understand… (Big Ideas)*

1. (Patterns) Patterns in the natural world can be observed.
7. (Stability and Change) Things may change slowly or rapidly.

Essential Questions: *Students will keep considering…*

- What are some patterns in the natural world that can be observed?
- What are some things that may change slowly?
- What are some things that may change rapidly?
- How does developing and using technology impact the natural world?
- What are some ways that scientists the natural and material world?
- How can wind and water change the shape of the land?
- What are some things that you can show on a map?
- What are some of the different roles that water has on Earth's surface?
- Why is it useful to compare and test designs when designing solutions to problems?

STANDARDS ADDRESSED		
Students who demonstrate understanding can: **2-ESS1-1/MO 2.ESS1.C.1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.** [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.] **2-ESS2-1/MO 2.ESS2.A.1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.** [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.] 2-ESS2-2/MO 2.ESS2.B.1: Develop a model to represent the shapes and kinds of land and bodies of water in an area. [Assessment Boundary: Assessment does not include quantitative scaling in models.] 2-ESS2-3/MO 2.ESS2.C.1: Obtain information to identify where water is found on Earth and that it can be solid or liquid.		
Disciplinary Core Ideas **Students will know...**	**Cross Cutting Concepts** **Students will understand…**	**Science and Engineering Practice** **Students will be able to...**
ESS1.C: The History of Planet Earth Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)	**CCC7: Stability and Change** ● Things may change slowly or rapidly. (2-ESS1-1)	SEP1: Asking Questions and Defining Problems Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. ● Ask questions based on observations to find more information about the natural and/or designed world. **SEP6: Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1)
ESS2.A: Earth Materials and Systems Wind and water can change the shape of the land. (2-ESS2-1)	**CCC7: Stability and Change** Things may change slowly or rapidly. (2-ESS2-1)	**SEP6: Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Compare multiple solutions to a problem. (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)	CCC1: Patterns Patterns in the natural world can be observed. (2-ESS2-2)	SEP2: Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. ● Develop a model to represent patterns in the natural world. (2-ESS2-2)
ESS2.C: The Roles of Water in Earth's Surface Processes Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)	CCC1: Patterns Patterns in the natural world can be observed. (2-ESS2-3)	SEP8: Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K-2 builds on prior experiences and uses observations and texts to communicate new information. ● Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)
ETS1.C: Optimizing the Design Solution Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)		SEP1: Asking Questions and Defining Problems Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested. ● Define a simple problem that can be solved through the development of a new or improved object or tool. **SEP6: Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. ● Compare multiple solutions to a problem.

Unit 3 (A Changing Earth): Assessment

EVIDENCE of LEARNING			
Understanding	Standards	**Unit Performance Assessment**:	**R/R Quadrant 21 Century**
7	**2-ESS1-1** **2-ESS2-1** **CCC7** (stability and change) **SEP6** (construct explanations and design solutions)	**Description of Assessment Performance Task(s):** Changing Earth Performance Task **Scoring Guide:** see Changing Earth Performance Task	C Critical thinking

