Diocese of Charleston Science Standards Support Guide for Grades K-2

These guides were developed by a curriculum team made up of teachers from across the Diocese of Charleston. The Next Generation Science Standards (NGSS) have adapted to meet the needs of the schools in the Diocese of Charleston.

DCI Arrangements of the Next Generation Science Standards

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Elementary Standards

Students in kindergarten through fifth grade begin to develop an understanding of the four disciplinary core ideas: physical sciences; life sciences; earth and space sciences; and engineering, technology, and applications of science. In the earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. By the end of fifth grade, students are able to demonstrate grade-appropriate proficiency in gathering, describing, and using information about the natural and designed world(s). The performance expectations in elementary school grade bands develop ideas and skills that will allow students to explain more complex phenomena in the four disciplines as they progress to middle school and high school. While the performance expectations shown in kindergarten through fifth grade couple particular practices with specific disciplinary core ideas, instructional decisions should include use of many practices that lead to the performance expectations.

Kindergarten

The performance expectations in kindergarten help students formulate answers to questions such as: "What happens if you push or pull an object harder? Where do animals live and why do they live there? What is the weather like today and how is it different from yesterday?" Kindergarten performance expectations include PS2, PS3, LS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas from the *NRC Framework*. Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather. Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live. The crosscutting concepts of patterns; cause and effect; systems and system models; interdependence of science, engineering, and technology; 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 the kindergarten performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, 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.

Kindergarten Evidence Statements (nextgenscience.org)

K-PS2 Motion and Stability: Forces and Interactions

K-PS2 Motion and Stability: Forces and interactions

Students who demonstrate understanding can:

K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. [Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.] [Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.* [Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.] [Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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.

- With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS2-1)

Disciplinary Core Ideas

PS2.A: Forces and Motion

- Pushes and pulls can have different strengths and directions. (K- PS2-1),(K-PS2-2)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1),(K-PS2-2)

PS2.B: Types of Interactions

- When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

PS3.C: Relationship Between Energy and Forces

- A bigger push or pull makes things speed up or slow down more quickly. *(secondary to K-PS2-1)*

ETS1.A: Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. *(secondary to K- PS2-2)*

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2- 1),(K-PS2-2)

Connections to other DCIs in kindergarten: **K.ETS1.A** (K-PS2-2); **K.ETS1.B** (K-PS2-2)

Articulation of DCIs across grade-levels: **2.ETS1.B** (K-PS2-2); **3.PS2.A** (K-PS2-1),(K-PS2-2); **3.PS2.B** (K-PS2-1); **4.PS3.A** (K-PS2-1); **4.ETS1.A** (K-PS2-2)

Cross Curricular Connections:

ELA/Literacy –With prompting and support, ask and answer questions about key details in a text. *(K-PS2-2)*
Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)
Ask and answer questions in order to seek help, get information, or clarify something that is not understood. *(K-PS2-2)*

Readworks
Epic online[1]
The Story of Isaac Newton- Reza Nazari
I am Curious:A Little Book about Albert Einstein-Brad Meltzer
Pushing or Pulling-Natalie Hyde

Mathematics –Reason abstractly and quantitatively. *(K-PS2-1)*
Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. *(K-PS2-1)*
Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K-PS2-1)

[1] **DRAFT June 2024**

Faith Connections

- David and Goliath 1 Sam 17
- David and Goliath STEM lesson-https://www.wonderinhisworld.com/david-and-goliath-craft/
- Vibrations in the Bible- What Does The Bible Say About Vibrations | Awesome 6 Bible Verses| (bibleversesnow.com)
- Storybook Express Video-Superbook - A Giant Adventure - Season 1 Episode 6 - Full Episode (Official HD Version) (youtube.com)
- The Holy Spirit, the scriptures, the Church, the sacraments, and the beauty of creation pull us toward God.
- Love is God's pull on our hearts.
- We are sometimes pushed from the path of doing what is right and pulled toward making bad decisions.
- With the help of Jesus, we are able to follow the path in the direction of love and kindness.
- What are those things that pull us more strongly and quickly towards God?
- Sometimes something big happens in our lives that makes us change direction.
- Christian saints and heroes show us the way to God through their lives

Books to use:

- *David and Goliaith-Akram Zaki*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales
- Evangelista Torricelli (Inventor of the barometer)

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

K-PS3 Energy

K-PS3 Energy

Students who demonstrate understanding can:

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface. [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water] [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]

K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.* [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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 that can be used to make comparisons. (K-PS3-1)

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.

- Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3- 2)

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientists use different ways to study the world. (K-PS3-1)

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- Sunlight warms Earth's surface. (K-PS3-1),(K-PS3-2)

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-PS3-1),(K-PS3-2)

Connections to other DCIs in kindergarten: **K.ETS1.A** (K-PS3-2); **K.ETS1.B** (K-PS3-2)

Articulation of DCIs across grade-levels: **1.PS4.B** (K-PS3-1),(K-PS3-2); **2.ETS1.B** (K-PS3-2), **3.ESS2.D** (K-PS3-1); **4.ETS1.A** (K-PS3-2)

Cross Curricular Connections:

ELA/Literacy – Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS3-1),*(K-PS3-2)*
Readworks
Epic online
I am Curious:A Little Book about Albert Einstein-Brad Meltzer
Energy: Heat, Light, and Fuel-Darlene R. Stille
Sun and Shade-Mary Lindeen
Lucia and the Light- Phyllis Root

