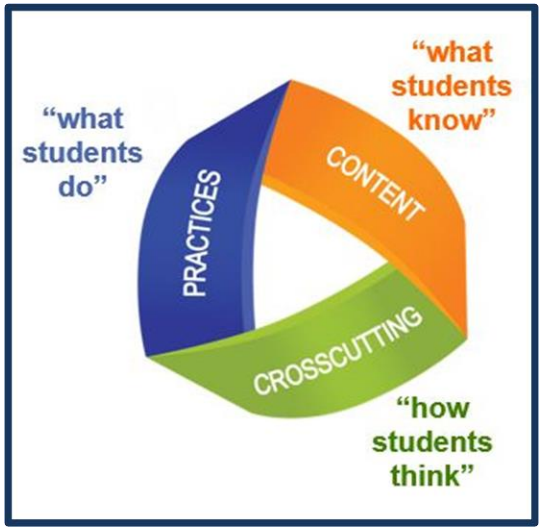
Ledyard Public Schools
Third Grade NGSS Curriculum



District Science Curriculum Committee	
Kim Pelletier	**District Math and Science Consultant**
Barbara Heaney, Ashley Zelinski, Gina Peluso	**Kindergarten**
Katherine McKelvey, Kathy Colosi, Janice Masse	**First Grade**
Johanne Wernquest, Deb Biondo, Kevin Rogers	**Second Grade**
Jennifer Pacheco, Matthew Hyatt, Lisa Silva	**Third Grade**
Santo Silva, Emily Reed, Ben Freiert	**Fourth Grade**
Lisa Tedder, Nikki Conger, Jeff Lewis	**Sixth Grade**
Sandy DeRosa, Dave Davino	**Seventh Grade**

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District Philosophy

Ledyard's vision for K-12 inquiry based science is to engage students in scientific and engineering practices as they apply crosscutting concepts to deepen their understanding of the core ideas in these fields.

A New Vision for Science Education

Implications of the Vision of the Framework for K-12 Science Education and the Next Generation Science Standards

SCIENCE EDUCATION WILL INVOLVE LESS:	SCIENCE EDUCATION WILL INVOLVE MORE:
Rote memorization of facts and terminology.	Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning.
Learning of ideas disconnected from questions about phenomena.	Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned.
Teachers providing information to the whole class.	Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance.
Teachers posing questions with only one right answer.	Students discussing open-ended questions that focus on the strength of the evidence used to generate claims.
Students reading textbooks and answering questions at the end of the chapter.	Students reading multiple sources, including science-related magazine and journal articles and web-based resources; students developing summaries of information.
Pre-planned outcome for "cookbook" laboratories or hands-on activities.	Multiple investigations driven by students' questions with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas.
Worksheets.	Student writing of journals, reports, posters, and media presentations that explain and argue.
Oversimplification of activities for students who are perceived to be less able to do science and engineering	Provision of supports so that all students can engage in sophisticated science and engineering practices

Source: National Research Council. (2015). *Guide to Implementing the Next Generation Science Standards* (pp. 8-9). Washington, DC: National Academies Press. http://www.nap.edu/catalog/18802/guide-to-implementing-the-next-generation-science-standards

Three Dimensions of the *Next Generation Science Standards*:

SEP (appendix F), DCI (appendix E), CCC (appendix G)

Scientific and Engineering Practices Matrix

Asking Questions and Defining Problems

A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.

Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world. Both scientists and engineers also ask questions to clarify the ideas of others.

Planning and Carrying Out Investigations

Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.

Analyzing and Interpreting Data

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.

Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.

Developing and Using Models

A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.

Constructing Explanations and Designing Solutions

The products of science are explanations and the products of engineering are solutions. The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories. The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.

Engaging in Argument from Evidence

Argumentation is the process by which explanations and solutions are reached. In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to identify strengths and weaknesses of claims.

Using Mathematics and Computational Thinking

In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions. Statistical methods are frequently used to identify significant patterns and establish correlational relationships.

Obtaining, Evaluating, and Communicating Information

Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to acquire information that is used to evaluate the merit and validity of claims, methods, and designs.

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Developed by NSTA based on content from the *Framework for K-12 Science Education* and supporting documents for the *May 2012 Public Draft of the NGSS*

Disciplinary Core Ideas Matrix Grade 3 Disciplinary Core Ideas are highlighted yellow			
Physical Science	**Life Science**	**Earth and Space Science**	**Engineering, Technology, and the Application of Science**
PS1: Matter and Its Interactions PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions PS1.C: Nuclear Processes **PS2: Motion and Stability: Forces and Interactions** PS2.A: Forces and Motion PS2.B: Types of Interactions **PS3: Energy** PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer PS3.C: Relationship Between Energy and Forces PS3.D: Energy in Chemical Processes and Everyday Life **PS4: Waves and Their Applications in Technologies for Information Transfer** PS4.A: Wave Properties PS4.B: Electromagnetic Radiation PS4.C: Information Technologies and Instrumentation	**LS1: From Molecules to Organisms: Structures and Processes** LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS1.C: Organization for Matter and Energy Flow in Organisms LS1.D: Information Processing **LS2: Ecosystems: Interactions, Energy, and Dynamics** LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS2.D: Social Interactions and Group Behavior **LS3: Heredity: Inheritance and Variation of Traits** LS3.A: Inheritance of Traits LS3.B: Variation of Traits **LS4: Biological Evolution: Unity and Diversity** LS4.A: Evidence of Common Ancestry and Diversity LS4.B: Natural Selection LS4.C: Adaptation LS4.D: Biodiversity and Humans	**ESS1: Earth's Place in the Universe** ESS1.A: The Universe and Its Stars ESS1.B: Earth and the Solar System ESS1.C: The History of Planet Earth **ESS2: Earth's Systems** ESS2.A: Earth Materials and Systems ESS2.B: Plate Tectonics and Large-Scale Systems ESS2.C: The Role of Water in Earth's Surface Processes ESS2.D: Weather and Climate ESS2.E: Biogeology **ESS3: Earth and Human Activity** ESS3.A: Natural Resources ESS3.B: Natural Hazards ESS3.C: Human Impacts on Earth Systems ESS3.D: Global Climate Change	**ETS1: Engineering Design** ETS1.A: Defining and Delimiting an Engineering Problem ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution

Crosscutting Concepts Matrix		
Patterns Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **Cause and Effect: Mechanism and Explanation** Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.	**Scale, Proportion, and Quantity** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance. **Systems and System Models** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.	**Energy and Matter: Flows, Cycles, and Conservation** Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. **Structure and Function** The way in which an object or living thing is shaped and its substructure determine many of its properties and functions. **Stability and Change** For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Developed by NSTA based on content from the *Framework for K-12 Science Education* and supporting documents for the *May 2012 Public Draft of the NGSS*

