

**Hitchcock Center Fieldtrip Programs
and the Revised Massachusetts Science and
Technology/Engineering Curriculum Framework 2013**

HABITAT STUDIES

(Grades 1-5)

Grade 1: Overview

Describing Patterns

In grade 1, students have more fluency with language, number sense and inquiry skills. This allows students to describe patterns of motion between the sun, moon, and stars in relation to the Earth. From this understanding they can identify seasonal patterns from sunrise and sunset data that will allow them to predict future patterns. Building from their experiences in Pre-K and kindergarten observing and describing daily weather, they can now examine seasonal data of temperature and rainfall to describe patterns over time. Grade 1 students investigate sound and light through various materials. They describe patterns in how light passes through and sounds differ from different types of materials. Based on this they design and build a device to send a signal. Students compare the ways different animals and plants use their body parts and senses to do the things they need to do to grow and survive including typical ways parents keep the young safe so they will survive to adulthood. They notice that though there are differences between plants or animals of the same type, the similarities of behavior and appearance are what allow us to identify them as belonging to a group. Grade 1 students begin to understand the power of patterns to predict future events in the natural and designed world.

Grade 1: Life Science

1-LS1 From Molecules to Organisms: Structures and Processes
1-LS1-1. Use evidence to explain that: a. different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air; and b. plants have roots, stems, leaves, flowers and fruits that are used to take in nutrients, water and air, produce food (sugar), and make new plants. [Assessment Boundary: Descriptions are not expected to include mechanisms.]
1-LS1-2. Obtain information to compare ways in which the behavior of different animal parents and their offspring help the offspring to survive. [Clarification Statement: Examples of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

- Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. (1-LS1-1)

Disciplinary Core Ideas

LS1.A: Structure and Function

- All organisms have body parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.B: Growth and Development of Organisms

- In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

Grade 2: Overview

Wholes and Parts

As students grow in their ability to speak, read, write and reason mathematically, they also grow in their ability to grapple with larger systems and the parts that make them up. In grade 2, students start to look beyond the structures of individual plants and animals to looking at the environment in which the plants and animals live as a provider of the food, water, and shelter that the organisms need. They learn that water is found everywhere on Earth and takes different forms and shapes. They map landforms and bodies of water and observe that flowing water and wind shapes these landforms. Grade 2 students use their observation skills gained in earlier grades to classify materials based on similar properties and functions. They gain experience testing different materials to collect and then analyze data for the purpose of determining which materials are the best for a specific function. They construct large objects from smaller pieces and, conversely, learn that when materials are cut into the smallest possible pieces, they still exist as the same material that has weight. These investigations of how parts relate to the whole provide a key basis for understanding systems in later grades.

Grade 2: Life Science

2-LS2 Ecosystems: Interactions, Energy, and Dynamics	
2-LS2-3(MA). Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live. [Clarification Statement: Animals need food, water, air, shelter, and favorable temperature; plants need sufficient light, water, minerals, favorable temperature and, animals or other mechanisms to disperse seeds.]	
[Note: 2-LS2-1 is included in other standards, including K-LS1-1 and 2-LS2-3(MA).] [Note: 2-LS2-2 from NGSS are not included.]	
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :	
Science and Engineering Practices	<div>Disciplinary Core Ideas</div> <div>LS2.A: Interdependent Relationships in Ecosystems<ul style="list-style-type: none">▪ Animals depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature.▪ Animals depend on plants or other animals for food. They use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food.▪ Plants depend on air, water, minerals (in the soil), and light to grow.▪ Animals can move around, but plants cannot, and they often depend on animals for pollination or to move their seeds around. Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight. (2LS2-3)</div>

Grade 3: Overview

Human Interactions

In grade 3, students develop and sharpen their skills at obtaining, recording and charting, and analyzing data in order to study their environment. They use these practices to study the interactions between humans and earth systems, humans and the environment, and humans and the designed world. They learn that these entities not only interact but influence behaviors, reactions, and traits of organisms. Grade 3 students analyze weather patterns and consider humans' influence and opportunity to impact weather-related events. In life science they study the interactions between and influence of the environment and human traits and characteristics. They use the engineering design process to identify a problem and design solutions that enhance human's interactions with their surroundings and to meet their needs. Students consider the interactions and consequent reactions between objects and forces, including forces that are balanced or not. Students reason and provide evidence to support arguments for the influence of humans on nature and nature on human experience.

Grade 3: Life Science

3-LS1 From Molecules to Organisms: Structures and Processes	
3-LS1-1. Use simple graphical representations to show that species have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen. [Clarification Statement: Examples can include different ways plants and animals are born (e.g., sprout from a seed, born from an egg), grow (e.g., increase in size and weight, produce new part), reproduce (e.g., develop seeds and spores, root runners, mate and lay eggs that hatch) and die (e.g., length of life).] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment of animal life cycles is focused on a comparison of the stages, not on a detailed description of any one organism's cycle, nor the differences of "complete metamorphosis" and "incomplete metamorphosis". Assessment does not include details of human reproduction.]	
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :	
Science and Engineering Practices	Disciplinary Core Ideas
	LS1.B: Growth and Development of Organisms <ul style="list-style-type: none">Plants and animals have unique and diverse life cycles. (3-LS1-1)

3-LS2 Ecosystems: Interactions, Energy, and Dynamics

[Note: 3-LS2-1 from NGSS is not included]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Disciplinary Core Ideas