Mathematics – Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. (K-PS3-1),(K- PS3-2)

Faith Connections

- "This is the message we have heard from Him and announce to you, that God is Light, and in Him there is no darkness at all." 1 John 1:5
- "Then God said, "Let there be light"; and there was light. God saw that the light was good; and God separated light from the darkness." Genesis 1:3-4
- God created the sun to provide the Earth with warmth and light.
- Jesus is the Light of the world who shines upon us and warms our hearts.
- Sometimes we take care of creation by making sure that people, plants and animals don't get too warm.
- Jesus is the light of the world craft-https://www.youtube.com/watch?v=xP_fgE1HpII
- STEM lesson- Use a flashlight to create shadows-discuss the light and darkness

Books to use:

- *When God Made Light - Matthew Paul Turner*
- *When God Made the World - Matthew Paul Turner*
- *When God Turned on the Light- Allia Nolan*
- *Oscar and the Moth - Geoff Waring*
- *The 7 Days of Creation - Mindy MacDonald*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales
- Evangelista Torricelli (Inventor of the barometer)

Saints:

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K-LS1 From Molecules to Organisms: Structures and Processes

K-LS1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-LS1-1)

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-levels: **1.LS1.A** (K-LS1-1); **2.LS2.A** (K-LS1-1); **3.LS2.C** (K-LS1-1); **3.LS4.B** (K-LS1-1); **5.LS1.C** (K-LS1-1); **5.LS2.A** (K-LS1-1)

Cross Curricular Connections:
ELA/Literacy – Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)
Readworks
Epic online
Plant the Tiny Seed-Christie Matheson
And the Seed Grew-Marianne Dubuc
How do Baby Animals Live?-Faith Hickman Brynie
Baby Pets-Bobbie Kalman
Mathematics – Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *(K-LS1-1)*

Faith Connections

- God created a world in which plants, animals and humans depend on the Earth and each other to survive. Everything is connected. Our bodies need food and water in order to survive. Our souls need God in order to survive.
- Water and food are part of our physical lives and our spiritual lives.
- Come to the water (Isaiah 55:1).
- Everyone needs to have their needs for food and water met (Life and Dignity of the Human Person; Option for the Poor and Vulnerable).
- Exhibit care and concern at all stages of life for each human person as an image and likeness of God.
- Share concern and care for the environment as a part of God's creation.
- Book of Genesis
- Lk 13:16-9 Parables about barren fig tree
- Matthew 13:1-9 Parable about we reap what we sow
- STEM lesson-https://www.pinterest.com/pin/408842472414685567/?lp=true

Books to use:

- *Why Noah Chose the Dove-Isaac Bashevis Singer*
- *Good for Nothing Tree-Amy-Jill Levine*
- *The Bird with the Word talks about Sowing and Reaping - Claudia Tarpley Rees*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales
- Evangelista Torricelli (Inventor of the barometer)

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

K-ESS2 Earth's Systems

K-ESS2 Earth's Systems

Students who demonstrate understanding can:

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time. [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.]

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)

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. (K-ESS2-2)

Connections to Nature of Science

Science Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-ESS2-1)

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)

ESS2.E: Biogeology

- Plants and animals can change their environment. (K- ESS2-2)

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. *(secondary to K-ESS2-2)*

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS2-2)

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-levels: **2.ESS2.A** (K-ESS2-1); **3.ESS2.D** (K-ESS2-1); **4.ESS2.A** (K-ESS2-1); **4.ESS2.E** (K-ESS2-2); **5.ESS2.A** (K-ESS2-2)

Cross Curricular Connections:

ELA/Literacy –With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)
Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)
Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. *(K-ESS2-2)*
Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-ESS2-1)
Readworks
Epic online
See Inside Weather and Climate-Katie Daynes
What Will the Weather Be?-Lynda DeWitt
Sunshine Makes the Seasons-Franklyn M Branley
Animal Adaptations- Louise Spilsbury, Richard Spilsbury
The Giving Tree-Shel Silverstein

Mathematics –
Reason abstractly and quantitatively. (K-ESS2-1)
Model with mathematics. (K-ESS2-1)
Know number names and the count sequence. (K-ESS2-1)
Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1)
Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)

Faith Connections

- Share Biblical stories related to weather and climate: The story of Noah's Ark (Genesis 6-9); the voice of God in the great storm (Psalm 29).
- Consider what it would be like to spend 40 days in the desert.
- God's creation is filled with patterns, including weather patterns.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Clouds, rain, and snow may show the beauty of God.
- Give examples of the beauty evident in God's creation.
- Display a sense of wonder and delight about the natural universe and its beauty.
- We are called to respect and care for all creation because it is a gift of God's love.
- The choices we make can affect God's creation.
- As Catholics we should seek to change the world in only good ways.
- Care for God's creation.
- Share concern and care for the environment as a part of God's creation.
- Genesis 6:5-8;13-22
- "This is the sign of the covenant which I am making between Me and you and every living creature that is with you, for all future generations." Genesis 9:12
- STEM lesson-https://i.pinimg.com/originals/df/5b/f3/df5bf321a55fe79218c7fba309aa7342.jpg

Books to use:

- *Why Noah Chose the Dove-Isaac Bashevis Singer*
- *The Beautiful Works of God-The Children's Bible Project*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales
- Evangelista Torricelli (Inventor of the barometer)

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

K-ESS3 Earth and Human Activity

K-ESS3 Earth and Human Activity

Students who demonstrate understanding can:

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.* [Clarification Statement: Emphasis is on local forms of severe weather.]

