Washington Township School District

***The mission of the Washington Township Public Schools** is to provide a safe educational environment for all students to attain the skills and knowledge specified in the New Jersey Core Curriculum Content Standards at all grade levels so as to ensure their full participation in our global society as responsible, self-directed, and civic-minded citizens.*

Course Title:	**Science**
Grade Level(s):	**3rd**

Duration:	*Full Year:*		*Semester:*	X	*Marking Period:*	**MP1 & MP2**

Course Description:

The Washington Township School District third grade curriculum uses an integrated approach to general science that focuses on units in physical, life, and earth science. By using this approach, teachers are able to meet the needs of all students while aligning with the New Jersey Model Curriculum and the Next Generation Science Standards. Hands-on activities are stressed and include student discovery experiments, problem solving, model building, cooperative learning, technology integration, classroom discussion, teacher demonstrations, and writing opportunities for research and self-expression. Interdisciplinary subject areas are incorporated whenever possible. Students are introduced to the use of scientific tools and methods used for investigations. The course is designed to be implemented using the 5E Model of Instruction: Engage, Explore, Explain, Extend/Elaborate, and Evaluate. The major topics of study for fifth grade are taken specifically from the Next Generation Science Standards:

- Forces and Interactions
- Interdependent Relationships In Organisms: Environmental Impacts on Organisms
- Inheritance and Variation of Traits: Life Cycles and Traits
- Weather and Climate
- Engineering Design

Grading Procedures:

Major -60%

Minor -40%

Primary Resources:

National Geographic Exploring Science & Mystery Science

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

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Written: August 2017

Revised: July 2024 by Alicia Tanner

BOE Approval:

Unit Title: Life Science

Unit Description:

Students will explore interdependent relationships within ecosystems. They will construct an argument that some animals form groups that help them survive. The students will analyze and interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago. Students will construct an argument with evidence that in a particular habitat organisms can survive well, some survive less well, and others cannot survive at all. Students will 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.

In this unit, students will also explore inheritance and variations of traits through the study of life cycles. Students will develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death. They will analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variation of these traits exist in a group of similar organisms. Students will use evidence to support the explanation that traits can be influenced by the environment. Also, students will use evidence to construct an explanation of how the variations in characteristics among individuals in the same species may provide advantages in surviving, finding mates, and reproducing.

Unit Duration: 38 lessons, some 2 days long

Desired Results

New Jersey Standard Learning Standard(s):

Students who demonstrate understanding can:

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

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-LS4-3. 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

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

Understandings:
Students will….

Ecosystems
- Describe how populations live and interact in a variety of ecosystems.

Forests Change
- Describe how natural events can change an environment.
- Explain how changes in an environment's physical characteristics, temperature, or availability of resources affect the organisms living there.

Searching for Water
- Describe how the availability of water changes habitats.
- Explain how availability of water in an environment affects the organisms living there.

Changes in Temperature
- Describe how shifts in temperature change habitats.
- Explain how changes in temperature in an environment affect organisms living there.

Living Things Make Changes
- Describe how living things make changes to the environments that affect the organisms living there.

People Change Land
- Describe how humans make changes to the land that affect the organisms living there.

People Change Ecosystems
- Describe how changes people make affect living things and change ecosystems.

Compare Solutions and Make a Claim (Think Like a Scientist)
- Make a claim about the merit of solutions to the drop in salmon population in the Columbia River.

Living in Groups
- Explain how being part of a group helps animals obtain food, defend themselves, and cope with changes.

Getting Food
- Explain how being part of a group helps animals obtain food.

Protection and Defense
- Explain how being part of a group helps animals protect and defend themselves.

Coping with Change
- Explain how being part of a group helps some animals cope with changes.

Construct an Argument (Think Like a Scientist)
- Construct an argument that some animals form groups that help members survive.

Fossils

Essential Questions:

- How do organisms survive in their ecosystem?
- How can I use fossils to understand their past environment?
- How does a life cycle affect the growth and change of plants and animals from birth to death?
- How do plant and animal traits affect the survival of organisms?

● Explain that some kind of plants and animals that once lived on Earth are no longer found anywhere. ● Explain that fossils provide evidence about the types of organisms that lived long ago and the nature of their environments. **Fish in the Desert** ● Explain that fossils provide evidence about the types of organisms that lived long ago and the nature of their environments. **Plants in the Antarctic** ● Explain that fossils provide evidence about the types of organisms that lived long ago and the nature of their environments. **Fossils (Investigate)** ● Explain how fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **Analyze and Interpret Data (Think Like a Scientist)** ● Analyze and interpret data from pictures of fossils around the world. ● Provide evidence of the organisms and the environments in which they lived long ago. **Cold or Warm?** ● Explain how for cold and warm environments, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Wet or Dry?** ● Explain how, for wet and dry environments, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Light or Dark?** ● Explain how for light and dark environments, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Construct an Argument (Think Like a Scientist)** ● 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. **Life Cycles** ● Explain that reproduction is essential to the continued existence of every kind of organism. ● Explain that living things have unique and diverse life cycles. **Life Cycle of a Jalapeño Pepper Plant** ● Explain life cycle diagrams. ● Describe the unique life cycle of a jalapeño pepper plant. **Life Cycle of a Ladybug** ● Describe the unique life cycle of a ladybug. **Life Cycle of a Leopard Frog** ● Describe the life cycle of a leopard frog. **Life Cycles (Investigate)** ● Describe the sequence of stages in the life cycle of a spotted salamander. **Develop a Model (Think Like a Scientist)**	

● Develop two models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. **Inherited Traits: Looks** ● Explain how many characteristics of organisms are inherited from their parents. ● Explain that different organisms vary in how they look and function because they have different inherited information. **Inherited Traits: Functions** ● Explain how many characteristics or organisms are inherited by their parents. ● Explain that different organisms vary in how they function because they have different inherited information. **Acquired Traits** ● Explain how some characteristics of organisms result from individuals' interactions with the environment. ● Explain that different organisms vary in how they look and function because environmental factors, like diet, affect the traits that an organism develops. **More Acquired Traits** ● Explain how some characteristics of organisms result from individuals' interactions with the environment. ● Explain that different organisms vary in how they look and function because environmental factors, like the weather, affect the traits that an organism develops. **Learning** ● Explain how some characteristics of organisms result from individuals' interactions with the environment. ● Explain that different organisms vary in how they look and function because environmental factors, like learned behaviors, affect the traits that an organism develops. **Environment and Traits (Investigate)** ● Explain how traits can be influenced by the environment. **Variation and Survival** ● Explain how sometimes the difference in characteristics between individuals of the same species provide advantages in surviving. **Variation and Mates** ● Explain how sometimes the difference in characteristics between individuals of the same species provide advantages in finding mates and reproducing. **Construct an Explanation (Think Like a Scientist)** ● Construct an explanation for why the pink form of katydid is less common in adults than in hatchlings. **Marine Ecologist (Science Career)**	

- Connect the concepts of consistent patterns and natural systems with the career of a marine ecologist.

Assessment Evidence

Performance Tasks:

<u>Investigate Lessons</u>: Students will practice performance tasks in cooperative groups engaging in the scientific steps of an investigation.

- **Lesson 27: *Investigate* Life Cycles (pgs. 92-93)**

Objective: Describe the sequence of stages in the life cycle of a spotted salamander.

- **Lesson 34: *Investigate* Environment and Traits (pgs. 106-107)**

Objective: Explain how traits can be influenced by the environment.

<u>Think Like a Scientist</u>: Plan and Investigate Lessons- Students will engage in performance tasks in cooperative groups to plan and conduct an investigation, provide evidence and use that evidence to explain results. These tasks will be recorded in their science notebooks and evaluated by a Teacher Rubric and Student Rubric.

- **Lesson 8: *Think Like a Scientist* Compare Solutions and Make a Claim (pgs. 52- 55)**

Objective: Make a claim about the merit of solutions to the drop in salmon population in the Columbia River.

- **Lesson 13: *Think Like a Scientist* Construct an Argument (pgs. 64-65b)**

Objective: Construct an argument that some animals form groups that help members survive.

- **Lesson 18: Analyze and Interpret Data Think Like a Scientist (pgs. 74-75b)**

Objective(s): Analyze and interpret data from pictures of fossils around the world.

Provide evidence of the organisms and the environments in which they lived long ago.

- **Lesson 22: *Think Like a Scientist* Construct and Argument (pgs. 82-83b)**

Objective: Construct and argument with evidence that in a particular habitat some

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook Entries
- Unit Test
- Quizzes
- Homework
- Benchmark

organisms can survive well, some survive less well, and some cannot survive at all. ➢ **Lesson 28: *Think Like a Scientist* Develop a Model (pgs. 94-95b)** **Objective:** Develop two models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. ➢ **Lesson 37: *Think Like a Scientist* Construct an Explanation (pgs. 112-113)** **Objective:** Construct an explanation for why the pink form of katydids is less common in adults than in hatchlings.	

Benchmarks: Life Science Benchmark

Activities Learning Plan

Lesson & Duration	Activities	Materials/ Suggested Resources
Lesson 1 Ecosystems pp 106-107 **NJSLS LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Diagram the parts and interactions of a system. -Describe how populations live and interact in an ecosystem. **1 Day**	**ENGAGE:** ● Introduce the Phenomenon Use Photography Show students a dramatic photo of a deep sea fish, such as an anglerfish, have teacher led discussion. **EXPLORE:** ● Think About Ecosystems ● Four Square Diagram ● Set a Purpose and ReadFocus Question-What are some physical characteristics of the forest ecosystem in the photo? Have students read the lesson. **EXPLAIN** ● Describe Populations and EcosystemsAfter students have read the lesson, have them exchange answers to the Focus Question in pairs. ● Revisit the Phenomenon-Have students revisit the phenomenon presented at the beginning of the lesson. Show students the photo of the deep-sea fish again and this time explain that the fish lives deep in the sea where there is little light from the sun. Now that students have thought through the parts of ecosystems, ask them to speculate on the nonliving and living features of the animal's ecosystem. **ELABORATE** ● Electronic Field Trip-Have small groups of students use the Internet to go on an electronic field trip to different ecosystems: **EVALUATE**	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Citizen Science Bio Blitz 108-109 (NGL Sync) ➢ Video: Bio Blitz (NGL Sync) Optional Mystery Science activity- Why some animals are the color they are. See prep work, materials and handouts in this link as well. https://mysteryscience.com/trending/mystery-21/ecosystems/585?code=MTEwMzE0NTAx&t=student&chapter=all

	● Wrap It Up! 1. DEFINE What is an ecosystem? (An ecosystem is all the living and nonliving things in an area and the ways they interact.) CCC Systems and System Models 2. INTERPRET Look at the photo of the forest. What are some of the living things in this forest ecosystem? (the giant salamander, trees, moss, and microorganisms) 3. INFER Name some of the nonliving things you cannot see that may be a part of this forest ecosystem. (mud, sand, or stones at the bottom of the river; air, sunlight, water in the air)	
Lesson 2 **Forests** **Change pp** **110-111** **NJSLS LS2.C** 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, and yet others move into transformed environments, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Describe ways a natural event can change an environment. -Infer how changes in an environment's characteristics affect the organisms living there. **1 Day**	**ENGAGE** ● Introduce the Phenomenon-Use Photography Show students a photo of a fence that is leaning to one side due to ground creep, have teacher led discussion. ● Tap Prior Knowledge- Agree/Disagree Students may have preconceptions that changes always have an overall negative effect on an environment. Help students reflect on their ideas with this activity. **EXPLORE** ● Think About How Forests Change. Have students observe the photos in the lesson. Have a teacher-led discussion. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read-Focus Question: How does a fire change a forest ecosystem? ● 3-2-1 Explain Consider using this strategy to help students summarize their new understanding and remaining questions. Have students answer the following questions in their science notebooks. -Three things that they have learned. -Two questions that they still have. -One aspect of the activity that relates to their lives. **ELABORATE** ● Make a Timeline- Have student groups construct a timeline showing each stage of regrowth, how long each stage lasts, and what changes happen in the forest at each stage. **EVALUATE** ● Wrap It Up! 1. DESCRIBE How does a fire change a forest? (It burns the trees and other plants and turns the ground black and	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Photo Gallery (NGL Sync) Optional Mystery Science activity on mosquitoe's habitats. See prep work, materials and handouts in this link as well. https://mysteryscience.com/circle-of-life/mystery-2/environmental-change-engineering/266?code=MTEwMzE0NTAx&t=student&chapter=all

	bare.) 2. CAUSE AND EFFECT How does a fire affect the deer in a forest? (It affects the deer's food supply, the available shelter, and potentially its ability to reproduce.) CCC Cause and Effect 3. INFER After a forest fire, wildflowers soon begin to grow. How might the wildflowers eventually affect the number of rabbits in the area? Why? (Possible answer: The number of rabbits might eventually increase as their food supply increases.)	
Lesson 3 **Searching for Water pp 112-113** **NJSLS LS2.C** 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, and yet others move into transformed environments, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Describe how a change in the availability of water in an environment can affect the organisms living there. -Diagram cause-effect relationships relating to water availability in ecosystems. **1 Day**	**ENGAGE** ● Introduce the Phenomenon- Use Video Use the Interactive E-book to show students the video clip of gnu migration in the lesson. Have a teacher-led discussion. **EXPLORE** ● Think About Searching for Water-To preview the lesson, have students observe the pictures of the gnu and the elephants. ● Set a Purpose and Read- Focus Question How do seasonal changes in rainfall affect organisms living in East Africa? Have students read the lesson. **EXPLAIN** ● Describe How Water Availability Changes the Environment. After students read the lesson have them work in pairs to discuss the Focus Question ● **ELABORATE** ● Diagram a Cause-Effect Chain Tell students that they will investigate what happens to lemurs on the large island of Madagascar during low rain or drought conditions. **EVALUATE** ● Wrap It Up! 1. IDENTIFY What are the two main seasons in the grasslands of East Africa? (There is a dry season and a rainy season.) 2. CAUSE AND EFFECT How does the dry season affect the grasses? Why? (The grasses turn brown in the dry season because they don't have as much water as in the wet season.) CCC Cause and Effect 3. INFER What might happen to the population of wildebeests if they did not migrate? Explain. (Possible answer: Most likely many of them would die or become dangerously weak from lack of water and food.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip: Gnu Migrations (NGL Sync)

