Niagara Falls City School District

Learning For All...Whatever It Takes

Kindergarten - Grade 2 Science Scope and Sequence Updated 2023

Below are the units of study for each grade level. You can Ctrl+Click on a grade level (yellow box) to move to that section of the document.

KINDERGARTEN

- Weather, Climate and Matter
- Forces and Interactions
- Plants, Animals and Their Environments

GRADE 1

- Structure, Function and Information Processing
- Light and Sound Waves
- Patterns and Cycles in Space

GRADE 2

- Relationships in Ecosystems
- Structure and Properties of Matter
- Processes That Shape the Earth

Understanding the New York State P-12 Science Learning Standards

The New York State P-12 Science Learning Standards are a series of performance expectations that define what students should understand and be able to do as a result of their study of science. The New York State P-12 Science Learning Standards are based on the Framework for K–12 Science Education developed by the National Research Council and the Next Generation Science Standards . The framework outlines three dimensions that are needed to provide students a high-quality science education. The integration of these three dimensions provides students with a context for the content of science, how science knowledge is acquired and understood, and how the sciences are connected through concepts that have universal meaning across the disciplines.

Grade K	WEATHER AND CLIMATE MATTER	(Weeks 3-20) Weather – also year long study

UNIT OVERVIEW

In this unit of study, students apply an understanding of the effects of the sun on the Earth's surface. Students develop an understanding of patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather.

There are nine lessons in this unit. Lessons may contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

In addition to the BOCES4Science unit, weather is a full year focus. This focus includes collecting data about the weather to describe patterns over time. The method by which the data collection and analyzation occurs is at the discretion of the classroom teacher.

PERFORMANCE EXPECTATIONS

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-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 and local resources available for preparedness measures.]

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.]

K-PS1-1. Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature. [Clarification Statement: Emphasis should be on solids and liquids at a given temperature and that a solid may be a liquid at

higher temperature and a liquid may be a solid at a lower temperature.] [Assessment Boundary: Only a qualitative description of temperature, such as hot, warm, and cool, is expected]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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) **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) • With guidance, plan and conduct an investigation in collaboration with peers. (K-PS1-1) **Analyzing and Interpreting Data** Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.	**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. (K-PS1-1) **PS3.B: Conservation of Energy and Energy Transfer** • Sunlight warms Earth's surface. (K-PS3-1),(K-PS3-2) **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) **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) **ETS1.A: Defining and Delimiting an Engineering Problem**	**Patterns** • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) **Cause and Effect** • Events have causes that generate observable patterns. (K-PS3-1),(K-PS32),(K-ESS3-2) • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS11) **Energy and Matter** • Students observe objects may break into smaller pieces, be put together into larger pieces, or change shapes. (K-PS1-1) --- **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**

• Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1) • Record information (observations, thoughts, and ideas). (K-PS1-1) • Analyze data from tests of an object or tool to determine if it works as intended. (K-PS1-1) **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-PS32) **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) ----------	• Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2)	• People depend on various technologies in their lives; human life would be very different without technology. (K-ESS32)

Connections to Nature of Science Scientific Investigations Use a Variety of Methods • Scientists use different ways to study the world. (K-PS3-1) **Science Knowledge is Based on Empirical Evidence** • Scientists look for patterns and order when making observations about the world. (K-ESS2-1) **Investigations Use a Variety of Methods** • Scientists use different ways to study the world. (K-PS1-1)		

DISTRICT RESOURCES	**OTHER SUGGESTED ACTIVITIES/RESOURCES**
BOCES4Science: Weather for Kindergarten	See BOCES4Science website for additional resources including literature, apps, and interactive Smartboard activities. Generation Genius: • Solids, Liquids and Gases • Introduction to Weather • Sunlight Warms the Earth *Evidence Statements for Kindergarten. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS

Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY

cloudy, meteorologist, precipitation, rain, season, sleet, snow, sunny, temperature, weather, windy, cold, cool, hot, thermometer, warm, fall, patter, spring, summer, winter, predict, rain gauge, wind sock, accumulation, blizzard, safety, lightening, thunder, thunderstorm, flood, forecast, overflow, precaution, engineer, solution, problem solving, engineering cycle

ASSESSMENT
This unit includes embedded formative assessments.

Grade K	FORCES AND INTERACTIONS: PUSHES AND PULLS	(Weeks 21-27)

UNIT OVERVIEW

In this unit, kindergartners explore the forces of pushes and pulls. They learn how to describe the position/motion of objects and the effects of forces on those objects. They experience the effect of slope on the speed of cars going downhill on tracks set at different heights, and forward and backward collisions.