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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 designed world. (K-ESS3-2)

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, storyboard) that represent concrete events or design solutions.

- Use a model to represent relationships in the natural world. (K-ESS3-1)

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.

- Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K-ESS3-2)
- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

ESS3.B: Natural Hazards

- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3- 3)

ETS1.A: Defining and Delimiting an Engineering Problem

- Asking questions, making observations, and gathering information are helpful in thinking about problems. *(secondary to K-ESS3-2)*

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 K-ESS3-3)*

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (K-ESS3-2),(K- ESS3-3)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS3-1)

Connections to Engineering, Technology and Applications of Science

Interdependence of Science, Engineering, and Technology

- People encounter questions about the natural world every day. (K-ESS3-2)

Influence of Engineering, Technology, and Science on Society and the Natural World

- People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3- 2)

Connections to other DCIs in kindergarten: **K.ETS1.A** (K-ESS3-2),(K-ESS3-3)

Articulation of DCIs across grade-levels: **1.LS1.A** (K-ESS3-1); **2.ESS1.C** (K-ESS3-2); **2.ETS1.B** (K-ESS3-3); **3.ESS3.B** (K-ESS3-2); **4.ESS3.A** (K-ESS3-3); **4.ESS3.B** (K-ESS3-2); **5.LS2.A** (K-ESS3-1); **5.ESS2.A** (K-ESS3-1); **5.ESS3.C** (K-ESS3-3)

Cross Curricular Connections:

ELA/Literacy –

With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2)
Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. *(K-ESS3-3)*
Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)
Add drawings or other visual displays to descriptions as desired to provide additional detail. *(K-ESS3-1)*

Readworks
Epic online
Plant the Tiny Seed-Christie Matheson
And the Seed Grew-Marianne Dubuc
How do Baby Animals Live?-Faith Hickman Brynie
Baby Pets-Bobbie Kalman

Mathematics –

Reason abstractly and quantitatively. *(K-ESS3-1)*
Model with mathematics. *(K-ESS3-1),(K-ESS3-2)*
Counting and Cardinality *(K-ESS3-1),(K-ESS3-2)*

Faith Connections

- Refer to the Catholic Identity portion of the Kindergarten Earth and Space Science Standards overview at the beginning of this section.
- How can weather forecasting help people plan for, and respond to, specific types of local weather?
- How can practicing severe weather drills help us to be prepared?
- As Christians we are called to make choices that do not hurt the land, water, air, and other living things.
- Care for God's creation.
- Share concern and care for the environment as a part of God's creation.
- "work and take care of it" Genesis 2:15
- "The earth is the Lord's, and everything in it, the world, and all who live in it." Psalms 24:1
- STEM lesson-https://www.growingajeweledrose.com/2014/02/rain-clouds-in-jar-experiment.html
- STEM lesson-https://elliemoon.typepad.com/blog/2012/02/tornado-in-a-jar-diy.html

Books to use:

- *God's Earth is Something to Fight For- Amy Houts*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales
- Evangelista Torricelli (Inventor of the barometer)

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

NEXT GENERATION SCIENCE STANDARDS For States, By States

First Grade

The performance expectations in first grade help students formulate answers to questions such as: "What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?" First grade performance expectations include PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas from the *NRC Framework*. Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; 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 the first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and

communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

1st Grade Evidence Statements (nextgenscience.org)

1-PS4 Waves and their Applications in Technologies for Information Transfer

1-PS4 Waves and their Applications in Technologies for Information Transfer

Students who demonstrate understanding can:

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]

1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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 investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1),(1-PS4-3)

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. (1- PS4-2)
- Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Science investigations begin with a question. (1-PS4-1)
- Scientists use different ways to study the world. (1-PS4-1)

Disciplinary Core Ideas

PS4.A: Wave Properties

- Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)

PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2)
- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1- PS4-3)

PS4.C: Information Technologies and Instrumentation

- People also use a variety of devices to communicate (send and receive information) over long distances. (1- PS4-4)

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science, on Society and the Natural World

- People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (1-PS4-4); **2.PS1.A** (1-PS4-3); **2.ETS1.B** (1-PS4-4); **4.PS4.C** (1-PS4-4); **4.PS4.B** (1-PS4-2); **4.ETS1.A** (1-PS4-4)

Cross Curricular Connections:

ELA/Literacy –

Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. *(1-PS4-2)*
Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4- 1),(1-PS4-2),(1-PS4-3),(1-PS4-4)
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1),(1-PS4-2),(1- PS4-3)
Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. *(1-PS4-1),(1-PS4-2),(1- PS4-3)*
Sounds All Around:The Science of How Sound Works - Susan Huges
Sound Waves and Communication - Jenna Winterburg
How Sound Moves - Sharon Coan
How it Works: Light - Sarah Hull
Light Waves - Anna Raff
Light: Shadows, Mirrors, and Rainbows - Natalie Rosinsky

Mathematics –

Use appropriate tools strategically. *(1-PS4-4)*
Order three objects by length; compare the lengths of two objects indirectly by using a third object. *(1-PS4-4)*
Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *(1-PS4-4)*

Faith Connections

- "This is the message we have heard from Him and announce to you, that God is Light, and in Him there is no darkness at all." 1 John 1:5
- "As long as I am in the world, I am the light of the world." John 9:5
- Flashlight lessons about God- https://ministry-to-children.com/5-flashlight-object-lessons/
- God is Light STEM Lesson- https://www.mediafire.com/file/ow4xwrtyhbjbk0y/light_handout.pdf/file
- Vibrations in the Bible- What Does The Bible Say About Vibrations | Awesome 6 Bible Verses| (bibleversesnow.com)
- God gave us our senses which allow us to hear sound and see and feel vibrations. Our senses help us to know God's creation.
- Other creatures can also hear us and each other.
- Value the human body as the temple of the Holy Spirit.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.