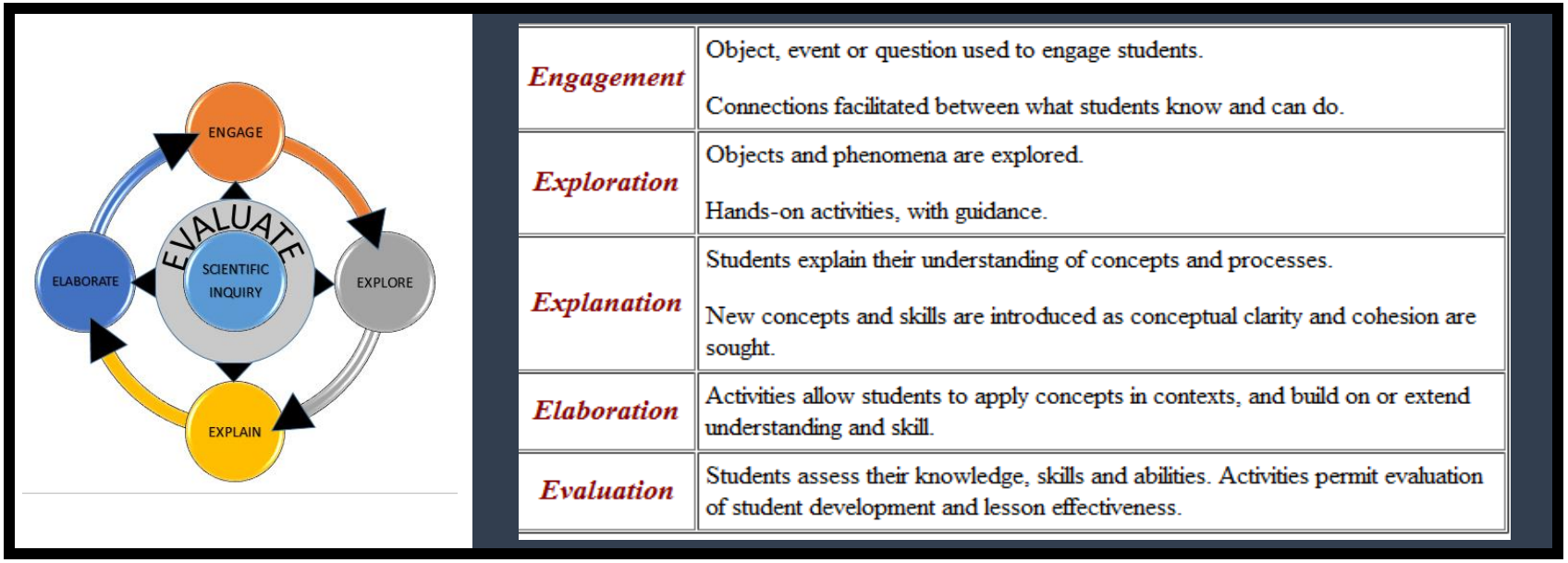
Connections to the Nature of Science

Nature of Science Practices	Nature of Science Crosscutting Concepts
These understandings about the nature of science are closely associated with the science and engineering practices, and are found in that section of the foundation box on a standards page. More information about the Connections to Engineering, Technology and Applications of Science can be found in Appendix H.	These understandings about the nature of science are closely associated with the crosscutting concepts, and are found in that section of the foundation box on a standards page. More information about the Connections to Engineering, Technology and Applications of Science can be found in Appendix H.
Scientific Investigations Use a Variety of Methods	**Science is a Way of Knowing**
Science Knowledge is Based on Empirical Evidence	**Scientific Knowledge Assumes and Order and Consistency in Natural Systems**
Scientific Knowledge is Open to Revision in Light of New Evidence	**Science is a Human Endeavor**
Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena.	**Science Addresses Questions About the Natural and Material World**

How does Ledyard Define Inquiry?

Inquiry is defined as a way of seeking information, knowledge, or truth through questioning. Inquiry is a way for a learner to acquire new information and data and turn it into useful knowledge. Inquiry involves asking good questions and developing robust investigations from them. Inquiry also involves considering possible solutions and consequences. A third component of inquiry is separating evidence based claims from common opinion, and communicating claims with others, and acting upon these claims when appropriate. Questions lead to gathering information through research, study, experimentation, observation, or interviews. During this time, the original question may be revised, a line of research refined, or an entirely new path may be pursued. As more information is gathered, it becomes possible to make connections and allows individuals to construct their own understanding to form new knowledge. Sharing this knowledge with others develops the relevance of the learning for both the student and a greater community. Sharing is followed by reflection and potentially more questions, bringing the inquiry process full circle.

Inquiry 5 Science Teaching Model



Engagement	Object, event or question used to engage students. Connections facilitated between what students know and can do.
Exploration	Objects and phenomena are explored. Hands-on activities, with guidance.
Explanation	Students explain their understanding of concepts and processes. New concepts and skills are introduced as conceptual clarity and cohesion are sought.
Elaboration	Activities allow students to apply concepts in contexts, and build on or extend understanding and skill.
Evaluation	Students assess their knowledge, skills and abilities. Activities permit evaluation of student development and lesson effectiveness.

Ledyard Next Generation Science Standards Grade 3

Unit 1: A Study of Organisms and Climate

(21 days in First Trimester August-November)

Anchoring Unit Phenomenon	
Lake Natron (do not use sound at the beginning of the unit, use sound at the end of the unit) Fossils from sea creatures can be found on some hilltops Houses at the beach often have hurricane shutters	
Compelling Question(s)	**Supporting Questions**
What does an organism need to adapt and survive in its environment? **How does climate affect organisms?**	• Where do organisms live? • What is an organism? • How do environments change? • How are weather and climate related? • How does extreme weather affect people? • What do fossils show about environments of long ago
Storyline	**Possible Student Misconceptions:**
Third graders will build an understanding that environments change over time and those changes can affect organisms.	Fossils are limited to dinosaurs.

Unit 1: The Study of Organisms and Climate Overview

Performance Expectations	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• **3-LS4-4** • **3-ESS2-2** • **3-ESS3-1** • **3-LS4-1** • **3-5-ETS1-2** *Teacher Note: All the Performance Expectations above will be covered this unit and can be worked on concurrently. All Science and Engineering Practices and Crosscutting Concepts in bold are written in the Performance Expectations above. The italicized practices and crosscutting concepts, although not mentioned specifically, may be incorporated additionally in any science lesson at any time.*	• 1: Asking Questions and Defining Problems • 2: Developing and Using Models • 3: Planning and Carrying Out Investigations • **4: Analyzing and Interpreting Data** • 5: Using Mathematical Computational Thinking • **6: Constructing Explanations and Designing Solutions** • **7: Engaging in Argument from Evidence** • **8: Obtaining, Evaluating, and Communicating** Information	**ENGINEERING, TECHNOLOGY AND THE APPLICATION OF SCIENCE** • **ETS1 Engineering Design** -ETS1.B Developing Possible Solutions **EARTH AND SPACE SCIENCE** • **ESS2 Earth's Systems** -ESS2.D: Weather and Climate • **ESS3 Earth and Human Activity** -ESS3.B: Natural Hazards **LIFE SCIENCE** • **LS2 Ecosystems: Interactions, Energy, and Dynamics** -LS2.C: Ecosystem Dynamics Functioning and Resilience • **LS4 Biological Evolution: Unity and Diversity** -LS4.A: Evidence of Common Ancestry and Diversity -LS4.D: Biodiversity in Humans	• **1: Patterns** • **2: Cause and Effect** • **3: Scale, Proportion and Quantity** • **4: Systems and System Models** • 5: Energy and Matter • 6: Structure and Function • 7: Stability and Change

Performance Expectation:
3-LS4-4 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:
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.*

