Course: Third Grade Science

Unit #1: Water and Climate

Grade Level(s):	**Length of Unit:** 20 days

Unit Rationale:

In the Water and Climate unit, students understand that water is the most important substance on Earth. It moves all over the Earth through the water cycle, defines life, and changes the surface of our planet. Students will learn that human life depends on water so new technologies are being constructed to conserve and protect this precious resource. They will also see how climate is determined in part by the water from precipitation.
In this module, students will explore the properties of water, the water cycle, weather, how water interacts with other materials, and how we use water as a natural resource. Students will have the opportunity to engage in engineering practices while exploring these topics and experiencing first hand how science affects everyday life.

Stage 1 - Desired Results

Enduring Understandings:	**Essential Questions:**
Students will understand that… ● Water has different properties. ● When water is dropped on absorbent materials it soaks in, while when water is dropped on water-proof materials, it forms a dome shape. ● On materials found outdoors, water will act differently. For example, rain water will repel on plant leaves, but absorb on bark. ● A standard is needed when measuring temperature. ● Water expands when it gets really cold/freezes. ● Weather is fairly predictable. Because of this, it is easy for people to prepare for natural hazards. ● Water shapes the Earth's surface by grinding or flowing through different materials and distributing those materials elsewhere.	● What happens when water falls on different surfaces? ● What happens outdoors when rain falls on natural materials? ● How does water change when it gets really cold? ● How do we describe different climates? ● How do people deal with natural hazards such as floods?
Content: *Students will know…* ● Water forms beads on waterproof materials and soaks into absorbent materials. ● Water moves downhill. ● Large water domes move faster down a slope	**Skills:** *Students will be able to…* ● Discover how water-dome size, slope, and speed are related. ● Use appropriate tools to make accurate measurements. ● Collect and use measurement data to construct

than smaller domes. ● The steeper the slope of a surface, the faster a water dome moves. ● Temperature is a measure of how hot matter is. ● Water expands when heated and contracts when cooled. ● Cold water is more dense than warm water. ● Weather is measured using observation and tools such as thermometers, wind vanes, and rain gauges. ● Evaporation is the process by which liquid water changes to gas (water vapor). ● As temperature increases, the rate of evaporation increases. ● The larger the surface area of a volume of water that is exposed to air, the greater the rate of evaporation. ● Moving air increases the rate of evaporation. ● Condensation is the process by which gas (water vapor) changes to liquid. ● Condensation occurs on a cool surface. ● Evaporation and condensation contribute to the movement of water through the water cycle. ● The Sun's energy drives weather. ● Typical weather in a region often varies with seasons. High and low temperatures and amount of precipitation are the main ways to describe seasonal weather changes. ● Climate is the average or typical weather that can be expected to occur in a region of Earth's surface, based on long term observations and data analysis. ● Weather-related natural hazards include tornadoes, hailstorms, blizzards, lightning, floods, and drought. ● People often modify their homes and their way of life to deal with floods. ● Wetland protection and restoration is one way to prevent floods.	explanations. ● Observe and explain the interaction between masses of water at different temperatures. ● Observe and explain the inter between masses of water in liquid and solid states. ● Construct a thermometer to observe that water expands as it warms and contracts as it cools. ● Investigate the effects of surface area and air temperature on evaporation. ● Investigate the effect of temperature on condensation. ● Interpret the data displayed in tables and graphic displays and look for patterns over time. ● Investigate what happens when water is poured through two earth materials, soil and gravel. ● Use field techniques to compare how well several soils drain.
NJ Student Learning Standards - Science	

Performance Expectations ("the Standards"):
3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.
3-ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard.

Connected components:
Science and Engineering Practices:
Practice 1: Asking Questions (for Science) and Defining Problems (for Engineering).
Practice 2: Developing Using Models
Practice 3: Planning and Carrying Out Investigations
Practice 4: Analyzing and Interpreting Data
Practice 5: Using Mathematics and Conceptual Thinking
Practice 6: Constructing Explanations and Designing Solutions
Practice 7: Engaging in Argument from Evidence
Practice 8: Obtaining, Evaluating and Communicating Information

Disciplinary Core Ideas:
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. (3ESS2-1) Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3ESS2-2)

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.)