Lesson 4 Changes in Temperature **pp 114-115** **NJSLS LS2.C** 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, and yet others move into transformed environments, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Describe how temperatures can change in an environment and explain why they change. -Give examples of the effects of changes in temperature on plants and animals. **1 Day**	**ENGAGE** ● Introduce the Phenomenon-Help students recognize and reflect on their preconceptions about temperature and ecosystems. **EXPLORE** ● Think About Changes in Temperature Direct students' attention to the picture of hibernating dormice. Have a teacher-led discussion. ● Set a Purpose and Read Focus Question-What are different ways organisms respond to changes in temperature? **EXPLAIN** ● Describe How Temperature Change Affects Environments. After students read the lesson, have them work together to answer the Focus Question **ELABORATE** ● Compare Deciduous and Coniferous Trees- Have pairs of students use the Internet to learn about how plant life changes with elevation. **EVALUATE** ● Wrap It Up! 1. DESCRIBE What are two ways that plants respond to changes in the environment, such as fewer hours of daylight and the cold weather of winter? (They die and leave behind their seeds, or they shed their leaves and become dormant.) 2. EXPLAIN How does hibernation help a dormouse survive? (The dormouse doesn't use much energy while it is hibernating, so it doesn't need to eat.) 3. GENERALIZE How does the cold weather of winter affect the amount of food available to most animals? (Food supplies generally decrease with the colder weather of winter.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 5 Living Things Make Changes **pp 116-117** **NJSLS LS2.C** 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, and yet others move into transformed environments, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Describe how living things make changes to	**ENGAGE** ● Introduce the Phenomenon-Use Photography Show students a photo of kudzu overtaking a wooded area. Have a teacher-led discussion. ● Think-Pair-Share Arrange students into partners. Explain that one partner will pretend to be a tree in the kudzu covered area. The other partner will pretend to be a squirrel. Have students think about the answer to this question: How did your daily life change when the kudzu began to grow? **EXPLORE** ● Think About How Living Things Make Changes Have students observe the pictures of the beaver and the dam. Have a teacher-led discussion. ● Set a Purpose and Read-Focus Question- How does a beaver dam change a stream? **EXPLAIN** ● Describe How Living Things Make Changes After students read the lesson, have a class discussion to answer the Focus Question.	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip: Beavers building a dam (NGL Sync)

the environments that affect the organisms living there. -Identify the effects of beavers on their environment. -Construct a model that shows how living things form a system of connections. **1 Day**	**ELABORATE** ● Make a Mural - Revisit the Phenomenon have student groups make a before-and-after "mural." Have the first half of the mural show what the plants and animals' habitat might look like before kudzu arrived. The second half should show what the habitat is like after kudzu has been there for many years. **EVALUATE** ● Wrap It Up! 1. DEFINE How does a beaver dam change a stream? (It holds back water and changes a stream into a pond.) 2. CAUSE AND EFFECT How do beaver dams affect the other animals in the ecosystem? (Possible answer: The dam provides a good habitat for some animals, including turtles, dragonflies, and sunfish.) CCC Cause and Effect 3. APPLY Beavers use their teeth to cut down trees to make their dams. How might cutting down trees affect the animals in the nearby forest? (Possible answer: Animals in the forest might lose shelter or protection when the beavers cut down trees.)	
Lesson 6 People Change Land **pp 118-119** **NJSLS LS2.C** 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, and yet others move into a transformed environment, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: -Describe how humans make changes to the land that affect the organisms living there. -Identify cause and effect relationships related to how people change land. **1 Day**	**ENGAGE** ● Introduce the Phenomenon-Tap Prior Knowledge Ask students to share what they know about how humans change the environment. Have a teacher-led discussion. **EXPLORE** ● Think About How People Change Land Have students observe the picture of the logged trees. Ask probing questions to encourage exploration. ● Graffiti Board Post a large piece of white paper in the room. Write "Ways That People Change Land" at the center. Then elicit examples of other man-made structures or human activities that have changed the land. Ask: What are other ways that people can change the land? Have students use bright colors to write as many possible changes they can think of on the graffiti board. ● Set a Purpose and Read Focus Question- What are some human activities that change the environment? **EXPLAIN** ● Describe How People Change Land- After students read the lesson, have them work with a partner to share their answers to the Focus Question. **ELABORATE** ● Literacy Through Science-Research and Write Group students to do research on how coffee is grown. See guide for specific questions. Have students work together to create a news report. **EVALUATE** ● Wrap It Up! 1. LIST What are some human activities that change the environment? (Possible answers: People build roads and houses. They also plant crops and build dams.) 2. CAUSE AND EFFECT How does cutting down trees in a forest affect the animals that live there? (Possible answer: When the trees are cut down, it changes the forest so that some animals are forced to leave. Others may die from lack of food, shelter, or protection. Some animals may survive and reproduce.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Photo Gallery (NGL Sync)

	3. MAKE JUDGEMENTS What do you think is a good way to protect the animals that live in forests? Explain. (Possible answer: A good way to protect the animals in the forest is to study their behavior and try to use practices that have the least disruptive effect on them.)	

Lesson 7 People Change Ecosystems pp 124-125 **NJSLS LS2.C** 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, and yet others move into transformed environments, and some die. **LS4.D** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **Objectives** Students will be able to: Describe an environmental problem and multiple solutions. Identify possible negative impacts of an engineered solution. Make a claim about the merit of a solution. Use relevant evidence to engage in argument **1 Day**	**Engage**: ● Introduce the Phenomenon- Present students with a photo of unusual lodging, such as the Kolarbyn huts in Sweden which are built into the natural landscape. Have a teacher-led discussion. **Explore**: ● Think About How People Change Ecosystems-Have students look at the photos in the lesson. Have a teacher-led discussion. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson ● Set a Purpose and Read- Focus Question: Can gardens built by humans replace forests as habitats? **Explain**: ● Describe How People Change Ecosystems-After students read People Change Ecosystems, clarify the following points as a class. Then have students work in pairs to discuss their answers to the Focus Question. **Elaborate**: ● Design a Housing Development- Revisit the Phenomenon Have students revisit the phenomenon and apply their understanding in a new way. Have students choose an ecosystem that they would like to learn more about and have them research the living and nonliving parts of this ecosystem **Evaluate:** ● *Wrap It Up!* 1. DESCRIBE How do rooftop gardens change the rooftop environment? (They give off oxygen and help keep the air clean.) 2. COMPARE In summer, how would the temperature of a rooftop garden differ from that of a bare roof? (Buildings with rooftop gardens would be cooler than buildings without them.) 3. INFER How might building rooftop gardens affect the number of birds in a city? Why? (Possible answer: Rooftop gardens might increase the number of birds in the city by providing them with shelter and food. They might also affect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Gallery (NGL Sync)

	the types of birds that are seen in the city.)	
Lesson 8 *Think Like A Scientists* Compare Solutions and Make a Claim **pp 126-129** **NJSLS LS4.4** Make a claim about the merit of a solution to a problem when the environment changes and the types of plants and animals that live there may change. **Objectives** Students will be able to: Describe an environmental problem and multiple solutions. Identify possible negative impacts of an engineered solution. Make a claim about the merit of a solution. Use relevant evidence to engage in argument **2 Days**	**Engage**: ● Introduce the Phenomenon- Use Video Show students a video with dramatic footage of salmon leaping high out of the water to pass upstream over a small waterfall. Lead discussion on why fish are doing that. ● Step 1: Set the scene. **Explore**: ● Step 2: Define the problem. ● Step 3: Compare solutions. Have students create a table in the SNB for a solution comparison. ● Step 4: Make a Claim. **Explain**: ● Step 5: Support your claim. Organize students in small groups, and have them take turns sharing and defending their claims. **Elaborate**: ● 3-2-1 After students have finished the activity, have them respond to the following prompts in their science notebooks: -Three things that they have learned. -Two questions that they still have. -One aspect of the activity that they enjoyed. ● Investigate Further- Help students conduct Internet research to explore the ethical debate over dams in the Columbia River basin. **Evaluate:** ● *Wrap It Up!*	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Sample Data Table see NGL Sync for printable ➢ Evaluation Rubrics see NGL Sync for printable **Suggested SNB for Quiz Grade**

	EXPLAIN Why has there been a drop in the Columbia River salmon population? (Because dams are keeping fish from migrating up the river to reproduce and down the river after they hatch.) 2. SUMMARIZE How do fish ladders address the decreasing salmon population? (Fish ladders help the adult salmon get over dams so that they can migrate upstream to reproduce.) 3. COMPARE What is a similarity between the way spillways and fish hatcheries address the decreasing salmon population? (Possible answer: Spillways and fish hatcheries both are focused on increasing the number of young salmon that make it to the ocean.)	

OPTIONAL Lesson **STEM Space Station Project** **pp 120-123** **NJSLS 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 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.] **Objective:** ● Define the design problem they need to solve, including criteria and constraints. ● Develop and compare several solutions to the design problem, evaluating each based on how well it meets the criteria and constraints. ● Design and build a seed starter within the constraints of the design. ● Test the seed starter and analyze	**Engage:** Use a Video Show students a short video showing seedlings sprouting from seeds. Engage students int a conversation to identify the problem using the 5 whys. **Explore:** Carry out the investigation. Guide students through the steps of the design project. Read through the steps together. Have students test their solutions and then refine or change their solutions accordingly. **Explain:** Regroup students. Have each group present its results. Groups should point out key features of their seed starter designs. Allow time for questions and answers. **Elaborate:** Search online for photographs of seed starters. Search terms might include “seed starters” or “seedling pots.” Have students print out three photographs of different types of seed starters to add to their science notebooks. For each photograph, students should identify whether the seed starters are made of recycled materials, if they will break down in the soil, or both. **Evaluate:** *Wrap It Up!* SNB 1. DEFINE What are criteria? What was one criterion for the design of your seed starter? (Possible answer: Criteria state goals that a project should meet, such as being able to grow a seedling that is at least 3 cm tall within two weeks.) 2. EXPLAIN How can growing plants in space help people create habitats for themselves in space? (Possible answer: Plants can help to create habitats for people by providing oxygen, removing air pollution, and providing food.) CETS Interdependence of Engineering, Technology and Application of Science on Society and the Natural World 3. INFER Why is the rate at which a seed starter breaks down over time important? (Possible answer: It needs to last long enough to hold soil in place while a seed sprouts and a seedling grows, but it needs to break down quickly enough for roots to be able to grow through it once it is placed in the ground.	➢ Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ For groups of 4: 3 cardboard toilet paper tubes, half of a 12-cell cardboard egg carton, 6 sheets of newspaper, empty can (15 oz.) or other container similar in size with straight sides, masking tape, scissors, potting soil, tree seeds, spray bottle containing water, ruler

their results to determine if it meets the criteria of the design problem **1 Day teaching** **14 Days observing**		
Lesson 9 **Living in Groups pp 130-131** **NJSLS LS2.D** Being a part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. **Objective:** Students will be able to: Compare and contrast group behavior of different animals. Create a graphic that summarizes the survival advantages of living in groups. **1 Day**	**Engage**: ● Introduce the Phenomenon-Use Video Use the Interactive E-book to show students the video clip of penguins huddled together that is provided in the lesson. Have a teacher-led discussion. **Explore**: ● Think About Living in Groups- Have students observe the picture in the lesson. Ask probing questions to encourage exploration ● Partner Talk Have students explore how group behavior may be connected to the challenges organisms face in different environments ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read -Focus Question-: How does living in groups benefit some animals? Have students read the lesson. **Explain**: ● Explain the benefits of living things in groups.Have students work in pairs to discuss their answers to the focus question. ● Jigsaw Activity **Elaborate**: ● Make an Infographic-Revisit the Phenomenon Have students re-watch the video of huddling behavior among emperor penguins. **Evaluate:** ● Wrap it up! 1. NAME What are some of the names used for groups of animals? (Possible answers: flock of birds, herd of elephants, school of fish, swarm of bees, pod of whales) 2. CONTRAST Animal groups come in different sizes. Describe how the size of a wolf pack is different from the size of a large flock of birds. (A wolf pack is fewer than 50 members, and usually is closer to 20 members. A large flock of birds could have more than one million members.) 3. SUMMARIZE How does living in groups help animals survive? (Possible answers: Living in groups can help animals get food. It can help them defend themselves. It can help them care for their young. It can help them cope with changes in weather or in their environment.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip: Emperor Penguins Flocking for Warmth (NGL Sync) ➢ Life Science Photo Gallery (NGL Sync)

Lesson 10 **Getting Food pp 132-133** **NJSLS LS2.D** Being a part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. **Objective:** Students will be able to: Demonstrate how being part of a group helps animals obtain food. Identify patterns in how animals obtain food. **1 Day**	**Engage**: ● Introduce the Phenomenon- Quick Hands-On Play a game to introduce the phenomenon of collaboration among animals ● Tap Prior Knowledge- Help students recognize and reflect on their ideas about predators and hunting strategies in the animal kingdom. ● **Explore**: ● Think About Getting Food- Have students observe the photo in the lesson. Have a teacher-led discussion. ● Video-Hunting Whales ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read-Focus Question: How does being part of a pack help animals? ● **Explain**: ● Explain How Animals Get Food ● After students have read the lesson, have them work in pairs to answer the Focus Question. Then, have a teacher-led discussion. **Elaborate**: ● Design a board game **Evaluate:** ● Wrapt it Up! 1. DEFINE What is a pack? (A pack is a group of closely related animals that live and hunt together.) 2. CONTRAST What kind of prey can a single wolf catch? How is this different from the prey that a pack of wolves can catch? (A single wolf can catch mice and rabbits and other small animals. Packs of wolves can catch bigger animals.) 3. GENERALIZE How does hunting in groups help animals survive? (Possible answer: Hunting in groups allows animals to catch larger prey and share it with the whole group.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip: Army Ants Gathering Food; Video: Hunting Whales (NGL Sync)

Lesson 11 Protection and Defense pp 134-135 **NJSLS LS2.D** Being a part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. **Objective:** Students will be able to: Chart patterns of protective and defensive behaviors. Identify the advantages and disadvantages of group defense. **1 Day**	**Engage:** ● Introduce the Phenomenon-Teacher-Led Demo ● Tap Prior Knowledge ● Help students recognize and reflect on their preconceptions about animal defense. **Explore**: ● Think About Protection and Defense-Have students preview the title of the lesson and scan for the bold vocab term. Ask students to infer what this lesson will be about. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read-Focus Question: How else does living in groups help animals survive? Have students read the lesson. **Explain**: ● Explain How Animals Protect and Defend- After students read the lesson, have them work in pairs to discuss their answer to the Focus Question and then clarify with a class discussion ● Inside Outside Circle **Elaborate**: ● Create a chart **Evaluate:** ● Wrap It Up! 1. DEFINE What is a school of fish? (A school of fish is a group of fish that swims very close together.) 2. EXPLAIN How does swimming in a school help protect fish? (Possible answer: Swimming in a school means there are many eyes to spot predators. The huge number of fish also makes it more difficult for a predator to target a single fish.) 3. INFER How might swimming in a large school not help fish survive? (Possible answer: Predators might be more likely to see a school of fish. Also, the fish on the outside of the school are left vulnerable.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip: Flock of Starlings (NGL Sync)