Lesson Level Photo Analysis: What are some organisms you might find in the forest environment? What are some ways the environment changes? What happens to an organism if its environment changes?
Lesson Level Phenomenon Videos: Living things live in different places; The land in front of a forest fire looks different than the land behind it, Coati finds food in trash
note: all photo and video above links to suggested activities below

3-LS4-4 Suggested Activities	3-LS4-4 Recommended Formative Assessments
Where Do Organisms Live? *(TCI: Unit 1, lesson 1*) Students will learn about four different environments: hot desert, coral reef, temperate forest and tropical rain forest. With a partner, students will match organisms to the environments in which they would best survive. (100 minutes) How Do Environments Change? (TCI Unit 1, Lesson 3) Students will examine pictures that show changes to environments. (155 minutes) "What Happens to Organisms in Changing Environments?" *(TCI: Unit 1, lesson 4*) Students will research and analyze data to recommend a design for a new animal crossing at Ledyard student recess areas to find a new place for geese to graze instead of our recess areas. (85 minutes) ***This lesson covers 3-5-ETS1-2, listed at the end of the unit****	• Compare and contrast environments using placard cards, videos, and discussion. • Choose one of the four different environments and list three evidence clues about an organism possibly living in that environment. Have your team or partner make claims and try to guess your environment and organism by reasoning about their learning. (Slide 28 presentation) • Create a Venn diagram displaying environmental changes due to natural events and human activity after investigating environmental changes, resource removal, rocks wearing away, invasive species, wildfire, or landslide • Draw a proposed change to a Canadian Goose population, depicting its adaptations to the environment, and explaining how the Canadian Goose population would adapt to the proposed change.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. **Engaging in Argument from Evidence** **Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).**	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)* LS4.D: Biodiversity and Humans • Populations live in a variety of habitats, and change in those habitats affects the organisms living there.	Systems and System Models • A system can be described in terms of its components and their interactions. --- ***Connections to Engineering, Technology, and Applications of Science*** Interdependence of Engineering, Technology, and Science on Society and the Natural World • Knowledge of relevant scientific concepts and research findings is important in engineering.

Performance Expectation:
3-LS4-4 Biological Evolution: Unity and Diversity

Connections to other DCIs in Third Grade:
3.ESS3.B

Articulation of DCIs across grade-levels:
K.ESS3.A ; K.ETS1.A ; 2.LS2.A ; 2.LS4.D ; 4.ESS3.B ; 4.ETS1.A ; MS.LS2.A ; MS.LS2.C ; MS.LS4.C ; MS.ESS1.C ; MS.ESS3.C

Common Core State Standards Connections:
ELA/Literacy –

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS4-4)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-4)*
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. *(3-LS4-4)*
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. *(3-LS4-4)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS4-4)*
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS4-4)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-LS4-4)*
MP.4	Model with mathematics. *(3-LS4-4)*

Lesson Level Vocabulary: *natural resource, species, organism, bacteria, environment, rain forest, desert, coral reef, temperate forest*

DCI Domain Vocabulary:

Domains are bold:

- **Biological Evolution: Unity and Diversity→Biodiversity in Humans (LS4)**
  Earth, ecosystem, environment, environmental, erosion, habitat, health, human, living, material, medicine, pollution, recycle, recycling, safety, species, survival

Performance Expectation
3-ESS2-2 Earth's Systems

Students who demonstrate understanding can:
Obtain and combine information to describe climates in different regions of the world.
Clarification Statement: N/A
Assessment Boundary: N/A

Lesson Level Photo Analysis: How can you tell what the weather is like for most of the year in a climate?
Lesson Level Phenomenon Video: Different places on Earth have different climates.
note: all photo and video above links to suggested activities below

3-ESS2-2 Suggested Activities	3-ESS2-2 Recommended Formative Assessments
How are Weather and Climate Related? *(TCI: Unit 3, lesson 6*) Students will gather information on the climate of one location (country) of personal choice and the location of Ledyard, CT, and discuss the relationship between weather and climate in groups. (85 minutes) "Climate Post Cards" (NSTA) Students will investigate different climates from around the world. Students will use post cards from around the world from their traveling grandmother and they will have to figure out where she is in the world based on information she provides on her post cards during her travels. (80 minutes)	• Construct a visual display (e.g t-chart) illustrating the comparisons between Ledyard and location (country) of choice. Students can make digital displays (e.g, QR code generator, google slides) for presentation to demonstrate learning. Students will explain how the weather/climate in the country is different or similar to Ledyard's. • Create post cards and have peers in their groups guess where they are in the world, including the location's climate.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information • Obtain and combine information from books and other reliable media to explain phenomena. **Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.**	ESS2.D: Weather and Climate • Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.	Patterns • Patterns of change can be used to make predictions.

Performance Expectation
3-ESS2-2 Earth's Systems

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
MS.ESS2.C ; MS.ESS2.D

Common Core State Standards Connections:

ELA/Literacy -

RI.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)*
RI.3.9	Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
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. (3-ESS2-2)

Mathematics –

MP.2	Reason abstractly and quantitatively. (3-ESS2-2)
MP.4	Model with mathematics. (3-ESS2-2)

Lesson Level Vocabulary: *desert, climate, equator*

DCI Domain Vocabulary

Domains are bold:

- **Earth's Systems→Weather and Climate (ESS2)**
  prediction, flow, glacier, ocean, planet, surface, volcanic eruption, continent, region, volume, air movement, atmosphere, Celsius, characteristics of air, climate, collide, cycle, Fahrenheit, glacial, interconnected, ocean current, rotation, typical, weather condition

Performance Expectation
3-ESS3-1 Earth and Human Activity

Students who demonstrate understanding can:
Make a claim about the merit of a design solution that reduces the impact 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.
Assessment Boundary: N/A

Lesson Level Photo Analysis: How can you make choice to be safe in extreme weather situations?
Lesson Level Phenomenon Video: Tornadoes can cause damage.
note: all photo and video above links to suggested activities below

3-ESS3-1 Suggested Activities	3-ESS3-1 Recommended Formative Assessments
How Does Extreme Weather Affect People? *(TCI: Unit 3, lesson 7*) Students will watch videos of extreme weather and identify what type of extreme weather is shown. Students will research a local natural hazard such as ice dams, flooding, earthquakes and design a model that reduces the impact of the weather-related hazard. (70 minutes)	• Write an email to a friend about how to stay safe during a blizzard, hurricane, thunderstorm, flood, etc. while living in Ledyard. (See TCI slide 28 for reference)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. **Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).**	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. *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)*	Cause and Effect • Cause and effect relationships are routinely identified, tested, and used to explain change. ***Connections to Engineering, Technology, and Applications of Science*** --- **Influence of Engineering, Technology, and Science on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). ***Connections to Nature of Science*** --- **Science is a Human Endeavor** • Science affects everyday life.

Performance Expectation
3-ESS3-1 Earth and Human Activity

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
K.ESS3.B ; K.ETS1.A ; 4.ESS3.B ; 4.ETS1.A ; MS.ESS3.B

Common Core State Standards Connections:

ELA/Literacy -

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

W.3.7 Conduct short research projects that build knowledge about a topic. *(3-ESS3-1)*

Mathematics -

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

EEMP.4 Model with mathematics. *(3-ESS3-1)*

Lesson Level Vocabulary: *wildfire, tornado, dust storm, blizzard, thunder storm, hurricane*

DCI Domain Vocabulary

Domains are bold:

- **Earth and Human Activity→Natural Hazards (ESS3)**
  prediction, descriptive, flood, drought, earthquake, existing, forest fire, form, hurricane, surface, tornado, tsunami, volcanic eruption, everyday life, hazard, lightning rod, natural hazard, region, barrier, climate, designed world, force

Performance Expectation
3-LS4-1 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

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

Clarification Statement: *Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.*

Assessment Boundary: *Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.*

Lesson Level Photo Analysis: What can scientists learn about organisms and the environment of long ago by studying fossils?