Crosscutting Concepts:
3.ESS2.2. Patterns of change can be used to make predictions.
3.ESS3.1. Cause and effect relationships are routinely identified, tested, and used to explain change.
3.ESS3.1. Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones).
3.ESS3.1. Science affects everyday life.

Career Education (Career Readiness, Life Literacies, and Key Skills Practices and 9.2 Standards)

- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
- 9.2.5.CAP.2: Identify how you might like to earn an income.

CLKS Practices:
1. Act as a responsible and contributing community members and employee
2. Consider the environmental, social and economic impacts of decisions

Connected Careers:
meteorologist, oceanographer

Explanation of how 9.2 standards connect to the unit:
Students who find themselves fascinated by how water cycles through the environment, how weather patterns form, or how climate change impacts ecosystems might discover a passion for environmental science or meteorology. Students who enjoy outdoor activities, hands-on experiments, and field research might be inclined towards careers that involve significant fieldwork, such as hydrology or environmental biology.

Some careers in water and climate, such as consulting or academic research, may be appealing to students. Students can adopt sustainable living practices.

Explanation of how CLKSs connect to the unit:
Understanding the importance of water conservation and the impacts of water pollution encourages students to adopt and promote sustainable water use practices within their communities. Equipped with information about water and climate, students can participate in community awareness campaigns, educating others on the importance of sustainable practices.

Learning about ecosystems and climate change helps students evaluate the environmental consequences of their decisions, such as resource consumption and waste production.

Explanation of how Connected Careers connect to the unit:

Meteorologists require an understanding of how water vapor contributes to the formation and intensity of storms, including hurricanes and cyclones. This is vital for accurate weather forecasting and early warning systems.

Oceanographers need to understand water as a natural resource because the oceans play a critical role in Earth's climate, ecosystems, and human societies. Oceanographers study how pollutants, including plastics and chemicals, are transported and dispersed in ocean waters. This understanding is critical for developing strategies to mitigate marine pollution.

Interdisciplinary Standards

Math Connections:

- **3.DL.A.1.** Develop data-based questions and decide what data will answer the question. (e.g. “What size shoe does a 3rd grader wear?”, “How many books does a 3rd grader read?”)
- **3.M.A.2 -** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Literacy Connections:

- **RI.CR.3.1.** Ask and answer questions and make relevant connections to demonstrate understanding of an informational text, referring explicitly to textual evidence as the basis for the answers
- **RI.CT.3.8.** Compare and contrast the elements of informational texts regarding the most important points

and key details presented in two texts on the same topic.

Explanation of how interdisciplinary standards connect to the unit:
Measuring and estimating volumes and masses using standard units (grams, kilograms, liters) teaches students the importance of precision and accuracy in scientific experiments. Representing problems with drawings and equations helps students visualize and conceptualize scientific phenomena. This skill is important for creating diagrams and models in science. The literacy standards help students develop inquiry skills by prompting them to ask relevant questions and seek information, which is vital for conducting scientific research and experiments.
Students will develop data-based questions and decide what data will answer the question (rainfall, etc.).

Technology Integration (9.4 Standards):
•9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.M.B.3,7.1.NM.IPERS.6).

9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).

Explanation of how 9.4 standards connect to the unit:
Learning about how climate change impacts both local environments (e.g., droughts, floods) and global systems (e.g., melting polar ice caps, rising sea levels) prepares students to consider diverse perspectives and the broad implications of climate change. By focusing on potential solutions to climate change students learn to think critically and creatively about addressing environmental challenges.

Digital tools can be used to modify and display weather and climate data in various ways that can be organized to communicate ideas.

Stage 2- Assessment Evidence:	
Assessment:	
Formative	**Lab experiments**: Use science journals to check student understanding of entries. **Focus Questions**: Students summarize their learning at the end of each lab experiment. **Science Notes**: Throughout the unit, student full in content provided in the notes to act as the student textbook. Students may use prepared notebook sheets or may generate free-form notebook entries that could both be collected and assessed for student progress.
Summative	**I-Check Performance Assessments**: These are teacher prepared formal assessments that are appropriate for the students. They are up to one period in length and are taken individually. They are given at the end of the Investigation. This a performance based

	assessment. **Survey/Posttest**: A full-period assessment which consists of content questions, multiple choice, fill in the blank, and open-response questions.
Alternative	**Response Sheet**: Students provide content to answer a provided question. Evidence for answer is required. **Tutorials/Virtual Investigations**: Virtual simulations are provided for each investigation to enrich lab experiences.
Benchmark	Unit Assessment
Other (optional)	Posters, multimodal projects

