Niagara Falls City School District

Learning For All...Whatever It Takes

Grade 3 - Grade 5

Science Scope and Sequence

GRADE 3	GRADE 4	GRADE 5
• Interdependent Relationships in Ecosystems • Weather and Climate • Inheritance and Variation of Traits	• Grade 4 will transition to the NYSSLS in the 2021/22 school year.	• Structure and Properties of Matter • Earth's Systems • Matter and Energy in Ecosystems

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 3	INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS	1ST TRIMESTER (9 weeks)

UNIT OVERVIEW

BOCES4Science Program: Where are the Wolves?
The main focus of this unit is the interdependence of organisms in an ecosystem. The anchoring phenomenon is the wolves of Yellowstone. Students learn about how bringing wolves back to Yellowstone National Park significantly changed the park's ecosystem. Students are posed with the question: "Should wolves be brought back to Adirondack Park in New York State?" Students learn about the concerns New York State citizens have with this idea and how wolves would adapt to living in New York. Students use the information learned to take a position on this idea. Fossils are included in this unit. They represent other animals no longer found in New York State. Deforestation is focused on as an environmental change. Students investigate whether solutions to deforestation have merit and would make a positive impact to a changed ecosystem.

PERFORMANCE EXPECTATIONS
Students who demonstrate understanding can:

3-LS2-1. Construct an argument that some animals form groups that help members survive. [Clarification Statement: Examples of groups could include a herd of cattle, a swarm of bees, a flock of geese, a pod of whales, etc.]

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include both natural and human-influenced changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds. • Construct an argument with evidence, data, and/or a model. (3-LS2-1) • Construct an argument with evidence. (3-LS4-3) • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS2.D: **Social Interactions and Group Behavior** • (NYSED) Being part of a group helps some animals obtain food, defend themselves, and survive. Groups may serve different functions and vary dramatically in size. (Note: Moved from K–2) (3-LS2-1) LS4.A: **Evidence of Common Ancestry and Diversity** • Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: Moved from K–2) (3-LS4-1) • Fossils provide evidence about the types of organisms that lived long	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS21),(3-LS4-3) **Scale, Proportion, and Quantity** • Observable phenomena exist from very short to very long time periods. (3-LS4-1) **Systems and System Models** • A system can be described in terms of its components and their interactions. (3-LS4-4) **Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology** • Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-4) **Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes consistent patterns in natural systems. (3-LS4-1)

	ago and also about the nature of their environments. (3-LS4-1) LS4.C: **Adaptation** • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) LS4.D: **Biodiversity and Humans** • Populations live in a variety of habitats and change in those habitats affects the organisms living there. (3-LS4-4)	
DISTRICT RESOURCES BOCES4Science – Where are the Wolves?	**CROSS-CURRICULAR RESOURCES** **Journey's** Unit 1, Lesson 5: Cause and Effect Unit 2, Lesson 9: Cause and Effect	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 3rd Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol Generation Genius • Fossils and Extinction • Adaptations • Ecosystems • Animal Group Behavior **BrainPOP Jr** • Habitats • Fossils • Camouflage • Migration

		• Food Chain • Hibernation **BrainPOP** • Ecosystems
LEARNING TARGETS Learning targets are located at the beginning of each lesson in the BOCES4Science Teacher's Guide.		
VOCABULARY ecosystem, carnivore, herbivore, omnivore, habitat, predator, prey, endangered, extinct, species, adaptation, camouflage, migration, hibernation, alpha, pack, solitary, food chain, food web, deforestation, claim, evidence, reasoning		
ASSESSMENT This unit includes embedded formative assessment (Student Journal) and a final summative assessment (end of unit design project) of their learning.		

Grade 3	WEATHER AND CLIMATE	2ND TRIMESTER (9 weeks)

UNIT OVERVIEW

BOCES4Science Program: Investigating Weather and Climate

The main topics included in this unit are investigating the phenomenon of weather, the water cycle, weather-related hazards, and climates in different regions of the world. The class collaborates to plan and conduct an investigation of the weather using weather tools. Students develop a presentation about the weather and climate at a specific global location.

