



2018 Mississippi College- and Career-Readiness Standards (MS CCRS) for Science Correlation to PhD Science®

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Key: Module (M), Lesson (L)

PhD Science Level K

The Kindergarten 2018 Mississippi College- and Career-Readiness Standards for Science are mostly covered by the *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Kindergarten Disciplinary Core Ideas, Conceptual Understandings, Standards, and Performance Objectives		
Life Science		
Disciplinary Core Idea: L.K.1 Hierarchical Organization		
L.K.1A		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Objects in the environment can be classified as living and nonliving. Living things include plants and animals. All living things reproduce, grow, develop, respond to stimuli, and die; and nonliving things do not. Living things require air, food, water, and an environment in which to live. Acting as scientists, students will observe the natural world and use investigations, charts, drawings, sketches, and models to communicate ideas.	 Level K M1 L4–7, 22–24 Level K M2 L4–8, 21–23 Level K M3 L1–26 Level K M4 L1–2, 6–7, 10, 14–17, 20–28
Standard	Students will demonstrate an understanding of living and nonliving things.	 Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16

Performance Objective		Aligned <i>PhD Science</i> Lessons
L.K.1A.1	With teacher guidance, conduct an investigation of living organisms and nonliving objects in various real-world environments to define characteristics of living organisms that distinguish them from nonliving things.	Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16
L.K.1A.2	With teacher support, gain an understanding that scientists are humans who use observations to learn about the natural world. Obtain information from informational text or other media about scientists who have made important observations about living things.	Level K M3 L1–3, 8, 10, 14, 16–18, 22, 29
L.K.1B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	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. Animals (including humans) use their senses to learn about the world around them.	Level 1 M1 L1–10, 16–17, 27–29
Standard	Students will demonstrate an understanding of how animals (including humans) use their physical features and their senses to learn about their environment.	Level 1 M1 L16-17
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.K.1B.1	Develop and use models to exemplify how animals use their body parts to (a) obtain food and other resources, (b) protect themselves, and (c) move from place to place.	Level 1 M1 L1–9, 11–18, 27–29
L.K.1B.2	Identify and describe examples of how animals use their sensory body parts (eyes to detect light and movement, ears to detect sound, skin to detect temperature and touch, tongue to taste, and nose to detect smell).	Level 1 M1 L4–6, 16–18, 27–29

Disciplinary Core Idea: L.K.2 Reproduction and Heredity		
L.K.2		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Plants and animals change in form as they go through stages in the life cycle. Young plants and animals are very much like their parents and other plants and animals of the same kind, but they can also vary in many ways.	Level 1 M1 L23, 25–29
Standard	Students will demonstrate an understanding of how living things change in form as they go through the general stages of a life cycle.	Level 3 M2 L17, 19
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.K.2.1	Use informational text or other media to make observations about plants as they change during the life cycle and use models to communicate findings.	Level 1 M1 L1–3, 7–9 Level 3 M2 L19
L.K.2.2	Construct explanations using observations to describe and model the life cycle.	Level 3 M2 L17–19
L.K.2.3	With teacher guidance, conduct a structured investigation to observe and measure (comparison of lengths) the changes in various individuals of a single plant species from seed germination to adult plant. Record observations using drawing or writing.	Level K M3 L4–8
L.K.2.4	Use observations to explain that young plants and animals are like but not exactly like their parents.	Level 1 M1 L25–29