Books to use:

- *When God Made Light - Matthew Paul Turner*
- *When God Made the World - Matthew Paul Turner*
- *When God Turned on the Light- Allia Nolan*
- *Oscar and the Moth - Geoff Waring*
- *The 7 Days of Creation - Mindy MacDon*ald

Catholic/Christian Scientists:

- Roger Bacon (Franciscan friar and early advocate of the scientific method)
- Marin Mersenne (acoustics)
- André-Marie Ampère (electromagnetism)
- Antoine César Becquerel (electric and luminescent phenomena)
- Vincenzo Viviani (Viviani's theorem, Viviani's curve and his work in determining the speed of sound)
- Hippolyte Fizeau (the velocity of light)
- Guglielmo Marconi (long-distance radio transmission)
- Theodoric of Freiberg (the rainbow)
- André-Marie Ampère (electromagnetism)

Saints:

- St. Albert the Great (Albertus Magnus), patron saint of scientists

1-LS1 From Molecules to Organisms: Structures and Processes

1-LS1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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.

- Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

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.

- Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (1-LS1-2)

Disciplinary Core Ideas

LS1.A: Structure and Function

- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.B: Growth and Development of Organisms

- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

LS1.D: Information Processing

- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (1-LS1-1); **3.LS2.D** (1-LS1-2); **4.LS1.A** (1-LS1-1); **4.LS1.D** (1-LS1-1); **4.ETS1.A** (1-LS1-1)

Cross Curricular Connections:

ELA/Literacy –

Ask and answer questions about key details in a text. (1-LS1-2)
Identify the main topic and retell key details of a text. (1-LS1-2)
With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)
Participate in shared research and writing projects(e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions)(1-LS1-1)
Plant Adaptations; How Will We survive? - Sarah Lalonde
Plant Adaptations; How Do We Live in our Habitat? - Sarah Lalonde
How and Why do Animals Adapt? - Bobbie Kalman
Creature Features - Steve Jenkins and Robin Page

Mathematics –

Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. *(1-LS1-2)*

Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings
and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. *(1-LS1-2)*

Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. *(1-LS1-2)*

Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. *(1-LS1-2)*

Faith Connections

- "In your lives you must think and act like Jesus Christ." Philippians 2:5
- "And we know that God causes all things to work together for good to those who love God, to those who are called according to His purpose." Romans 8:28
- Survival as a kid - Survival Guide - PursueGOD Kids
- Live Like Jesus video- Bing Videos
- I love Jesus game - https://ministry-to-children.com/i-love-jesus-game/
- God has given plants and animals the capabilities to survive.
- A sunflower changes direction as the sun moves across the sky so that the flower is always facing the sun. There are some kinds of solar panels that follow the sun across the sky like sunflowers. Scripture, the church, and the sacraments help us to keep our faces turned toward God.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- God, our Heavenly Father, helps us to live happy, healthy lives.
- God provides animal parents with the necessary behaviors to help their offspring survive and thrive.
- What patterns can we develop in our lives to help plants, animals and others, especially the poor, to survive?
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.

Books to use:

- *The Life of Jesus - Lisa Regan*
- *I will Follow Jesus - Judan & Chelsea Smith*
- *I know Jesus - Matthew Kelly*

Catholic/Christian Scientists:

- James Britten (botanist)
- Stephan Endlicher (botanist, plant classification)
- Sr. Paula González (biology) • Antoine Laurent de Jussieu (natural classification of flowering plants)
- Carl Linnaeus (botanist, plant classification)
- Andrea Cesalpino

Saints:

- St. Ambrose, patron saint of beekeepers
- St. Ansovinus, patron saint of gardeners
- St. Anthony of Padua, patron saint of harvests and lost animals
- St. Dorothy, patron saint of horticulture
- St. Gall, patron saint of birds
- St. Isidore the Farmer, patron saint of farmers
- St. Phocus, patron saint of gardeners, agricultural workers, farm workers, farmers and field hands
- St. Urban, patron saint of grape growers

1-LS3 Heredity: Inheritance and Variation of Traits

1-LS3 Heredity: Inheritance and Variation of Traits

Students who demonstrate understanding can:

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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. (1-LS3-1)

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

- Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1)

LS3.B: Variation of Traits

- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS3-1)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **3.LS3.A** (1-LS3-1); **3.LS3.B** (1-LS3-1)

Cross Curricular Connections:
ELA/Literacy –
Ask and answer questions about key details in a text. (1-LS3-1)
Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS3-1)
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)
Creature Features - Steve Jenkins and Robin Page
Mathematics -
Reason abstractly and quantitatively. *(1-LS3-1)*
Use appropriate tools strategically. *(1-LS3-1)*
Order three objects by length; compare the lengths of two objects indirectly by using a third object. *(1-LS3-1)*