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world. [Clarification Statement: Emphasis should be on various climates in different regions rather than on localized weather conditions.]

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.* [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]

3-ESS2-3. Plan and conduct an investigation to determine the connections between weather and water processes in Earth systems. [Clarification Statement: Emphasis should be on the processes that connect the water cycle and weather patterns.]

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 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-ESS2-3) • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-ESS2-3) **Analyzing and Interpreting Data** Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5	**ESS2.D: Weather and Climate** • Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1) • Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2) • (NYSED) Earth's processes continuously cycle water, contributing to weather and climate. (3-ESS2-3) **ESS3.B: Natural Hazards** • A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)	**Patterns** • Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2) **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS2-3),(3-ESS3-1) **Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World** • (NYSED) Engineers improve existing technologies or develop new ones to increase their benefits (e.g., improved Doppler radar), decrease known risks (e.g., severe weather alerts), and meet societal demands (e.g., cell phone applications). (3-ESS3-1) **Connections to Nature of Science Science is a Human Endeavor** • Science affects everyday life. (3-ESS3-1)

builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)		
DISTRICT RESOURCES BOCES4Science – Investigating Weather and Climate	**CROSS-CURRICULAR RESOURCES** **Journey's** Unit 2, Lesson 8: Infer/predict Unit 2, Lesson 9: Cause and Effect Unit 3, Lesson 11: Cause and Effect	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 3rd Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol **Generation Genius** • Water Cycle • Extreme Weather for Kids • Weather vs Climate

		BrainPOP Jr • Seasons • Temperature • Water Cycle **BrainPOP** • Weather

LEARNING TARGETS

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

VOCABULARY

data, forecast, meteorologist, observe, pattern, prediction, weather, drought, flood, hail, lightning, thermometer, temperature, tornado, Celsius, Fahrenheit, rain gauge, anemometer, wind speed, control, experiment, variable, procedure, model, water cycle, condensation, precipitation, water vapor, evaporation, climate, desert, tundra, temperate, tropical

ASSESSMENT

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

Grade 3	INHERITANCE AND VARIATION OF TRAITS: LIFE CYCLES AND TRAITS	3rd TRIMESTER (9 weeks)

UNIT OVERVIEW

BOCES4Science Program: Generations of Butterflies

In this unit of study, students explore the phenomenon of the monarch migration to Mexico. Lessons within the unit help students figure out that a special generation of monarchs migrate to Mexico over several months even though their adult life span is typically two to three weeks. Additionally, students determine that the butterflies making the trip south do not come back north. A main topic in this unit is life cycles. Students watch butterflies go through their life cycle right in their classroom and collect data on the four stages of their life cycle - birth, growth, reproduction, and death. Another main topic in the unit is inheritance of traits. Variations of these traits provide advantages in surviving, finding mates, and reproducing.

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could include plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to produce offspring.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop models to describe phenomena. (3-LS1-1) **Analyzing and Interpreting Data** Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) **Constructing Explanations and Designing Solutions**	**LS1.B: Growth and Development of Organisms** • Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1) **LS3.A: Inheritance of Traits** • Many characteristics of organisms are inherited from their parents. (3-LS3-1) • Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. (3LS3-2) • (NYSED) Some characteristics result from the interactions of both inheritance and the effect of the environment. (3-LS3-2) **LS3.B: Variation of Traits**	**Patterns** • Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) • Patterns of change can be used to make predictions. (3-LS1-1) **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),(3-LS4-2)

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2) • Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2) **Connections to Nature of Science** Scientific Knowledge is Based on Empirical Evidence • Science findings are based on recognizing patterns. (3-LS1-1)	• Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) • The environment also affects the traits that an organism develops. (3-LS3-2) **LS4.B: Natural Selection** • Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	
DISTRICT RESOURCES BOCES4Science – Generations of Butterflies	**CROSS-CURRICULAR RESOURCES** **Journey's** Unit 3, Lesson 13: Compare and Contrast Unit 3, Lesson 15: Infer/Predict	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 3rd Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol **Generation Genius** • Variation of Traits • Life Cycles