Lesson Level Phenomenon Video: We know about types of organisms because of fossils.

note: all photo and video above links to suggested activities below

3-LS4-1 Suggested Activities	3-LS4-1 Recommended Formative Assessments
"What Do Fossils Show About Environments of Long Ago?" *(TCI: Unit 1, lesson 6,)* Students will look at pictures of dinosaur teeth and use these pictures to predict what the dinosaur ate and present these findings to the class. (60 minutes)	• Construct a cause and effect chart demonstrating the match between dinosaur tooth type and diet.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. ***Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.***	**LS4.A: Evidence of Common Ancestry and Diversity** • Some kinds of plants and animals that once lived on Earth are no longer found anywhere. *(Note: moved from K-2)* • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.	**Scale Proportion and Quantity** • Observable phenomena exist from very short to very long time periods. --- ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes consistent patterns in natural systems

Performance Expectation
3-LS4-1 Biological Evolution: Unity and Diversity

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
4.ESS1.C ; MS.LS2.A ; MS.LS4.A ; MS.ESS1.C ; MS.ESS2.B

Common Core State Standards Connections:

ELA/Literacy -

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS4-1)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-1)*
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. *(3-LS4-1)*
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. *(3-LS4-1)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS4-1)*
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. (3-LS4-1)

Mathematics –

MP.2	Reason abstractly and quantitatively. *(3-LS4-1)*
MP.4	Model with mathematics. *(3-LS4-1)*
MP.5	Use appropriate tools strategically. *(3-LS4-1)*
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-LS4-1)*

Lesson Level Vocabulary: *infer, wetlands, fossils, extinct, organism, living, non-living, environment*

DCI Domain Vocabulary

Domains are bold:

- **Biological Evolution: Unity and Diversity→Inheritance of Traits (LS4)**
  exact, exist, growth, parent, sibling, characteristic, offspring, parent-offspring similarity, species, region, code, feature, inherit, inheritance, inherited characteristic, natural phenomenon, reproduce, trait

Performance Expectation
3-ETS1-2

Students who demonstrate understanding can:
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
Clarification Statement*: N/A*
Assessment Boundary*: N/A*

Lesson Level Photo Analysis: What happens to an organism if its environment changes?
Lesson Level Phenomenon Video: Coati finds food in a trash can.
note: all photo and video above links to suggested activities below

3-ETS1-2 Suggested Activities	3-ETS1-2 Recommended Formative Assessments
"What Happens to Organisms in Changing Environments?" *(TCI: Unit 1, lesson 4, pg.24*) Students will research and analyze data to recommend a design for a new animal crossing at Ledyard student recess areas to find a new place for geese to graze instead of our recess areas. (85 minutes) ***On page 11, this lesson also addresses LS4-4, listed previously in the unit***	• Draw a proposed change to a Canadian Goose population, depicting its adaptations to the environment, and explaining how the Canadian Goose population would adapt to the proposed change.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. **Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.**	ETS1.B: Developing Possible Solutions • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.	Influence of Science, Engineering, and Technology on Society and the Natural World • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

Performance Expectation
3-5-ETS1-2 Engineering Design

Connections to 3-5-ETS1.B: Developing Possible Solutions Problems include:
Fourth Grade: 4-ESS3-2

Articulation of DCIs across grade-levels:
K-2.ETS1.A ; K-2.ETS1.B ; K-2.ETS1.C ; MS.ETS1.B ; MS.ETS1.C

Common Core State Standards Connections:

ELA/Literacy -

RI.5.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. *(3-5-ETS1-2)*
RI.5.1	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. *(3-5-ETS1-2)*
RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-5-ETS1-2)*
MP.4	Model with mathematics. *(3-5-ETS1-2)*
MP.5	Use appropriate tools strategically. *(3-5-ETS1-2)*
3-5.OA	Operations and Algebraic Thinking *(3-ETS1-2)*

Lesson Level Vocabulary: *infer, wetlands, fossils, extinct, organism, living, non-living, environment*

DCI Domain Vocabulary

Domains are bold:

- **Engineering Design→Developing Possible Solutions (ETS1)**
  diagram, engineer, engineering, physical model, diorama, existing, design problem, design process, design solution, designed, operate, peers, replicable experiment, reproducible result

Ledyard Next Generation Science Standards Grade 3

Unit 2: The Study of Organism Life and Survival

(34 days in Second Trimester December-March)

Anchoring Phenomenon	
Monarch Butterfly Labrador Retriever Puppies Watered Basil Plant	
Compelling Questions	**Supporting Questions**
What causes differences between organisms? **What affects the survival of an organism?**	• What are the life cycles of plants? • What are the life-cycles of animals with backbones? • Why do offspring look similar to their parents? • How does the environment affect the traits of plants and animals? • Where do organisms live? • How could you find whales in a desert?
Storyline	**Possible Student Misconceptions:**
Third graders will build an understanding of how organisms are different, organism life cycles, and how organisms survive.	All organisms have the same needs.

Unit 2: The Study of Organism Life and Survival Overview

Performance Expectations	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• **3-LS1-1** • **3-LS3-1** • **3-LS3-2** • **3-LS4-3** • **3-LS2-1** • **3-LS4-2** • **3-ESS2-1** • **3-5 ETS1-1** *Teacher Note: Teacher Note: All the Performance Expectations above will be covered this unit and can be worked on concurrently. All Science and Engineering Practices and Crosscutting Concepts in bold are written in the Performance Expectations above. The italicized practices and crosscutting concepts, although not mentioned specifically, may be incorporated additionally in any science lesson at any time.*	• 1: Asking Questions and Defining Problems • **2: Developing and Using Models** • *3: Planning and Carrying Out Investigations* • **4: Analyzing and Interpreting Data** • *5: Using Mathematical Computational Thinking* • **6: Constructing Explanations and Designing Solutions** • **7: Engaging in Argument from Evidence** • *8: Obtaining, Evaluating, and Communicating Information*	**EARTH AND SPACE SCIENCE** • **LS1 From Molecules to Organisms: Structure and Processes** -LS1.B: Growth and Development of Organisms • **LS2 Ecosystems: Interactions, Energy and Dynamics** -LS2.D: Social Interactions and Group Behavior • **LS3 Heredity: Inheritance and Variation of Traits** -LS3.A: Inheritance of Traits -LS3.B: Variation of Traits • **LS4 Biological Evolution** -LS4.B: Natural Selection -LS4.C: Adaptation **LIFE SCIENCE** • **ESS2 Earth's Systems** -ESS2.D: Weather and Climate **ENGINEERING, TECHNOLOGY AND THE APPLICATION OF SCIENCE** • **ETS1 Engineering Design** -ETS1.A :Defining and Delimiting Engineering Problems	• **1: Patterns** • **2: Cause and Effect** • *3: Scale, Proportion and Quantity* • *4: Systems and System Models* • *5: Energy and Matter* • *6: Structure and Function* • **7: Stability and Change**