Stage 3 - Learning Plan

Learning Activities:

- **Investigation 1: Water Observations**
- **Investigation 2: Hot Water, Cold Water**
- **Investigation 3: Weather and Water**
- **Investigation 4: Season and Climate**

- **Related Application/Connection/Extension problems (Inv 1)**

- Investigation 1, Part 1: Drops of Water
- Investigation 1, Part 2: Water on a Slope
- Investigation 1, Part 3: Soaking Sponges
- Investigation 1, Part 4: Water in Nature
- (Start with Part 4, then combine Parts 1,2,3)

- **Related Application/Connection/Extension problems (Inv 2)**

- Investigation 2, Part 1: Measuring Temperature
- Investigation 2, Part 2: Build a Thermometer
- Investigation 2, Part 3: Sinking and Floating Water (if time permits)
- Investigation 2, Part 4: Water as Ice (if time permits)
- Investigation 2, Part 5: Ice Outdoors (if weather permits)

- **Related Application/Connection/Extension**

Differentiation:

ELL: Model abstract concepts
- Provide visuals illustrating scientific concepts
- Create a word wall that includes definitions and examples
- Draw pictures to illustrate terms
- Provide information sheets in different

G&T: *FOSS Teacher Module* extension files
- Provide research opportunities tailored for each unit of study

Special Ed: Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise language
- Provide additional time to complete independent

504: Provide additional time to complete independent activities
- Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise

Students at Risk: Use models to show related facts
- Facilitate personal coping skills and strategies

problems (Inv 3) • Investigation 3, Part 1: Measuring Water • Investigation 3, Part 2: Evaporation • Investigation 3, Part 3: Surface Area • Investigation 3, Part 4: Evaporation Locations • Investigation 3, Part 5: Condensation **Related Application/ Connection/Extension problems (Inv 4)** • Investigation 4, Part 1: Seasonal Weather • Investigation 4, Part 2: Describing Climate • Investigation 4, Part 3: Weather-Related Natural Hazards	**Link to Science Differentiation Chart and Accommodations Chart**

Core and Supplementary Instructional Materials

Teacher Pedagogical Resources:

- FOSS Water and Climate teacher manual
- FOSS Water and Climate teacher toolkit and equipment kit
- FOSS student textbook
- FOSS Science Resource books
- Bedwell Garden

Student Materials:

- FOSS student textbook
- FOSS technology website: www.FOSSweb.com
- Bedwell Garden

Notes:

Inclusion of Climate Change Opportunities

Students can connect with peers and experts to learn about different approaches to climate change. This perspective helps them understand the varying impacts and responses to climate change in different regions.

Course: Third Grade Science

Unit #2: Motion and Matter

Grade Level(s): Third	**Length of Unit:** 20 days

Unit Rationale:

In the Motion and Matter unit, students understand the principles of forces and interactions, matter, and engineering design. Students will work with magnets to explore different forces, various patterns of motion and use their knowledge during the engineering design process. They will record data, compare their findings, reflect on their designs, and improve their designs when needed.

Stage 1 - Desired Results

Enduring Understandings:	**Essential Questions:**
Students will understand that… ● Magnetism and gravity can pull, and magnetism can sometimes push as well. ● How far magnetic fields extend around two magnets. ● There are balanced and unbalanced forces. ● There are many configurations when making a wheel and axle system. ● They can predict the way objects will roll down a path. ● Gravity and air resistance will affect how a twirly bird flies. ● Solutions to a design problem are limited by available materials.	● What happens when magnets interact with other magnets and a paperclip? ● How is a magnetic field affected when more magnets are added? ● What causes change in motion? ● What rules help predict the motion of an object? ● How can you improve the design of your cart?
Content: *Students will know…* ● Magnetic force between objects does not require that the objects be in contact; the strength of the magnetic force depends on the objects' properties and their distance apart. ● How magnets interact depends on their orientation (sometimes they attract and sometimes they repel). ● Each force acting on an object has a strength and a direction. Unbalanced forces (pushes or pulls) cause change of motion. ● Gravity is the force that pulls things toward the center of Earth.	**Skills:** *Students will be able to…* ● Ask questions while observing the interaction of magnets. ● Develop a model to explain the attraction between magnets and paper clips. ● Analyze and interpret data in order to make a prediction about the boundary of the magnetic field. ● Ask questions about how changes of system variables affect the system's motion. ● Make observations to produce data to test a design. ● Communicate observations and comparisons

