Unit 1 Weather and Climate

Unit Summary: In this unit of study, students organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merits of a design solution that reduces the impact of such hazards.

Concepts & Vocabulary: Key vocabulary may include but are not limited to: Weather conditions (e.g. average temperature, precipitation and wind direction), Seasons, Areas, Patterns, Climate, Regions, Weather-related hazard (e.g. heavy rain or snow, strong winds, lightning, etc.), Impact (e.g. flooding, fires), Cause and effect, Design solution.

Key Concepts: Identify and test cause and effect relationships to explain change. Use data to understand graphical displays and typical weather conditions expected during a particular season. Climate describes the range of an area's typical weather conditions and the extent to which those conditions vary over the years. Science affects everyday life. People's needs and wants change over time, as do their demands for new and improved technologies.

Stage 1 – Desired Results (Also see Disciplinary Core Ideas below)

Performance Expectations: (PE) (Established Goals / Content Standards)

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction. Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs.

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 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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(2-LS2-1) ● Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) ● Make a claim about the merits of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1) ● Obtain and combine	**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 the years. (3-ESS2-2) **ESS3.B: Natural Hazards** ● A variety of natural hazards	**Patterns** ● Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2) **Cause and Effect** ● Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

information from books and other reliable media to explain phenomena. (3-ESS2-2)	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.)	

Enduring Understandings (1-3 max) Students will understand that:	**Essential Questions** (1-2 EQ per EU)
Patterns of change can be used to make weather predictions. People record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next and how to limit damage from severe weather.	How can weather patterns be used to predict results and solve problems? How do weather related hazards cause problems and how can the damage they cause be limited? How effective is the solution that limits the damage?

Stage 2 – Model Assessment	
Summative Performance Task(s): Students will create a model using materials to build a barrier or protective wall to prevent your home from flooding during a storm surge. Students must be able to defend their solution and design. (Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.) **Audience:** ● By what criteria AND what audience will "performances of understanding" be judged? Student Self-Reflection Rubric	**Formative Evidence:** Non Fictioarticles (focused on weather) followed by quizzes Mystery Science End of Unit Assessments

	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.) Examples of data could include: o Average temperature o Precipitation o Wind direction

Stage 3 – Learning Plan Resources and Activities
Suggested Resources for Planning: Mystery Science The National Weather Service has several education resources available at this website. The National Oceanic and Atmospheric Administration (NOAA) provides education resources at this website. https://www.nationalgeographic.org/activity/create-weather-map/ Wonderopolis Articles
Learning Activities: **Learning Activities (that can be found on Mystery Science), but are not limited to:** **Gas Experiment:** In this activity, students will create a mini cloud in a cup. Students will examine a clear cup — then you'll add hot water to the cup. If you have several bottles of water, you may want to appoint responsible students to help you pour water. **Climate Decoder** In this activity, students work in pairs to color a map and figure out the climates of different locations around the world. **Protect My Home!** In this lesson, students will create a model barrier or protective wall which could be used to prevent home flooding during a storm surge. **Building an Earthquake Resistant Structure** In this lesson, students will build an earthquake resistant structure.

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the "why do I need to know this" questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry Based Learning
- Case studies
- Engaging in Argument w/ evidence

Unit 2 Force and Motion

Unit Summary: In this unit of study, students are able to determine the effects of balanced and unbalanced forces on the motion of an object.

Concepts and Vocabulary: Key vocabulary may include but are not limited to: Forces (e.g. number, size, direction, Balanced, Unbalanced), Motion (e.g. starting, stopping, or changing direction), Object, Cause and Effect, Patterns of motion (e.g. swinging pendulum, ball on curved track, magnet repulsion), Future motion

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

3-PS2-1: **Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all. Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.

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.** Clarification Statement: Examples of motion with a predictable pattern could include a child swinging on a swing, a ball rolling back and forth in a bowl, and two children on a see-saw. Assessment Boundary: Assessment does not include technical terms such as period and frequency.

Enduring Understandings (1-3 max)	**Essential Questions** (1-2 EQ per EU)
Make predictions using patterns of change. Relationships exist between force and motion. Recognize cause and effect patterns.	What is the relationship between force and motion? How can we explain and predict interactions between objects? How can we predict an object's continued motion, change in motion, or stability? Why do objects move the way they do?