There are nine lessons in this unit. Lessons may contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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,	**PS2.A: Forces and Motion** • Pushes and pulls can have different strengths and directions. (KPS2-1),(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)	**Cause and Effect** • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS21),(K-PS2-2)

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)	**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** • (NYSED) A push or a pull may cause stationary objects to move, and a stronger push or pull in the same or opposite direction makes an object in motion 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 KPS2-2)	

DISTRICT RESOURCES	**OTHER SUGGESTED ACTIVITIES/RESOURCES**
Boces4Science: Pushes and Pulls	YouTube – Jack Hartman Forces Can Push or Pull Generation Genius: • Pushes and Pulls *Evidence Statements for Kindergarten. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY
pull, push, motion, faster, height, slower, trial, at rest, direction, strength, collision, interaction, data, direction, position

ASSESSMENT
This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.

Grade K	INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS: PLANTS, ANIMALS AND THEIR ENVIRONMENT	(Weeks 28-38)

UNIT OVERVIEW

Why are there piles of worms evenly spaced along the center of a road? Kindergartners ask questions and observe a classroom compost bin of redworms in order to investigate this phenomenon. On behalf of the Worm Scouts of the World, Scout the Worm guides students through the unit as they explore interdependent relationships in the ecosystem of a worm.

There are nine lessons in this unit. Lessons may contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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 and other materials to live, grow, and thrive.]

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.]

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-ESS3-3. Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment. * [Clarification Statement: Examples of human impact on the environment (land, water, air, plants, and animals) 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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models	**LS1.C: Organization for Matter and Energy Flow in Organisms**	**Patterns**

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. • Use a model to represent relationships in the natural world. (K-ESS3-1) **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) **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) **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.	• (NYSED) All animals need food, air, and water in order to live, grow, and thrive. Animals obtain food from plants or from other animals. Plants need water, air, and light to live, grow, and thrive. (K-LS1-1) **ESS2.E: Biogeology** • Plants and animals can change their environment. (K-ESS2-2) **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.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),(K-ESS3-3) **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)	• Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) **Cause and Effect** • Events have causes that generate observable patterns. (K-ESS3-3) **Systems and System Models** • Systems in the natural and designed world have parts that work together. (K-ESS2-2),(K-ESS3-1)

• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3) ---------- **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)		

DISTRICT RESOURCES	**OTHER SUGGESTED ACTIVITIES/RESOURCES**
BOCES4Science: Worm Scouts	*Evidence Statements for Kindergarten. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. STEM in Action: Little Footprints Generation Genius: • Living vs. Non-living • Living Things Change Their Environment • Habitats • Reducing Our Impact on Earth

LEARNING TARGETS

I can give examples of what living things need to survive.
I can give examples of how living things change their environment.
I can demonstrate specific ways to reduce my impact on the environment.

VOCABULARY

engineer, resource, footprint, map, route, pollution, plant, animal, needs, living things, environment

ASSESSMENT

This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit project) of their learning.

Grade 1	STRUCTURE, FUNCTION AND INFORMATION PROCESSING	1st TRIMESTER (weeks 2-13)

UNIT OVERVIEW

In this unit, students act as scientists as they observe how young rabbits look similar to but different from their parents. Students continue to study the rabbit, and other animals, when they look at patterns of behavior displayed by both the parents and the offspring that ensure the survival of the offspring. These patterns of behavior include how parents and offspring use their senses to process information. Students also observe how the structure and function of the rabbit's external body parts (feet and coat) help the animal survive. Inspired by what they have learned, students design a product, which solves a problem in their own lives, by copying nature.

There are eleven lessons in this unit. Lessons may contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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).]

1-LS3-1. Make observations to construct an evidence-based account that some young plants and animals are similar to, 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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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) • 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)	**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) **LS3.A: Inheritance of Traits** • (NYSED) Some young animals are similar to, but not exactly, like their parents. Some young plants are also similar to, but not exactly, like their parents. (1-LS3-1) **LS3.B: Variation of Traits**	**Patterns** • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2),(1-LS31) **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 by using materials derived from the natural world. (1-LS1-1)

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

DISTRICT RESOURCES	OTHER SUGGESTED ACTIVITIES/RESOURCES
BOCES4Science: A Bunny's Life	Generation Genius: • Inspired by Nature • Animals Help Their Babies Survive • Introduction to Traits Cross-Curricular resources are included in the Teachers Manual at the end of each lesson. *Create PBS Learning Media account-it's free. *Evidence Statements for Grade 1. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY
Adult, seed, seed coat, species, survive, characteristics, inherit, offspring, trait, birds, female, fish, hatch, mammals, predator, prey, reptiles, calf, chick, gather, herd, infant, protect, shelter, burrow, function, habitat, nest, structure, warren, senses, adaptation (external body parts), camouflage, cold-blooded, contour feathers, down feathers, underfur, warm-blooded, claws, hoof, naturalist, paw, track, webbed, brainstorm, design, engineer, inspire, invention, prototype, product, tool, choices, invest, need, want

ASSESSMENT
This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.