● The patterns of an object's motion in various situations can be observed and measured. ● When past motion exhibits a regular pattern, future motion can be predicted from it. ● A twirly bird is a simple winged system that spins when it interacts with air; variables affect twirler performance. ● Tops exhibit rotational motion (spinning) when torque is applied to the axial shaft; variables affect top performance. ● Possible solutions to a problem are limited by available materials and other resources (constraints). ● The success of a designed solution is determined by considering the desired features of a solution (criteria). ● Research on a problem should be carried out before beginning to design a solution. Testing a solution involves evaluating how well it performs under a range of likely conditions. ● The pattern of an object's or a system's motion in various situations can be observed and measured. ● When past motion exhibits a pattern, it can be used to predict future motion.	of motion, using precise vocabulary. ● Communicate with peers about proposed design solutions. ● Compare proposals for design solutions on the basis of how well each one meets the criteria for success and how well each takes the constraints into account.

NJ Student Learning Standards - Science

Performance Expectations ("the Standards"):
3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3-PS2-3: Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
3-PS2-4: Define a simple design problem that can be solved by applying scientific ideas about magnets

Connected components:
Science and Engineering Practices:
Practice 1: Asking Questions (for Science) and Defining Problems (for Engineering).
Practice 2: Developing Using Models
Practice 3: Planning and Carrying Out Investigations
Practice 4: Analyzing and Interpreting Data
Practice 5: Using Mathematics and Conceptual Thinking
Practice 6: Constructing Explanations and Designing Solutions
Practice 7: Engaging in Argument from Evidence
Practice 8: Obtaining, Evaluating and Communicating Information

Disciplinary Core Ideas:
PS2.A: Forces and Motion Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces, are used at this level.)

(3-PS2-1) The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)

PS2.B: Types of Interactions Objects in contact exert forces on each other. (3-PS2-1) Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3), (3-PS2-4)

Crosscutting Concepts:
3.PS2.2 Patterns of change can be used to make predictions.
3.PS2.1 Cause and effect relationships are routinely identified.
3.PS2.3 Cause and effect relationships are routinely identified, tested, and used to explain change.
3.PS2.4 Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process.
3.PS2.2 Science findings are based on recognizing patterns.
3.PS2.1 Science investigations use a variety of methods, tools, and techniques.

Career Education (Career Readiness, Life Literacies, and Key Skills Practices and 9.2 Standards)

• 9.2.5.CAP.6: Compare the characteristics of a successful entrepreneur with the traits of successful employees.

CLKS Practices:
1. Demonstrate creativity and innovation
10. Use technology to enhance productivity increase collaboration and communicate effectively
11. Work productively in teams while using cultural/global competence

Connected Careers:
Mechanical engineer, biomedical engineer

Explanation of how 9.2 standards connect to the unit:
Successful entrepreneurs often need to identify problems, develop innovative solutions, and adapt to changing circumstances. Learning about motion and matter involves understanding complex systems and how different variables interact, which parallels the strategic thinking required in entrepreneurship.

Explanation of how CLKSs connect to the unit:
Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner. Students can communicate observations and comparisons of motion, using precise vocabulary. Students will communicate with peers about proposed design solutions.

Knowledge of physical principles and systems can be applied to understand and use virtual collaboration tools like video conferencing (e.g., Zoom) and collaborative documents (e.g., Google Docs) effectively.

Students will appreciate the importance of each team member's role, fostering a collaborative and inclusive team environment. Applying scientific methods to problem-solving can aid in resolving conflicts within teams, as it encourages an evidence-based and objective approach to addressing issues.

Explanation of how Connected Careers connect to the unit:
A mechanical engineer designs, analyzes, and tests mechanical systems and components, applying principles of forces, motion, and energy. A mechanical engineer needs to understand force and patterns of motion to design, analyze, and improve mechanical systems and components effectively.