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1) ● Make observations and/or measurements to produce data to	**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	**Cause and Effect** ● Cause and effect relationships are routinely identified. (3-PS2-1) Patterns **Patterns** ● Patterns of change can be used to make predictions. (3-PS2-2) **Connections to Nature of Science Science Knowledge is**

serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)	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)	**Based on Empirical Evidence** ● Science findings are based on recognizing patterns. (3-PS2-2) Scientific Investigations Use a Variety of Methods ● Science investigations use a variety of methods, tools, and techniques. (3-PS2-1)

Stage 2 – Model Assessment	
Summative Performance Task **Bridge Engineering Activity** In this activity, students will create a bridge using a variety of materials such as books, paper, popsicle sticks, a ruler, scissors etc. Students can create a bridge that is meant to hold a certain amount of weight. Students will test how strong their bridge is by placing a stack of pennies on their bridge. Students will discuss what materials worked and why. Students will also discuss the concepts of force and whether their bridge withheld the weight of the pennies. **Self Assessment Rubric**	**Formative Evidence:** **Non Fiction (Engineering) Articles with Quiz** Mystery Science Unit Assessments **Possible informal assessment to ask students to model with arrows forces in the following example:** -If two children stand with their hands together and push against each other, the pushing force each exerts balances to a net zero effect if neither child moves. Pushing a box from both sides also demonstrates a balanced force if the forces do not produce any change in motion or position of the box.

	(Possible) Informal Assessment Discussion: Investigating the effects of forces on objects will also give students opportunities to observe that patterns exist everywhere. Patterns are found in shapes, structures, natural environments, and recurring events. Scientists and engineers analyze patterns to make predictions, develop questions, and create solutions. As students have opportunities to observe forces interacting with objects, they will ask questions and analyze and interpret data in order to identify patterns of change in the motion of objects and to make predictions about an object's future motion. When students are on the playground, they can observe multiple patterns of change in the back-and-forth motion of a child swinging on a swing or in the up-and-down motion of a seesaw. In the classroom, students can observe a variety of objects, such as marbles rolling back and forth in bowls or tops spinning across the floor.

Stage 3 – Learning Plan and Resources
Suggested Resources for Planning: **Mystery Science:**

Robo Arm: This fun activity is one of five in a series of space based engineering challenges developed by NASA and Design Squad where students are engaged in implementing the Engineering Design process to build a robotic arm that can lift a cup off a table using cardboard strips, brass fasteners, paper clips, straw, string, tape and a cup. The activity includes an instructor's guide, questioning techniques, discussion questions, extension activity, a rubric, and 3 short video clips that enhance the purpose of the activity and its relevance to NASA.

Learning Activities:

Learning Activities (which can be found on Mystery Science), can include, but are not limited to:

Hopper Popper Activity
In this activity, each student will make and test a Hopper Popper.

Step 1: Print out materials and get supplies

Each student needs: ruler, pen, scissors, "light chipboard" to cut a 3" x 6" rectangle,Universal Science Recording sheet

For open-ended exploration, the class will also need: Extra chipboard for students who want to make additional hoppers. Rubber bands of different sizes and thicknesses.

Step 2: Prepare for class

If you want your students to practice measuring, you can have them cut 3" x 6" rectangles from chipboard before you begin this mystery. Otherwise, we recommend you cut the chipboard into 3" x 6" rectangles before class. It doesn't take long if you use a paper cutter.

Let's Investigate: Balanced and Unbalanced Forces
In this lesson, students will investigate how balanced and unbalanced forces affect the motion of a ball.

Forces and Interactions Unit
The following lessons address the effects of balanced and unbalanced forces on the motion of an object.

The Great Slide Challenge
In this activity, students work in groups of 4 to test which materials have the most friction and which materials have the least friction. Each group makes a model of a slide using a stack of books and a piece of cardboard and turn their materials into "sliders".

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the "why do I need to know this" questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry Based Learning
- Case studies
- Engaging in Argument w/ evidence

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Unit 3 Electrical and Magnetic Forces

Unit Summary: In this unit of study, students determine the effects of balanced and unbalanced forces on the motion of an object and the cause-and-effect relationships of electrical or magnetic interactions to define a simple design problem that can be solved with magnets.

Concepts and Vocabulary: Key vocabulary may include but are not limited to: Forces (e.g. number, size, direction, Balanced, Unbalanced), Motion (e.g. starting, stopping, or changing direction), Object, Cause and Effect, Patterns of motion (e.g. swinging pendulum, ball on curved track, magnet repulsion), Future motion

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

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.** Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paper clips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects the strength of the force and how the orientation of magnets affects the direction of the magnetic force. Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.