Performance Expectation
3-LS1-1 Ecosystems: Interactions, Energy and Dynamics

Students who demonstrate understanding can:
Develop models to describe that organisms have unique and diverse life cycles but all have 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.*

Lesson Level Photo Analysis: How does the fruit of a plant help it to reproduce? What are the parts of the skeleton?
Lesson Level Phenomenon Video: Some plants, like this tomato plant, form fruits with seeds inside. Animals like ducks or birds hatch from eggs.
note: all photo and video above links to suggested activities below

3-LS1-1 Suggested Activities	3-LS1 -1 Recommended Formative Assessments
What are the Life Cycles of Plants? *(TCI: Unit 4, lesson 5*) Students will develop models to describe that organisms have unique and diverse life cycles, depicting the commonalities of birth, growth, reproduction, and death. (85 minutes) What are the Life Cycles of Animals with Backbones? *(TCI: Unit 4, lesson 6*) Students will develop models to describe that organisms have unique and diverse life cycles, depicting the commonalities of birth, growth, reproduction, and death. (175 minutes) "Plant Life Cycles" DE Video (segments 1-6, and 8). Students will watch a video and analyze the life cycles of plants in a garden.	• Draw and label the life cycle of a sunflower from "Story of a Sunflower". • Draw and label the life cycle of the chosen animal to create "Story of a (chosen wild animal with a backbone that lives in Ledyard)".

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop models to describe phenomena. **Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.** --- ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** • Science findings are based on recognizing patterns. phenomena.	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.	Patterns • Patterns of change can be used to make predictions.

Performance Expectation
3-LS1-1 Ecosystems: Interactions, Energy and Dynamics

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
MS.LS1.B

Common Core State Standards Connections:

ELA/Literacy -

RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). *(3-LS1-1)*

SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. *(3-LS1-1)*

Mathematics -

MP.4 Model with mathematics. *(3-LS1-1)*

3.NBT Number and Operations in Base Ten *(3-LS1-1)*

3.NF Number and Operations—Fractions *(3-LS1-1)*

Lesson Level Vocabulary: *life span, fruit, flower, life cycle, seed, metamorphosis, vertebrate*

DCI Domain Vocabulary

Domains are bold:

- **Ecosystems: Interactions, Energy and Dynamics→Growth and Development of Organisms (LS1)**
  adult, behavior, growth, life cycle, mate, nectar, parent, plant growth, pollen, predator, shelter, behavior patterns, characteristic, drought, herd, offspring, species, existence, reproduction, unique

Performance Expectation
3-LS3-1 Heredity: Inheritance and Variation of Traits

Students who demonstrate understanding can:
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that a 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.*

Lesson Level Photo Analysis: How are kittens alike and different from their parents?
Lesson Level Phenomenon Video: Baby animals look like their parents but not like another type of animals' parents.
note: all photo and video above links to suggested activities below

3-LS3-1 Suggested Activities	3-LS3-1 Recommended Formative Assessments
Why Do Offspring Look Similar to Their Parents? (*TCI Unit 4, Lesson 1)* Students will analyze a set of images of animals that live in Ledyard and match their offspring using the comparison of species traits to complete the match. (65 minutes)	• Communicate correct match of offspring to parents.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. **Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.**	**LS3.A: Inheritance of Traits** • Many characteristics of organisms are inherited from their parents. **LS3.B: Variation of Traits** • Different organisms vary in how they look and function because they have different inherited information.	**Stability and Change** • Similarities and differences in patterns can be used to sort and classify natural phenomena.

Performance Expectation
3-LS2-1 Ecosystems: Interactions, Energy and Dynamics

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
1.LS3.A ; 1.LS3.B ; MS.LS3.A ; MS.LS3.B

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1)
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS3-1)*
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. (3-LS3-1)
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS3-1)*
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS3-1)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-LS3-1)*
MP.4	Model with mathematics. (3-LS3-1)
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-LS3-1)*

Lesson Level Vocabulary: *inherited traits, offspring, species, trait*

DCI Domain Vocabulary

Domains are bold:

- **Ecosystems: Interactions, Energy and Dynamics→Inheritance of Traits; Variation of Traits (LS3)**
  exact, exist, growth, parent, sibling, characteristic, offspring, parent-offspring-similarity, species, region, code, feature, inherit, inheritance, inherited characteristic, natural phenomenon, reproduce, trait, individual differences, diet, population, inheritable, stunt

Performance Expectation
3-LS3-2 Earth's Systems

Students who demonstrate understanding can:
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.*
Assessment Boundary*: N/A*

Lesson Level Photo Analysis: **What traits does a plant have?**
Lesson Level Phenomenon Video: **Plants will die if they do not have enough water.**
note: all photo and video above links to suggested activities below

3-LS3-2 Suggested Activities	3-LS3-2 Recommended Formative Assessments
How Does the Environment Affect Traits? (TCI Unit 4, lesson 2) Students will analyze a series of photographs showing plants and animals, including humans, in their environments. They will use visual clues in each image to explain how an organism's traits can be impacted by the environment. (55 minutes) **"Ways Animals Adapt to Environments"** (*Discovery Education video*) Students will watch a video and analyze how raccoons are adapting to environments where humans have taken over their habitat.	• Flowchart explaining inherited traits and environmental impact(s) on inherited traits. • Create a cause and effect picture depicting an environment impacting a plant or an animal trait • Compare and contrast the outcome of each environmental effect on the plant(s) after observing two plants in different environments (e.g. one inside and one outside; one watered, one not watered, etc.)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions • Use evidence (e.g., observations, patterns) to support an explanation. ***Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.***	**LS3.A: Inheritance of Traits** • 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** • The environment also affects the traits that an organism develops.	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change.

Performance Expectation
3-LS3-2 Earth's Systems

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
MS.LS1.B

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-2)
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS3-2)*
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. *(3-LS3-2)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-2)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS3-2)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-LS3-2)*
MP.4	Model with mathematics. *(3-LS3-2)*
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-LS3-2)*

Lesson Level Vocabulary: *learned behavior, environment*

DCI Domain Vocabulary

Domains are bold:

- **Ecosystems: Interactions, Energy and Dynamics→Inheritance of Traits; Variation of Traits (LS3)**
  exact, exist, growth, parent, sibling, characteristic, offspring, parent-offspring-similarity, species, region, code, feature, inherit, inheritance, inherited characteristic, natural phenomenon, reproduce, trait, individual differences, diet, population, inheritable, stunt

Performance Expectation
3-LS4-3 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:
Construct an argument with evidence that in a particular habitat some organisms can survive well, some can 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.*
Assessment Boundary*: N/A*

Lesson Level Photo Analysis: What are other environments where organisms live and survive well?
Lesson Level Phenomenon Video: Living things live in different places.
note: all photo and video above links to suggested activities below

3-LS4-3 Suggested Activities	3-LS4-3 Recommended Formative Assessments
Where Do Organisms Live? *(TCI: Unit 1, lesson 1*) ***this lesson has already been used for LS4-4 in unit 1, but covers this material.*** (100 minutes) "Where Can You Find Whales in A Desert" (*Mystery Science Third Grade Animals Through Time Mystery 1: Habitats and Environmental Change)* Students will investigate changing environments on Earth over time and try to match a fossil with its environment of origin. (45 minutes)	• Make a claim as to what would happen if Rocky Neck State Park closed when a raccoon population lives and thrives there.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Construct an argument with evidence. ***Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).***	LS4.C: Adaptation • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.	Cause and Effect •Cause and effect relationships are routinely identified and used to explain change.