Biomedical engineers study the forces exerted by muscles and how these forces interact with bones and joints. This is crucial for designing prosthetics, orthotics, and surgical implants that mimic or support natural movement.

Interdisciplinary Standards

Math Connections:

- **3.DL.A.1.** Develop data-based questions and decide what data will answer the question. (e.g. "What size shoe does a 3rd grader wear?", "How many books does a 3rd grader read?")
- **3.M.A.2 -** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Literacy Connections:

- **RI.CR.3.1.** Ask and answer questions and make relevant connections to demonstrate understanding of an informational text, referring explicitly to textual evidence as the basis for the answers
- **RI.CT.3.8.** Compare and contrast the elements of informational texts regarding the most important points and key details presented in two texts on the same topic.

Explanation of how interdisciplinary standards connect to the unit:
Measuring and estimating volumes and masses using standard units (grams, kilograms, liters) teaches students the importance of precision and accuracy in scientific experiments. Representing problems with drawings and equations helps students visualize and conceptualize scientific phenomena. This skill is important for creating diagrams and models in science. The literacy standards help students develop inquiry skills by prompting them to ask relevant questions and seek information, which is vital for conducting

scientific research and experiments.

Technology Integration / 9.4 Standards:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Explanation of how 9.4 standards connect to the unit:
In studying matter and motion, students encounter scientific problems that require solutions. For example, they might explore why certain materials are more effective insulators or how to design a vehicle that moves efficiently. Identifying real-world problems, such as why certain materials are better for building structures or how to reduce friction in machinery, helps students apply their knowledge of matter and motion to practical situations.
Data can be organized, displayed, and presented to highlight relationships. Students will communicate observations and comparisons of motion, using precise vocabulary (motion and matter).

Stage 2- Assessment Evidence:	
Assessment:	
Formative	**Lab experiments**: Use science journals to check student understanding of entries. **Focus Questions**: Students summarize their learning at the end of each lab experiment. **Science Notes**: Throughout the unit, student full in content provided in the notes to act as the student textbook. Students may use prepared notebook sheets or may generate free-form notebook entries that could both be collected and assessed for student progress.
Summative	**I-Check Performance Assessments**: These are teacher prepared formal assessments that are appropriate for the students. They are up to one period in length and are taken individually. They are given at the end of the Investigation. This a performance based assessment. **Survey/Posttest**: A full-period assessment which consists of content questions, multiple choice, fill in the blank, and open-response questions.
Alternative	**Response Sheet**: Students provide content to answer a provided question. Evidence for

	answer is required. **Tutorials/Virtual Investigations**: Virtual simulations are provided for each investigation to enrich lab experiences.
Benchmark	Unit Assessment
Other (optional)	Posters, multimodal projects

Stage 3 - Learning Plan

Learning Activities:

- Investigation 1: Forces
- Investigation 2: Patterns of Motion
- Investigation 3: Engineering

Related Application/Connection/Extension problems (Inv 1)

- Investigation 1, Part 1: Two Forces
- Investigation 1, Part 2: Magnetic-Force
- Investigation 1, Part 3: More about Forces

- Related Application/Connection/Extension problems (Inv 2)

- Investigation 2, Part 1: Wheel and Axle Systems
- Investigation 2, Part 2: Predicting Motion of a New System
- Investigation 2, Part 3: Twirly Birds
- Investigation 2, Part 4: Tops

- Related Application/Connection/Extension problems (Inv 3)

- Investigation 3, Part 1: From Here to There
- Investigation 3, Part 2: Distance Challenge
- Investigation 3, Part 3: Investigating Start Positions
- Investigation 3, Part 4: Cart Tricks

Differentiation:

ELL: Model abstract concepts
- Provide visuals illustrating scientific concepts
- Create a word wall that includes definitions and examples
- Draw pictures to illustrate terms
- Provide information sheets in different

G&T: *FOSS Teacher Module* extension files
- Provide research opportunities tailored for each unit of study

Special Ed: Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise language
- Provide additional time to complete independent

504: Provide additional time to complete independent activities
- Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise

Students at Risk: Use models to show related facts
- Facilitate personal coping skills and strategies

Link to Science Differentiation Chart and Accommodations Chart

Core and Supplementary Instructional Materials

Teacher Pedagogical Resources:

- FOSS teacher manual
- FOSS teacher toolkit and equipment kit
- FOSS student textbook
- FOSS Science Resource books
- Bedwell Garden

Student Materials:

- FOSS student textbook
- FOSS technology website: www.FOSSweb.com
- Bedwell Garden

Notes:
Inclusion of Climate Change Opportunities
Talk about how changing wind patterns can lead to more extreme weather events.
Connect the observed wind directions to real-world weather patterns and climate change impacts.