3-PS2-4: Define a simple design problem that can be solved by applying scientific ideas about magnets. Clarification Statement: Examples of problems could include constructing a latch to keep the door shut and creating a device to keep two moving objects from touching each other.

Enduring Understandings (1-3 max)	**Essential Questions** (1-2 EQ per EU)
Cause-and-effect relationships are routinely identified, tested, and used to explain change. Scientific discoveries about the natural world can often lead to new and improved solutions to problems. Ask questions that can be investigated based on patterns and observations.	What are the relationships between electrical and magnetic forces? How do the properties of magnets allow them to be useful to society? How can we use our understandings about magnets be used to solve problems? Why are magnets essential to our everyday lives?

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Analyzing and Interpreting Data ● Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) **Asking Questions and Defining Problems** ● Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) ● Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) ● Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)	**PS2.B: Types of Interactions** ● Electric and magnetic forces between a pair of objects do not require that objects be in contact. The sizes of the forces in each situation depends 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) **ETS1.A: Defining and Delimiting Engineering Problems** ● Possible solutions to a problem are limited by the available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)	**Cause and Effect** ● Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3) - **Connections to Engineering, Technology, and Applications of Science** **Interdependence of Science, Engineering, and Technology** ● Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. (3-PS2-4)

Stage 2 – Model Assessment	
Summative Performance Task(s) Students will experiment with static electricity. 1. Children write a prediction down in their science journal about what will happen when you place two static electrically charged balloons next to each other. 2. Rub the 2 balloons one by one against the woolen fabric, then try moving the balloons together. Do they want to attract or do they repel each other? 3. Children record a prediction about the effects of rubbing a balloon against their hair. 4. Rub 1 of the balloons back and forth on your hair then slowly pull it away. Have group members observe what	**Formative Evidence:** **Mystery Science Magnet Assessments** **Invent a Magnet Lock** In the activity, students apply their scientific ideas about magnets to create a useful product: a magnetic lock. Students engage in the engineering design process to test and improve their designs.

happens. 5. Predict what will happen when you place a static electrically charged balloon next to an aluminum can. 6. Put the aluminum can on its side on a table. After rubbing the balloon on your hair again, hold the balloon close to the can and observe what happens. Does it roll towards it or away? Slowly move the balloon away from the can and see what happens. Materials Needed: Two balloons per group, One tin can per group, One piece of woolen fabric per group. Probing or Clarifying Questions: In small groups or pairs, students discuss possible everyday problems that might be solved using magnets. For example, they could construct a latch to keep the door shut. As a class, determine possible criteria that might be used to determine how successful the devices might be, and discuss possible constraints that might affect each group's design solution. Small groups or pairs should have the opportunity to create a presentation (poster, PowerPoint, drawings, or actual physical model) to share both the design problem and solution with the class. **Self Assessment Rubric**	**Short Performance Assessment:**

Stage 3 – Learning Plan and Resources
Suggested Resources for Planning: Mystery Science
Learning Activities: **What Are Magnets?** In this lesson, students will make predictions and observations to determine the cause and effect relationship between magnets and magnetic and nonmagnetic items. **Magnetism Exploration** Students will be able to identify objects that are attracted or repelled by magnetism. **Using Magnets to Solve Real World Problems**

In this lesson, students will be able to use their knowledge of magnetism to solve a problem or respond to a situation.

Magnet Lessons
This packet includes a variety of lessons on magnets. Lessons include experiments, stations, and discussions about electrical and magnetic forces.

Brain-Pop video with attached quizzes:

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the "why do I need to know this" questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry Based Learning
- Case studies
- Engaging in Argument w/ evidence

Unit 4 Life Cycles and Traits

Unit Summary: In this unit of study, students acquire an understanding that organisms have different inherited traits and that the environment can also affect the traits that an organism develops. Students will also develop an understanding of the similarities and differences in organisms' life cycles. In addition, students 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.