Faith Connections

- God's presence is everywhere.
- God created an orderly world according to His plan, and it is good.
- God has created a world in which such things as day and night follow a predictable pattern.
- God's love and forgiveness is a predictable pattern. The love of God always follows night, no matter how dark it gets.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
- Give examples of the beauty evident in God's creation.
- Display a sense of wonder and delight about the natural universe and its beauty.
- Planting seeds activity - Planting Seeds Object Lesson (1 Corinthians 3-5-8) - Ministry-To-Children
- God's Garden - God's Garden Bible Lessons for Kids About Growing in Christ (sundayschoolnetwork.com)
- Growing in God - Lesson: Growing in God - Parable of the Sower - Ministry-To-Children

Books to use:

- *Made by God - Tony Evans*
- *As You Grow - Kirk Cameron*
- *I Prayed for You - Jean Fischer*
- *I'm So Glad You Were Born - Ainsley Earhardt (SC native and USC graduate)*

Catholic/Christian Scientists:

- Gregor Mendel (genetics through plant research)
- James Britten (botanist, member of the Catholic Truth Society and Knight Commander of the Order of St. Gregory the Great)
- Stephan Endlicher (botanist, plant classification)
- Sr. Paula González (biology)
- Antoine Laurent de Jussieu (natural classification of flowering plants)
- Theodor Schwann (theory of the cellular structure of animal organisms)
- Jérôme Lejeune (the link of diseases to chromosome abnormalities)

1-ESS1 Earth's Place in the Universe

1-ESS1 Earth's Place in the Universe

Students who demonstrate understanding can:

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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 that can be used to make comparisons. (1-ESS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1- ESS1-1)

Disciplinary Core Ideas

ESS1.A: The Universe and its Stars

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1- ESS1-1)

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes natural events happen today as they happened in the past. (1-ESS1-1)
- Many events are repeated. (1-ESS1-1)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **3.PS2.A** (1-ESS1-1); **5.PS2.B** (1-ESS1-1),(1-ESS1-2); **5-ESS1.B** (1-ESS1-1),(1-ESS1-2)

Cross Curricular Connections:

ELA/Literacy –

Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1- ESS1-1),(1-ESS1-2)

With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1),(1-ESS1-2)

Sky Gazing: A Guide to the Moon, Planets, Stars, Eclipses, and Constellations - Meg Thatcher

I am the Moon - Rebecca and James McDonald

I am the Sun - Rebecca and James McDonald

I am the Solar System - Rebecca and James McDonald

Lights Day and Night - Susan Hughes

Mathematics –

Reason abstractly and quantitatively. *(1-ESS1-2)*

Model with mathematics. *(1-ESS1-2)*

Use appropriate tools strategically. *(1-ESS1-2)*

Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. *(1-ESS1-2)*

Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. *(1-ESS1-2)*

Faith Connections

- "There is a time for everything, and a season for every activity under heaven." Ecclesiastes 3:1
- There are seasons and feasts in the Church that follow the seasons of the year. For example, Christmas comes shortly after the darkest day of the year and shows that the baby Jesus was the light coming back into the world. Easter happens during the Spring, when nature comes back to life again after winter.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
- Give examples of the beauty evident in God's creation.
- Display a sense of wonder and delight about the natural universe and its beauty.
- Creation Day #4 lesson - Creation Day #4 Children's Church Lesson - Ministry-To-Children
- God's masterpiece lesson - Day 4- Sun, Moon, Stars — Children's Ministry (familyfed.org)
- Day vs Night lesson - Sun, Moon, and Stars Hands-on Activities (christianmontessorinetwork.com)
- Seasons change, but God never does lesson - Seasons Change: God Never Changes (Ecclesiastes 3) Lesson (ministry-to-children.com)

Books to use:

- *Seasons of Life; Our Walk with Christ - Marliee Joy Mayfield*
- *God Made the Stars - J.W. Lewis*

- *How the Moon Became Dim - Ruth Wiseman*
- *The Moon Speaks - Jason G. Duesing*

Catholic/Christian Scientists:

- G.G. Coriolis Galileo Galilei (astronomer)
- Martin Stanislaus Brennan (priest, astronomer and writer)
- Giovanni Domenico Cassini (first to observe four of Saturn's moons and the co-discoverer of the Great Red Spot on Jupiter)
- Christopher Clavius (Jesuit, the Gregorian calendar)
- Nicolas Louis de Lacaille (French astronomer, cataloged stars, nebulous objects, and constellations)
- Pierre-Simon Laplace (the "Newton of France")
- Paolo dal Pozzo Toscanelli (Italian mathematician, astronomer and cosmographer)
- Eduard Heis (contributed the first true delineation of the Milky Way)
- Gaspard-Gustave Coriolis (laws regarding rotating systems - the Corialis effect)
- Léon Foucault (the Foucault pendulum - measures the effect of the earth's rotation)

Saints:

- St. Dominic, patron saint of astronomers

Second Grade

The performance expectations in second grade help students formulate answers to questions such as: "How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place?" Second grade performance expectations include PS1, LS2, LS4, ESS1, ESS2, and ETS1 Disciplinary Core Ideas from the *NRC Framework*. Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials. Students are able to 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. Students are able to 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 the second grade performance expectations, 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.

