TOWER HILL
BOTANIC GARDEN

11 French Drive, P. O. Box 598, Boylston, MA 01505

School and Education Program Catalogue

All programs below are two hours in length and are divided by grade to align with state and school curricula.

Programs for Grade 1, 2

Seasons in Nature

What season are we in and how can we tell?
What clues can we find in nature that tell us the season?

1-ESS1-2. Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature and rainfall or snowfall patterns, and seasonal changes to the environment.

Students will know:

- That the environment changes as the season outside changes.
- That there are four seasons and each season has predictable characteristics.

Students will be skilled at:

- Identifying relationships among seasonal patterns of change.
- Articulating verbally seasonal changes that can be observed outside.

Overview:
Students will read stories and go on a seasonal nature walk to observe what plants look like during that time of year and what animals are active, and will participate in a garden scavenger hunt in one of the gardens or conservatories. Group discussions are facilitated with questions to guide students to make their own conclusions about seasons.

What is a Plant?

What is a plant and are all plants the same?
What does a plant need to live, and how do plants work?

1-LS1-1. Use evidence to explain that plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.
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.

2-LS2-3(MA). Develop and use models to compare how plants depend on their surroundings and other living things to meet their needs in the places they live.

Students will know:

- That all plants have roots, stems and leaves, and that plants need water air and nutrients to survive.
- That plants of the same kind have similar characteristics in their leaves, size, shape and color.
- That plants and animals depend on their surroundings as well as other living things to meet their needs.

Students will be skilled at:

- Identifying the parts of a plant.
- Understanding and listing what plants need to survive
- Comparing similarities and differences between plants of the same and different kind.
- Identifying and giving examples of how plants depend on their surroundings to meet their needs for survival.

Overview:
On this field trip students learn about the parts of a plant by "dissecting" or observing live plants and understanding how they function and what they need to survive. Students hear stories and illustrate a plant's life, make comparisons between different plants on a garden scavenger hunt.

What is an Ecosystem?

What is an ecosystem?

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.
2-LS4-1. Use texts and local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.

Students will know:

- That an ecosystem is an interconnected community of living things and their physical environment.
- That plants and animals depend on their surroundings and other living things to meet their needs for survival.
- That different plants and animals live in different ecosystems that meet their needs.

Students will be skilled at:

- Identifying and describing ways in which a local environment supports plant and animal life.
- Understanding and illustrating examples of interactions within a local ecosystem.
- Comparing different environments and identifying differences in the kinds of living things in different types of areas.

Overview:
To understand and explore ecosystems students will participate in a nature walk along on of the trails at Tower Hill to identify ways in which the environment supports plant life. Students will hear stories about different environments and play a matching game about interactions between living things.

Programs for Grade 3

Life Cycle of a Plant

How do plants grow and change?
What are some examples of different plant life cycles?

3-LS1-1. Different organisms have unique and diverse life cycles. All organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.

Students will know:

- That various plants have unique and diverse life cycles.
- That all plants give birth, grow, reproduce, and die.

Students will be skilled at:

- Drawing the life cycle of various organisms.
- Labeling the stages of a plant's life cycle.
- Articulating verbally and expressing in writing what is happening during a particular stage.
- Identifying the commonalities in life cycles such as birth, death and the differences such as metamorphosis, etc.

Overview:
Students will learn how plants grow and change during their lifecycles through observations of plants outside and stories about the plan life cycle. Students will play a seed matching game and plant their own seed to take home.

Plant Adaptations

How can plants adapt in order to survive and reproduce?
How are some plants well adapted to the environment at Tower Hill while others are not?

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.
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.
3-LS4-4. Interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce.

Students will know:

- that some organisms are equipped with features that allow it to survive well in its environment and reproduce.
- adaptations are characteristics or traits that help organisms survive.
- adaptations are not "instantaneous" but happen over long periods of time.

Students will be skilled at:

- studying various organisms and describing what features allow the organism to survive or not survive in a particular environment.
- recognizing characteristics of organisms that make survival unlikely.

- constructing an argument supported by evidence.

Overview:
Students will explore how plants adapt and survive in different environments as they observe different gardens and trails at Tower Hill. Students will learn about seed as well as aquatic plant adaptions and will explore how plant life would change were the environment to change at Tower Hill.

Programs for Grades 4, 5

Parts of a Plant

What are the parts of a plant?
How do plant structures support plant survival, growth, behavior and reproduction?

4-LS1-1. Construct an argument that plants have internal and external structures that support their survival, growth, behavior, and reproduction.

Students will know:
- That plant structures vary by plant species and habitat.
- That plant structures contribute to the survival and reproduction of the plant.