Course: Third Grade Science

Unit #3: Structures of Life

Grade Level(s):	**Length of Unit:** 20 days

Unit Rationale:

In the Structures of Life unit, students think about how they share the most fundamental requirements of life with all other life-forms— nourishment, water, air, space, and suitable environment. Students come to understand these facts so that they are prepared to assume responsibility for the well-being of the system of life on Earth. Through a variety of activities, students come to learn that organisms have numerous strategies for life, variations of traits that help them survive, observable behaviors and predictable life cycles. Students look at the interactions between organisms of the same kind, among organisms of different kinds, and between the environment and populations over time. Students observe, compare, categorize, and care for a selection of organisms while engaging in practices to investigate structures and behaviors of the organisms.

Stage 1 - Desired Results	
Enduring Understandings: *Students will understand that…* ● Not all seeds are alike. Seeds have different properties depending on the type of seed. ● Water has different effects on seeds. ● The functions and structures of the roots differ depending on if they are below or above ground. ● Food chains change depending on the population of animals present. ● To sustain a food chain, there must be many more plants than organisms that eat plants. There must be a stable population of consumers and many more plants for them to consume. ● The functions of the skeletal system include protection, support, and movement. ● The role of joints is to connect two or more bones so the body can move.	**Essential Questions:** ● How are seeds alike and different? ● How do the roots and structures of plants differ? ● What is needed to sustain a food chain? ● What are the functions of the skeletal system?
Content: *Students will know…* ● Seeds develop in the plant part called a fruit. Different kinds of fruits have different kinds and numbers of seeds; seeds have a variety of properties. ● A seed is an organism, a living thing. ● Seeds undergo changes in the presence of water. ● A seed contains the embryo plant and stores food. A seed grows into a new plant (reproduction). Seed-dispersal mechanisms (wind, water, and animals) move seeds away from parent plants. ● Germination is the onset of a seed's development. ● Plants need water, light, space, and nutrients to grow. ● The life cycle is the sequence of stages during which a seed grows into an adult (mature) plant and produces seeds, which in turn produce new plants of the same kind. ● The fruit of the plant develops from the flower. ● Roots function to take up water and nutrients so	**Skills:** *Students will be able to…* ● Observe and compare properties of seeds and fruits. ● Investigate the effect of water on seeds. ● Monitor and record daily changes in seeds. ● Compare the mass of dry seeds to those soaked in water. ● Design and test models of seed-dispersal mechanisms. ● Describe and compare different kinds of germinated seeds. ● Plant bean seedlings in nutrient solution and observe them throughout their life cycle. ● Observe plant structures as they appear during the plant's life cycle. ● Observe, analyze, and interpret observations of crayfish structures and behavior as individuals and in groups. ● Use models to understand change over time. ● Explore how variation of traits might affect the survival of individuals. ● Study skeletal systems using bones, images, and models. ● Dissect rodent bones from owl pellets and compare them to human bones.

they can be transported to other parts of the plant. Different kinds of plants have different root systems. ● Crayfish have observable structures and behaviors that serve various functions in growth, survival, and reproduction. ● Different organisms can live in different environments; organisms have adaptations that allow them to survive and reproduce in those environments. ● Organisms are related in feeding relationships called food chains. ● Differences in characteristics between individuals of the same species may provide an advantage in surviving. ● Some animals claim a territory that they defend against others of their kind. Some organisms live in social groups that help the individuals in the group survive. ● A skeleton is a system of interacting bones. Humans have about 206 bones. Bones have several functions: support, protection, and movement. ● The number and kinds of bones in an organism are characteristics inherited from the parents of the organism. ● Muscles attach across joints to move bones. ● Fossils are important evidence about extinct organisms and past environments. ● Fingerprints can be sorted into three groups based on basic pattern: whorl, arch, and loop.	● Construct operational models of muscle-bone systems.

NJ Student Learning Standards - Science

Performance Expectations ("the Standards"):

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.