Grade 1	WAVES: LIGHT AND SOUND	2nd TRIMESTER (weeks 14-28)

UNIT OVERVIEW

In this unit, young students behave as scientists as they plan and carry out investigations to provide evidence that vibrating materials make sound. Students realize the cause and effect relationship between light and our ability to see. Through a series of activities, students conduct investigations, make observations, and communicate information on how light interacts with different materials. Students look for patterns in their data focusing on how we use sound and light to communicate non-verbally. The unit culminates in an engineering project in which students work collaboratively to design and build a device that solves the problem of communicating over a distance.

There are sixteen lessons in this unit. Lessons contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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 (firsthand or from media) 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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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-PS42) • 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)	**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.) (1PS4-3) **PS4.C: Information Technologies and Instrumentation** • People also use a variety of devices to communicate (send and receive information) over long distances. (1PS4-4)	**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

• Scientists use different ways to study the world. (1-PS4-1)		

DISTRICT RESOURCES	OTHER SUGGESTED ACTIVITIES/RESOURCES
BOCES4Science: Sending Messages with Light and Sound	Cross-Curricular resources are included in the Teachers Manual at the end of each lesson. Generation Genius (video) • Introduction to Sound • Introduction to Light • Communication over Distance *Evidence Statements for Grade 1. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY
Connection, pattern, observe, tine, tuning fork, communicate, device, listen, evidence, investigate, vibrate, observation, analyze, data, procedure, energy, ear drum, invisible, sound waves, particles, matter, amplify, megaphone, code, claim, artificial, manmade, natural, source, light waves, reflect, lenses, opaque, tint, translucent, transparent, prediction, property, focus, reflective, decipher, engineer, design

ASSESSMENT
This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning. Generation Genius provides assessments for each video.

Grade 1	SPACE SYSTEMS: PATTERNS AND CYCLES	3rd TRIMESTER (weeks 29-37)

UNIT OVERVIEW

In this unit of study, students take on various missions as they investigate different sky patterns. These missions include tracking the Sun to predict where it will be at different times of the day and checking out sunsets to discover the seasonal pattern to the amount of daylight throughout the year. Students consider the cycle of night and day and figure out the patterns to the phases of the moon.

There are nine lessons in this unit. Lessons contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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 along the eastern horizon, move in a predictable pathway across the sky, and set along the western horizon; and stars other than our Sun are visible at night depending on weather and other conditions such as light pollution but not visible 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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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,	**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. (1ESS1-1) **ESS1.B: Earth and the Solar System**	**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**

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

DISTRICT RESOURCES	**OTHER SUGGESTED ACTIVITIES/RESOURCES**
BOCES4Science: Patterns and Cycles	Generation Genius: • Patterns in the Sky • Seasons and Day Length *Evidence Statements for Grade 1. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY
Data, observation, prediction, claim, evidence, planet, moon, star, sunset, sunrise, sundial, shadow, cardinal, compass rose, globe, rotation, telescope, constellation, solar system, full moon, new moon, cycle, reflect, season

ASSESSMENT

This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.

Grade 2	INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS	1st TRIMESTER (weeks 1-13)

UNIT OVERVIEW

The main topics included in this unit are needs of plants and animals, how plants and animals depend on each other for survival, the diversity of life in different habitats, seed dispersal, and pollination. The issue of global loss of the bee population is the phenomenon that is a central focus of the unit. An engineering design project involving the design of a hand pollinator allows students to devise a solution to the decline in bee population.

There are twelve lessons in this unit. Lessons contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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 illustrates how plants and animals depend on each other for survival.* [Clarification Statement: Examples could include animals dispersing seeds or pollinating plants, and plants providing food, shelter, and other materials for animals.]