Lesson 12 Coping with Change pp 137 **NJSLS LS2.D** Being a part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. **Objectives:** Students will be able to: Describe changes to environments that affect the plants and animals that live there. Analyze a bee swarming as a way that some animals cope with change. Identify causes and effects of environmental change. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use Photography Display side-by-side photographs of an Arctic fox in both summer and winter. Have a teacher-led discussion. ● Tap Prior Knowledge- Think-Pair-Share The Arctic fox goes through a physical change. But some changes are behavioral. Ask students to share what they know from previous lessons about behaviors that help animals survive. **Explore**: ● Think About Coping with Change-Have students preview the lesson title and photograph. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read-Focus Question: How do animals cope with change? Have students read the lesson. **Explain:** ● Discuss How Conditions Change Over Time Partner Talk After students have read the lesson, ask them to work in pairs to discuss the Focus Question ● Explain How Animals Cope With Change-Turn and Talk Use this activity to help students continue the discussion about the way animals cope with change ● 3-2-1 **Elaborate**: ● Apply Coping with Change-Have students apply their understanding of environmental change to another example **Evaluate:** ● Wrap It Up! . DEFINE What is a swarm of bees? (A swarm of bees is a large group of bees moving together.) 2. CAUSE AND EFFECT What condition causes bees to swarm? (Overcrowding of a nest causes bees to swarm.) CCC Cause and Effect 3. INFER What change in their habitat makes it necessary for birds to migrate in the fall? (Possible answer: Birds migrate in the fall to warmer areas where it is easier to find food and shelter.	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 13 *Think Like a Scientist* **Construct an Argument pp 138-139** **NJSLS LS2.1** Construct an argument that some animals form groups that help members survive. **Objective:** Construct an argument that some animals form groups that help members survive. **1 Day**	**Engage**: ● Introduce the Phenomenon-Use Video Play for students a video that shows a line of cranes following an ultralight aircraft. Have a teacher-led discussion. ● Tap Prior Knowledge-Have students note that the sandhill cranes they see in the lesson, like the cranes in the video, travel in groups called flocks. **Explore**: ● Step 1: Ask a question **Explain**: ● Step 2: Gather Information- create a table ● Step 3: Construct and Argument. **Elaborate**: ● Extend Your Thinking About Cranes- Turn and talk **Evaluate:** ● Wrap It Up! 1. LIST Name three behaviors that sandhill cranes do in groups. (They fly, rest during migration, and raise their young.) 2. EXPLAIN How is migration a way that living things cope with change? (When the weather gets cold, they move to warmer areas to find food and shelter.) 3. MAKE JUDGMENTS Which picture is the best representation of safety in numbers? (Possible answer: The bottom left picture because it shows an entire flock. The bigger the group, the more eyes for spotting danger and the more birds for defense against predators.) SEP Engaging in Argument from Evidence	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Sample Data Table see NGL Sync for printable ➢ Evaluation Rubric see NGL Sync for printable ➢ Video Clip: Changing environments (NGL Sync) Mystery Science Lesson on how living in groups helps animals survive. See prep work, materials and handouts in this link as well. https://mysteryscience.com/selection/mystery-4/animal-groups-survival/265?code=MTEwMzE0NTAx&t=student&chapter=all **Suggested SNB for Quiz Grade**
Lesson 14 Fossils pp 140-141 **NJSLS LS4.A** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. **LS4.1** Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **Objectives** Students will be able to: Explain that some kinds of plants and animals that once lived on Earth are no longer found anywhere. Describe the way fossils provide evidence about the types of organisms that lived long ago and the nature of their environments. Observe that phenomena exist in very short as well as very long time periods. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use Visuals Show students a dramatic illustration of a dinosaur. Have a teacher- led discussion. ● Tap Prior Knowledge-Engage students in sharing what they know about how animals cope with change, from the previous lessons **Explore**: ● Think About Fossils- Think-Pair-Share observing pictures. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read- Focus Question: What can fossils tell us? Have students read the lesson **Explain**: ● Explain extinct organisms and fossils. Work together to answer the focus question. ● Video- Changing Environments ● Virtual Lab **Elaborate**: ● Quick Hands-On **Evaluate:** ● Wrap It Up! 1. DEFINE What is a fossil? (A fossil is a trace of an organism that lived long ago.) 2. EXPLAIN How do fossils form? (Fossils form when parts of organisms or traces of them are buried in mud that is pressed together and hardened into rock over a long time.) 3. INFER Dinosaur fossils usually show their bones but not their inner organs, such as the heart and lungs. Why do you	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Animation: Prehistoric Ocean Animal Swimming ➢ Virtual Lab: Fossil Dig; Life Science Gallery Optional Mystery Science activity analyzing dino fossils. See prep work, materials and handouts in this link as well. https://mysteryscience.com/animals/mystery-2/fossil-evidence-dinosaurs/967?code=MTEwMzE0NTAx&t=student&chapter=all

	think this is so? (Possible answer: Since bones are hard, they can be preserved, while softer tissue decomposes.)	
Lesson 15 Fish in the Desert pp 144-145 **NJSLS LS4.A** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. **LS4.1** Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **Objectives** Students will be able to: Analyze fossil evidence and make inferences about Earth's past. Evaluate evidence of changing environments. Draw conclusions about how Earth changes over time based on findings **1 Day**	**Engage**: ● Introduce the Phenomenon-Use Photography Show students a photo of a rhinoceros in an African savanna habitat. Have a teacher-led discussion. ● Tap Prior Knowledge- Have students reflect on what they have learned about how much environments change over time. **Explore**: ● Think About the Fish in the Desert- Have students create a table. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read- Focus Question: What can fossils tell scientists about the environment in which they are found? **Explain**: ● Explain fish in the desert.- read the text ● Turn and talk **Elaborate**: ● Compare Examples-Revisit the Phenomenon Have students review the lesson phenomenon in a new way, applying concepts they've learned to a new case.	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Stories In Science-Dinosaur Egg

	Evaluate: ● Wrap It Up! 1. CONTRAST How is the environment of Utah today different from the environment when the fossils in the picture formed? (The environment of Utah today is very dry. The fish fossils formed when the area was much wetter, probably covered by lakes or a shallow sea.) 2. DRAW CONCLUSIONS Scientists have found fossils of clams in rocks at the tops of mountains. What do these fossils suggest about the rocks? (Possible answer: They suggest that	

	the rocks at the tops of mountains were not always dry land. The rocks' layers were once underwater.) CCC Scale, Proportion, and Quantity	
Lesson 16 Plants in the Antarctic pp 146-147 **NJSLS LS4.A** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. **LS4.1** Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **Objectives** Students will be able to: Explain that some kinds of plants and animals that once lived on Earth are no longer found anywhere. Analyze fossil evidence and infer about past environments. Observe that phenomena occur over very short as well as very long time periods. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use Photography- Have a teacher-led discussion ● Tap Prior Knowledge- Think-Pair-Share- have students reflect on what they know form hte previous lesson. **Explore**: ● Think About Plants in the Antarctic- Partner Talk- Pair students and have a teacher-led discussion. ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. ● Set a Purpose and Read-Focus Question: How could plants grow in Antarctica? Have students read the lesson. **Explain:** ● Explain Plants in the Antarctic- read the text ● Select a Sentence **Elaborate**: ● Elaborate on Plants in the Antarctic- Draw to Show Understanding Have students extend their thinking by creating cartoons to visually depict the phenomenon in a creative, fictional way. ● Exit Slip **Evaluate:** ● Wrap It Up! 1. IDENTIFY Where do ferns grow today? (Today's ferns grow primarily in warm, moist places.) 2. DESCRIBE Contrast the present environment of Antarctica with the environments where ferns grow today. (The present environment of Antarctica is cold and icy. Today, ferns grow in warm, humid places.) 3. INFER Why do you think fossil ferns can be found in a place that is frozen all year long? (Fossil ferns can be found in a place that is frozen all year long because the climate there was different long ago.) CCC Scale, Proportion, and Quantity	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 17 ***Investigate Fossils*** **NJSLS LS4.A** Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. **Objectives** Students will be able to: Use a model to observe phenomena that occur over very long time periods. Draw a conclusion based on observations, inferences, and knowledge about a topic. **1 Day**	**Engage**: ● Introduce the Phenomenon-Use Photography- Display a photo that clearly shows rock layers of the Grand Canyon- Have a teacher-led discussion. ● Tap Prior Knowledge- Turn and talk to recall info from previous lessons **Explore**: ● Carry out the investigation- create table ● Complete steps 1-4 **Explain**: ● Teach the dimensions- revisit the phenomenon ● Share and Explain Findings ● **Elaborate**: ● Discuss paleontologists ● Investigate further **Evaluate:** ● Wrap It Up! . CONCLUDE Describe the environment of animal fossils found in the red layer of rock. (These animals lived in warm, shallow ocean water in a warm and humid climate.) 2. INFER What can you infer about how the environment of the area represented by these layers changed over the years? (The changes happened slowly)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** 4 lumps of clay-green, yellow, red, tan (About ½ cup of each), 4 small objects (Marbles, coins, buttons, washers, paperclips, centimeter cubes), plastic knife, craft stick, toothpick ➢ Sample Data Table see NGL Sync for printable
Lesson 18 ***Think Like a Scientist*** **Analyze and Interpret Data pp 150-151** **NJSLS LS4.1** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. **Objectives** Students will be able to: Analyze fossils to provide evidence of organisms no longer living and the environments in which they lived long ago. Interpret a map to gather evidence to make a claim. Use a model to observe phenomena that occur over very long time periods. Observe evidence of consistent patterns in natural systems. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use Photography Show students several photos of crinoids, a type of fossil frequently found in many locations around the world. Have a teacher-led discussion. ● Tap Prior Knowledge **Explore**: ● Help students get familiar with the map. Have student locate the fossil of a dragonfly. **Explain**: I ● Analyze and Interpret Fossil Data-Have students work in small groups of no more than four to analyze and interpret the data on the map. **Elaborate**: ● Investigate Further ● Teach the Dimensions **Evaluate:** ● Wrap It Up! 1. INTERPRET MAPS What do the different colored regions on the map represent? (The blue represents water; the other colors represent different types of environment in those present day places.) 2. INTERPRET FACTS Which of the fossils shown here came from a land area that was once covered in water? How do you know? (All of these fossils except for the dragonfly came from a land area that was once covered in water. They are all creatures that lived in oceans and lakes.) CCC Scale, Proportion, and Quantity 3. ANALYZE What kind of fossil was found in South America? What does this fossil show about the environment of that area a long time ago? (A dragonfly fossil was found in South America, which shows that the environment was a warm, forested area a long time ago.) CCC Scale, Proportion, and Quantity	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Sample Data Table see NGL Sync for printable

Lesson 19 **Cold or Warm? pp 152-153** **NJSLS LS4.C** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Objectives** Students will be able to: Describe adaptations organisms have for surviving in cold or warm environments. Recognize patterns in animals adapted to similar environments. Draw conclusions about survival based on adaptations. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use Photography Show students a photo of the odd-looking long-eared jerboa. Have a teacher-led discussion. ● Tap Prior Knowledge **Explore**: ● Think about Cold or Warm-Observe photos ask probing questions ● Turn and Talk ● Four Square Diagram ● Set a purpose and read- Focu Question- Why do some organisms survive well in cold environments while other survive in warm environments? **Explain**: ● Explain the Effect of Cold and Warm Environments on Living Things Think-Pair-Share Ask the whole class the following series of questions about organisms that live in cold climates. ● Featured PHoto ● Teach the Dimensions **Elaborate**: ● Each student should work with a partner to come up with one photograph or illustration that shows a human adaptation to extreme heat or extreme cold. **Evaluate:** ● Wrap It Up! 1. DESCRIBE Where do polar bears live? What is the temperature like there? (Polar bears live in the far north where the climate is cold.) 2. EXPLAIN How are polar bears able to survive in their environment? (They have thick fur and body fat that help them keep warm. They also live on sea ice where they can catch seals for food.) 3. DRAW CONCLUSIONS Could a lizard survive where polar bears live? Why or why not? (The lizard would most likely die. It could not survive where polar bears live because it would not be able to stay warm enough.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Photo Gallery (NGL Sync)

Lesson 20 **Wet or Dry?** **pp 154-155** **NJSLS LS4.C** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Objectives** Students will be able to: Describe adaptations organisms have for surviving in wet or dry environments. Recognize patterns in animals adapted to similar environments. Infer about environments based on traits of animals. **1 Day**	**Engage**: ● Introduce the Phenomenon-Use Photography Show students a photo of a white water lily with its roots visible under water. Have a teacher-led discussion. ● Tap Prior Knowledge **Explore**: ● Explore Wet or Dry Environments-Sketch to Stretch ● Four Square diagram ● Set a Purpose and Read- Focus Question: Why do some organisms survive well in wet environments, while others survive well in dry environments? **Explain**: ● Explain organisms in wet and dry environments have students work in pairs to answer focus questions ● Featured Photo. **Elaborate**: ● In groups, research how either bats, owls, jackrabbits, or snakes have adapted to living in harsh conditions. **Evaluate:** ● Wrap It Up! 1. RECALL Where do most frogs lay their eggs? (They lay their eggs in water.) 2. EXPLAIN How do camels survive in deserts? (Possible answers: They can survive weeks without drinking water; they have thick, tough lips for eating desert plants; they can go weeks without food and use fat stored in their humps for energy.) 3. INFER Could a leopard frog survive where a camel lives? Why or why not? (No. A leopard frog would die in the desert because it needs its skin to be moist for gasses to pass through it.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Photo Gallery (NGL Sync)

Lesson 21 Light or Dark? **pp 156-157** **NJSLS LS4.C** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. **Objectives** Students will be able to: Describe adaptations organisms have for surviving in dark or light environments. Recognize patterns in animals adapted to similar environments. Compare and contrast ways animals cope with darkness. **1 Day**	**Engage**: ● Introduce the Phenomenon- Show students a video of bioluminescent organisms, such as the National Geographic Video "Why Deep-Sea Creatures Glow." Have a teacher-led discussion ● Tap Prior Knowledge **Explore**: ● Think Light or Dark- Observe photo asking probing questions ● Inside-OUtside Circle ● Four Square Diagram ● Set a Purpose and Read- Focus Question: How do plants and animals cope with light and dark environments? **Explain**: ● Explain light or dark environments- Partner Talk-answer focus questions ● Featured Photo ● Teach te Dimensions **Elaborate**: ● Extend your thinking- Investigate scorpions that give off light ● Exit Slip **Evaluate:** ● Wrap It Up! 1. LIST What are some of the animals that need bright light to find food? (Hawks, hummingbirds, and butterflies need bright light to find food.) 2. EXPLAIN Why do plants need sunlight? (Plants need	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Life Science Photo Gallery (NGL Sync)

	sunlight to make food.) 3. EVALUATE Could plants grow in the deep ocean? Explain. (Some plants might be able to live in the deep ocean, but they would need uncommon adaptations to allow them to make food without light.) CCC Cause and Effect	
Lesson 22 *Think Like a Scientist* **Construct and Argument pp 158-159** **NJSLS 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. **Objectives** Students will be able to: Construct an argument with evidence that in some habitats some organisms survive well, some survive less well, and some cannot survive. Engage in argument with evidence, data, and/or a model. Use cause and effect relationships to predict the effects of environmental change. **1 Day**	**Engage**: ● Use Photography Show students a photo of animals living in a very strange or extreme habitat, such as the Saharan Desert Ant. ● Tap Prior Knowledge- Graffiti Board **Explore**: ● Ask a question ● Read and observe- create a table **Explain**: ● Regroup ● Teach the Dimensions ● Construct an Argument ● Turn and Talk **Elaborate** ● Investigate Further **Evaluate:** ● Wrap It Up! 1. INFER How does the star-nosed mole use its big, clawed feet? (The star-nosed mole uses its feet to dig through the soil as it searches for food.) 2. CONCLUDE Do you think a muskox lives in a hot or cold environment? Explain. (A muskox lives in a cold environment. It has thick fur and hooves that help it dig in snow.) 3. ANALYZE How do a mallard duck's webbed feet and wide bill help it find food? (A mallard eats plants and small animals that live in water. Its feet help it swim, and its bill helps it catch small animals or pull up plants from underwater.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Sample Data Table see NGL Sync for printable ➢ Evaluation Rubric see NGL Sync for printable **Suggested SNB for Quiz Grade**
Lesson 23 Life Cycles pp 70-71 **NJSLS LS1.B** Reproduction is essential to the continued existence of every kind of organism. **LS1.1** Plants and animals have unique and diverse life cycles. **Objectives** Students will be able to: Explain that reproduction is essential to the continued existence of	**Engage**: ● Introduce the Phenomenon- Quick Hands-on ● Tap Prior Knowledge **Explore:**: ● Think about Life Cycles ● Four-Square Diagram Have students make a full-page four-square diagram in their science notebooks and add to it throughout the lesson. In the top left square, have students write the title of the lesson, "Life Cycles." In the top right square, have students write a few sentences stating what they think they will learn about life cycles in the lesson. Have students write in the lower left square what they learned after reading. ● Set a Purpose and Read- Focus Question-What is a life Cycle? **Explain:**	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

every kind of organism. Describe examples of living things that have unique and diverse life cycles. Identify patterns in the life cycles of living things. **1 Day**	• Describe Life Cycles and Reproduction • Identify Life Cycle Patterns-Inside Outside Circle • Teach the Dimensions • Graffiti Board • Featured Photo **Elaborate**: • Diagram a Life Cycle **Evaluate:** • Wrap It Up! 1. DEFINE What is a life cycle? (A life cycle is a series of changes a living thing goes through during its lifetime.) 2. IDENTIFY PATTERNS How are a baby orangutan and its mother alike? How are they different? (A baby orangutan looks like its mother. They are different because of their stages of life and their individual traits.) CCC Patterns 3. APPLY What are the stages in the life cycle of a cat? (The cat's life cycle includes birth, growth and development, reproduction, and death.)	