3-LS2-1: Construct an argument that some animals form groups that help members survive.

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.

3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

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.

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.

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.

Connected components:
Science and Engineering Practices:
Practice 1: Asking Questions (for Science) and Defining Problems (for Engineering).
Practice 2: Developing Using Models
Practice 3: Planning and Carrying Out Investigations
Practice 4: Analyzing and Interpreting Data
Practice 5: Using Mathematics and Conceptual Thinking
Practice 6: Constructing Explanations and Designing Solutions
Practice 7: Engaging in Argument from Evidence
Practice 8: Obtaining, Evaluating and Communicating Information

Disciplinary Core Ideas:
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)

LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (3-LS2-1)

LS3.A: Inheritance of Traits Many characteristics of organisms are inherited from their parents. (3LS3-1) Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3LS3-2)

LS3.B: Variation of Traits 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)

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)

LS4.A: Evidence of Common Ancestry and Diversity Some kinds of plants and animals that once lived on Earth are

no longer found anywhere. (3-LS4-1) Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

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)

LS4.C: Adaptation For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS43)

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)

Crosscutting Concepts:
3.LS1.1 Patterns of change can be used to make predictions.
3.LS1.1 Science findings are based on recognizing patterns.
3.LS2.1 Cause and effect relationships are routinely identified and used to explain change.
3.LS3.1 Similarities and differences in patterns can be used to sort and classify natural phenomena.
3.LS3.2 Cause and effect relationships are routinely identified and used to explain change.
3.LS4.1 Observable phenomena exist from very short to very long time periods.
3.LS4.4 A system can be described in terms of its components and their interactions.
3.LS4.4 Knowledge of relevant scientific concepts and research findings is important in engineering.
3.LS4.1 Science assumes consistent patterns in natural systems.

Career Education (Career Readiness, Life Literacies, and Key Skills Practices and 9.2 Standards)

• 9.2.5.CAP.8: Identify risks that individuals and households face.
• 9.2.5.CAP.9: Justify reasons to have insurance.

CLKS Practices:

8. Model integrity, ethical leadership and effective management
9. Plan education and career paths aligned to personal goals

Connected Careers:

Ecologists, zoologist

Explanation of how 9.2 standards connect to the unit:
Learning about the structures of life, which includes understanding biological systems, ecosystems, and ecological relationships, can help students identify risks that individuals and households face in various aspects of life. Knowledge of biological structures and functions helps students understand how diseases spread and affect individuals.
Awareness of environmental structures and natural disasters informs students about risks such as floods, hurricanes, earthquakes, and wildfires. Property insurance helps protect against financial losses from damage to homes and belongings caused by these events.

Explanation of how CLKSs connect to the unit:
Studying biological systems teaches students about the interconnectedness of life and the importance of maintaining balance within ecosystems. This awareness fosters a sense of responsibility and integrity, as students learn the impact of their actions on the environment and society.

Through studying various aspects of biology, students can identify specific areas of interest, such as genetics, ecology, or microbiology. This self-awareness helps them make informed decisions about their education and career paths that align with their passions and strengths.

Explanation of how Connected Careers connect to the unit:
An ecologist studies ecosystems and the relationships between organisms, including food chains and food webs. Ecologists need to understand how energy and nutrients flow through an ecosystem and how changes in one part of the food chain affect the entire system.

A zoologist researches various animal species, including their feeding behaviors and roles in the food chain. This understanding is essential for captive breeding programs, reintroduction efforts, and managing animal populations in the wild.

Interdisciplinary Standards

Math Connections:

- **3.DL.A.2.**Collect student-centered data (e.g. collect data on students' favorite ice cream flavor) or use existing data to answer data-based questions.

Literacy Connections:

- **SL.ES.3.3.** Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **SL.PI.3.4.** Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.
- **RI.MF.3.6.** Use information gained from text features (e.g., illustrations, maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

Explanation of how interdisciplinary standards connect to the unit:
Representing problems with drawings, maps, and photographs helps students visualize and conceptualize scientific phenomena. Collecting data is an important skill in science. The literacy standards help students develop inquiry skills by prompting them to ask relevant questions and seek information, and report on the topic, which is vital for conducting scientific research and experiments.