Concepts and Vocabulary: Key vocabulary may include but are not limited to: Organisms (plants and animals), Group, Parents and offspring, Inheritance, Variation, Patterns, Environmental factors (e.g. amount of food or water, exercise, chemicals), Traits (e.g. height or weight of a plant or animal, color or quantity of the flowers), Cause and Effect, Organisms [both plant (no flowering plants) and animal (no human reproduction)], Life cycles (Birth, Growth, Reproduction, Death), Patterns, Characteristics (e.g. plant thorns, animal camouflage), Variation, Individuals, Species, Effect (Surviving, Finding mates, Reproduction)

Stage 1 – Desired Results

Performance Expectations: (PE) (Established Goals / Content Standards)

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

Enduring Understandings (1-3 max)	**Essential Questions** (1-2 EQ per EU)
Students will understand that: Many characteristics of organisms are inherited from their parents. Different organisms vary in how they look and function because they have different inherited information. Plants and animals have unique and diverse life	How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics? How do organisms live, grow, respond to their environment and reproduce?

cycles.	

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1) **Developing and Using Models** Develop models to describe phenomena. (3-LS1-1) **Constructing Explanations and Designing Solutions** Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2) Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)	**LS3.A: Inheritance of Traits** Many characteristics of organisms are inherited from their parents. (3-LS3-1) Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2) **LS1.B: Growth and Development of Organisms** Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1) **LS3.B: Variation of Traits** Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) The environment also affects the traits that an organism develops. (3-LS3-2) **LS4.B: Natural Selection** Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	**Patterns** Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) Patterns of change can be used to make predictions. (3-LS1-1) **Cause and Effect** Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2) Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2),(3-LS4-3) **Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence** Science findings are based on recognizing patterns. (3-LS1-1)

Stage 2 – Model Assessment	
Summative Performance Task(s) **3-LS3-1, 3-LS3-2:** **Odd One Out Activity**	**Formative Evidence:** **Mystery Science Assessments**

In this activity, students work in pairs and play a card sorting game to apply their knowledge on traits. Students will discuss which plants are related to one another by observing and explaining the traits they acquire. Students will also explore how human beings have modified plants based on our knowledge of how plants inherit their traits. **3-LS1-1, 3-LS4-2** **<u>Life Cycle Summative Assessment</u>** Students will create several animals and describe their characteristics, response to the environment, and group behaviors. Students will label the life cycle of each animal. Students can create this on google slides, construction paper, file or folder, or another way of their choosing.	**Designer Dogs** In this visual activity, students are shown pairs of adult dogs and three potential puppies. They study the physical traits of the dogs and look for the puppy that shares these traits.

Stage 3 – Learning Plan and Resources
Suggested Resources for Planning: Mystery Science A-Z-animals.com Animal Research **Tower Garden lessons**
Learning Activities:

Why Do Plants Grow Flowers?

In this Mystery students learn how and why flowers are pollinated. In the activity students create a model of a flower.

Why Do Plants Give us Fruit?

In this Mystery students learn about why plants grow fruit. In the activity, they practice identifying fruit versus vegetables.

Why Are Some Apples Red and Some Green?

In this Mystery students learn how the food we eat is a result of selection. In the activity students taste different apples and identify the traits human beings have selected for.

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the "why do I need to know this" questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry Based Learning
- Case studies
- Engaging in Argument w/ evidence

Unit 5 Organisms and Change in Environments

Unit Summary: In this unit of study, students develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. Students also develop an understanding of the types of organisms that lived long ago and also about the nature of their environments. Students develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

Key vocabulary may include but are not limited to: Animal groups, Members, Survival (e.g. obtaining food, defense, response to environmental change), Cause and Effect, Organisms (characteristics, needs), Habitat, Survival (well - less well - not at all),Environments, Fossils, Extinct, Scale (time), Environmental change (e.g. water, temperature, food, etc.), Organisms (plants and animals), Ecosystem, Design solution

Stage 1 – Desired Results (Also see Disciplinary Core Ideas below)

Performance Expectations: (PE) (Established Goals / Content Standards)

3-LS2-1: Construct an argument that some animals form groups that help members survive.
3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.