		BrainPOP Jr • Plant Life Cycle • Butterflies • Frogs • Migration • Camouflage

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

VOCABULARY
migration, survival, life cycle, metamorphosis, larva, pupa, chrysalis, exoskeleton, germinate, root, seed, sprout, fair test, control, variable, hypothesis, investigation, life span, reproduction, acquired trait, inherited trait, organism, adapt, generation, offspring, species, environment, habitat

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

Grade 5	STRUCTURES AND PROPERTIES OF MATTER	1ST TRIMESTER (8 weeks)

UNIT OVERVIEW

BOCES4Science Program: Toys Matter

This unit explores the Structure and Properties of Matter. Students begin this unit by being welcomed to their first day at the toy company, Toys Matter. They are about to embark on an intensive training program to see if they have what it takes to be hired as Materials Engineers. Throughout the unit, students will complete a series of tasks in which they will explore and work with a large variety of materials. Their final test will be to use what they have learned to engineer a new toy.

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances the total amount of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances. Assume that reactions with any gas production are conducted in a closed system.] [Assessment Boundary: Assessment does not include distinguishing between mass and weight.]

5-PS1-3. Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing between mass and weight.]

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
[Clarification Statement: Examples could include mixing baking soda and water compared to mixing baking soda and vinegar.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model to describe phenomena. (5-PS1-1) **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K– 2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4) • Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3) **Using Mathematics and Computational Thinking**	**PS1.A: Structure and Properties of Matter** • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) • (NYSED) The total amount of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) **PS1.B: Chemical Reactions**	**Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4) **Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large. (5-PS1-1) • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5PS1-3) **Connections to Nature of Science** Scientific Knowledge Assumes an Order and Consistency in Natural Systems • Science assumes consistent patterns in natural systems. (5-PS1-2)

Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)	• When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5PS1-2)	
DISTRICT RESOURCES BOCES4Science – Toys Matter	**CROSS-CURRICULAR RESOURCES**	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 5th Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol **BrainPOP:** Lesson 2 – Atoms Lesson 3 – States of Matter Lesson 4 – Measuring Matter

		Lesson 7 – Property Change Lesson 8 – Conservation of Mass **Generation Genius** • Conservation of Matter • Particle Nature of Matter • Properties of Matter • Chemical vs Physical Changes

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

VOCABULARY
matter, property, particle, gas, liquid, phase, solid, mass, volume, chemical property, physical property, dichotomous key, chemical change, physical change, Law of Conservation of Matter

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

Grade 5	EARTH'S SYSTEMS	2nd TRIMESTER (7 weeks)

UNIT OVERVIEW

BOCES4Science Program: Got Water?

In this unit, students investigate Earth's Systems by taking on the role of interns at their local Got Water facility. Students will develop and use system models to explore interactions among Earth's atmosphere, biosphere, geosphere, and hydrosphere. As a final performance assessment, students will obtain, evaluate, and communicate information on environmental conservation issues, then use this information to clean up a water source that has been polluted with various contaminants.

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]

5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment. [Clarification Statement: Emphasis should be on how communities use information to sustain resources and the environment locally, regionally, nationally, and/or internationally.]

NIAGARA FALLS CITY SCHOOL DSITRICT SCIENCE SCOPE AND SEQUENCE

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model using an example to describe a scientific principle. (5-ESS2-1) **Using Mathematics and Computational Thinking** Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2) **Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 3– 5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1**)**	**ESS2.A: Earth Materials and Systems** • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) **ESS2.C: The Roles of Water in Earth's Surface Processes** • Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5ESS2-2) **ESS3.C: Human Impacts on Earth Systems** • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help	**Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2) **Systems and System Models** • A system can be described in terms of its components and their interactions. (5-ESS21),(5-ESS3-1) **Connections to Nature of Science** Science Addresses Questions About the Natural and Material World • Science findings are limited to questions that can be answered with empirical evidence. (5ESS3-1)