Lesson 24 Life Cycle of a Jalapeño Pepper Plant pp 72-73 **NJSLS LS1.B** Reproduction is essential to the continued existence of every kind of organism. **LS1.1** Plants and animals have unique and diverse life cycles. **Objectives** Students will be able to: Create and use diagrams to explain life cycles. Analyze the unique life cycle of a jalapeño pepper plant **1 Day**	**Engage**: • Introduce the Phenomenon- Quick Hands On • Tap Prior Knowledge- Word Web **Explore**: • Think About the Life Cycle of a Jalapeno Plant. • Four Square Diagram • Set a purpose and read- Focu question: What is inside a jalapeno pepper that helps the plant reproduce? **Explain**: • Explain life cycle diagrams • Describe the Life Cycle of a Jalapeno Pepper Plant • Teach the Dimensions **Elaborate**: • Compare Plant Life Cycles **Evaluate:** • Wrap It Up! 1. IDENTIFY Which parts of a pepper plant produce fruit? (The flowers may produce fruit.) 2. SEQUENCE Put these life cycle stages in order: young plant, seedling, seed, adult plant. Start with a seed. (seed, seedling, young plant, adult plant) 3. ANALYZE In which stage of its life cycle does a pepper plant reproduce? (A pepper plant reproduces in its adult stage.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook Mystery life science lesson where students discover similarities in plant life cycles. https://mysteryscience.com/circle-of-life/mystery-5/plant-life-cycles/832?code=MTEwMzE0NTAx&t=student&chapter=all

Lesson 25 Life Cycle of a Ladybug pp 74-75 **NJSLS LS1.B** Reproduction is essential to the continued existence of every kind of organism. **LS1.1** Plants and animals have unique and diverse life cycles. **Objectives** Students will be able to: Analyze the unique life cycle of a ladybug. Compare and contrast the ladybug life cycle to patterns in other organism life cycles. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use a video or photo of the alien looking pupa of a hercules beetle. Have a teacher-led discussion. ● Tap Prior Knowledge- Sketch to Stretch **Explore**: ● Think About the Life Cycle of a Ladybug-observe pictures ask questions have discussions ● Four Square Diagram ● Set a purpose and read-focus question: What are hte stages of a ladybug's life cycle? **Explain**: ● Describe the life cycle of a ladybug. ● Teach the Dimensions **Elaborate**: ● Design a Field Study-Role Play **Evaluate:** ● Wrap It Up! 1. LIST What are the stages of a ladybug's life cycle? (The stages of a ladybug's life cycle are: egg, larva, pupa, and adult.) 2. CONTRAST List some differences between the pupa and the adult stages in the ladybug life cycle. (The adult ladybug has wings and can fly. The pupa doesn't have a hard shell yet and cannot fly. The pupa does not have wings and has different coloring from the adult ladybug.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook Mystery life science lesson where students discover similarities and differences of animal life cycles. https://mysteryscience.com/circle-of-life/mystery-1/animal-life-cycles/822?code=MTEwMzE0NTAx&t=student&chapter=all
Lesson 26 Life Cycle of a Leopard Frog **pp 76-77** **NJSLS LS1.B** Reproduction is essential to the continued existence of every kind of organism. **LS1.1** Plants and animals have unique and diverse life cycles. **Objective:** Describe the unique life cycle of a leopard frog. **1 Day**	**Engage**: ● Introduce the Phenomenon- Modeling Challenge ● Tap Prior Knowledge **Explore**: ● Think about the life cycle of a Leopard Frog-explore pictures ● Think Pair Share ● Four Square Diagram ● Set a purpose and read- focus question- What are the stages of the life cycle of a leopard frog? **Explain**: ● Describe the life cycle of a leopard frog. ● Animation ● Teach the Dimensions\ ● T Chart **Elaborate**: ● Citizen Science: FrogWatch USA **Evaluate:** ● Wrap It Up! 1. RECALL What are the stages in the life cycle of a frog? (egg, tadpole, young frog, and adult) 2. CONTRAST Describe some differences between the tadpole stage and the adult stage of the frog. (An adult frog breathes air and has full-grown legs and no tail. A tadpole has a tail and no legs. It breathes through gills.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Animation- Life Cycle -NGL Sync

Lesson 27 Investigate Life Cycles pp 78-79 **NJSLS LS1.B** Reproduction is essential to the continued existence of every kind of organism. **LS1.1** Plants and animals have unique and diverse life cycles. **Objectives** Students will be able to: Create a model that explains how a salamander grows and develops during its life cycle. Determine patterns common among life cycles. Conclude that reproduction is essential to the continued existence of organisms. Compare and contrast the life cycles of two different amphibians. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use photography- show a picture of an axolotl, have a teacher led discussion. ● Tap Prior Knowledge **Explore**: ● Carry out he investigation-make a table ● Complete steps 1-4 **Explain**: ● Students share their observations and conclusions with other students in their groups. **Elaborate**: ● Investigate further- ask questions to extend student thinking **Evaluate:** ● Wrap It Up! 1. DESCRIBE Where does the larva of a spotted salamander live? (in water) 2. COMPARE How are the life stages of the spotted salamander similar to the life stages of a frog? (Both begin life in a mass of eggs, grow into larvae that live in water, develop lungs and live on land, and develop into adults that can reproduce.) 3. CONTRAST How are the life stages of a spotted salamander different from those of a frog? (A spotted salamander is not called a tadpole in the larva stage. Salamander larvae have external gills.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***<u>For each group of 4:</u>*** 4 stages in the Life Cycle of a Salamander charts (Teacher's Manual pg. 206), 2 scissors, 4 pieces of construction paper, 2 glue sticks, 4 markers ➢ Sample Data Table see pg. 92 (Teacher's Manual)
Lesson 28 *Think Like a Scientist Develop a Model* pp 80-81 **NJSLS LS1.1** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. **Objectives** Students will be able to: Obtain information about an organism's life cycle. Develop models to describe that organisms have unique and diverse life cycles but have birth, growth, reproduction, and death in common. Display patterns of change. Compare and contrast the life cycles of different plants and animals. **2 Days**	**Engage**: ● Introduce the Phenomenon- Use video show video of a monarch butterfly going through the stages of its life cycle- hold teacher-led discussion. ● Tap Prior Knowledge- think-pair-share **Explore**: ● Step 1: research the Models ● Step 2: Construct Explanatory Models ● Step 3: Construct your Models **Explain**: ● Step 4: Analyze and revise your models. ● Step 5: Share and Explain Your Models **Elaborate**: ● Apply Results, 3-2-1 ● Investigate Further . **Evaluate:** ● Wrap It Up! 1. RECALL What was the purpose of creating two life cycle models? (The purpose was to use the models to explain how different living things have different life cycles.) NS Science Knowledge Is Based on Empirical Evidence 2. APPLY What steps would you follow to make a life cycle model of another organism? (1. Research the life cycle; 2. Plan an explanatory model; 3. Construct the model; 4. Analyze and revise the model, and; 5. Share and explain the model.) SEP Developing and Using Models 3. GENERALIZE What do the organisms' life cycles have in common? (They all have in common birth, growth, reproduction, and death.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Materials for making posters if desired. ➢ Books about gray whales, toad, monarch butterfly, tomato, dandelion ➢ Video Clip: Monarch Butterfly NGL Sync **Suggested SNB for Quiz Grade**

Lesson 29 Inherited Traits: Looks pp 96-97 **NJSLS LS3.A** Many characteristics of organisms are inherited from their parents. **LS3.B** Different organisms vary in how they look and function because they have different inherited information. **LS3.1** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms. **Objectives** Students will be able to: Identify inherited traits in multiple organisms. Design a graphic that uses the concept of inherited traits to explain patterns in looks in animals. Analyze data to explain inheritance patterns. **1 Day**	**Engage**: ● Introduce the Phenomenon- Use photography, show students a photo of a crowd of people, have a teacher led discussion. ● Tap Prior Knowledge- Inside-outside circle **Explore**: ● Think about inherited traits and looks-Observe the pictures, ask probing questions ● Four Square Diagram ● Featured Photo ● Set a Purpose and Read- FOcus Question- How do we know that offspring inherit traits from their parents? **Explain**: ● Describe inherited traits and looks ● Think like a Scientist. Analyze and interpret data. ● Video **Elaborate**: ● Design an Infographic to teach others about inherited traits. **Evaluate:** ● Wrap It Up! Wrap It Up! 1. DEFINE What is an inherited trait? (An inherited trait is a trait, or characteristic, passed down from parents to offspring.) 2. LIST List some inherited traits of potatoes. (size, shape, and color) 3. GENERALIZE List two other traits of tomatoes and corn besides color. (size and shape)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks ➢ Sample Data Table see pg. 97(Teacher's Manual)

Lesson 30 Inherited Traits: Functions pp 86-87 **NJSLS LS3.A** Many characteristics of organisms are inherited from their parents. **LS3.B** Different organisms vary in how they look and function because they have different inherited information. **LS3.1** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms. **Objectives** Students will be able to: Relate functions to inherited traits. Analyze evidence that offspring inherit traits that have variations in look or function. .	**Engage**: ● Introduce the Phenomenon- Use a video of a Venus FlyTrap catching an insect, have a teacher led discussion. ● Tap Prior Knowledge-think-pair-share **Explore**: ● Think About Inherited Traits and Functions, Observe the pictures, ask probing questions ● Four Square Diagram ● Set a Purpose and Read- FOcus Question: Are traits only related to how organisms look? **Explain**: ● Describe how inherited traits include functions ● Explain how inherited functions relate to classification- partner talk ● Think like a scientist- analyze and interpret data ● Teach the Dimensions **Elaborate**: ● Literacy through Science ● Analyze and produce texts ● Use Cultural Context **Evaluate:** ● Wrap It Up! 1. RECALL What makes beak shape an example of an inherited trait? (Beak shape is an example of an inherited trait because it is passed down from parent to offspring.) 2. EXPLAIN How can traits be classified by their function? (The shape of a bird's beak is a trait that is classified by its	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks

1 Day	function of how it helps the bird get food.) CCC Patterns	
Lesson 31 **Acquired Traits** **pp 100-101** **NJSLS LS3.A Inheritance of Traits; LS3.1** Many Characteristics of organisms are inherited from their parents. **LS3.2** Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. **LS3.B**; **Variation of Traits; LS3.1** Different organisms vary in how they look and function because they have different inherited information. **LS3.2** The environment also affects the traits that an organism develops. **Objectives** Students will be able to: Differentiate acquired traits from inherited traits. Draw an acquired trait. Identify evidence of acquired traits in animals. **1 Day**	**Engage**: ● Introduce the Phenomenon- Teach Led Demo ● Tap Prior Knowledge **Explore**: ● Think about acquired traits- Observe the pictures, ask probing questions ● Four Square Diagram ● Set a Purpose and Read- Focus Question: How can the environment influence an organism's traits? **Explain**: ● Describe acquired traits. ● Sketch to Stretch ● T-Chart ● Teach the Dimension **Elaborate**: ● Write About INherited and Acquired Traits **Evaluate:** ● Wrap It Up! 1. CONTRAST What is the difference between an inherited trait and an acquired trait? (An inherited trait is a characteristic passed down from parents to offspring. An acquired trait is a characteristic gained from the environment.) 2. IDENTIFY What is the evidence that pinkness in flamingos is an acquired trait? (Flamingos with a certain diet have pink feathers.) 3. EXPLAIN How might diet affect an animal's body weight? (Animals that have more food available might weigh more than those with leaner diets.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks

Lesson 32 More Acquired Traits pp 102-103 **NJSLS LS3.A Inheritance of Traits; LS3.1** Many Characteristics of organisms are inherited from their parents. **LS3.2** Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics	**Engage**: ● Introduce the phenomenon- use photography- show students two pictures of Himalayan rabbits tat have different fur color patterns based on environmental temperature hold a teacher led discussion. ● Tap Prior KNowledge- think-pair-share. **Explore**: ● Think about More Acquired Traits-Observe the picture, ask probing questions ● Four square diagram ● Set a purpose-focus question: What other factors in the environment can influence traits beside food?	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks
involve both inheritance and environment. **LS3.B**; **Variation of Traits; LS3.1** Different organisms vary in how they look and function because they have different inherited information. **LS3.2** The environment also affects the traits that an organism develops. **Objectives** Students will be able to: Analyze examples of characteristics of organisms that result from individuals' interactions with the environment. Create a graphic that describes an acquired trait and distinguishes it from inherited traits.	**Explain**: ● Describe more acquired traits. **Elaborate** ● Make an infographic about acquired traits **Evaluate:** ● Wrap It Up! 1. ANALYZE Which part of the shape of the tree shown on this page is inherited? Which part is acquired? (The general shape of the tree and its limbs are inherited. The way the tree is bent by the wind is acquired.) 2. IDENTIFY What factor in the environment affects this tree's shape? (The wind affects the tree's shape. Students may also be aware of the plant's natural growth responses to light and gravity.) CCC Cause and Effect 3. INFER Describe how you think this tree might look if it were growing in a place with little wind. (The tree would probably be more upright and evenly extended in all directions.)	Mystery Science lesson examining plant traits.See prep work, materials and handouts in this link as well. https://mysteryscience.com/selection/mystery-1/traits-inheritance/1137?code=MTEwMzE0NTAx&t=student&chapter=all
Lesson 33 Learning pp 104-105 **NJSLS LS3.A Inheritance of Traits; LS3.2** Other characteristics result from individuals'' interactions with the environment, which can range from diet to learning. **LS3.B Variation of Traits; LS3.2** The environment also affects the traits that an organism develops. **Objectives Students will be able to:** **Evaluate evidence that some characteristics of organisms result from individuals' interactions with the environment.** **Demonstrate that learning is a trait that is acquired from an animal's environment.**	**Engage**: ● Introduce the Phenomenon- Use a video-show students a video of meerkats rolling millipedes in sand to clean them and hold a teacher-led discussion. ● Tap Prior Knowledge- Cause and Effect Chain **Explore**: ● Think about learning- Observe the picture, ask probing questions ● Four Square diagram ● Set a purpose and read- focus question: How is learning related to acquired traits? **Explain**: ● Describe learning. ● Teach the Dimensions **Elaborate**: ● Design a Field Study-Role Play **Evaluate:** ● Wrap It Up! 1. DEFINE What are behaviors? (Behaviors are actions taken by animals to satisfy particular needs.) 2. INFER What is something a chimpanzee can learn? (A	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks