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

3-LS4-4: Make a claim about the merits 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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Construct an argument with evidence, data, and/or a model. (3-LS2-1) Construct an argument with evidence. (3-LS4-3) **Analyzing and Interpreting Data** Analyze and interpret data to make sense of phenomena using logical	**LS2.D: Social Interactions and Group Behavior** Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1) LS4.C:	**Cause and Effect** Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),(3-LS4-3) **Scale, Proportion, and Quantity** Observable phenomena exist from very short to very long time periods. (3-LS4-1)

reasoning. (3-LS4-1) Engaging in Argument from Evidence Make a claim about the merits of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4) **Asking Questions and Defining Problems** Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)	**Adaptation** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) **LS4.A: Evidence of Common Ancestry and Diversity** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1) Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.D: Biodiversity and Humans** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4) LS2.C: **Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.(secondary to 3-LS4-4) ETS1.A: **Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by the available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets	**Systems and System Models** A system can be described in terms of its components and their interactions. (3-LS4-4)

	the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)	

Enduring Understandings (1-3 max) Students will understand that:	**Essential Questions** (1-2 EQ per EU)
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.	How do organisms live, grow, respond to their environment and reproduce?
Organisms and their habitat make up a system in which the parts depend on each other.	How do the structures of organisms enable life's functions?
Observable phenomena exist from very short to very long periods of time.	How do organisms interact with the living and nonliving environments to obtain matter and energy?
Fossils provide evidence about the types of organisms that lived long ago, and also about the nature of their environments.	What happens to ecosystems when the environment changes?
	How do organisms grow and develop?

Stage 2 – Model Assessment	
Summative Performance Task: **Astronaut in Training** In the Mystery, students examine how physical traits can be influenced by the environment. In the activity, students analyze how a NASA astronaut's traits changed during his "year in space," then they predict how their own traits might change after living in space. In this activity, students measure some of their physical traits (arm strength, height, and balance) and learn how spending time in the environment of outer space can change those characteristics.	**Formative Evidence:** Unit Test Video, Formative Discussion Questions, Attached Quiz **Mystery Science Assessments**

Stage 3 – Learning Plan and Resources
Suggested Resources for Planning: Mystery Science
Learning Activities: **Bug Off!** In this activity, students figure out how to help a town deal with an abundance of mosquitoes resulting from a very rainy summer. Students draw and write about their solution of what the town can build or do to solve the problem. **How Can We Help Endangered Species?** Students will engage in a preliminary investigation of how people can help animals that are not adapting well to environmental changes, such as habitat loss. **Presenting a Persuasive Argument - Children Can Change the World** Students will present their ideas about how to solve an environmental problem involving natural resource use and loss of gorilla habitat. **Fossil Webquest** Working in collaborative groups, students engage in an interactive research about fossils. **How Fossil Records Add to Our Understanding** In this two day lesson, students identify and illustrate how fossil records are used. **Fossil Formation** Students will learn about how fossils are formed and why they are important. **Discovering Fossils** This activity allows students to explore the process used by paleontologists — scientists who study fossils to understand ancient landscapes, climate, and life on Earth — to find and identify fossils. **Where Can You Find Whales in the Desert?**

In this activity, students use paper to create a model fossil dig. They identify traits of fossils to determine what the habitat looked like when these organisms were alive. Then they use this information to figure out where some Mystery Fossils belong in their fossil dig.

Guess What these Animals Eat
In this visual activity, students examine a printout that shows skulls of both familiar animals and dinosaurs. Questions prompt students to examine each animal's teeth to figure out what each animal eats.

Suggested Methods: (The following methods anchor learning with a purpose, mitigating the "why do I need to know this" questions.)

- Phenomena based learning
- Problem Based Learning (PBL)
- Inquiry Based Learning
- Case studies
- Engaging in Argument w/ evidence

Third Grade Science
Course Compendium

<u>UNITS OF STUDY</u>*

Unit 1- *Weather and Climate*
Unit 2- *Force and Motion*
Unit 3- *Electrical and Magnetic Forces*
Unit 4- *Life Cycles and Traits*
Unit 5 - *Organisms and Change in Environments*

<u>INTERDISCIPLINARY CONNECTIONS</u>

ELA Standards:

- RI.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- RI.3.2. Determine the main idea of a text; recount the key details and explain how they support the main idea.
- RI.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.
- RI.3.8. Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).
- RI.3.9.Compare and contrast the most important points and key details presented in two texts on the same topic.
- W.3.8. Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- SL.3.3. Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

Math Standards

- MP.4. Make sense of problems and persevere in solving them.
- MP.5. Use appropriate tools strategically.
- 3.MD.A.2Add, 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. MD.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.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
- 3.NBT. Number and Operations in Base Ten
- 3. NF. Number and Operations—Fractions

**See individual units for Pacing Guide, NJSLS Standards, Transfer Skills, Enduring Understandings, Essential Questions, Learning Objectives, Key Vocabulary, Skills, Resources, & Assessments*

21st Century Life and Careers

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP11.** Use technology to enhance productivity.
- **9.2.4.A.3** Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.
- **9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Technology

- **8.2.2.B.4** Identify how the ways people live and work has changed because of technology.
- **8.2.2.C.1** Brainstorm ideas on how to solve a problem or build a product.