Disciplinary Core Idea: L.K.3 Ecology and Interdependence		
L.K.3A		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	The environment consists of many types of living things including plants and animals. Living things depend on the land, water, and air to live and grow.	Level K M3 L1–3, 9–25 Level K M4 L1–19, 25–28
Standard	Students will demonstrate an understanding of what animals and plants need to live and grow.	Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.K.3A.1	With teacher guidance, conduct a structured investigation to determine what plants need to live and grow (water, light, and a place to grow). Measure growth by directly comparing plants with other objects.	Level K M4 L1–10, 14–17, 25–28
L.K.3A.2	Construct explanations using observations to describe and report what animals need to live and grow (food, water, shelter, and space).	Level K M3 L4–29 Level K M4 L1–2, 6–13, 15–17, 26–28
L.K.3B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Interdependence exists between plants and animals within an environment. Living things can only survive in areas where their needs for air, water, food, and shelter are met.	Level K M3 L4–29 Level K M4 L1–17, 26–28
Standard	Students will demonstrate an understanding of the interdependence of living things and the environment in which they live.	Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.K.3B.1	Observe and communicate that animals get food from plants or other animals. Plants make their own food and need light to live and grow.	Level K M3 L4–16, 19–20, L22, L27–29
L.K.3B.2	Create a model habitat which demonstrates interdependence of plants and animals using an engineering design process to define the problem, design, construct, evaluate, and improve the habitat.	Level 2 M3 L14–18 Level 2 M4 L7–25

Disciplinary Core Idea: L.K.4 Adaptations and Diversity		
L.K.4		Aligned PhD Science Lessons
Conceptual Understanding	When animals do not get what they need to survive, they will die. Some types of plants and animals are now extinct because they were unable to adapt when the environment changed. There are similarities between some present-day animals and extinct animals.	Level K M3 L7–16, 19–22, 27–29 Level K M4 L11–13
Standard	Students will demonstrate an understanding that some groups of plants and animals are no longer living (extinct) because they were unable to meet their needs for survival.	Level 3 M2 L6–8, 26–28
Performance Objective		Aligned PhD Science Lessons
L.K.4.1	Obtain information from informational text or other media to document and report examples of different plants or animals that are extinct.	Level 3 M2 L6–8, 26–28
L.K.4.2	Observe and report how some present-day animals resemble extinct animals.	


Physical Science		
Disciplinary Core Idea: P.K.5 Organization of Matter and Chemical Interactions		
P.K.5A		Aligned PhD Science Lessons
Conceptual Understanding	Matter exists in different states, including solid and liquid forms. Water can exist as a solid or a liquid. Solid objects can be described and sorted according to their attributes. Different properties are suited for different purposes.	Level 2 M1 L1–31
Standard	Students will demonstrate an understanding of the solid and liquid states of matter.	Level 2 M1 L1–16, 19, 23, 29–31 Level 2 M2 L3–4, 14–17
Performance Objective		Aligned PhD Science Lessons
P.K.5A.1	Generate questions and investigate the differences between liquids and solids and develop awareness that a liquid can become a solid and vice versa.	Level 2 M1 L4–7, 12–16
P.K.5A.2	Describe and compare the properties of different materials and classify these materials by their observable characteristics (visual, aural, or natural textural) and by their physical properties (weight, volume, solid or liquid, and sink or float).	Level 2 M1 L1–9, 12–16, 19, 23, 29–31


P.K.5B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Many objects can be built from a smaller set of pieces. Most objects can be broken down into various component pieces and any piece of uniform matter can be subdivided into smaller pieces of the same material. If pieces of the original object are damaged or removed, the object may not have the same properties or work the same.	Level 2 M1 L10–11, 29–31
Standard	Students will demonstrate an understanding of how solid objects can be constructed from a smaller set.	Level 2 M1 L10–11, 24–31
Performance Objective		Aligned <i>PhD Science</i> Lessons
P.K.5B.1	Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects.	
P.K.5B.2	Analyze a large composite structure to describe its smaller components using drawing and writing.	Level 2 M1 L10–11, 24–31
P.K.5B.3	Explain why things may not work the same if some of the parts are missing.	