. **1 Day**	chimpanzee can learn to use tools.) 3. SUMMARIZE How can the environment affect the way an animal behaves? (As an animal interacts with its environment, it learns to behave based on its experience.)	
Lesson 34 ***Investigate*** **Environment and Traits pp 106-107** **NJSLS LS3.2** Use evidence to support the explanation that traits can be influenced by the environment. **Objectives** Students will be able to: Apply understanding of plants' unique life cycles. Use a model to determine the effects of different environments on plant traits. Carry out the steps of a procedure and take accurate measurements using a ruler. Gather evidence by making observations and interpreting the results. Use evidence to draw conclusions about a plant's acquired traits. **1 – 5 Days 25 minutes set up, 15 minutes for 3 days, and 30 minutes on day 5**	**Engage**: ● Introduce the Phenomenon- Use a photo of a tree-lined oasis in the midst of a sandy desert, hold a teacher led discussion. ● Tap Prior Knowledge- think-pair-share **Explore**: ● Carry out the investigation ● Complete steps 1-4 **Explain**: ● Share and explain findings **Elaborate**: ● Investigate further **Evaluate:** ● Wrap It Up! 1. CAUSE AND EFFECT How did the amount of water affect plant growth? (The plant that received water grew more than the plant that did not.) CCC Cause and Effect 2. EXPLAIN Do your results provide evidence that traits can be affected by the environment? Explain. (Yes, my results provide evidence that traits can be affected by the environment because the plant that received water grew taller.) 3. CONCLUDE Is seedling height an inherited trait, an acquired trait, or both? Explain (Each kind of plant inherits its general height, but the amount of water it receives can affect its height. So, plant height is both inherited and acquired.) SEP Constructing Explanations and Designing Solutions	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks ➢ *** Be sure to plant the wheatgrass seeds several days before today's experiment! ➢ ***For each group of 4:*** 2 wheatgrass seedlings, masking tape, marker, ruler, spray bottle ➢ Sample Data Table see pg. 106 (Teacher's Manual)

Lesson 35 Variation and Survival pp 108-109 **NJSLS LS4.B Natural Selection LS4.2** Sometimes the difference in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. **Objectives** Students will be able to: Provide examples of variation in the traits of individuals of a species. Infer how variation in a species population can provide survival advantages to some individuals. Write cause-effect statements involving variation and survival. **1 Day**	**Engage**: ● Introduce the Phenomenon-use photography-show different images of animal camouflage hold a teacher led discussion. ● Tap Prior Knowledge- 5 Whys **Explore**: ● Think about variation and Survival- Observe the pictures, ask probing questions ● Four Square Diagram ● Set a purpose and Read- Focus Question: Why don't all sea dragons have the same traits? **Explain**: ● Explain variation and survival. ● Teach the Dimensions ● Featured Photo ● Literacy Through Science **Elaborate**: ● Virtual Lab. **Evaluate:** ● Wrap It Up! 1. EXPLAIN Describe how traits of the sea dragon shown here help it survive. (The leaf-shaped structures on the sea dragon and its coloring help it survive. These traits help it to blend in with its environment and hide from predators.) 2. INFER Suppose a few of the thorn bugs in the photo above were orange. What could you infer about the variation in thorn bug color? (You could infer that the orange thorn bugs would survive best in a different environment than the green thorn bugs.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks
Lesson 36 Variation and Mates pp 110-111 **NJSLS LS4.B Natural Selection LS4.2** Sometimes the difference in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. **Objectives** Students will be able to: Explain that differences in traits among individuals of the same species can provide advantages to some in finding mates and reproducing. Write cause-effect statements involving variation and mates. **1 Day**	**Engage**: ● Introduce the PHenomenon- Use photography, show students one to three photos of bower builds building a bower to attract mates, hold a teacher led discussion. ● Tap Prior Knowledge **Explore**: ● Think about Variation and Mates- Observe the picture, ask probing questions ● Think-pair-share ● Four Square Diagram ● Set a purpose and read-Focus Question: Why don't female great frigatebirds have a red pouch? **Explain**: ● Describe variation and mates. ● Teach the Dimensions **Elaborate**: ● Evaluate Examples **Evaluate:** ● Wrap It Up! 1. EXPLAIN What advantage does the trait of a bright red pouch give a male great frigatebird? (The bright red pouch helps the frigatebird attract mates.) 2. INFER What is the disadvantage of having the bright pouch? (The bright red pouch makes it easier for predators to see the birds.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebooks

Lesson 37 *Think Like a Scientist* **Construct an Explanation pp 112-113** **NJSLS 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.	**Engage**: ● Introduce the Phenomenon- Use photography- display a photo that shows an insect that blends in with its surroundings and its therefore camouflage- hold a teacher led discussion ● Tap Prior Knowledge. **Explore**: ● Preview the Lesson-Turn and Talk ● Construct an Explanation **Explain**: ● Make Observations ● Construct and Explanation **Elaborate**: ● Apply results ● Extend your thinking ● Teach the Dimensions	● Text Exploring Science or Digital version of Exploring Science ● Student Laptop ● Science Notebooks

Objectives Students will be able to: 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. Comprehend that cause and effect relationships are identified and used to explain change. Use evidence to construct an explanation. **1 Day**	**Evaluate:** ● Wrap It Up! 1. CONSTRUCT AN EXPLANATION Why might the pink form of katydid be less common in adults than in hatchlings? (As hatchlings grow, they might become less and less common because their color makes them visible to predators. Pink hatchlings may be more common than adults because they were just born, but the longer they are alive, the more opportunity they have to be eaten.) SEP Constructing Explanations and Designing Solutions 2. CAUSE AND EFFECT How does the trait of color help katydids survive? (The color variation ensures that different katydids will survive in different environments.) CCC Cause and Effect	
Resources: Text Exploring Science or Digital version of Exploring Science, Student Laptop, Science Notebook, Mystery Science		

Interdisciplinary Connections

Indicators:

ELA/Literacy - ,

RI.CR.3.1, Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1),(3-PS2-3)

RI.IT.3.3., Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3)

RI.AA.3.7., Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3)

W.WR.3.5., Establish a central idea about a topic, investigation, issue or event and use and quote several sources to support the proposed central idea.(3-PS2-1),(3-PS2-2)

W.3.8, W.SE.3.6. Use discussion, books, or media resources to gather ideas, outline them, and prioritize the information to include while planning to write about a topic. (3-PS2-1),(3-PS2-2)

SL.ES.K.3., Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. (3-PS2-3)

Mathematics - ,

MP.2, Reason abstractly and quantitatively. (3-PS2-1) MP.5,
Use appropriate tools strategically. (3-PS2-1)

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. (3-PS2-1)

Integration of 21st Century Skills

Indicators:

8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.

8.1.5.A.3 Use a graphic organizer to organize information about problem or issue.

8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.

8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.

8.1.5.D.3 Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.

8.1.5.D.4 Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.

8.1.2.E.1 Use digital tools and online resources to explore a problem or issue.

8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.

8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.C.5 Explain the functions of a system and subsystems.

8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.

8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.

9.2.4.A.1 Identify reasons why people work, and how work can help a person achieve personal and professional goals.

9.2.4.A.3 Investigate traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4.A.4 Explain why knowledge and skills acquired in elementary grades lay the foundation for future academic and career success.

Unit Title: Earth Science

Unit Description:

In this unit the students explore weather and climate. They will represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. They will obtain and combine information to describe climates in different reasons of the world. Lastly, students will make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Unit Duration: 15 lessons, some 2 days

Desired Results

New Jersey Student Learning Standard(s):

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

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. [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]

Indicators:

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)

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.)

Understandings:

Students will understand that…

Weather

- Define and describe weather.
- Explain that weather changes over time.

Weather Measurements

- Identify and describe instruments that are used to measure weather.
- Describe the weather data that these instruments measure.

Weather (Investigate)

- Measure and record two types of changes in weather- wind speed and air temperature.
- Analyze weather data and interpret patterns to construct reasonable explanations from the data.

Patterns and Predictions

- Use a map key to interpret the symbols and colors used on a weather map.
- Make weather predictions using weather maps.

The Pattern of the Seasons

- Identify the sequence of seasons.

Essential Questions:

1) How do weather and climate vary throughout the world?
2) What are some solutions to help weather related hazards?

- Describe patterns of change in the seasons over time.

Seasonal Changes

- Analyze data to identify sequences of seasons over time.
- Analyze data to predict patterns of change in seasons over time.

Represent Data (Think Like a Scientist)

- Represent data in graphical displays to describe typical weather conditions during a particular season.
- Compare and contrast data to find patterns of change for different seasons.

Climate

- Define climate.
- Differentiate between weather and climate.
- Explore the different climate zones of the United States.

Obtain and Combine Information

- Obtain and combine information to describe climates in different regions of the world.
- Analyze the information to draw conclusions about climates.

Weather Hazards

- Identify and describe a variety of natural hazards such as thunderstorms, hurricanes, and floods.
- Describe some of the impacts of natural hazards.

Reducing the Impact of Flooding

- Describe how humans can reduce the impact of flooding.

Reducing the Impact of Wind

- Describe how humans can reduce the impact of wind.

Reducing the Impact of Lightning

- Describe how humans can reduce the impact of lightning.

Make a Claim (Think Like an Engineer)

- Conceptualize a house design that reduces the impacts of a weather-related event.
- Identify the merits of the design solution.

Severe-Storms Researcher (Science Career)

- Connect the concept of weather with the career of a severe-storms researcher.

Assessment Evidence

Performance Tasks:

<u>Investigate Lessons</u>: Students will practice performance tasks in cooperative groups engaging in the scientific steps of an investigation.

- **Lesson 3: *Investigate***
  Life Cycles (pgs. 122-123)

Objectives: Measure and record two types of changes in weather- wind speed and air temperature. Analyze weather data and interpret patterns to construct reasonable explanations from the data.

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook Entries
- Unit Test
- Quizzes
- Homework
- Benchmark

<u>Think Like a Scientist</u>: Plan and Investigate Lessons- Students will engage in performance tasks in cooperative groups to plan and conduct an investigation, provide evidence and use that evidence to explain results. These tasks will be recorded in their science notebooks and evaluated by a Teacher Rubric and Student Rubric.

- **Lesson 7: *Think Like a Scientist* Represent Data (pgs130-131b)**

Objectives: Represent data in graphical displays to describe typical weather conditions during a particular season. Compare/Contrast data to find patterns of change for different seasons.

- **Lesson 9: Think Like a Scientist Obtain and Combine Information (pgs. 134-135)**

Objectives: Obtain and combine information to describe climates in different regions of the world. Analyze the information to draw conclusions about climates.

Think Like an Engineer: Plan and research a solution to a problem in cooperative groups. After defending a solution, students refine and change their solution based on feedback received from other groups. These tasks will be recorded in their science notebooks and evaluated by a Teacher Rubric and Student Rubric.

- **Lesson 14: Think Like an Engineer Make a Claim (pgs. 144-145b)**

Objectives: Conceptualize a house design that reduces the impacts of a weather-related event. Identify the merits of the design solution.

Benchmarks: Earth Science Assessment

Learning Plan		
Learning Activities:		
Lesson & Duration	Activities	Materials/ Suggested Resources
Lesson 1: Weather **pgs. 168-169** **NJSLS ESS2.D** Scientists record patterns of weather across different time zones and areas so they can make predictions about what kind of weather might happen next. **Objectives** Students will be able to: Make predictions based on patterns in weather observations. Explain why weather is measured across different times and areas. **1 Day**	**Engage:** ● Introduce the phenomenon- use photography- show students a dramatic photo of dark clouds hold a teacher-led discussion ● Tap Prior Knowledge **Explore:** ● Think about Weather ● Four- Square Diagram ● Set a purpose and read-focus question: What is weather? **Explain:** ● Define weather and Describe weather Changes- Agree/Disagree collaborative strategy ● Explain weather Patterns and Predictions ● Teach the DImensions-Inside outside Circle **Elaborate:** ● Find out more about weather and research weather adages. **Evaluate:** ● Wrap It Up! 1. DEFINE What is weather? (Weather is the set of conditions in the air outside at a certain time and place.) 2. EXPLAIN: Tell three ways in which weather can change. (Weather can change from day to day, hour to hour, and season to season.) 3. DESCRIBE What is the weather like in the large photo on these two pages? (Possible answer: The weather is stormy. The sky is cloudy. It might also be cool.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Earth Science gallery
Lesson 2: Weather Measurements **pgs. 170-171** **NJSLS ESS2.D** Scientists record patterns of the weather across different time zones and areas so they can make predictions about what kind of weather might happen next. **Objectives** Students will be able to: Compare and contrast tools used by scientists to gather information about the weather. Explain how scientists look for patterns in weather data to make predictions. 1 Day	**Engage**: ● Introduce the phenomenon- quick hands-on ● Tap Prior Knowledge **Explore:** ● Explore weather instruments (thermometer, wind vane, barometer, rain gauge.) and photos ask probing questions. ● Four Square Diagram ● Set a purpose and read-focus question: How do scientists gather information about the weather? **Explain:** ● Identify weather instruments ● Describe Weather Measurements and Predications **Elaborate:** ● Make a Venn Diagram **Evaluate:** ● Wrap It Up! 1. EXPLAIN Tell why scientists record patterns of weather across different times and areas. (Possible answer: Because patterns repeat, scientists can use past patterns of weather that they have studied to predict future weather.) CCC Patterns 2. CAUSE AND EFFECT How do changes in temperature affect air? (Changes in temperature cause air to move.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 3: *Investigate Weather pp 172-173* **NJSLS ESS2.D** Scientists record patterns of the weather across different time zones and areas so they can make predictions about what kind of weather might happen next. **Objectives** Students will be able to: Measure and record two types of changes in weather—wind speed and air temperature. Analyze weather data and interpret patterns to construct reasonable explanations and make predictions. Compare data collected by different groups to identify similarities and differences. **1 Day**	**Engage:** ● Introduce the Phenomenon-use photography- show students a photo of an umbrella turned inside out by the wind then show a photo of a vented umbrella hold a teacher-led discussion. ● Tap Prior Knowledge **Explore:** ● Carry out the investigation-create a table ● Complete steps 1-4 **Explain:** ● Analyze findings and make predictions ● Teach the Dimensions. **Elaborate:** ● Investigate Further **Evaluate:** ● Wrap It Up! 1. SUMMARIZE How did the data for wind speed and temperature change during the week? (Answers will depend on actual weather. Encourage students to look for patterns.) 2. EXPLAIN How did your weather tools help you measure the weather conditions? (I used the anemometer to measure relative wind speed by counting the number of turns it made per minute. I used the thermometer to measure temperature by determining the level of the liquid in the tube.) 3. COMPARE AND CONTRAST How were the data collected at different areas alike and different? (Answers will depend on actual weather.) SEP Analyzing and Interpreting Data	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** a heavy paper plate, golf-ball sized lump of clay, unsharpened pencils, 2 sturdy drinking straws, masking tape, 4 small, identical paper cups (about 3 oz. Size), marker, straight pin, stopwatch or timer, Celsius thermometer