Technology Integration / 9.4 Standards:

- 9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.
- 9.4.5.DC.5: Identify the characteristics of a positive and negative online identity and the lasting implications of online activity.
- 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Explanation of how 9.4 standards connect to the unit:
Understanding how organisms within an ecosystem interact and affect one another helps students appreciate the interconnectedness of online activities. Just as actions in an ecosystem can have ripple effects, online actions can impact one's digital footprint and identity.

Just as students critically evaluate scientific information and sources, they can apply these skills to evaluate their online actions and the information they share. This involves considering how their posts, comments, and shares might be perceived and the potential long-term impact on their digital identity.

Data can be organized, displayed, and presented to highlight relationships. Students will use models to understand change over time, explore how variation of traits might affect the survival of individuals, and study skeletal systems using bones, images, and models. Students will communicate observations and comparisons of motion, using precise vocabulary.

Stage 2- Assessment Evidence:	
Assessment:	
Formative	**Lab experiments**: Use science journals to check student understanding of entries. **Focus Questions**: Students summarize their learning at the end of each lab experiment. **Science Notes**: Throughout the unit, student full in content provided in the notes to act as the student textbook. Students may use prepared notebook sheets or may generate free-form notebook entries that could both be collected and assessed for student progress.
Summative	**I-Check Performance Assessments**: These are teacher prepared formal assessments that are appropriate for the students. They are up to one period in length and are taken individually. They are given at the end of the Investigation. This a performance based assessment. **Survey/Posttest**: A full-period assessment which consists of content questions, multiple choice, fill in the blank, and open-response questions.
Alternative	**Response Sheet**: Students provide content to answer a provided question. Evidence for answers are required.

	Tutorials/Virtual Investigations: Virtual simulations are provided for each investigation to enrich lab experiences.
Benchmark	Unit Assessment
Other (optional)	Posters, multimodal projects

Stage 3 - Learning Plan

Learning Activities:

- **Investigation 1: Origins of Seeds**
- **Investigation 2: Growing Further**
- **Investigation 3: Meet the Crayfish**
- **Investigation 4: Human Body**

Related Application/Connection/Extension problems (Inv 1)

- Investigation 1, Part 1: Seed Search
- Investigation 1, Part 2: The Sprouting Seed
- Investigation 1, Part 3: Seed Soak
- Investigation 1, Part 4: Seed Dispersal

Related Application/Connection/Extension problems (Inv 2)

- Investigation 2, Part 1: Germination and Growth
- Investigation 2, Part 2: Life Cycle of the Bean
- Investigation 2, Part 3: Roots and Shoots

- **Related Application/Connection/Extension problems (Inv 3)**

- Investigation 3, Part 1: Crayfish Structures
- Investigation 3, Part 2: Adaptation
- Investigation 3, Part 3: Crayfish Territory
- Investigation 3, Part 4: Compare Crayfish to Other Animals
- Investigation 3, Part 5: Food Chains

- **Related Application/Connection/Extension problems (Inv 4) (if time permits)**

Differentiation:

ELL: Model abstract concepts
- Provide visuals illustrating scientific concepts
- Create a word wall that includes definitions and examples
- Draw pictures to illustrate terms
- Provide information sheets in different

G&T: *FOSS Teacher Module* extension files
- Provide research opportunities tailored for each unit of study

Special Ed: Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise language
- Provide additional time to complete independent

504: Provide additional time to complete independent activities
- Provide visuals illustrating scientific concepts
- Review key concepts from each investigation
- Summarize investigation goals in clear and concise

Students at Risk: Use models to show related facts
- Facilitate personal coping skills and strategies

Link to Science Differentiation Chart and Accommodations Chart

• Investigation 4, Part 1: Counting Bones • Investigation 4, Part 2: Owl Pellets • Investigation 4, Part 3: Joints and Muscles • Investigation 4, Part 4: Fingerprints	

Core and Supplementary Instructional Materials

Teacher Pedagogical Resources:

- FOSS teacher manual
- FOSS teacher toolkit and equipment kit
- FOSS student textbook
- FOSS Science Resource books
- Bedwell Garden

Student Materials:

- FOSS student textbook
- FOSS technology website: www.FOSSweb.com
- Bedwell Garden

Notes:

Inclusion of Climate Change Opportunities

Discuss how different conditions affect plant growth. Explain how climate change can lead to increased temperatures and droughts, impacting plant life and ecosystems.