2nd_Grade Evidence Statements (nextgenscience.org)

2-PS1 Matter and its Interactions

2-PS1 Matter and its Interactions

Students who demonstrate understanding can:

2-PS1-1. 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. 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. 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.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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-PS1-1)

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

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)

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)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)

Disciplinary Core Ideas

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)
- Different properties are suited to different purposes. (2- PS1-2),(2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (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)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

Cause and Effect

- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **4.ESS2.A** (2-PS1-3); **5.PS1.A** (2-PS1-1),(2-PS1-2),(2-PS1-3); **5.PS1.B** (2-PS1-4); **5.LS2.A** (2-PS1-3)

Cross Curricular Connections:
ELA/Literacy –

Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.
(2-PS1-4) Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
(2-PS1-4) Describe how reasons support specific points the author makes in a text. *(2-PS1-2),*(2-PS1-4)
Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., *because*, *and*, *also*) to connect opinion and reasons, and provide a concluding statement or section. *(2-PS1-4)*
Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). *(2-PS1-1),(2-PS1- 2),(2-PS1-3)*
Recall information from experiences or gather information from provided sources to answer a question. *(2-PS1-1),(2-PS1-2),(2-PS1-3)*
Many Kinds of Matter: A Look at Solids, Liquids, and Gases - Jennifer Boothroyd
Change It!: Solids, Liquids, Gases and You - Adrienne Mason

What is the World Made Of?: All About Solids, Liquids and Gasses - Kathleen Weidner Zoehfeld
What's the MATTER with the Three Little Pigs?: The Fairy-Tale Physics of Matter - Thomas Kingsley Troupe

Mathematics –

Reason abstractly and quantitatively.

(2-PS1-2) Model with mathematics.

(2-PS1-1),(2-PS1-2) Use appropriate tools strategically.

(2-PS1-2)

Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. *(2-PS1-1),(2-PS1-2)*

Faith Connections

- Students will explore human-made products using natural materials created by God.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Describe how science and technology should always be at the service of humanity and, ultimately, to God, in harmony with His purposes.
- People can use the talents given by God to create objects for the betterment of the common good.
- When we reuse items and create new ones with recycled materials, we show our care for our environment.
- When we give our lives to God, we allow ourselves to be remade in God's image.
- Describe God's relationship with humans and nature
- Describe how science and technology should always be at the service of humanity and, ultimately, to God, in harmony with His purposes.
- Share concern and care for the environment as a part of God's creation.
- "Then God Said, "Let the waters below the heavens be gathered into one place, and let the dry land appear" and it was so." Genesis 1:9
- STEM-Melt ice-relate the different states to creation and Earth

Books to use:

- *Properties of Matter (God's Design) - Debbie a in nd Richard Lawrence*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

2-S2 Ecosystems: Interactions, Energy, and Dynamics

2-LS2 Ecosystems: Interactions, Energy, and Dynamics

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. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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)

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)

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow. (2-LS2-1)
- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

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)*

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (2-LS2-1)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **K.LS1.C** (2-LS2-1); **K-ESS3.A** (2-LS2-1); **K.ETS1.A** (2-LS2-2); **5.LS1.C** (2-LS2-1); **5.LS2.A** (2-LS2-2)

Cross Curricular Connections:

ELA/Literacy –

Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1)
Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1)
Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(2-LS2-2)*
The Bumblebuzz World Pollination - C.K. Everhart
Amelia Ophelia; The Beekeeper by the Sea - JoAnn Dickenson
Planting a Rainbow - Lois Ehlert

Mathematics –

Reason abstractly and quantitatively.
(2-LS2-1) Model with mathematics.
(2-LS2-1),(2-LS2-2) Use appropriate tools strategically.
(2-LS2-1)
Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. *(2-LS2-2)*

Faith Connections

- Plant growth is dependent on God's gifts of light and water.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Everything is connected in God's creation. Everything works together for the common good.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Spiritual gardening - Spiritual Gardening: A Growing in Christ Lesson for Kids – FaithGateway Store
- Growing in God - https://ministry-to-children.com/lesson-growing-in-god-parable-of-the-sower/
- Good dirt and good seeds - Object Lesson & Craft: Good Dirt and Good Seeds (Mark 4:1-20) - Ministry-To-Children

Books to use:

- *God Grows our World - Gary Bower*
- *God's Garden - Frank Boylan*
- *Peeps Plant Seeds from A-Z - Lisa Ayotte*
- *Planting Seeds for Jesus - Timothy Wright*
- *God's Glorious Garden - Marie M. Galemore*

Saints:

- St. Albert the Great (Albertus Magnus), patron saint of scientists

2-LS4 Biological Evolution: Unity and Diversity

2-LS4 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

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.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Disciplinary Core Ideas

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)

Crosscutting Concepts

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **3.LS4.C** (2-LS4-1); **3.LS4.D** (2-LS4-1); **5.LS2.A** (2-LS4-1)

Cross Curricular Connections:

ELA/Literacy –

Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS4-1)
Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)
A Home Can Be - Stephanie Seidler
If Animals Built Your House - Bill Wise

Mathematics –

Reason abstractly and quantitatively. *(2-LS4-1)*
Model with mathematics. *(2-LS4-1)*
Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. *(2-LS4-1)*