		➢ Sample Data Table NGL Sync
Lesson 4: Patterns and Predictions pgs. 174-175 **NJSLS ESS2.D** Scientists record patterns of the weather across time zones and areas so they can make predictions about what kind of weather might happen next. **Objectives** Students will be able to: Interpret the symbols and colors used on a weather map. Make weather predictions using weather patterns and weather maps. **1 Day**	**Engage:** ● Tronduce the Phenomenon-Teacher Led Demo ● Tap Prior Knowledge **Explore:** ● Think About Patterns and Predictions-ask probing questions to encourage exploration of the lesson ● Four Square Diagram- ● Set a Purpose and read-focus questions: What types of information can weather maps provide? **Explain:** ● Interpret Weather Maps ● Video **Elaborate:** ● Make a Weather Map **Evaluate:** ● Wrap It Up! 1. DESCRIBE In general, how did the fronts move from Day 1 to Day 2? (The fronts generally moved from west to east.) 2. INTERPRET MAPS Look at the Day 1 map. Describe the weather in Chicago on that day. (It's raining in Chicago. The temperature is between 60°F and 70°F.) 3. PREDICT Study both maps. Tell what you think the weather	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video- Natural Hazards, Weather and Climate Optional Mystery Science activity-Exploring seasonal weather conditions. See prep work, materials and handouts in this link as well. https://mysteryscience.co

	will be like in Chicago on the day after Day 2. (A cold front is moving away from Chicago. The rainy weather will move on, and it should stop raining in Chicago.) CCC Patterns	m/weather/mystery-3/seasonal-weather-patterns/828?code=MTEwMzE0NTAx&t=student&chapter=all
Lesson 5: The pattern of the Seasons **pgs. 176-177** **NJSLS ESS2.D** Scientists record patterns of the weather across time zones and areas so they can make predictions about weather that might happen next. **Objectives** Students will be able to: Sequence and identify the seasons. Make predictions based on seasonal patterns. **1 Day**	**Engage:** ● Introduce the Phenomenon- Use Photography- Show students a photo showing the monsoons season- have a teacher led discussion. ● Tap Prior Knowledge-graffiti board **Explore:** ● Think About the Patters on the Seasons ● Four Square Diagram ● Set a Purpose and Read-Focus Question: What is the Sequence of the seasons? **Explain:** ● Sequence and Identify the Seasons **Elaborate:** ● Make an Infographic comparing two seasons in NJ **Evaluate**: ● Wrap It Up! 1. SEQUENCE Name the seasons in order, starting with winter. (winter, spring, summer, fall) 2. CONTRAST Tell how weather differs in spring and summer. (Spring weather is cooler and often rainier than summer weather.) CCC Patterns 3. ESTIMATE The average temperature of a city is 9°C (48°F) in winter and 29°C (83°F) in summer. Estimate what its average spring temperature might be. (An average spring temperature for this city will be much warmer than in winter, but cooler than in summer. It might be about 20°C [68°F].)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Animation: Weather and Seasons

Lesson 6: Seasonal Changes pgs.178-179 **NJSLS ESS2.D** Scientists record patterns of the weather across different time zones and areas so they can make predictions about weather that might happen next. **Objectives** Students will be able to: Analyze data to identify sequences of seasons over time. Analyze data to predict patterns of change in seasons over time. **1 Day**	**Engage:** ● Introduce the Phenomenon-quick Hands-on ● Tap Prior Knowledge **Explore:** ● Think About Seasonal Changes-look at photos ask probing questions ● Four Square Diagram ● Set a Purpose and Read-focus question:How do average temperatures change with each season in Charlottesville, Virginia? **Explain:** ● Analyze Seasonal Data for Charlottesville, Virginia ● Predict Patterns of Change in Seasons **Elaborate:** ● Explain Seasonal Changes ● **Evaluate:** ● Wrap It Up! 1. SEQUENCE What is the difference between the average high and low fall temperatures in Charlottesville? (11°C) 2. PREDICT What might the average amount of precipitation be in Charlottesville next summer? (about 34 cm) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 7:Think like a Scientist Represent Data pp 180-181 **NJSLS ESS2.1** Represent data in table and graphical displays to describe typical weather conditions expected during a particular season. **Objectives** Students will be able to: Create tables and graphs to describe typical weather conditions during a particular season. Compare and contrast data to find patterns of change for different seasons. **2 Days**	**Engage:** ● Introduce the Phenomenon- Use photography- show students a striking photo of record weather (snow drift, flash flood, before and afters) have a teacher-led discussion. ● Tap Prior Knowledge- compare/ contrast charge ● Step 1:Ask a question **Explore:** ● Step 2: research and organize data **Explain:** Analyze and interpret data. ● Step 3: Analyze and interpret Data. ● Teach the Dimensions ● Step 4: Present and Explain **Elaborate:** ● Apply results ● Investigate Further **Evaluate:** ● Wrap It Up! 1. APPLY What is the temperature range for your chosen season? How can you find out? (Answers vary depending on the data collected. Students should subtract the average low temperature from the average high temperature to find the range.) 2. EXPLAIN Did you find any patterns between the temperature and precipitation? Explain. (Answers will vary depending on the data students collect.) CCC Patterns 3. COMPARE When comparing your data to those of other seasons, did you notice any patterns of change from season to season? (Patterns of change should generally show warmer temperatures in summer and cooler temperatures in winter. Patterns of precipitation will vary depending on the climate of your area.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Information for students to use (Almanacs of information from the internet) containing average low and high temperatures, average precipitation, and average wind speed for the four seasons in our area. ➢ Graph paper ➢ Sample Data Tables see pg. 131 (Teacher's Manual) ➢ Evaluation Rubric see pg. 131b (Teacher's manual)

		*Stories in Science and Culture
Lesson 8: Climate **pgs. 132-133** **NJSLS ESS2.D** Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over the years. **Objectives** Students will be able to: Differentiate between weather and climate. Interpret a climate map and describe the climate zone they live in. **1 Day**	**Engage:** ● Introduce the Phenomenon-use video show students a video of Costa Rica, such as National Geopraphci's "Destination: Costa Rica" Hold a teacher-led discussion. ● Tap Prior Knowledge **Explore:** ● Think About Climate ● Think-Pair-Share ● Four Square Diagram ● Set a purpose- Focus Question: What are some conditions that make up climate? **Explain:** ● Differentiate Between Weather and Climate ● Describe Climate Zones in the United States ● Teach the Dimensions **Elaborate:** ● Literacy through Science **Evaluate**: ● Wrap It Up! 1. DEFINE What is climate? (Climate is the general weather pattern in an area over a long period of time.) 2. DESCRIBE What is the climate like in much of Florida? (Florida has a humid climate with hot summers and warm winters.) 3. INTERPRET MAPS What is the climate like in your area? (Answers will depend on your location. Help students locate your area on the map.	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook **Suggested SNB for Quiz Grade** Optional Mystery Science activity-Explore the world's five major climates. See prep work, materials and handouts in this link as well. https://mysteryscience.com/weather/mystery-4/climate-global-weather-patterns/98?code=MTEwMzE0NTAx&t=student&chapter=all

Lesson 9: *Think Like a Scientist* Obtain and Combine Information pgs. 186-187 **NJSLS ESS2.2** Obtain and combine information to describe climates in different regions of the world. **Objectives** Students will be able to: Combine information from a map and climate data to describe climates in different regions of the world. Analyze data to identify patterns and make predictions about climates. **1 Day**	**Engage**: ● Introduce the Phenomenon- hold a teacher-led discussion ● Use Video ● Tap Prior Knowledge- partner talk **Explore**: ● Identify Resources- maps photos captions ● Obtain and Combine Info-Jigsaw **Explain**: ● Analyze Patterns and Make Predictions **Elaborate**: ● Construct and Compare Climatograms **Evaluate**: ● Wrap It Up! 1. INTERPRET MAPS Use the map key to describe the climate of Minneapolis, Minnesota. (It has warm summers and no dry season.) 2. IDENTIFY Name two cities with similar climates. How do you know they have similar climates? (Possible answer: Oulu and Magadan have similar climates because both are the same color on the map. The photos of these two cities also show similarities in climate.) 3. PREDICT What climate would you predict to find if you traveled toward the Equator? (Climates near the Equator are warmer than climates closer to the poles.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

Lesson 10: Weather Hazards pgs. 188-189 **NJSLS ESS3.B** A variety of natural hazards results from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. **Objectives** Students will be able to: Identify and describe the hazards of severe weather events, such as thunderstorms, hurricanes, and floods. Write about the causes and effects of severe weather. Define problems caused by weather hazards that can be solved by human intervention. **1 Day**	**Engage:** ● Introduce the Phenomenon-use photography- show several photos of different signs that warn of hazardous conditions. Have teacher led discussion. ● Tap Prior Knowledge **Explore**: ● Think About Weather Hazards ● Four Square Diagram ● Set Purpose and Read- Focus Question: What are two types of hazardous weather? **Explain:** ● Define and Describe Weather Hazards ● Define Problems Caused by Weather Hazards 3-2-1 **Elaborate** ● Write a Report **Evaluate**: ● Wrap It Up! 1. IDENTIFY Name two types of hazardous weather. (thunderstorms and hurricanes) 2. EXPLAIN Why are hurricanes hazardous? (They bring high winds that can damage property and heavy rains that can cause flooding.) 3. INFER Look at the large photo. What could this type of weather do to houses built along a beach? (Students should infer that a storm that is strong enough to cause damage to a pier as shown would also be strong enough to damage or destroy houses built along a beach.) CCC Cause and Effect	● Text Exploring Science or Digital version of Exploring Science ● Student Laptop ● Science Notebook ● *Video Clip- Flooding* ● Optional Mystery Science activity-What makes hurricanes so dangerous? See prep work, materials and handouts in this link as well *https://mysteryscience.com/mini-lessons/dangerous-hurricanes?code=c87612f56b853303e9bfe22957991e6b*

Lesson 11: Reducing the Impact of Flooding **pgs. 190-191** **NJSLS ESS2.2** A variety of natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. **Objectives** Students will be able to: Describe how humans can reduce the impact of flooding. Identify cause-and-effect relationships related to flooding and design solutions for flooding. Demonstrate how engineering solutions can reduce damage caused by floods. **1 Day**	**Engage:** ● Introduce the Phenomenon- show the photographs of beach dunes before and after Hurricane Matthew (US Geological Survey site) hold teacher-led discussion. ● Teacher-Led Demo ● TaP Prior Knowledge **Explore:** ● Think about Reducing the Impact of Flooding ● Featured Photo ● Four Square Diagram ● Set Purpose and REad-Focus Question: What causes flooding? **Explain:** ● Identify Cause and Effects of Flooding ● Describe Ways Humans Reduce the Impacts of Flooding **Elaborate:** ● Continue Teacher-Led Demo from Engage **Evaluate:** ● Wrap It Up! 1. CAUSE AND EFFECT What causes flooding? (short, heavy rain; rain for a long time; and hurricanes) 2. EXPLAIN How do people try to reduce the damage caused by flooding? (People build levees and dams, and construct barriers to keep the floodwaters away.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook Optional Mystery Science activity-How can you save a town from a hurricane? See prep work, materials and handouts in this link as well https://mysteryscience.com/earth/mystery-5/natural-disasters-engineering/154?code=MTEwMzE0NTAx&t=student&chapter=all

Lesson 12: Reducing the Impact of Wind **pgs. 192-193** **NJSLS ESS3.B** A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. **Objectives** Students will be able to: Describe how humans can reduce the impact of wind. Identify cause-and effect-relationships related to wind and design solutions that prevent wind damage. Explain how engineering solutions that prevent wind damage require knowledge of several scientific concepts. **1 Day**	**Engage:** ● Introduce the Phenomenon-tornado video teacher-led discussion ● Teacher-led demo ● Tap Prior Knowledge **Explore**: ● Think about reducing the impact of wind- partner talk ● Four Square Diagram ● Set a Purpose and Read-Focus Question: What are two storms that have strong winds? **Explain**: ● Describe How to Reduce the Impact of Wind **Elaborate:** ● Interview an Architect **Evaluate**: ● Wrap It Up! 1. IDENTIFY Name two storms with strong winds. (tornadoes and hurricanes) 2. EXPLAIN Tell how people can protect property from strong winds. (People can use wind-resistant glass and roof tiles held with nails rather than staples to make safer buildings. They can also build roofs with four sloping sides.) 3. INFER How can people protect themselves during a storm with strong winds? (People can go to the basement, to a closet or other small interior room without windows, or to a storm shelter to protect themselves from strong winds.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip-Tornado
Lesson 13: Reduce the Impact of Lightning **pgs. 198-199** **NJSLS ESS3.B** A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. **Objectives** Students will be able to: Describe how humans can reduce the impact of lightning. Identify cause-and-effect relationships related to lightning and design solutions that prevent damage due to lightning. Create a presentation that describes the hazards of thunderstorms and how to stay safe during them. **1 Day**	**Engage**: ● Introduce the Phenomenon- Discussion ● Video ● Tap Prior Knowledge-Graffiti Board ● Featured Photo **Explore**: ● Think About Reducing The Impact of Lightning-partner talk ● Four Square Diagram ● Set a Purpose and Read-Focus Question: Why is lightning dangerous? **Explain**: ● Identify What Causes Lightning ● Explain the Impact of Lightning ● Describe how to Reduce the Impact of Lightning-inside outside circle ● Teach the Dimensions ● Teach the Nature of Science **Elaborate:** ● Make a storm safety presentation **Evaluate**: ● Wrap It Up! 1. DESCRIBE Why is lightning dangerous? (Lightning can cause fires and harm people.) 2. EXPLAIN What should you do if you are caught outdoors during a thunderstorm? (Stay away from water and from tall objects in the area.) 3. INFER Many people unplug their electronic equipment when a thunderstorm is predicted. Why do you think this is so? (Answers will vary. Possible answer: I	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook

	know that electricity travels through wires. If a home were hit by lightning, it might travel through the electric wires and harm the electronic equipment.)	
Lesson 14: *Think Like an Engineer* Make a Claim pgs. 200-201 **NJSLS ESS3.1** Make a claim about the merit of a design solution that reduces the impacts of a weather- related event. **Objectives** Students will be able to: Conceptualize a house design that reduces the impacts of a weather-related event. Evaluate the design solution against the criteria and constraints of the problem. Make a claim about the merit of the design solution. **2 Days**	**Engage:** ● Introduce the Phenomenon- Use video have teacher-led discussion. ● Tap Prior Knowledge **Explore:** ● Step 1: Define the Problem-Partner Talk, Graffiti Board ● Step 2: Find a Solution **Explain:** ● Step 3:Defend your Solution-Gallery Walk ● Step 4: Refine or CHange Your Solution ● Teach The Dimensions **Elaborate:** ● Make Before and After Diagrams **Evaluate:** ● Wrap It Up! 1. DESCRIBE What impacts from hurricanes might cause damage to a house? (floods, storm surges, wind, flying objects) 2. IDENTIFY How does the design of your house help prevent it from being damaged by hurricanes? (Students' responses will vary based on their designs and solutions.) 3. CONTRAST Do you think specially designed houses are a good solution for homes in your community? Explain why or why not. (Answers will depend on location.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4***: several photos of houses (Pre and post damaged by Hurricanes)

Resources: Text Exploring Science or Digital version of Exploring Science, Student Laptop, Science Notebook, Mystery Science

Unit Modifications for Special Population Students	
Advanced Learners	● Vocabulary- Weather adageChallenge students to research concepts on their own from the Elaborate Section of each lesson ● Permit students to choose graphic organizers they feel most comfortable using ● Write a weather report announcing a hurricane or tornado warning. It must explain to the listeners why the weather event is happening, how people can stay safe, and what to expect. ● Ask probing questions at the beginning of lessons and tap into prior knowledge and allow students to explain their thinking
Struggling Learners	● Use clues to revisit main idea of passages ● Vocabulary-add unknown words to student notebook to refer to during the unit ● Differentiate between air masses and fronts ● Discuss and identify cause -effect relationships with weather conditions ● Revisit pages with key concepts and have students point out and retell what they have learned (provide further information where gaps exist) ● Ask questions where students find evidence in the book to provide an answer
English Language Learners	● Vocabulary- floods, dams, levees ● Sentence frames to describe weather for time, place, change ● Picture card of weather instruments and their purposeMake word web of action verbs similar but not limited to: learn, help, prepare, measure, destroy ● Ask yes or no questions to help students express their ideas ● Use of graphics and pictures to support language learning
Special Needs Learners	● Provide concrete examples when introducing new vocabulary and concepts. ● Vocabulary- add unknown words to the student notebook to refer to during the unit. ● Provide students with word banks for terms: clouds, humidity, precipitation, wind speed, temperature, lightning, fog, changes quickly, and repeats year after year. ● Construct two column chart comparing the impact or wind with the impact of water, discuss similarities and differences between the causes and impacts of each ● Help in construction of models for learners with fine motor skill difficulties ● Clarify misconception about reason for season ● Provide drawings/graphic organizers for students to add to the Science Notebook for data collection to name and/or complete and label.