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.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e.,	**LS2.A: Interdependent Relationships in Ecosystems** • Animals depend on plants or other animals for food. (2-LS2-2)	**Cause and Effect** • Events have causes that generate observable patterns. (2-LS2-1)

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) • Make observations (firsthand or from media) to collect data that 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)	• (NYSED) Plants depend on water, light and air to grow. (2-LS21) • (NYSED) Some plants depend on animals for pollination and for dispersal of seeds from one location to another. (2-LS2-2) **LS4.D: Biodiversity and Humans** • There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) **ETS1.B: Developing Possible Solutions** • (NYSED) Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas to other people (secondary to 2-LS2-2)	**Structure and Function** • The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) **Patterns** • Similarities and differences in patterns can be used to sort and classify organisms. (2-LS4-1)
DISTRICT RESOURCES	**OTHER SUGGESTED ACTIVITIES/ACTIVITIES**	

BOCES4Science: Save the Bees	How To Train Your Betta Fish video (lesson 5): https://www.youtube.com/watch?v=XlQY1nvZA_Q Why All The Bees Are Dying video (before beginning unit) https://www.youtube.com/watch?v=BRGrI4AQG70 Generation Genius: • Plant Growth Conditions • Habitats • Diversity of Life on Earth *Evidence Statements for Grade 2. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY- Suggested vocabulary words: behavior, biodiversity, characteristic, claim, control, dispersal, ecologist, ecosystem, endangered, engineer, evidence, extinct, germinate, habitat, hypothesis, investigation, non-living, observation, pesticide, pollination, root, seed, soil, sprout, stamen, stem, stigma, structure, survive, system, thorax, and variable.

*Other vocabulary words can be found in the glossary section of the student's science journal.

ASSESSMENT
This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.

Grade 2	STRUCTURE AND PROPERTIES OF MATTER	2nd TRIMESTER (weeks 14-26)

UNIT OVERVIEW

This unit covers science concepts about matter, its properties and how it is used. Students will plan investigations to classify objects by their observable properties, analyze data to determine which materials have the properties are best suited for an intended purpose, use evidence to explain that changes to materials due to heating and cooling can be reversed with some materials and not with others, and finally explain how objects are made from a smaller set of pieces which can be disassembled and made into a different object.

There are twelve lessons in this unit. Lessons contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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: An example of a reversible change could include freezing and melting. An example of an irreversible change could include cooking an egg.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
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,	**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	**Patterns** • Patterns in the natural and human designed world can be observed. (2-PS1-1) **Cause and Effect**

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. (2PS1-4)	and classified by its observable properties. (2-PS1-1) • Different properties are suited to different purposes. (2PS1-2),(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)	• 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 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)		

DISTRICT RESOURCES	OTHER SUGGESTED ACTIVITIES/RESOURCES
BOCES4Science: Made of Matter	*Evidence Statements for Grade 2. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. STEM in Action: Muddy Mats Generation Genius • Heating and Cooling • Solids, Liquids, & Gasses

LEARNING TARGETS
Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY
Observe, matter, mass, weight, property, solid, liquid, phase, texture, flexibility, absorbent, classify, claim, evidence, reasoning, heat, reversible, irreversible, buoyancy

ASSESSMENT
This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.

Grade 2	EARTH'S SYSTEMS: PROCESSES THAT SHAPE THE EARTH	3rd TRIMESTER (weeks 27-39)

UNIT OVERVIEW

This unit covers science concepts about Earth's features and how Earth's surface changes. The main topics covered in this unit include using maps and being able to find and map the shapes and kinds of land and water features in an area. As a follow up, students will use their mapping skills to develop models to represent the shapes and kinds of land and bodies of water in an area. Students will identify whether water on Earth is liquid or solid. Using several sources students will provide evidence that Earth events can occur quickly or slowly. Finally, students will use an engineering design model to compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

There are thirteen lessons in this unit. Lessons contain more than one instructional session. Refer to the teacher's guide for a suggested implementation schedule.

PERFORMANCE EXPECTATIONS

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 weathering and erosion of rocks, which may occur slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

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 for using rocks, shrubs, grass, and trees to hold back wind, water, and 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.

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models	**ESS1.C: The History of Planet Earth**	**Patterns**

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. • Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1) • 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)	• Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) **ESS2.A: Earth Materials and Systems** • Wind and water can change the shape of the land. (2ESS2-1) **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-ESS22) **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)	• Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3) **Stability and Change** • Things may change slowly or rapidly. (2ESS1-1),(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 Addresses Questions About the Natural and Material World** • Scientists study the natural and material world. (2-ESS2-1)

DISTRICT RESOURCES	OTHER SUGGESTED ACTIVITIES/RESOURCES
BOCES4Science – Earth's Features/Processes That Shape the Earth	Generation Genius: • Timescale of Earth • Changing the Shape of Land • Maps of Earth's Surface • Oceans, Lakes and Rivers *Evidence Statements for Grade 2. NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do.

LEARNING TARGETS

Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.

VOCABULARY

characteristic, continent, criteria, Earth, earthquake, engineer, erosion, eruption, flood, glacier, globe, lake, land, map, mountain, ocean, plain, rapid, river, stability, tornado, tsunami, and weathering.

*Other vocabulary words can be found in the glossary section of the student's science journal.

ASSESSMENT

This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.