Faith Connections

- There is a great diversity of life in God's creation. Diversity is part of God's plan. It is a good thing.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
- Genesis 1:20-31 God creates animals
- STEM Lesson-https://www.growingajeweledrose.com/2016/03/grow-magic-beanstalk.html
- Stem Lesson-file:///C:/Users/sta2n/Downloads/AnimalHabitatsProjectAssignmentFreebie-1.pdf

Book to use:

- *When God Made the World - Matthew Paul Turner*
- *The World God Made - Hannah Anderson*
- *Made by God: Celebrating God's Glorious Diverse World - Tony Evans*
- *I'm So Glad You Were Born - Ainsley Earhardt (SC native and USC graduate)*

Catholic/Christian Scientists:

- Rachel Carson
- Sr. Paula Gonzales

Saints:

- St. Francis of Assisi, patron saint of animals and the environment
- St. Kateri Tekakwitha, patron saint of the environment and ecology

Scripture:

- "How varied are your works, Lord! In wisdom you have made them all; the earth is full of your creatures. There is the sea, great and wide! It teems with countless beings, living things both large and small." (Psalm 104: 24-25)

2-ESS1 Earth's Place in the Universe

2-ESS1 Earth's Place in the Universe

Students who demonstrate understanding can:

2-ESS1-1. 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.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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)

Disciplinary Core Ideas

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)

Crosscutting Concepts

Stability and Change

- Things may change slowly or rapidly. (2- ESS1-1)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **3.LS2.C** (2-ESS1-1); **4.ESS1.C** (2-ESS1-1); **4.ESS2.A** (2-ESS1-1)

Cross Curricular Connections:

ELA/Literacy –

Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text. *(2-ESS1-1)*
Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1)
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. *(2-ESS1-1)*
Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1)
Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
All About Natural Disasters For Kids - Sandhya Warekar
The Quicksand Book - Tomie dePaola
Hurricane Rescue: a Branches Book (Disaster Squad #2) - Rekha S. Rajah
Vladimir the Volcano: A Tale of an Unforeseen Eruption - Rana Boulos

Mathematics –

Reason abstractly and quantitatively. *(2-ESS1-1)*
Model with mathematics. *(2-ESS1-1)*
Understand place value. (2-ESS1-1)

Faith Connections

- Natural processes occur according to God's timing and wisdom.
- Spiritual growth sometimes happens slowly and sometimes quickly. Prayer and the sacraments can help us to grow quickly.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Creation is ever changing. We can be good stewards of creation by preventing damage to creation.
- Describe God's relationship with humans and nature.
- Share concern and care for the environment as a part of God's creation.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Just as water can take different forms, so can God. God the Father, the Son and the Holy Spirit make up the Trinity.
- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
- Give examples of the beauty evident in God's creation.
- "For I know the plans I have for you," declares the Lord, "plans to prosper you and not to harm you…" Jeremiah 29:11
- "...Who calls the waters of the sea And pours them out onto the surface of the earth, The Lord is His name." Amos 5:8
- STEM lesson-https://www.growingajeweledrose.com/2014/02/rain-clouds-in-jar-experiment.html
- STEM lesson-https://elliemoon.typepad.com/blog/2012/02/tornado-in-a-jar-diy.html

Books to use:

- *When God Made the World - Matthew Paul Turner*
- *The 7 Days of Creation - Mindy MacDonald*

Catholic/Christian Scientists:

- Georgius Agricola (mineralogy)
- Jean Baptiste Julien d'Omalius d'Halloy (geology)
- René Just Haüy (crystallography)
- Abraham Ortelius (created the first modern atlas and theorized on continental drift)
- Wilhelm Heinrich Waagen (geologist and paleontologist)
- Johann Joachim Winckelmann (archaeology)
- Teilhard de Chardin (paleontology)
- Nicolas Steno (stratigraphy)

Saints:

- St. Barbara, patron saint of geology
- St. Clare of Assisi, patron saint of good weather
- St. Eurosia, patron saint against bad weather

2-ESS2 Earth's Systems

2-ESS2 Earth's Systems

Students who demonstrate understanding can:

2-ESS2-1. 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. 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. Obtain information to identify where water is found on Earth and that it can be solid or liquid.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

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)

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)

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)

Disciplinary Core Ideas

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)

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)

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)*

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

Stability and Change

- Things may change slowly or rapidly. (2- ESS2-1)

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)

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Scientists study the natural and material world. (2-ESS2-1)

Connections to other DCIs in second grade: **2.PS1.A** (2-ESS2-3)

Articulation of DCIs across grade-levels: **K.ETS1.A** (2-ESS2-1); **4.ESS2.A** (2-ESS2-1); **4.ESS2.B** (2-ESS2-2); **4.ETS1.A** (2-ESS2-1); **4.ETS1.B** (2-ESS2-1); **4.ETS1.C** (2-ESS2-1); **5.ESS2.A** (2-ESS2-1); **5.ESS2.C** (2-ESS2-2),(2-ESS2-3)

Cross Curricular Connections:

ELA/Literacy –

Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. *(2-ESS2-1)*
Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. *(2-ESS2-3)*
Recall information from experiences or gather information from provided sources to answer a question. (2-ESS2-3)
Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(2-ESS2-2)*
Water Land: Land and Water Forms Around the World - Christy Hale
Agent H2O Rides the Water Cycle - Rita Goldnerteach
Earth's Landforms and Bodies of Water - Natalie Hyde
Land and Water - Eve Heidi Bine-Stock
When the Dyke Broke-Alta Halverson Seymour

Mathematics –

Reason abstractly and quantitatively. *(2-ESS2-1),(2-ESS2-2)*
Model with mathematics. *(2-ESS2-1),(2-ESS2-2)*
Use appropriate tools strategically. *(2-ESS2-1)*
Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. *(2-ESS2-2)*
Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. *(2-ESS2-1)*

Faith Connections

- Just as water can take different forms, so can God. God the Father, the Son and the Holy Spirit make up the Trinity.