3-LS3 Heredity: Inheritance and Variation of Traits

3-LS3-1. Provide evidence, including through the analysis of data, that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms. [Clarification Statement: Examples of inherited traits that vary can include the color of fur, shape of leaves, length of legs, and size of flowers.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance nor prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Give examples of characteristics of living organisms that are influenced by both inheritance and the environment. [Clarification Statement: Examples of the environment affecting a characteristic could include normally tall plants grown with insufficient water or light are stunted; a lizard missing a tail due to a predator; and, a pet dog that is given too much food and little exercise may become overweight.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Constructing Explanations and Designing Solutions

- Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)

Disciplinary Core Ideas

LS3.A: Inheritance of Traits

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

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops or has. (3-LS3-2)

3-LS4 Biological Evolution: Unity and Diversity

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction. [Clarification Statement: Examples might include rose bushes of the same species, one with slightly longer thorns than the other which may prevent its predation by deer; and color variation within a species that may provide advantages so one organism may be more likely to survive and therefore more likely to leave offspring such as rock pocket mice. Examples of evidence could include needs and characteristics of the organisms and habitats involved.]

3-LS4-3. Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved.]

3-LS4-4. Analyze and interpret data about changes in the environment in an area and describe how the changes may affect the ability of organisms that live in that area to survive and reproduce. [Clarification Statement: Environmental changes should include changes to landforms, distribution of water, climate, and availability of resources. Changes in the environment could range in time from a season to decades. Data should be provided.] [Assessment Boundary: Assessment is limited to a single environmental change, however, it is understood that environmental changes are complex.]

3-LS4-5(MA). Provide evidence to support a claim that the survival of a population is dependent upon reproduction. [Assessment Boundary: Assessment does not address details of reproduction.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1), (3-LS4-4)

Constructing Explanations and Designing Solutions

- Use evidence (e.g., observations, patterns) to construct an explanation.(3-LS4-2)
- Identify the evidence that

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. (3-LS4-5)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-2)

<p>supports particular points in an explanation. (3-LS4-5)</p> <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none">▪ Construct an argument with evidence. (3-LS4-3)	<p>LS4.D: Biodiversity and Humans</p> <ul style="list-style-type: none">▪ Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

Grade 4: Overview

Matter and Energy

In grade 4, students observe and interpret patterns related to the transfer of matter and energy on earth, in physical interactions, and in organisms. Students learn about energy—its motion, transfer, and conversion—in different physical contexts. Grade 4 students interpret patterns of changes over time as it relates to the deposition and erosion in landscape formation. They study today’s landscapes to provide evidence for past processes. Students learn about a broader set of animal internal and external structures that support life, growth, behavior, and reproduction. They work through the engineering design process, focusing on developing solutions by building, testing, and redesigning prototypes to fit a specific purpose. Each domain relates to the use of matter and energy over time and for specific purposes.

Grade 4: Life Science

4-LS1From Molecules to Organisms: Structures and Processes	
4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. [Clarification Statement: External animal structures might include legs, wings, feathers, trunks, claws, horns and antennae. Animal organs might include eyes, ears, nose, heart, stomach, lung, brain, and skin. Plant structures might include leaves, roots, stems, bark, branches, and flowers.] [Assessment Boundary: Assessment is limited to macroscopic structures.] [Note: 4-LS1-2 from NGSS is not included.]	
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :	
Science and Engineering Practices Engaging in Argument from Evidence <ul style="list-style-type: none">Construct an argument with evidence, data, and/or a model. (4-LS1-1)	Disciplinary Core Ideas LS1.A: Structure and Function <ul style="list-style-type: none">Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Grade 5: Overview

Connections and Relationships in Systems

In grade 5, students model, provide evidence to support arguments, and obtain and display data about relationships and interactions among observable components of different systems. By studying systems grade 5 students learn that objects and organisms do not exist in isolation and that animals, plants and their environments are connected to, interact with, and are influenced by each other. They study the relationships between Earth and other nearby objects in the solar system and the impact of those relationships on patterns of events as seen from Earth. They learn about the relationship among elements of Earth’s systems through the cycling of water and human practices and processes with Earth’s resources. They also learn that matter and energy cycle through plants and animals, and the ecosystems within which they live. An ability to describe, analyze and model observable components of different systems is key to understanding the natural and designed world.

Grade 5: Life Science

5-LS2 Ecosystems: Interactions, Energy, and Dynamics						
5-LS2-1. Develop a model of a food web to describe the movement of matter among producers, primary and secondary consumers, decomposers, and the air and soil in the environment: a. show that plants produce sugars and plant materials; b. show that some animals eat plants for food and other animals eat the animals that eat plants; and c. show that some organisms, including fungi and bacteria, break down dead organisms and recycle some materials back to the air and soil. [Clarification Statement: Emphasis is on matter moving throughout the ecosystem. Waste includes matter in the form of gasses (such as air), liquids (such as water), or solids (such as minerals or nutrients).] [Assessment Boundary: Assessment does not include molecular explanations.]						
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :						
Science and Engineering Practices	<table><tr><th colspan="2">Disciplinary Core Ideas</th></tr><tr><td rowspan="2"></td><td>LS2.A: Interdependent Relationships in Ecosystems<ul style="list-style-type: none">Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. (5-LS2-1)Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. (5-LS2-1)</td></tr><tr><td>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems<ul style="list-style-type: none">Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)</td></tr></table>	Disciplinary Core Ideas			LS2.A: Interdependent Relationships in Ecosystems <ul style="list-style-type: none">Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. (5-LS2-1)Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. (5-LS2-1)	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems <ul style="list-style-type: none">Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)
Disciplinary Core Ideas						
	LS2.A: Interdependent Relationships in Ecosystems <ul style="list-style-type: none">Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. (5-LS2-1)Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. (5-LS2-1)					
	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems <ul style="list-style-type: none">Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)					