Interdisciplinary Connections

Indicators:

ELA/Literacy —,

RI.CR.3.1., Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2),(3-ESS3-1)

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. (3-ESS2-2)

W.AW.3.1. , Write opinion pieces on topics or texts, supporting a point of view with reasons and information (3-ESS3-1)

W.WR.3.5. Generate questions about a topic and independently locate related information from at least two reference sources (print and non-print) to obtain information on that topic. (3-ESS3-1)

W.SE.3.6. Use discussion, books, or media resources to gather ideas, outline them, and prioritize the information to include while planning to write about a topic. (3-ESS2-2)

Mathematics —,

MP.2, Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2),(3-ESS3-1)

MP.4, Model with mathematics. (3-ESS2-1),(3-ESS2-2),(3-ESS3-1)

MP.5, Use appropriate tools strategically. (3-ESS2-1)

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. (3-ESS2-1)

3.DL.B.3, Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in bar graphs. (3-ESS2-1)

Integration of 21st Century Skills

Indicators:

8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3 Use a graphic organizer to organize information about a problem or issue.
8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.
8.1.5.D.3 Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
8.1.5.D.4 Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
8.1.2.E.1 Use digital tools and online resources to explore a problem or issue.
8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.
8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.
8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
8.2.5.C.5 Explain the functions of a system and subsystems.
8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.
9.2.4.A.1 Identify reasons why people work, and how work can help a person achieve personal and professional goals.
9.2.4.A.3 Investigate traditional and nontraditional careers and relate information to personal likes and dislikes.
9.2.4.A.4 Explain why knowledge and skills acquired in elementary grades lay the foundation for future academic and career success.

Unit Title: Physical Science

Forces and Interactions

Unit Description:

During this unit of study students will plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. They will make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. Students will ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. In addition, students will define a simple design problem that can be solved by applying scientific ideas about magnets.

Unit Duration: 16 lessons, some 2 days

Desired Results

New Jersey Student Learning Standard(s)

Students who demonstrate understanding can:

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.

Indicators:

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)

Understandings:
Students will…

Pushes and Pulls
- Define force as a push or pull of an object.
- Know that every force has a strength and direction.

Balanced Forces
- Recognize that objects in contact exert forces on each other.
- Define balanced force and net force.

Unbalanced Forces
- Define unbalanced forces.
- Describe the effects of net force.

Changing Direction
- Recognize that the forces can change an object's speed or direction.

Plan and Conduct an Investigation (**Think Like a Scientist)**
- Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces in the motion of an object.

Patterns of Motion
- Identify the pattern of an object's motion.
- Define regular motion.

Motion (Investigate)
- Observe and measure the pattern of an object's motion.
- Predict the future motion of an objet moving in a regular pattern.

Make Observations (Think Like a Scientist)
- Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Magnets
- Identify magnetic force as a force that can act at a distance.
- Recognize that the forces between two magnets depend on their orientation relative to each other.

Magnetic Force (Investigate)
- Identify evidence that magnetic forces do not require that objects be in contact.

Essential Questions:

1) How can I demonstrate how different objects move and interact with each other?
2) How do magnets and electricity interact?

- Observe the effects of a magnet's distance apart from an object, and orientation on the force it exerts.

Electromagnets (Investigate)

- Identify evidence that electromagnets can exert a force without being in contact with an object.
- Change the size of force produced by an electromagnet.

Electric Forces

- Identify electric forces as a force that can act at a distance.
- Recognize that the electric force between two objects depends on the properties of the objects.
- Observe the effect of distance on the force exerted by a charged object.

Electric Forces (Investigate)

- Identify evidence that electric forces between a pair of objects do not require that the objects be in contact.
- Observe attractive and repulsive effects of electric forces.

Determine Cause-and-Effect Relationships (Think Like a Scientist)

- Ask questions to determine cause-and-effect relationships of electric or magnetic interactions between two objects not in contact with each other.

Define and Solve a Problem (Think Like an Engineer)

- Define a design problem that can be solved by applying scientific ideas about magnets.
- Specify criteria for success and constraints on materials, time, or cost.

Roller Coaster Design (Science Career)

- Connect concepts about forces, motion, and patterns to the career of a roller coaster designer.

Assessment Evidence

Performance Tasks:

<u>Investigate Lessons</u>: Students will practice performance tasks in cooperative groups engaging in the scientific steps of an investigation.

- **Lesson 7: *Investigate* Motion (pgs. 16-17)**

Objectives: Observe and measure the pattern of an object's motion. Predict the future motion of an object moving in a regular pattern.

- **Lesson 10: Investigate Magnetic Force (pgs. 22-23)**

Objectives: Identify evidence that magnetic forces do not require that objects be in contact. Observe the effects of a magnet's distance apart from an object, and orientation on the force it exerts.

Other Evidence:

Students will demonstrate their understandings through:

- Science Notebook Entries
- Unit Test
- Quizzes
- Homework
- Benchmark

➢ **Lesson 11: Investigate Electromagnets (pgs. 24-25)** **Objectives:** Identify evidence that electromagnets can exert a force without being in contact with an object. Change the size of force produced by an electromagnet. ➢ **Lesson 13: Investigate Electric Forces (pgs. 28-29)** **Objectives:** Identify evidence that electric forces between a pair of objects do not require that the objects be in contact. Observe attractive and repulsive effects of electric forces. **Think Like a Scientist:** Plan and Investigate Lessons- Students will engage in performance tasks in cooperative groups to plan and conduct an investigation, provide evidence and us e that evidence to explain results. These tasks will be recorded in their science notebooks and evaluated by a Teacher Rubric and Student Rubric. ➢ **Lesson 5: *Think Like a Scientist* Plan and Conduct an Investigation (pgs. 12-13b)** **Objectives:** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces in the motion of an object. ➢ **Lesson 8: Think Like a Scientist Make Observations (pgs. 18-19b)** **Objective**: Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. ➢ **Lesson 14: Think Like a Scientist Determine Cause-and-Effect Relationships (pgs. 30-31b)** **Objective**: Ask questions to determine cause-and-effect relationships of electric or magnetic interactions between two objects not in contact with each other. **Think Like an Engineer**: Collaborative work to plan and carry out an investigation. Identify problem needed to be solved and use materials to design a prototype of a design solution. Analyze and interpret data to prove success of prototype and if improvements should be made. Construct an explanation about the investigation from evidence gathered. These tasks will be recorded in their science notebooks and evaluated by a Teacher Rubric and Student Rubric. ➢ **Lesson 15: Think Like an Engineer Define and Solve a Problem (pgs. 32-33b)**	

Objectives: Define a design problem that can be solved by applying scientific ideas about magnets. Specify criteria for success and constraints on materials, time, or cost.	
Benchmarks: Physical Science Benchmark	

Learning Plan		
Lesson & Duration	Activities	Materials/ Suggested Resources
Lesson 1: Pushes and Pulls pgs. 22-23 **NJSLS PS2.A** Each force acts on one particular object and has both strength and direction. **Objectives** Students will be able to: Define force as the strength and direction of a push or a pull on an object. Identify patterns involving force and motion **1 Day**	**Engage:** ● Introduce the Phenomenon-quick hands on ● Tap Prior Knowledge **Explore**: ● Think about pushes and pulls ● Four Square Diagram ● Video ● Set a purpose and read-focus question: What is a force? **Explain**: ● Define a Force as a Push or Pull. ● Explain that every force has a strength and a direction. jigsaw ● Featured Photos ● Teach the Dimensions **Elaborate**: ● Design a Demonstration (materials for groups of 4: one spring, stand and clamp to suspend spring, set of masses (10 mg, 50 mg, 100 mg), set of small balls, rulers, popsicle sticks, building blocks, toy cars ● Time 20 minutes **Evaluate**: ● Wrap It Up! 1. DEFINE What is a force? (A force is a push or a pull.) 2. RELATE How does the direction of a push relate to the direction that the object moves? (The object moves in the same direction as the push.) 3. PREDICT Suppose more team members pushed and pulled the cart. How might the force the people apply to the cart change? (Each individual would not need to apply as much force if more people were pushing.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video-effects of forces ➢ Physical Science Gallery

Lesson 2: Balanced Forces pgs. 24-25 **NJSLS PS2.A** Each force acts on one particular object and has both strength and 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. **PS2.B** Objects in contact exert forces on each other. **Objective(s):** Recognize that objects in contact exert forces on each other. Defined balanced force and net force. **1 Day**	**Engage:** ● Introduce the Phenomenon-quick hands on ● Tap Prior Knowledge think pair share **Explore**: ● Think about balanced forces ● Four Square Diagram ● Set a purpose and read- focus question: What are balanced forces?. **Explain**: ● Identify the Effects of Forces on Objects ● Define Balanced Forces and Net Force ● Teach the Dimensions **Elaborate**: ● Build with Balance ● Materials For partners: toothpicks, plastic forks and spoons, plastic cups, plastic-foam cups, popsicle sticks ● Time 40 minutes **Evaluate**: ● Wrap It Up! 1. CAUSE AND EFFECT What caused the boards to move? (The downward force of the hand on the boards caused them to move.) CCC Cause and Effect 2. INFER The blackbelt's hand hits only the board on the top of the stack. What causes the other boards to break? (Force is passed from one board to another.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook
Lesson 3: Unbalanced Forces pgs. 26-27 **NJSLS PS2.A** Each force acts on one particular object and has both strength and 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. **PS2.B** Objects in contact exert forces on each other. **Objective(s):** Define unbalanced forces. Describe the effects of net force. **1 Day**	**Engage**: ● Introduce the Phenomenon- teacher led demo ● Tap Prior Knowledge **Explore**: ● Think About Unbalanced Forces-anticipation guide ● Four Square Diagram ● Set a purpose and read- focus question: What is an unbalanced force? **Explain**: ● Define Unbalanced Forces ● Describe the Effects of net Force-sketch to stretch ● Virtual Lab **Elaborate**: ● Write a results summary ● Materials For groups of 4: film canister, water, 2 antacid tablets, goggles (for each group member) ● Time 30 minutes **Evaluate:** ● Wrap It Up! 1. DEFINE What is an unbalanced force? (An unbalanced force is a net force that does not add up to zero; an unbalanced force is a force that changes an object's motion.) 2. INFER Suppose the rope is moved to the left. In which direction is the net force? (The net force is to the left.) CCC Cause and Effect 3. APPLY Describe a situation in which forces are balanced and a situation in which forces are unbalanced. (Possible answer: When a ball is not moving, the forces acting on it are balanced. When I kick the ball and it moves, the forces are unbalanced.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Virtual Lab-Marble Collisions ➢ Optional Mystery Science activity-How could you win a tug-of-war against a bunch of adults? See prep work, materials and handouts in this link as well https://mysteryscience.com/forces/mystery-1/balanced-unbalanced-forces/111?code=MTEwMzE0NTAx&t=student&chapter=all

Lesson 4: Changing Direction pgs. 32-33 **NJSLS PS2.A** 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. **PS2.B** Objects in contact exert forces on each other. **Objectives** Students will be able to: Identify cause-effect pairs relating to changes in an object's speed and direction. Create a graphic to explain the effect of net force. . **1 Day**	**Engage:** ● Introduce the Phenomenon-Teacher-Led Demo ● Video ● Tap Prior Knowledge **Explore:** ● Think about changing direction ● Four Square Diagram ● Set a purpose and read-focus question: When an object changes direction, are fores balanced or unbalanced? **Explain:** ● Explain how objects change speed and direction ● Science in a SNAP: ● Materials For groups of 2: small rubber or plastic ball, unsharpened pencil **Elaborate**: ● Make an infographic to explain the role of net force in a specific sport. **Evaluate**: ● Wrap It Up! 1. RECALL Are the forces on the ball in the photo balanced or unbalanced? How do you know? (The forces on the ball in the photo are unbalanced. I know this because the ball's motion is changing.) CCC Cause and Effect 2. GENERALIZE In what ways can forces change an object's motion? (Forces can change an object's speed or direction.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 2:*** Small rubber or plastic ball, unsharpened pencil ➢ Video: Changing Direction
Lesson 5: *Think Like a Scientist* Plan and Conduct and Investigation pgs. 12-13b **NJSLS PS.2.1** Plan and conduct and investigation to provide evidence of the effect of balanced and unbalanced forces on the motion on an object. **Objectives** Students will be able to: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Describe how using different investigation methods can affect the fairness of a scientific test. Identify cause-effect relationships relating to forces and motion. **2 Days**	**Engage:** ● Introduce the phenomenon- use video-have teacher led discussion ● Tap prior knowledge **Explore:** ● Step 1: Ask a question ● Step 2: Plan and conduct an experiment **Explain**: ● Step 3: Analyze your results ● Step 4: Share your results ● Step 5: Explain your findings **Elaborate:** ● Explore on your own ● Teach the Dimensions-think pair share **Evaluate:** ● Rubrics-Have students evaluate their work using the rubric in their Science Notebook Companion. Use students' completed rubrics and the teacher rubric provided for this activity to guide your assessment of their work.	● Text Exploring Science or Digital version of Exploring Science ● Student Laptop ● Science Notebook ● ***For each group of 4***; Cotton ball, metric ruler, 4 straws, assortment of materials including but not limited to cardboard boxes, pieces of cardboard, paper towel tubes, and wooden blocks of various shapes ➢ Sample Data Table NGL ➢ Evaluation rubric NGL **Suggested SNB for Quiz Grade**

Lesson 6: Patterns of Motion pgs. 36-37 **NJSLS PS2.A** The pattern 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. **Objectives** Students will be able to: Define regular motion. Identify the pattern of an object's motion. Explain how patterns of motion can be used to make predictions. **1 Day**	**Engage:** ● Introduce the Phenomenon- teacher-led demo ● Tap Prior Knowledge-Graffiti Board **Explore**: ● Think aboutPatterns of Motion ● Use Diagrams ● Four Square Diagram ● Set a purpose and read-focus question: How does the motion of a falling leaf differ from the motion of a swing? **Explain**: ● Identify the pattern of an object's motion. Think pair share ● Define Regular Motion ● Teach the Dimensions **Elaborate**: ● Make an educational video. **Evaluate**: ● Wrap It Up! 1. CONTRAST How does the motion of a falling leaf differ from the motion of a swing? (Possible answer: The motion of the falling leaf does not follow a predictable pattern. The motion of the swing follows a regular and predictable pattern.) 2. PREDICT Look at the person in the photo. Describe how she will move next. (Possible answer: She will swing back in the direction of the place that is shown on the right page.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video Clip-Newton's Cradle
Lesson 7: *Investigate* Motion pgs. 38-39 **NJSLS PS2.A** 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. **Objectives** Students will be able to: Observe and measure the pattern of an object's motion. Predict the future motion of an object moving in a regular pattern. **1 Day**	**Engage**: ● Introduce the phenomenon-use video of a olympic ski jumper- have a teacher-led discussion ● Tap Prior Knowledge-class list **Explore:** ● Carry out the investigation ● Complete steps 1-4- make table **Explain**: ● Share and explain findings **Elaborate:** ● Teach the Dimensions ● Investigate Further **Evaluate**: ● Wrap It Up! 1. PREDICT Did your results support your predictions? Explain. (Possible answer: My results did not support my predictions. I predicted the marble would go higher than it did each time.) 2. INTERPRET What pattern do you notice in your data? (No matter what height I dropped the marble from, the marble did not reach the same height on the other side of the foam tube.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4***; foam tubing (Pipe insulation), cut in half lengthwise (3 m), marble, masking tape, meter stick, two chair, metal mixing bowl ➢ Sample Data Table see NGL ➢ Stories In Science-Math Girl