Performance Expectation
3-LS4-3 Biological Evolution: Unity and Diversity

Connections to other DCIs in Second Grade:
3.ESS2.D

Articulation of DCIs across grade-levels:
K.ESS3.A ; 2.LS2.A ; 2.LS4.D ; MS.LS2.A ; MS.LS4.B ; MS.LS4.C ; MS.ESS1.C

Common Core State Standards Connections:

ELA/Literacy -

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS4-3)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-3)*
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. *(3-LS4-3)*
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-3)
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS4-3)*
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS4-3)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-LS4-3)*
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 scaled bar graphs. *(3-LS4-3)*

Lesson Level Vocabulary: *organism, bacteria, environment, rain forest*

DCI Domain Vocabulary

Domains are bold:

- **Biological Evolution: Unity and Diversity→Adaptation (LS4)**
  survival, survival of organisms, flood, characteristic, drought, ecosystem, habitat, species, extinct, extinction, population, barrier, reproduce, reproduction, trait

Performance Expectation
3-LS2-1 Ecosystems: Interactions, Energy and Dynamics

Students who demonstrate understanding can:
Construct an argument that some animals form groups that help members survive.
Clarification Statement: *N/A*
Assessment Boundary*: N/A*

Lesson Level Photo Analysis: What are the advantages to an organism living in a group?
Lesson Level Phenomenon Video: Some bison live in groups. Some fish swim in schools.
note: all photo and video above links to suggested activities below

3-LS2-1 Suggested Activities	3-LS2-1 Recommended Formative Assessments
How Does Living in a Group Help Some Animals Survive *(TCI: Unit 1, lesson 2)* Students will investigate how a school of fish protect themselves. (115 minutes)	• Graph data for number of fish caught • Make a claim using your graph as evidence, as to why fish survive better in schools. • List and compare three benefits of animals that live in groups and live alone.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Construct an argument with evidence, data, and/or a model. ***Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).***	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)*.	Cause and Effect • Cause and effect relationships are routinely identified and used to explain change.

Performance Expectation
3-LS2-1 Ecosystems: Interactions, Energy and Dynamics

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
1.LS1.B ; MS.LS2.A

Common Core State Standards Connections:

ELA/Literacy -

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS2-1)*
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. *(3-LS2-1)*
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1)

Mathematics -

MP.4	Model with mathematics. (3-LS2-1)
3.NBT	Number and Operations in Base Ten. (3-LS2-1)

Lesson Level Vocabulary: *social animal, prey*

DCI Domain Vocabulary

Domains are bold:

- **Biological Evolution: Unity and Diversity→Social Interactions and Group Behavior (LS2)**
  behavior mimic, pollinate, pollination, predatory, survival, migrate, ecosystem, flock, group behavior, herd, membership, species, swarm, population, competitive, cooperative, cope, organism

Performance Expectation
3-LS4-2 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:
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.*
Assessment Boundary*: N/A*

Lesson Level Photo Analysis: Why does a cheetah try to catch a gazelle?
Lesson Level Phenomenon Video: Most squirrels match their surroundings. It is very rare to find a pure white squirrel.
note: all photo and video above links to suggested activities below

3-LS4-2 Suggested Activities	3-LS4-2 Recommended Formative Assessments
Why Do Some Members of A Species Survive and Not Others *(TCI: Unit 4, lesson 4)* Students will look at three different habitats of moths to keep data as to which moths were caught more and how the adaptations of the moths affected whether the moths were caught. (85 minutes)	• Write a short essay after the moth simulation using evidence to explain differences in a trait can help an organism survive and reproduce. Include what would happen if different species of moths were equally likely to survive in the wild.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information • Use evidence (e.g., observations, patterns) to construct an explanation. ***Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.***	LS4.B: Natural Selection • Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.	Cause and Effect • Cause and effect relationships are routinely identified and used to explain change.

Performance Expectation
3-LS4-2 Biological Evolution: Unity and Diversity

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
MS.LS2.A ; MS.LS3.B ; MS.LS4.B

Common Core State Standards Connections:

ELA/Literacy -

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS4-2)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-2)*
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. *(3-LS4-2)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-2)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS4-2)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-LS4-2)*
MP.4	Model with mathematics. *(3-LS4-2)*
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 scaled bar graphs. *(3-LS4-2)*

Lesson Level Vocabulary: *survive, reproduce, camouflage, mate*

DCI Domain Vocabulary

Domains are bold:

- **Biological Evolution: Unity and Diversity→Natural Selection (LS4)**
  behavior, mate, parent, predator, survival, camouflage, characteristic, coloration, offspring, species, population, advantage, competition, inheritance, reproduce, reproduction, resource, trait, variety

Performance Expectation
3-ESS2-1 Earth's Systems

Students who demonstrate understanding can:
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
Clarification Statement: *Examples of data could include average temperature, precipitation, and wind direction.*
Assessment Boundary: *Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.*

Lesson Level Photo Analysis: What forms of water are there when a storm cloud is present?
Lesson Level Phenomenon Video: The weather is different on different days.
note: all photo and video above links to suggested activities below

3-ESS2-1 Suggested Activities	3-ESS2-1 Recommended Formative Assessments
What Makes Weather? *(TCI: Unit 3, lesson 1*) Students will look at backdrop scenes depicting different to identify certain aspects of weather like temperature, wind, and precipitation, to create a movie clip. (105 minutes) How Can We Predict It's Going to Storm? (Mystery Science Third Grade Stormy Skies Mystery 2: How Can We Predict It's Going to Storm?) Students watch a video to track weather and analyze it, graph it and make predictions. Students will make their own "Storm Spotter Guide". (60 minutes)	• Record weather using weatherunderground.com with Ledyard weather during the day and during the night for one day and write how the weather changed. • Plan a trip to NYC in the spring after analyzing two years of previous weather data from NYC in the spring.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data •Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. ***Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.***	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.	Patterns • Patterns of change can be used to make predictions.

Performance Expectation
3-ESS2-1 Earth's Systems

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
K.ESS2.D ; 4.ESS2.A ; 5.ESS2.A ; MS.ESS2.C ; MS.ESS2.D

Common Core State Standards Connections:
ELA/Literacy – *N/A*

Mathematics -

MP.2	Reason abstractly and quantitatively. (3-ESS2-1)
MP.4	Model with mathematics. (3-ESS2-1)
MP.5	Use appropriate tools strategically. *(3-ESS2-1)*
3.MD.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.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-ESS2-1)

Lesson Level Vocabulary: atmosphere, temperature, weather, water vapor, humidity

DCI Domain Vocabulary

Domains are bold:

- **Earth's Systems→Weather and Climate (ESS2)**
  area, prediction, space, precipitation, flow, glacier, ocean, planet, surface, volcanic eruption, continent, region, volume, air movement, atmosphere, Celsius, characteristics of air, climate, collide, cycle, Fahrenheit, glacial, interconnected, ocean current, rotation, typical, weather condition

Performance Expectation
3-5-ETS1-1 Engineering Design

Students who demonstrate understanding can:
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
Clarification Statement: N/A
Assessment Boundary: N/A

Lesson Level Photo Analysis: How can wind cause damage?
Lesson Level Phenomenon Video: The wind can blow away your hat or even a roof.
note: all photo and video above links to suggested activities below

3-5-ETS1-1 Suggested Activities	3-5-ETS1-1 Recommended Formative Assessments
How Can You Keep A House From Blowing Away During a Windstorm? (*Mystery Science Third Grade Stormy Skies Mystery 4: How Can You Keep A House From Blowing Away During A Windstorm?)* Students will explore various natural hazards such as tornadoes and hurricanes. They will design multiple solutions to keep a house from blowing away in a high windstorm. (55 minutes)	• Design a windproof house.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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. **Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.**	ETS1.A: Defining and Delimiting Engineering Problems • Possible solutions to a problem are limited by 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.	Influence of Science, Engineering, and Technology on Society and the Natural World • People's needs and wants change over time, as do their demands for new and improved technologies.

