SCIENCE·3D

LIFE IN THE TREES

SCIENCE PERFORMANCE EXPECTATIONS AND DISCIPLINARY CORE IDEAS

In the Middle School Mission, students will address the general topics below. For a complete list of NGSS standards covered in each segment of the mission, continue reading after the general standards. *Note: Be sure to complete the **Mission Reader** and **Mission Research** before viewing the full **Mission Video**. Explore How to Use Science 3D to get suggestions on how to pace the mission and options for the order of activities. Math and Language Arts standards will be added shortly.*

- In the **Mission Reader**, *Life in the Trees,* students will learn about structure and function of animals and plants (from cells to whole bodies), classification of animals, plant reproduction, and sensory systems and information processing. They will also explore interactions in ecosystems and how scientists study animals in the rainforest canopy.
- During **Mission Research**, students will explore system models ranging from engineering and body systems, to ecological systems.
- In the **Science Mission**, students will develop hypotheses and predictions and test them using data that they graph and analyze. They will investigate digestion, feeding, and movements, to determine how kinkajous and woolly opossums might move seeds around the forest and how these interactions might be influenced by how people change the environment. They will analyze results of experiments and draw conclusions from maps to assess whether these nocturnal mammals are important for rainforest ecosystems.
- In the **STEM Project**, students will learn about sorting algorithms. They will use this knowledge to suggest ways to program a computer to automate the sorting of calls made by bats and other rainforest animals.
- The **Explore Your Backyard** activity has students explore plant structure and reproduction and plant-animal interactions in a local habitat.

SCIENCE/ENGINEERING AND DESIGN DISCIPLINARY CORE IDEAS AND PERFORMANCE EXPECTATIONS

MISSION READER

PS4.C	Information technologies and Instrumentation.
LS1.A	Structure and function: all living things are made of cells. Focus is on plant cells.
MS-LS1-2	Develop and use a model to describe the function of a cell as a whole and ways that parts of cells contribute to function. Focus is on plant cells.
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants.
LS1.B	Growth and development of organisms: plant and animal reproduction and behavior.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
LS1.B	Growth and development of organisms: genetic and local conditions affect growth of plants.
MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
LS1.D	Information processing.
LS2.A	Interdependent relationships in ecosystems: dependence on environment and may compete; resource limitation on organisms and populations.
LS2.A	Interdependent relationships in ecosystems: predation, mutualism, interactions similar across ecosystems.
M-L2-4	Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
LS2.C	Ecosystem dynamics, functioning and resilience: change through time possible.
LS4.D	Biodiversity and humans.
LS4.B	Natural selection: some traits common some rare.
LS4.C	Adaptation.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
ESS3.C	Human impacts on Earth systems.

*ELA and Math standards to come

MIDDLE SCHOOL

LIFE IN THE TREES NGSS STANDARDS

MISSION RESEARCH

ETS1.B	Developing possible solutions: solutions need to be tested and modified.
ETS1.C	Optimizing the design solution: different components may be best under different conditions and can be combined.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
LS1.A	Structure and function: body is a system of multiple interacting subsystems.
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants.
LS2.A	Interdependent relationships in ecosystems: predation, mutualism, interactions similar across ecosystems.

SCIENCE MISSION

MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants.
LS1.B	Growth and development of organisms: plant and animal reproduction and behavior.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
LS1.B	Growth and development of organisms: genetic and local conditions affect growth of plants.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
LS2.A	Interdependent relationships in ecosystems: dependence on environment and may compete; resource limitation on organisms and populations.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
LS2.A	Interdependent relationships in ecosystems: predation, mutualism, interactions similar across ecosystems.
M-L2-4	Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
LS2.C	Ecosystem dynamics, functioning and resilience: change through time possible.
LS4.D	Biodiversity and humans.
LS3.A	Inheritance of Traits: variation comes from getting a subset of chromosomes from each parent. Not covered explicitly but students see how genetic information that links parents and offspring is used to answer scientific questions.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
ESS3.C	Human impacts on Earth systems.

STEM PROJECT

ETS1.B	Developing possible solutions: solutions need to be tested and modified.
ETS1.C	Optimizing the design solution: different components may be best under different conditions and can be combined.
PS4.C	Information technologies and Instrumentation.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
ETS1.B	Developing possible solutions: systematic processes for evaluating solutions to make sure they meet criteria and constraints.
ETS1.B	Developing possible solutions: systematic processes for evaluating solutions to make sure they meet criteria and constraints - can combine different parts from past designs!
ETS1.C	Optimizing the design solution: what works best under what conditions?

EXPLORE YOUR BACKYARD

MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants.
LS1.B	Growth and development of organisms: plant and animal reproduction and behavior.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
LS2.A	Interdependent relationships in ecosystems: predation, mutualism, interactions similar across ecosystems.

*ELA and Math standards to come

MIDDLE SCHOOL

LIFE IN THE TREES NGSS STANDARDS

CROSS CUTTING CONCEPTS

Patterns: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Cause and effect: Mechanisms and Predictions: Reader, Science Mission, Explore Your Backyard
Scale, proportion and quantity: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
System and system models: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Energy and matter: Reader
Structure and function: Reader, Science Mission, Explore Your Backyard
Stability and change: Reader, Science Mission

CONNECTION TO ENGINEERING, TECHNOLOGY AND APPLICATIONS OF SCIENCE

Interdependence of science, engineering and technology: Reader, Science Mission, STEM Project
Influence of science, engineering and technology on society and the natural world: Reader, Science Mission

CONNECTION TO NATURE OF SCIENCE

Scientific investigations use a variety of methods: Reader, Science Mission, STEM Project
Scientific knowledge is based on empirical evidence: Reader, Science Mission, STEM Project
Scientific knowledge is open to revision in light of new evidence: Reader, Science Mission
Science models, laws, mechanisms and theories explain natural phenomena: Reader, Science Mission
Science is a way of knowing: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Scientific knowledge assumes an order and consistency in natural systems: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Science is a human endeavor: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Science addresses questions about the natural and material world: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard

SCIENCE AND ENGINEERING PRACTICES

Asking questions and defining: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Developing and using models: Reader, Mission Research, Science Mission, STEM Project, Explore Your Backyard
Planning and carrying out investigations: Reader, Science Mission, STEM Project, Explore Your Backyard
Analyzing and interpreting data: Science Mission, Explore Your Backyard
Using mathematics and computational thinking: Mission Research, Science Mission, STEM Project
Constructing explanations and designing solutions: Mission Research, Science Mission, STEM Project, Explore Your Backyard
Engaging in argument from evidence: Mission Research, Science Mission, STEM Project, Explore Your Backyard
Obtaining, evaluating and communicating information: Mission Research, Science Mission, STEM Project, Explore Your Backyard

*ELA and Math standards to come