Unit 3 (A Changing Earth): Sample Activities

SAMPLE LEARNING PLAN
Pre-assessment: Have students make a drawing of the landforms that they already know and label them.
Anchoring Phenomena for this Unit: Before and After of Mount St. Helen
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Understanding	Standards	Major Learning Activities:	Instructional Strategy:	R/R Quadrant: 21C:
7	**2-ESS1-1** (history of Planet Earth) **CCC7** (stability and change) SEP1 (asking questions and defining problems)	**Sample Learning Activity 1**. **Title:** Asking Questions **Objective:** Students will ask questions about stability and change of fast and slow changes in land. **Description:** 1. Teacher will show pictures to students. 2. Students will generate 10-15 questions that they have about the picture on their own. Remind students that when they are looking at the picture their questions should be deeper level thinking. Questions should also be testable. a. Students should not be talking together at this time. It is important for them to explore the phenomena on their own to pique their curiosity. 3. Students will share their questions with a small group/partner. Students should be looking for questions that the group/partnership have in common. 4. The group/partnership will select the 5 questions that they are most curious about and share their questions to the whole class.	Setting Objectives Nonlinguistic representation Cues, questions, organizers	B Critical thinking Communication
7	**2-ESS1-1** (history of Planet Earth) **CCC7** (stability and change) SEP2 (developing and using models)	**Sample Activity 2** **Title:** Planning and Carrying Out the Investigation **Objective:** Students will plan and carry out an investigation about stability and change of fast and slow changes in land. **Description:** 1. Give groups of students 3 foil pans filled with enough potting soil to slope to the middle of the pan, a spray bottle with water, ice cubes, and a straw for each student. Let students explore the changes that occur to the soil with each of the three elements (ice cubes, straws, water from spray bottles). Have students record the before and after of each change on their lab report. 2. Have students discuss with their group the changes that they observed. 3. Watch the Brainpop Jr. videos on Slow Land Changes and discuss examples of slow land changes. **Appendix Documents:** Erosion Lab Form	Setting objectives Generating & testing hypothesis Summarizing /note - taking	C Critical thinking Collaboration Communication

7	**2-ESS1-1** (history of Planet Earth) **CCC7** (stability and change) SEP6 (constructing explanations and designing solutions)	**Sample Activity 3** **Title:** Engineer a Solution to Help Slow Down Changes to the Land **Objective:** Students will engineer a solution about stability and change of slow land changes. **Description:** 1. Have students think back to the experiment about the soil changes that occurred with (wind (straw), glaciers (ice cubes), and water). 2. Students will need to independently engineer and develop a model of a solution that could slow the amount of erosion that occurs because of wind, water, or ice. 3. Have students share their model with a partner. Then have students share their solution and why they chose what they did with the class. 4. Watch the video and then discuss with their partner how they might want to revise their model solution to improve it. 5. Have students do a gallery walk to see the revisions that others made and why they made the revisions that they made to their model. 6. During this lesson, as it arises, would be an appropriate time to discuss the vocabulary that aligns with slow land changes.	Setting Objectives Nonlinguistic representation Cooperative learning	C Critical thinking Collaboration Communication Creativity
7	**2-ESS1-1** (history of Planet Earth) **CCC7** (stability and change) SEP1 (asking questions and defining problems)	**Sample Activity 4** **Title:** Asking Questions **Objective:** Students will ask questions about stability and change of fast and slow land changes. **Description:** 1. Watch the video and have the students generate questions about what they noticed independently. What do they think the effect of those changes were on the land? 2. Have students share their questions with a partner. Have them talk about questions that were similar and the ones that were different. 3. Share the questions together as a class. Encouraging the students to notice that these changes occurred quickly and had a great impact on the land. 4. Highlight the damage fast land changes cause. Preventive measures can be taken to slow them down, but often cannot stop them.	Setting Objectives Nonlinguistic representation Cooperative learning	B Critical thinking Communication
7	**2-ESS1-1** (history of Planet Earth) **2-ESS2-1**	**Sample Activity 5** **Title:** Developing Models **Objective:** Students will develop a model to slow or prevent the patterns of damage that occur when land changes.	Setting objectives	B Critical thinking

	(solutions for damage) CCC1 (patterns) SEP2 (developing and using models)	**Description:** 1. Have the students work with their partner to engineer a solution that would solve the problem/slow down one of the fast land changes that they observed. 2. Have students do a gallery walk to see the solutions that others engineered and hear why they did what they did and how it will help the land. 3. This would be a good time to discuss vocabulary as it arises.	Cooperative learning	Collaboration Communication Creativity

Unit 3 (A Changing Earth): Resources

UNIT RESOURCES
Teacher Resources: Mt. St. Helen's picture Erosion Lab Form Erosion video *Interactive Simulations* *STEM Sims simulations*
Student Resources: *Spray bottles* *Foil pans* *Potting soil* *Straws*
Vocabulary: *Erosion- the process that happens when rocks and sediments are picked up and moved to another place by ice, water, wind or gravity.* *Weathering- the process where rock is dissolved, worn away or broken down into smaller and smaller pieces.*