Performance Expectation
3-5-ETS1-1 Engineering Design

Connections to other DCIs in Third Grade:
Fourth Grade: 4-PS3-4

Articulation of DCIs across grade-levels:
K-2.ETS1.A ; MS.ETS1.A ; MS.ETS1.B

Common Core State Standards Connections:

ELA/Literacy -

W.5.7	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1)
W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. *(3-5-ETS1-1)*
W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. *(3-5-ETS1-1)*

Mathematics –

MP.2	Reason abstractly and quantitatively. *(3-5-ETS1-1)*
MP.4	Model with mathematics. *(3-5-ETS1-1)*
MP.5	Use appropriate tools strategically. *(3-5-ETS1-1)*
3-5.OA	Operations and Algebraic Thinking *(3-ETS1-1)*

Lesson Level Vocabulary: *hurricane, tornado*

DCI Domain Vocabulary

Domains are bold:

- **Engineering Design→Defining and Delimiting Engineering Problems (ETS1)**
  engineer, engineering, material, challenge, health, pollution, cost, situation, climate, design problem, design solution, designed world, feature, improved, operate, proposal, question formulation, resource, success, successful, global, local, natural resource, requirement, societal, supply, testable

Ledyard Next Generation Science Standards Grade 3

Unit 3: The Study of Movement and Interaction of Objects

(22 days in Third Trimester April-June)

Anchoring Phenomenon	
Larger magnets can pick up larger objects than smaller ones.	
Compelling Questions	**Supporting Questions**
How do objects affect the motion of other objects?	• *What do forces do?* • *What happens when forces are balanced or unbalanced?* • *How can you predict patterns of motion?* • *What can magnetic forces do?* • *What can electric forces do?*
Storyline	**Possible Student Misconceptions:**
Third graders will build an understanding concerning the cause and effect relationships between objects when they interact and move.	All metals are attracted to magnets.

Unit 3: The Study of Movement and Interaction of Objects Overview (April-June)

Performance Expectations	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• **3-PS2-1** • **3-PS2-2** • **3-PS2-3** • **3-PS2-4** • **3-5 ETS1-2** *Teacher Note: Teacher Note: All the Performance Expectations above will be covered this unit and can be worked on concurrently. All Science and Engineering Practices and Crosscutting Concepts in bold are written in the Performance Expectations above. The italicized practices and crosscutting concepts, although not mentioned specifically, may be incorporated additionally in any science lesson at any time.*	• **1: Asking Questions and Defining Problems** • *2: Developing and Using* Models • **3: Planning and Carrying Out Investigations** • *4: Analyzing and Interpreting Data* • *5: Using Mathematical Computational Thinking* • *6: Constructing Explanations and Designing Solutions* • *7: Engaging in Argument from Evidence* • *8: Obtaining, Evaluating, and Communicating Information*	**ENGINEERING, TECHNOLOGY AND THE APPLICATION OF SCIENCE** • **ETS1 Engineering Design** -ETS1.C: Optimizing the Design Solution **PHYSICAL SCIENCE** • **PS2 MOTION AND STABILITY: FORCES AND INTERACTIONS** -PS2.A: Forces and Motion -PS2.B: Types of Interactions	• **1: Patterns** • **2: Cause and Effect** • *3: Scale, Proportion and Quantity* • *4: Systems and System Models* • *5: Energy and Matter* • *6: Structure and Function* • *7: Stability and Change*

Performance Expectation
3-PS2-1 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

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; balanced forces pushing on a box from both sides will be produce any motion at all.

Assessment Boundary: 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.

Lesson Level Photo Analysis: What do you think will happen to a baseball's motion when someone catches it in his or her glove?
What will happen in an arm wrestling contest if one person pushes with more force than the other?

Lesson Level Phenomenon Video: When a ball is thrown at some tin cans, some cans fall but other cans do not.
In a tug-of-war, you might pull in one direction, but end up moving in the other direction.

note: all photo and video above links to suggested activities below

3-PS2-1 Suggested Activities	3-PS2-1 Recommended Formative Assessments
What Do Forces Do? (TCI Unit 2, Lesson 1) Students will observe moving objects, describing their position and motion. Then, identify the forces acting on the object and how these forces change the object's motion. (85 minutes) What Happens When Forces are Balanced or Unbalanced?" (TCI Unit 2, Lesson 2) Students will investigate each force acts on one particular object and has both strength and a direction. (115 minutes)	• Write and illustrate a story about how you pass a soccer ball to your friend. Include you and your friend before you pass the ball, the direction of force you kick the ball with, and whether the kick is a push or a pull. Describe what your friend does to stop the ball, and what happens to the speed of the ball.

Science and 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. ***Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.*** ***Connections to Nature of Science*** **Scientific Investigations Use a Variety of Methods** • Science investigations use a variety of methods, tools, and techniques.	**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.) **PS2.B: Types of Interactions** • Objects in contact exert forces on each other.	**Cause and Effect** • Cause and effect relationships are routinely identified.

Performance Expectation
3-PS2-1 Motion and Stability: Forces and Interactions

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
K.PS2.A ; K.PS2.B ; K.PS3.C ; 5.PS2.B ; MS.PS2.A ; MS.ESS1.B ; MS.ESS2.C

Common Core State Standards Connections*:*

ELA/Literacy --

RI.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)*
W.3.7	Conduct short research projects that build knowledge about a topic. (3-PS2-1)
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. (3-PS2-1

Mathematics--

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

Lesson Level Vocabulary: *motion, position, force, unbalanced forces, balanced forces, gravity*

DCI Domain Vocabulary

Domains are bold:

- **Motion and Stability: Forces and Interactions→Forces and Motion; Types of Interactions (PS2)**
  flow, lever arm, magnet, pulley, force, exert, store, transfer

Performance Expectation
3-PS2-2 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:

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 in a swing, a ball rolling back in forth in a bowl, and two children on a see-saw.

Assessment Boundary: *Assessment does not include technical terms such as a period and frequency.*

Lesson Level Photo Analysis: What pattern do swings move?

