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

LIFE IN A POND

(Grades Pre-K-2)

Pre-K: Overview

The World Around Me

Pre-K students focus on experiencing and making observations of the world around them. They are beginning to learn about their own environment as they observe plants and animals, the moon and the sun, and the daily weather. They experience their world through their senses and body parts and begin to recognize that animals also use their senses and body parts to meet their basic needs. They are given opportunities in their play to investigate pitch and volume, shadow and light, liquids and solids, and how things move. They sort materials by simple observable properties such as texture and color. They share their understanding of these concepts through discussion as they develop their language and quantitative skills. Pre-K students build awareness of the wide variety of natural phenomena and processes in the world around them.

PreK: Life Science

PreK-LS1 From Molecules to Organisms: Structures and Processes	
PreK-LS1-1(MA). Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts. [Clarification Statement: Examples can include comparison of humans having two legs and horses four, but both use legs to move.] **PreK-LS1-2(MA). Recognize that all plants and animals grow and change over time.** **PreK-LS1-3(MA). Explain that most animals have 5 senses they use to gather information about the world around them.** **PreK-LS1-4(MA). Use their five senses in their exploration and play to gather information.**	
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**
Developing and Using Models ▪ Represent (e.g., draw, use blocks, use clay, make a collage) findings. (PreK-LS1-1) **Constructing Explanations/Theories and Evaluating Solutions (Engineering)** ▪ Look for and describe patterns and relationships (PreK-LS1-2), (PreK-LS1-3) **Obtaining, Evaluating, and Talking about Information**	**LS1.A: Structure and Function** ▪ All organisms have external 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, grow, and produce more plants. (PreK-LS1-1)

▪ Document experiences and thinking to communicate with others. (PreK-LS1-4) **Planning and Carrying Out Investigations** ▪ Use their senses and simple tools to observe, gather, and record data (e.g., dictate, draw, photograph, write). (PreK-LS1-4)	**LS1.B: Growth and Development of Organisms** ▪ Plants and animals have predictable characteristics at different stages of development. Plants and animals grow and change. (PreK-LS1-2), (PreK-LS1-3) **LS1.D: Information Processing** ▪ Animals have body parts that capture and convey different kinds of information needed for growth and survival-for example, eyes for light, ears for sounds, and skin for temperature or touch. (PreK-LS1-4)

PreK-LS2 Ecosystems: Interactions, Energy, and Dynamics

PreK-LS2-1(MA). Use evidence from animals and plants to define several characteristics of living things that distinguish them from non-living things.

PreK-LS2-2(MA). Using evidence from the local environment explain how familiar plants and animals meet their needs where they live. [Clarification Statement: Basic needs include water, food, air, shelter, and, for most plants, light. Examples of evidence can include squirrels gathering nuts for the winter and plants growing in the presence of sun and water. The local environment includes the area around the student's school, home, or adjacent community.]

PreK-LS2-3(MA). Give examples from the local environment of how animals and plants are dependent on one another to meet their basic needs.

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
Engaging in Discussion/Argument from Evidence ▪ Support thinking with evidence. (PreK-LS2-1) **Constructing Explanations/Theories and Evaluating Solutions (Engineering)** ▪ Construct theories based in experience about what might be going on. (PreK-LS2-2) ▪ Look for and describe patterns and relationships (PreK-LS2-3)	**LS2.A: Interdependent Relationships in Ecosystems** ▪ 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. 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. (PreK-LS2-2), (PreK-LS2-3) **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** ▪ Organisms obtain the materials they need to grow and survive from the environment. (PreK-LS2-2), (PreK-LS2-3)

PreK-LS3 Variation of Traits

PreK-LS3-1(MA). Use observations to explain that young plants and animals are like but not exactly like their parents. [Clarification Statement: Examples of observations include puppies that look similar but not exactly the same as their parents.]

PreK-LS3-2(MA). Use observations to recognize differences and similarities among themselves and their friends.

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
Engaging in Discussion/Argument from Evidence ▪ Support thinking with evidence. (PreK-LS3-1) **Constructing Explanations/Theories and Evaluating Solutions (Engineering)** ▪ Look for and describe patterns and relationships. (PreK-LS3-1), (PreK-LS3-2)	**LS3.A: Inheritance of Traits** ▪ Young animals are very much, but not exactly, like their parents and also resemble other animals of the same kind. (PreK-LS3-1), (PreK-LS3-2)

Kindergarten: Overview

Reasons for Change

In kindergarten, students build on early experiences observing the world around them as they continue to make observations that are more quantitative in nature and help them identify why some changes occur. Students begin to learn to use these observations as evidence to support a claim through growing language skills. They learn that all animals and plants need food, water, and air to grow and thrive and that the fundamental difference between plants and animals is a plants ability to make its own food. Students build their quantitative knowledge of temperature in relationship to the weather and its effect on different kinds of materials. They observe that the amount of sunlight shining on a surface causes a temperature change and they design a structure to reduce the warming effects of sunlight. They investigate motions of objects by changing the strength and direction of pushes and pulls. They provide examples of plants and animals that can change their environment through their interactions with it. In kindergarten science students begin to identify reasons for changes in some common phenomena.

Kindergarten: Life Science

<table>
<tr><th colspan="2">K-LS1 From Molecules to Organisms: Structures and Processes</th></tr>
<tr><td colspan="2">K-LS1-1. Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants or other animals. Plants make their own food and need light to live and grow.
K-LS1-2(MA). Recognize that all plants and animals have a life cycle: a. most plants begin as seeds, develop and grow, make more seeds, and die; and b. animals are born, develop and grow, produce young, and die.</td></tr>
<tr><td colspan="2">The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:</td></tr>
<tr><th>Science and Engineering Practices</th><th>Disciplinary Core Ideas</th></tr>
<tr><td>Analyzing and Interpreting Data
▪ Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)</td><td>LS1.C: Organization for Matter and Energy Flow in Organisms
▪ All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)</td></tr>
<tr><td colspan="2">Common Core State Standards Connections:
ELA/Literacy –
SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K.LS1-1)</td></tr>
</table>

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	**Disciplinary Core Ideas**
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)	**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)

1-LS3 Heredity: Inheritance and Variation of Traits	
1-LS3-1. Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind. [Clarification Statement: Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]	
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**
Constructing Explanations and Designing Solutions ▪ Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1)	**LS3.B: Variation of Traits** ▪ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

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 *A Framework for K-12 Science Education*:	
Science and Engineering Practices ▪	**Disciplinary Core Ideas** **LS2.A: Interdependent Relationships in Ecosystems** ▪ 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)