<table>
<tr><th colspan="3">GENERAL CONSIDERATIONS FOR DIVERSE LEARNERS</th></tr>
<tr><th>English Language Learners</th><th>Students Receiving Special Education Services</th><th>Advanced Learners</th></tr>
<tr>
<td rowspan="3">• WIDA Can Do Descriptors for Kindergarten*
• WIDA Essential Actions Handbook
• FABRIC Paradigm
• Wall Township ESL Grading Protocol

*Use WIDA Can Do Descriptors in coordination with Student Language Portraits (SLPs).

Potential Accommodations for ELLs

• Personal glossary
• Text-to-speech
• Extended time
• Simplified / verbal instructions
• Frequent breaks
• Small group/One to one
• Additional time
• Review of directions
• Student restates information
• Extra visual and verbal cues and prompts
• Preferential seating</td>
<td rowspan="3">• New Jersey Tiered System of Supports
• National Center on Universal Design for Learning - About UDL
• UDL Checklist
• UDL Key Terms

Students within this class receiving Special Education/Section 504 programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP)/504 Plans due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, instruction is differentiated based upon the student's needs. The IEP/504 Plan acts as a supplemental curriculum guide inclusive of instructional strategies that support each specific learner.

Potential Accommodations for Special Education

Presentation accommodations:
• Listen to audio recordings instead of reading text
• Pre-teach unknown vocabulary through pictures or videos, and relate to prior knowledge
• Work with fewer items per page and/or materials in a</td>
<td>• Knowledge and Skill Standards in Gifted Education for All Teachers
• Pre-K-Grade 12 Gifted Programming Standards
• Gifted Programming Glossary of Terms

Potential Accommodations for Advanced Learners

• Use of high level academic vocabulary/texts
• Problem-based learning
• Pre-assess to condense curriculum
• Interest-based research
• Authentic problem-solving
• Homogeneous grouping opportunities</td>
</tr>
<tr><th>Students with 504 Plans</th></tr>
<tr><td>Teachers are responsible for implementing designated services and strategies identified</td></tr>
</table>

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- Verbal and visual cues regarding directions and staying on task - Checklists - Immediate feedback	larger print size - Use a visual blocker - Use visual presentations of verbal material, such as word webs and visual organizers - Be given a written list of instructions/picture cues **Response accommodations**: - Give responses in a form (oral or written) that's easier for him/her - Dictate answers to a scribe - Capture responses on an audio recorder - Use a spelling dictionary or electronic spell-checker - Use a word processor to give responses in class - Use a calculator or table of "math facts" **Setting accommodations**: - Work or take a test in a different setting, such as a quiet room with few distractions - Sit where he/she learns best (for example, near the teacher) - Take a test in small group setting **Timing accommodations**: - Take more time to complete a task or a test - Have extra time to process oral information and directions - Take frequent breaks, such as after completing a task **Assignment modifications**: - Complete fewer or different homework problems than peers - Shorten assignment - Answer fewer or different test questions - Create alternate projects or assignments	on a student's 504 Plan.

At Risk Learners / Differentiation Strategies		
Alternative Assessments Choice Boards Games and Tournaments Group Investigations Guided Reading Learning Contracts Leveled Rubrics Literature Circles Multiple Texts Personal Agendas	Independent Research & Projects Multiple Intelligence Options Project-Based Learning Varied Supplemental Activities Varied Journal Prompts or RAFT Writing Tiered Activities/Assignments Tiered Products Graphic Organizers Choice of Books/Activities Mini-Workshops to Reteach or Extend	Jigsaw Think-Tac-Toe Cubing Activities Exploration by Interest Flexible Grouping Goal-Setting with Students Homework Options Open-Ended Activities Use of Reading Buddies Varied Product Choices

**See individual units for Pacing Guide, NJSLS Standards, Transfer Skills, Enduring Understandings, Essential Questions, Learning Objectives, Key Vocabulary, Skills, Resources, & Assessments*

	Think-Pair-Share by readiness or interest Use of Collaboration of Various Activities	Stations/Centers Work Alone/Together

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