2-ESS2 Earth's Systems

- Describe the relationships, elements, underlying order, harmony, and meaning in God's creation.
- Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
- Give examples of the beauty evident in God's creation.
- God made the ocean - God Made the Ocean — Children's Ministry (familyfed.org)
- Creation Sky and Water - Creation Sky and Water Hands-On Learning Activities (christianmontessorinetwork.com)
- Creating the Earth activities - https://www.planetpals.com/earth-day-crafts.html

Books to use:

- *God's Blue Earth: Teaching Kids to Celebrate the Sacred Gift of Water - Kandy Hammer*
- *God Made the Earth - Heno Head*
- *Indescribable Atlas Adventures: …God's Amazing World - Louie Giglio*

Catholic/Christian Scientists:

- Georgius Agricola (mineralogy)
- Jean Baptiste Julien d'Omalius d'Halloy (geology)
- René Just Haüy (crystallography)
- Abraham Ortelius (created the first modern atlas and theorized on continental drift)
- Wilhelm Heinrich Waagen (geologist and paleontologist)
- Johann Joachim Winckelmann (archaeology)
- Teilhard de Chardin (paleontology)
- Nicolas Steno (stratigraphy)

Saints:

- St. Barbara, patron saint of geology

K-2-ETS1 Engineering Design

K-2-ETS1 Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s). (K- 2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2- ETS1-1)

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. (K-2-ETS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

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. (K-2-ETS1-2)

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. (K-2-ETS1-3)

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (K-2- ETS1-2)

Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include: **Kindergarten:** K-PS2-2, K-ESS3-2

Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include:
Kindergarten: K-ESS3-3,
First Grade: 1-PS4-4,
Second Grade: 2-LS2-2

Connections to K-2-ETS1.C: Optimizing the Design Solution include: **Second Grade:** 2-ESS2-1

Articulation of DCIs across grade-bands: **3-5.ETS1.A** (K-2-ETS1-1),(K-2-ETS1-2),(K-2-ETS1-3); **3-5.ETS1.B** (K-2-ETS1-2),(K-2-ETS1-3); **3-5.ETS1.C** (K-2-ETS1-1),(K-2-ETS1-2),(K- 2-ETS1-3)

Cross Curricular Connections:

ELA/Literacy –

Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text. (K-2-ETS1-1)
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. *(K-2-ETS1-1),(K-2-ETS1-3)*
Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1),*(K-2-ETS1-3)*
Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(K-2-ETS1-2)*

Mathematics –

Reason abstractly and quantitatively. *(K-2-ETS1-1),(K-2-ETS1-3)*
Model with mathematics. *(K-2-ETS1-1),(K-2-ETS1-3)*
Use appropriate tools strategically. *(K-2-ETS1-1),(K-2-ETS1-3)*
Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. *(K-2-ETS1-1),(K-2-ETS1-3)*

Faith Connections

- Noah was given precise directions to build a boat to withstand the flood (Genesis 6:14-16). This story from the Bible includes valuable data – the kind that is needed for engineering.
- Building the Ark of the Covenant (Exodus 37, 38).
- Simon builds a pyramid for the remains of his brother, Jonathan (1 Maccabees 13:25–30).
- The skilled master worker lays the foundation and others build upon. Jesus is the foundation of Christian life (1 Corinthians 3:9-15).
- The house of God is built upon the foundation of the apostles and prophets, with Jesus as the cornerstone (Ephesians 2:19-22).

Additional Resources

Textbook and Supplementary Suggestions:

Understanding NGSS - Understanding NGSS Standards for Elementary and Middle School (kidsparkeducation.org)

1st Grade Science | BJU Press

2nd Grade Science | BJU Press

Kindergarten - Kindergarten Science Curriculum | Science4Us (explorelearning.com)

Kindergarten Lesson Plans NGSS - Kindergarten Lesson Plans (sciencebuddies.org)

First Grade Lesson Plans - First Grade Lesson Plans (sciencebuddies.org)

Second Grade Lesson Plans - Second Grade Lesson Plans (sciencebuddies.org)

Webinars on NGSS - Next Generation Science Standards | Webinars | McGraw Hill (mheducation.com)

Free teaching resources from McGraw HIll (NGSS aligned)- Fun Educational Activities | McGraw Hill (mheducation.com)

Discovery Education virtual field trips - Virtual Field Trips | Interactive Field Trips | Discovery Education (discoveryeducationglobal.com)

Storylines for K-5th grade NGSS - Elementary — Next Generation Science Storylines (nextgenstorylines.org)

Teaching with Phenomena (NGSS lessons) - NGSS Phenomena - Virtual Science Education Resources

NGSS K-12 STEM Lesson plans with videos - Ignite STEM learning in K-12 - TeachEngineering

Science Videos for K-3 - SciShow Kids - YouTube