Lesson 8: *Think Like a Scientist* Make Observations **pgs. 42-43** **NJSLS 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. **Objectives** Students will be able to: Plan and conduct an investigation so that sufficient data is gathered to answer a research question. Make observations and measurements of an object's motion. Analyze data to identify patterns that can be used to predict future motion. **2 Days**	**Engage:** ● Introduce the phenomenon-use video ● Tap Prior Knowledge **Explore**: ● Step 1: Ask a question ● Step 2: Plan and conduct an experiment **Explain**: ● Step 3: Analyze your results ● Step 4 Share your results ● Step 5: Explain your findings **Elaborate** ● Design a New Test **Evaluate**: ● Wrap It Up! 1. EXPLAIN How do you know that a pendulum's motion is regular motion? (I know a pendulum's motion is regular motion because it follows a predictable pattern.) 2. IDENTIFY What evidence from your data shows that a pattern can be used to predict future motion? (Possible answer: My data showed a pattern in the pendulum's motion. The data showed that the shorter the string, the faster the pendulum moved. I was able to use that pattern to correctly predict the pendulum's future motion.) CCC Patterns	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** Metal washer, string, masking tape, meterstick, stopwatch, 2-3 additional washers of various weights ➢ Sample Data Table NGL ➢ Evaluation Rubric NGL ➢ **Suggested SNB for Quiz Grade**

	pattern can be used to predict future motion.	
Lesson 9: Magnets **pgs. 44-45** **NJSLS PS2.B** 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 to each other. **Objectives** Students will be able to: Provide evidence that magnetic force can act at a distance. Demonstrate that the forces between two magnets depend on their orientations relative to each other. Identify cause-and-effect relationships involving magnetism. **1 Day**	**Engage:** ● Introduce the phenomenon-quick hands on ● Featured Photo ● Tap Prior Knowledge. ● Animation **Explore**: ● Think about magnets ● Four square diagram ● Set a purpose and read-focus question: What does "attract" mean? What does "repel" mean? **Explain**: ● Identify magnetic force ● Consider the orientation of magnetic force ● Teach the Dimensions **Elaborate**: ● Literacy through Science ● Design a Demo ● Materials For groups of 2: one string (30–50 cm long), a weak magnet, a strong magnet, and a few metal objects such as a piece of copper and a piece of steel ● Time 20 minutes **Evaluate**: ● Wrap It Up! 1. DEFINE What does attract mean? What does repel mean? (Attract means "to pull together," and repel means "to push apart.") 2. CONTRAST How is the force applied in the kick of a soccer ball different from the force a magnet	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ Video- magnetic force Optional Mystery Science activity-What can magnets do? See prep work, materials and handouts in this link as well. https://mysteryscience.com/forces/mystery-4/magnets-forces/45?code=MTEwMzE0NTAx&t=student&chapter=all

	exerts on a paper clip? (Possible answer: The force applied to kick a soccer ball requires contact with the ball; the force a magnet exerts on a paper clip does not require contact.) 3. EXPLAIN: Tell what the phrase “opposites attract” means about magnets. (Opposite poles of magnets pull toward each other.)	
Lesson 10: Investigate: Magnetic Force **pgs. 48-49** **NJSLS PS2.B** 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. **Objectives** Students will be able to: Identify evidence that magnetic forces do not require that objects be in contact. Observe the effects of a magnet’s distance apart from an object, and orientation on the force it exerts. **1 Day**	**Engage:** ● Introduce the Phenomenon-use video ● Tap Prior Knowledge **Explore:** ● Carry out the investigation-create table ● Complete steps 1-4 **Expain:** ● Explain Findings **Elaborate**: ● Teach the Dimensions ● Investigate Further **Evaluate**: ● Wrap It Up! 1. DESCRIBE Identify evidence from your investigation that magnets can exert forces without touching. (Possible answer: Opposite poles of the magnets started pulling toward each other before they were touching. Like poles of the magnets pushed apart without touching. The paper clips began to move toward the magnet before the magnet touched them.) 2. COMPARE AND CONTRAST How are the large and small magnets alike? How are they different? (They both have north and south poles and both exert magnetic forces. The large magnets may exert a stronger force than the small magnets.) 3. CAUSE AND EFFECT What would happen if you brought the north pole of a bar magnet toward the north pole of another magnet that was attached to a toy car? (The magnets would repel each other and the car would move.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** Metric ruler, 2 strong bar magnets, 5 paper clips, small bar magnet ➢ Sample Data Table see pg. 22 (Teacher's Manual)

Lesson 11: *Investigate* Electromagnets **pgs. 48-49** **NJSLS PS2.B** Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The size 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. **Objectives** Students will be able to: Identify evidence that electromagnets can exert a force without being in contact with an object. Change the size of force produced by an electromagnet. **1 Day**	**Engage:** ● Introduce the Phenomenon-quick hands on ● Tap Prior Knowledge **Explore:** ● Preview lesson ● Ask a question ● Carry out the investigation-create a table ● Complete steps 1-4 **Explain**: ● Explain Findings ● Exit Slip **Elaborate**: ● Teach the Dimensions **Evaluate**: ● Wrap It Up! 1. EXPLAIN How did you measure the strength of the electromagnet's force? When was it weakest? Strongest? (Possible answer: I measured the strength of the force by counting the number of paper clips the electromagnet would hold. It was weakest when I wrapped the wire 15 times. It was strongest when I wrapped the wire 35 times.) 2. GENERALIZE Can an electromagnet exert a force without touching an object? Explain. (Yes. If electricity is flowing through the electromagnet, it can exert a magnetic force from a distance.) 3. CAUSE AND EFFECT What might happen if you had a longer bolt and wrapped the wire around 50 times? (The electromagnet would be even stronger.) CCC Cause and Effect	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4***: iron bolt(3 in.), D-cell battery, battery holder, 20 paper clips, piece of insulated copper wire with ends stripped(about 3 ft.) **TEACHER WILL NEED A WIRE STRIPPER** ➢ **AND CUTTER** ➢ Sample Data Table see pg. 24 (Teacher's Manual)

Lesson 12: Electric Forces pgs. 54-55 **NJSLS PS2.B** Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The size 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. **Objectives** Students will be able to: Identify electric force as a force that can act at a distance. Explain that electric force between two charged objects depends on the distance between them. Explain that materials vary in their ability to acquire static electricity. Identify cause and effect relationships relating to static electricity. Describe examples of how technologies that use static electricity affect everyday life. **1 Day**	**Engage:** ● Introduce the Phenomenon ● Use Video ● Teacher-led demo ● Video ● Tap Prior Knowledge **Explore**: ● Think about Electric Forces ● Four Square Diagram ● Set a purpose and read-focus question: What is static electricity? **Explain**: ● Identify electric forces ● Explain Factors that affect Electric Force ● Science in a SNAP: Effects of Electric Charge ● Materials For groups of 2: tissue paper, scissors, air-filled balloon, wool cloth. **Elaborate** ● Write a report **Evaluate**: ● Wrap It Up! 1. COMPARE How are the forces exerted by electric charges similar to the forces exerted by magnets? (Magnets and electric charges can both exert forces from a distance. With magnets, opposite poles attract and like poles repel. With electric charges, opposite charges attract and like charges repel.) 2. IDENTIFY Where have you seen the effects of	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 2:*** tissue paper, scissors, balloon full of air, wool cloth

	static electricity at home or at school? (Possible answer: I had a sock stuck to my shirt when it came out of the dryer at home.)	
Lesson 13: *Investigate* Electrical Forces pgs. 56-57 **NJSLS PS2.B** 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. **Objectives** Students will be able to: Demonstrate evidence that electric forces between a pair of objects do not require that the objects be in contact. Observe attractive and repulsive effects of electric forces. Make inferences based on observations. **1 Day**	**Engage:** ● Introduce the Phenomenon ● Use Photography ● Tap Prior Knowledge **Explore**: ● Carry out the investigation-create a table ● Complete steps 1-4 **Explain:** ● Explain findines. **Elaborate**: ● Investigate Further **Evaluate**: ● Wrap It Up! 1. EXPLAIN Why did you observe the hanging balloons before you rubbed them? (so I would have something to compare my results with after I rubbed one of them) 2. DESCRIBE In steps 3 and 4, what happened when the balloons were hanging freely? What did you do to cause this difference? (In step 3 they moved together, and in step 4 they moved apart. In step 3 only one balloon was charged and exerted a force on the other balloon. In step 4 both balloons had the same type of charge.) CCC Cause and Effect 3. INFER What can you infer about the charges on the balloons in step 3? In step 4? (In step 3 the charges were opposite; in step 4 the charges were the same.)	● Text Exploring Science or Digital version of Exploring Science ● Student Laptop ● Science Notebook ● ***For each group of 4***: 2 latex balloons filled with air, 2 pieces of string (1m), masking tape, wool cloth ● Sample Data Table see NGL

Lesson 14: *Think Like a Scientist* **Determine Cause-and-Effect Relationships** **pgs. 58-59** **NJSLS PS2.3** Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. **Objective** Students will be able to: Determine cause-and-effect relationships of electric or magnetic interactions between two objects not in contact with each other. **2 Days**	**Engage:** ● Introduce the Phenomenon-teacher-led demo ● Tap Prior knowledge **Explore**: ● Step 1: Ask a question ● Step 2: Plan and Conduct an Experiment **Explain**: ● Step 3: Analyze and Interpret Data ● Step 4: Share your findings **Elaborate**: ● Design a New Test **Evaluate:** ● Wrap It Up! 1. DESCRIBE How did your data show a cause-and-effect relationship? (Possible answer: Each time we changed one variable, the variable we were measuring changed. This shows a cause-and-effect relationship because the other variables were controlled.) CCC Cause and Effect 2. EXPLAIN What evidence did your data provide that an object can exert magnetic or electric forces on another object without contacting it? (Possible answer: The magnet was exerting a force on the paper clip even though they were not in contact.)	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** materials including, but not limited to: metric rulers, graph paper, magnets of varying sizes, strengths, and shapes; plastic bags full of paper clips or steel washers, stopwatches, inflated balloons, wool cloths, string, scissors, masking tape, plastic bags full of shredded paper or packing peanuts. ➢ Sample Data Table see NGL ➢ Evaluation Rubric see NGL
Lesson 15: *Think Like an Engineer* **Define and Solve a Problem** **pgs. 60-61** **NJSLS PS2.4** Define a simple design problem that can be solved by applying scientific ideas about magnets. **ETS1.1** Define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or, cost. **Objectives** Students will be able to: Define and solve a design problem that can be addressed by applying scientific ideas about magnets. Specify criteria for success and constraints on materials, time, or cost. **2 Days**	**Engage:** ● Introduce the Phenomenon-quick hands on ● Partner Talk ● Tap Prior Knowledge ● Step 1:Ask a question **Explore**: ● Step 2: Plan and carry out the investigation. ● Step 3: Analyze and interpret data. **Explain**: ● Construct an explanation from evidence ● Communicate information. **Elaborate**: ● .Field Test Your Final Design **Evaluate**: ● Wrap It Up! .1. DEFINE What problem did you set out to solve? How did you think of that problem? (Possible answer: We set out to solve the problem of coat zippers falling down. We thought of the problem because one of our group members has a coat that does this.) 2. IDENTIFY What observation from your data was most useful in improving	➢ Text Exploring Science or Digital version of Exploring Science ➢ Student Laptop ➢ Science Notebook ➢ ***For each group of 4:*** a Varity of materials including, but not limited to: disc magnets, bar magnets, horseshoe magnets, cut sections of a magnetic sheet, and magnets with adhesive backs. String, glue, tape, scissors, cardboard pieces, cardboard boxes, recycled containers, binder clips, and toy cars. ➢ Sample Data Tables see pg. 33a (Teacher's Manual) ➢ Evaluation Rubric see pg. 33b (Teacher's Manual) **Suggested SNB for Quiz Grade**

	your design? What did it teach you? (Possible answer: The observation from our first test when the magnet fell off was the most useful because it taught us that we needed to find just the right magnet for the job. Once we were able to do that, we had solved the problem.)	
Resources: Text Exploring Science or Digital version of Exploring Science, Student Laptop, Science Notebook, Mystery Science		

Unit Modifications for Special Population Students	
Advanced Learners	● Prepare a mock interview with roller coaster designer. One person will be interviewer and the other will be the designer. ● Extend thinking about balance forces by working on experiments with partner ● Draw and label diagrams in their notebooks to describe forces acting on a rope and the resulting motion ● Select a sport and analyze examples of force used by the sport's players ● Visit playground and discuss observations about applied forces and the resulting impacts when using playground equipment ● Build a marble rollercoaster using what has been learned about forces and patterns of motion ● Research famous rollercoasters
Struggling Learners	● Discuss how provided photographs help in understanding of concepts on page ● Teaching with Technology: Project lessons on white board, drawing arrows to show forces and help students identify type or force and amount of force ● Coach student through planning process for investigations and materials to be used
English Language Learners	● Ask yes or no questions to help students express their ideas ● Use of graphics and pictures to support language learning ● Vocabulary- cause-effect, pendulum, magnetism, repel, attract ● Help students define problems in Think Like a Scientist lessons
Special Needs Learners	● Provide Data Collection Tables for Science Notebooks. ● Review use of measurement tools and how to record measurements in distances and in time.

Interdisciplinary Connections

Indicators:

ELA/Literacy - ,

RI.CR.3.1., Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1),(3-PS2-3)

RI.IT.3.3., Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3)

RI.AA.3.7., Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3)

W.WR.3.5. Generate questions about a topic and independently locate related information from at least two reference sources (print and non-print) to obtain information on that topic. (3-PS2-1),(3-PS2-2)

W.SE.3.6. Use discussion, books, or media resources to gather ideas, outline them, and prioritize the information to include while planning to write about a topic.. (3-PS2-3)

Mathematics - ,

MP.2, Reason abstractly and quantitatively. (3-PS2-1) MP.5,

Use appropriate tools strategically. (3-PS2-1)

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. (3-PS2-1)

Integration of 21st Century Skills

Indicators:

8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3 Use a graphic organizer to organize information about a problem or issue.
8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.
8.1.5.D.3 Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
8.1.5.D.4 Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
8.1.2.E.1 Use digital tools and online resources to explore a problem or issue.
8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.
8.2.5.B.1 Examine ethical considerations in the development and production of a product through its life cycle.
8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
8.2.5.C.5 Explain the functions of a system and subsystems.
8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.
9.2.4.A.1 Identify reasons why people work, and how work can help a person achieve personal and professional goals.
9.2.4.A.3 Investigate traditional and nontraditional careers and relate information to personal likes and dislikes.
9.2.4.A.4 Explain why knowledge and skills acquired in elementary grades lay the foundation for future academic and career success.