	protect Earth's resources and environments. (5-ESS3-1)	
DISTRICT RESOURCES BOCES4Science – Got Water?	**CROSS-CURRICULAR RESOURCES** **Journey's** Unit 2, Lesson 8: Everglades Forever: Restoring America's Great Wetlands	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 5th Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol **BrainPOP**: Lesson 1 – Water cycle Lesson 2 – Oceans Lesson 3 – Earth's Atmosphere Lesson 5 – Water & Climate Types Lesson 7 – Human's and The Environment Lesson 8 – Water supply Lesson 9 – water pollution **Generation Genius** • Water Cycle • Water Quality and Distribution • Interactions of Earth's Spheres

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

VOCABULARY
hydrosphere, inference, observation, glacier, atmosphere, biosphere, geosphere, climate, weather, acid rain, erosion, water cycle, pesticide

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

Grade 5	MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS	3rd TRIMESTER (8 weeks)

UNIT OVERVIEW

BOCES4Science Program: Deer, Deer Everywhere

In this unit, Matter and Energy in Organisms and Ecosystems are explored through the lens of deer overpopulation. Students take on the role of NYS Department of Environmental Conservation researchers charged with the task of creating a public service announcement on this issue. During the unit, the students will focus on the Science and Engineering Practices of Developing and Using Models, and Engaging in Argument from Evidence. The unit addresses the Crosscutting Concepts of Systems and System Models, and Energy and Matter.

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the Sun. [Clarification Statement: Emphasis should be on plants converting light energy by photosynthesis into usable energy. Examples of models could include diagrams and flow charts.]

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

5-LS2-1. Develop a model to describe the movement of matter among plants (producers), animals (consumers), decomposers, and the environment. [Clarification Statement: Emphasis is on the flow of energy and cycling of matter in systems such as organisms, ecosystems, and/or Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSS-CUTTING CONCEPTS
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Use models to describe phenomena. (5-PS3-1) • Develop a model to describe phenomena. (5-LS2-1) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model. (5-LS1-1) **Connections to Nature of Science** Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena • Science explanations describe the mechanisms for natural events. (5-LS2-1)	**PS3.D: Energy in Chemical Processes and Everyday Life** • The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) **LS1.C: Organization for Matter and Energy Flow in Organisms** • Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) • Plants acquire their material for growth chiefly from air and water. (5-LS1-1) **LS2.A: Interdependent Relationships in Ecosystems** • The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition	**Systems and System Models** • A system can be described in terms of its components and their interactions. (5-LS2-1) **Energy and Matter** • Matter is transported into, out of, and within systems. (5-LS1-1) • Energy can be transferred in various ways and between objects. (5-PS3-1)

	eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1) **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** • Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)	
DISTRICT RESOURCES BOCES4Science – Deer, Deer Everywhere	**CROSS-CURRICULAR RESOURCES** **Journey's** Unit 2, Lesson 6: Quest for the Tree Kangaroo Unit 2, Lesson 10: Cougars	**OTHER SUGGESTED ACTIVITIES/RESOURCES** Evidence Statements for 5th Grade NGSS Evidence Statements provide educators with additional detail on what students should know and be able to do. Claim-evidence-reasoning protocol **Brainpop** Lesson 1 – Ecosystems Lesson 4 – Photosynthesis

		Lesson 6 Plant Growth Lesson 7 – Soil Lesson 8 + 9 – Energy Pyramid Lesson 10 – Food Chain **Generation Genius** • Food Webs • How do we use Food?

LEARNING TARGETS

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

VOCABULARY

ecosystems, organism, biodiversity, macroinvertebrate, eco column, niche, producer, photosynthesis, guard cells, stoma(ta), transpiration, constants, control, dependent variable, independent variable, mass, matter, competition, hydroponic, carnivore, consumer, herbivore, omnivore, decomposer, food chain, food web, invasive species, native species, non-native species, over population

ASSESSMENT

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