Lesson Level Phenomenon Video: A carnival ride swings forward and backward over and over again.

note: all photo and video above links to suggested activities below

3-PS2-2 Suggested Activities	3-PS2-2 Recommended Formative Assessments
How Can You Predict Patterns of Motion? (TCI Unit 2, Lesson 3) Students will work in groups to observe and measure patterns of motion. (115 minutes)	• Analyze amusement park rides to show evidence of rides that move in a forward motion. TCI NGSS-Lesson Assessment

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations • Make observations and/or measurements to produce data to serve as the basis for evidence to an explanation of a phenomenon or test a design solution. ***Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.*** - ***Connections to Nature of Science*** **Science Knowledge is Based on Empirical Evidence** • Science findings are based on recognizing patterns.	PS2.A: Forces and Motion • 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.)	Patterns • Patterns of change can be used to make predictions.

Performance Expectation
3-PS2-2 Motion and Stability: Forces and Interactions

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
1.ESS1.A ; 4.PS4.A ; MS.PS2.A ; MS.ESS1.B

Common Core State Standards Connections:
ELA/Literacy

W.3.7	Conduct short research projects that build knowledge about a topic. (3-PS2-2)
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. *(3-PS2-2*

Lesson Level Vocabulary: *predict*

DCI Domain Vocabulary

Domains are bold:

- **Motion and Stability: Forces and Interactions→Forces and Motion (PS2)**
  change of direction, change of motion, change of speed, contact, flow, unit, device, surrounding, applied force, balanced force, climate, collide, collision, controlled, force, force strength, friction, future motion, past motion, position over time, sum, unbalanced force, independent, measurement of motion, natural resource, conservation, electric current, exert, interaction, transfer

Performance Expectation
3-PS2-3 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:
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 paperclips, 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 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.

Lesson Level Photo Analysis: What forces can cause a crane to lift scrap metal off the ground? What force can cause your hair to stand up?
Lesson Level Phenomenon Video: Magnets can move objects, sometimes without even touching them. Your hair might stick up when riding down a slide.
note: all photo and video above links to suggested activities below

3-PS2-3 Suggested Activities	3-PS2-3 Recommended Formative Assessments
What Can Magnetic Forces Do? (TCI Unit 2, Lesson 4) Students will investigate magnets and how they are used in technology to solve problems. (105 minutes) What Can Electric Forces Do? (TCI Unit 2, Lesson 5) Students will investigate static electricity. (115 minutes)	• Solve a problem using magnets. For example, design a tool that uses magnets to keep a door closed.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying out Investigations • Ask questions that can be investigated based on patterns such as cause and effect relationships. ***Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.***	PS2.B: Types of Interactions • 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.	Cause and Effect • Cause and effect relationships are routinely identified, tested, and used to explain change.

Performance Expectation
3-PS2-3 Motion and Stability: Forces and Interactions

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
MS.PS2.B

Common Core State Standards Connections:

ELA /Literacy –

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

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. (3-PS2-3)

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). *(3-PS2-3)*

SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. *(3-PS2-3)*

Mathematics —
N/A

Lesson Level Vocabulary: *electromagnet, permanent magnet, magnetic force, electric force, static electricity*

DCI Domain Vocabulary

Domains are bold:

- **Motion and Stability: Forces and Interactions→Types of Interactions (PS2)**
  contact, magnet, magnetic, device, battery, charge attraction, electric, electrically charged, force, magnetic attraction, properties, wire, conductor, current, electric current, electrical energy, exert, gravitational, interaction, magnetic force, magnetic repulsion, transfer

Performance Expectation
3-PS2-4 Motion and Stability: Forces and Interactions

Students who demonstrate understanding can:
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 a door shut and creating a device to keep two moving objects from touching each other*
Assessment Boundary: *N/A*

Lesson Level Photo Analysis: What forces can cause a crane to lift scrap metal off the ground? What force can cause your hair to stand up?
Lesson Level Phenomenon Video: Magnets can move objects, sometimes without even touching them. Your hair might stick up when riding down a slide.
note: all photo and video above links to suggested activities below

3-PS2-4 Suggested Activities	3-PS2-4 Recommended Formative Assessments
Performance Assessment: Designing Plenty-O-Fish Game Students will design a fishing game for a carnival. (100 minutes)	• Students will successfully complete their fishing game design and evaluate themselves using the Performance Assessment Rubric. Students will conference with the teacher to discuss their project outcome and evaluation. Students will discuss and/or write about how their design could be improved.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems • Define a simple problem that can be solved through the development of a new or improved object or tool. **Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.**	PS2.B Types of Interactions • 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.	**N/A** --- ***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.

Performance Expectation
3-PS2-4 Motion and Stability: Forces and Interactions

Connections to other DCIs in Third Grade:
N/A

Articulation of DCIs across grade-levels:
K.ETS1.A ; 4.ETS1.A ; MS.PS2.B

Common Core State Standards Connections:

ELA /Literacy -
N/A

Mathematics –
N/A

Lesson Level Vocabulary: *electromagnet, permanent magnet, magnetic force, electric force, static electricity*

DCI Domain Vocabulary

Domains are bold:

- **Motion and Stability: Forces and Interactions→Types of Interactions (PS2)**
  contact, magnet, magnetic, device, battery, charge attraction, electric, electrically charged, force, magnetic attraction, properties, wire, conductor, current, electric current, electrical energy, exert, gravitational, interaction, magnetic force, magnetic repulsion, transfer

Performance Expectation
3-5 ETS1-3 Engineering Design

Students who demonstrate understanding can:
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Clarification Statement: N/A
Assessment Boundary: N/A

Lesson Level Photo Analysis: What forces can cause a crane to lift scrap metal off the ground? What force can cause your hair to stand up?
Lesson Level Phenomenon Video: Magnets can move objects, sometimes without even touching them. Your hair might stick up when riding down a slide.
note: all photo and video above links to suggested activities below

3-5 ETS1-3 Suggested Activities	3-5 ETS1-3 Recommended Formative Assessments
Performance Assessment: Designing Plenty-O-Fish Game Students will design a fishing game for a carnival. (100 minutes)	• Students will successfully complete their fishing game design and evaluate themselves using the Performance Assessment Rubric. Students will conference with the teacher to discuss their project outcome and evaluation. Students will discuss and/or write about how their design could be improved.

Science and 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. **Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.**	ETS1.B: Developing Possible Solutions • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. ETS1.C: Optimizing the Design Solution • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	**N/A**

Performance Expectation
3-5-ETS1-3 Engineering Design

Connections to 3-5-ETS1.B: Developing Possible Solutions Problems include:
Fourth Grade: 4-ESS3-2

Articulation of DCIs across grade-levels:
K-2.ETS1.A ; K-2.ETS1.C ; MS.ETS1.B ; MS.ETS1.C

Common Core State Standards Connections:

ELA/Literacy –

W.5.7	Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3)
W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. *(3-5-ETS1-3)*
W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. *(3-5-ETS1-3)*

Mathematics -

MP.2	Reason abstractly and quantitatively. *(3-5-ETS1-3)*
MP.4	Model with mathematics. *(3-5-ETS1-3)*
MP.5	Use appropriate tools strategically. *(3-5-ETS1-3)*

Lesson Level Vocabulary: *electromagnet, permanent magnet, magnetic force, electric force, static electricity*

DCI Domain Vocabulary

Domains are bold:

- **Engineering Design→Developing Possible Solutions; Optimizing the Design Solution (ETS1)**
  diorama, existing, design problem, design process, design solution, designed, operate, peers, replicable experiment, reproducible result, independent, societal, flow, cost, difficulty, presentation, successful, failure point, independent, perform, collaboratively, prototype, test results, trial