Students will be skilled at:
- Labeling the parts of a flowering plant.
- Articulating verbally and expressing in writing the purpose of certain plant structures such as leaves, roots, stems and bark.
- Identifying the commonalities and differences between plant structures of various plant species and types.

Overview:
On this field trip students will explore the function of the different parts of a plant and will make comparisons between different plant structures. Through botanical drawing students label and understand the function of different plant structures. In addition, students compare similarities and differences in structures between different plants on a garden scavenger hunt and a walk to Tower Hill Summit.

Soil and Weathering

What is soil and how is it made?
How does weathering and erosion impact soil and plants?

4-ESS2-1. Make observations and collect data to provide evidence that rocks, soils and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion.

Students will know:
- That soil is comprised of sand, silt and clay particles that are broken down through weathering and erosion.
- That soil characteristics are determined by geography, climate, human impact and parent material.

- Differences between sand, gravel and soil.

Students will be skilled at:

- Describing the characteristics and properties of soil.
- Identifying the commonalities and differences between soils in different places.
- Describing the relationship between soil and weathering and erosion.

Overview:
On this field trip students will explore soil and what soil is composed of by studying soil components with hand lenses and sifters, and observing the properties of soil through a variety of experiments. On an interpretive walk on one of Tower Hill's nature trails students will explore ways in which weather and erosion impact soil composition.

Matter Movement in Ecosystems

How does matter move through the ecosystems at Tower Hill?
What is a plant's role in the transfer of energy through an ecosystem?

5-LS2-1. Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment.

Students will know:

- That plants produce sugars and plant materials, and that animals eat plants or other animals for food and this involves a transfer of matter between the producer and the consumer.
- That some organisms, including fungi and bacteria, break down dead organisms and recycle some materials back to the air and soil.

Students will be skilled at:

- Illustrating and explaining transfer of matter between producers, consumers and decomposers in an environment.
- Articulating verbally and expressing in writing the purpose producers, consumers and decomposers in the environment.

Overview:
Students explore the ways in which matter moves through ecosystems by exploring examples of producers, consumers and decomposers from our gardens and landscapes. Students will gather information to then illustrate and map the relationships and transfer of energy among organisms and to understand the role of plants and vegetation in an ecosystem.

Programs for Grades 6, 7, 8

Plant Adaptations for Survival

How do plants and animals increase the probability of successful reproduction of plants?

7.MS-LS1-4. Construct an explanation based on evidence for how characteristic specialized plant structures increase the probability of successful reproduction of plants.

Students will know:

- That plants have specialized structures and adaptations that increase the probability of successful reproduction.
- That animal behaviors can increase the probability of successful plant reproduction.
- That the cell wall provides structural support for plants

Students will be skilled at:

- Identifying and explaining examples of ways in which plants have adapted to increase the probability of reproduction.
- Articulating verbally and in writing what makes plants unique.

Overview:

Students explore several examples of ways in which plants adapt to survive in nature: through seed dispersal, pollination and weather.

Activity:

Students will explore seed dispersal and the roles of bee pollination to understand how plant and animal adaptions increase the probability of successful plant reproduction. Through making observations in the gardens at Tower Hill students will learn about how plants adapt to survive and what makes plants unique within ecosystems.

Ecosystem Exploration

What are the relationships among organisms in an ecosystem like?

7.MS-LS2-2. Describe how relationships among and between organisms in an ecosystem can be competitive, predatory, parasitic, and mutually beneficial and that these interactions are found across multiple ecosystems.
7.MS-LS2-3. Develop a model to describe that matter and energy are transferred among living and nonliving parts of an ecosystem and that both matter and energy are conserved through these processes.
7.MS-LS2-4. Analyze data to provide evidence that disruptions (natural or human-made) to any physical or biological component of an ecosystem can lead to shifts in all its populations. Clarification S

Students will know:

- That organisms in an ecosystem share a variety of relationships between each other, including competitive, predatory, parasitic and mutually beneficial relationships.
- That matter and energy are transferred among living and nonliving organisms within an ecosystem.
- That cycling of matter includes the role of photosynthesis, cellular respiration, and decomposition, as well as transfer among producers, consumers (primary, secondary, and tertiary), and decomposers.

Students will be skilled at:

- Illustrating the relationship between living organisms in an ecosystem in a food chain.
- Illustrating transfer of matter and energy between organisms in an ecosystem in a food web.
- Describing verbally and in writing the relationships among organisms in an ecosystem at Tower Hill.

Overview:

Students will explore the relationships between organisms in the gardens and landscapes of Tower Hill through defining and different relationships between organisms and then exploring the plants and animals in one of the Tower Hill gardens. Using information gathered through observation, students will illustrate the transfer of matter and energy in an ecosystem at Tower Hill.