Earth and Space Science		
Disciplinary Core Idea: E.K.8 Earth and the Universe		
E.K.8A		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Seasonal changes occur as the Earth orbits the sun. These seasonal changes repeat in a pattern. Patterns of sunrise and sunset can be described and predicted.	Level K M1 L1–11, 17–24, 28–30
Standard	Students will demonstrate an understanding of the pattern of seasonal changes on the Earth.	Level 1 M4 L9–13, 23–25
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.8A.1	Construct an explanation of the pattern of the Earth’s seasonal changes in the environment using evidence from observations.	Level K M1 L1–11, 17–24, 28–30
E.K.8B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	The Sun is the source of heat and light for the solar system. This heat can impact Earth’s natural resources. Living things depend upon the effects of the Sun (warms the land, air, water, and helps plants grow) to survive.	Level K M1 L8–9
Standard	Students will demonstrate an understanding that the Sun provides the Earth with heat and light.	Level K M1 L8–11, 28–30
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.K.8B.1	With teacher guidance, generate and answer questions to develop a simple model, which describes observable patterns of sunlight on the Earth’s surface (day and night).	Level K M1 L8–11, 28–30
E.K.8B.2	With teacher guidance, develop questions to conduct a structured investigation to determine how sunlight affects the temperature of the Earth’s natural resources.	Level K M1 L8–9, 28–30
E.K.8B.3	Develop a device which would reduce heat from the Sun (temperature) using an engineering design process to define the problem, design, construct, evaluate, and improve the device.	Level K M1 L12–16, 28–30

Earth and Space Science		
Disciplinary Core Idea: E.K.10 Earth's Resources		
E.K.10		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Humans use Earth's resources for everything they do. Choices that humans make to live comfortably can affect the world around them. Recycling, reusing, and reducing consumption of natural resources is important in protecting our Earth's environment. Humans can make choices that reduce their impact on Earth's environment.	Level K M4 L18–24
Standard	Students will demonstrate an understanding of how humans use Earth's resources.	Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.K.10.1	Participate in a teacher-led activity to gather, organize, and record recyclable materials data on a chart or table using technology. Communicate results.	Level K M4 L18–19
E.K.10.2	With teacher guidance, develop questions to conduct a structured investigation to determine ways to conserve Earth's resources and communicate results.	Level K M4 L18–19
E.K.10.3	Create a product from the reused materials that will meet a human need. Use an engineering design process to define the problem, design, construct, evaluate, and improve the product.	Level K M4 L18–24

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Key: Module (M), Lesson (L)

PhD Science Level 1

The Grade 1 *2018 Mississippi College- and Career-Readiness Standards for Science* are almost entirely covered by the Level 1 *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Grade 1 Disciplinary Core Ideas, Conceptual Understandings, Standards, and Performance Objectives		
Life Science		
Disciplinary Core Idea: L.1.1 Hierarchical Organization		
L.1.1		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	All living things reproduce, grow, develop, respond to stimuli, and die. Living things require air, food, water, and an environment in which to live. Plants are living things, and each plant part (roots, stem, leaves, and fruit) helps them survive, grow, and reproduce.	 Level 1 M1 L1–10 Level 1 M1 L16–17 Level 1 M1 L21 Level 1 M1 L27–29
Standard	Students will demonstrate an understanding of the basic needs and structures of plants.	 Level 1 M1 L1–15, 27–29

Performance Objective		Aligned <i>PhD Science</i> Lessons
L.1.1.1	Construct explanations using first-hand observations or other media to describe the structures of different plants (i.e., root, stem, leaves, flowers, and fruit). Report findings using drawings, writing, or models.	Level 1 M1 L1–3 Level 1 M1 L7–8 Level 1 M1 L10 Level 1 M1 L19–21 Level 1 M1 L27–29
L.1.1.2	Obtain information from informational text and other media to describe the function of each plant part (roots absorb water and anchor the plant, leaves make food, the stem transports water and food, petals attract pollinators, flowers produce seeds, and seeds produce new plants).	Level 1 M1 L1–15, 27–29
L.1.1.3	Design and conduct an experiment that shows the absorption of water and how it is transported through the plant. Report observations using drawings, sketches, or models.	Level 1 M1 L7
L.1.1.4	Create a model which explains the function of each plant structure (roots, stem, leaves, petals, flowers, seeds).	Level 1 M1 L7 Level 2 M3 L2
L.1.1.5	With teacher support, gain an understanding that scientists are humans who use observations and experiments to learn about the natural world. Obtain information from informational text or other media about scientists who have made important observations about plants.	Level 1 M1 L1–3, 10–11

Disciplinary Core Idea: L.1.2 Reproduction and Heredity		
L.1.2		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Plants and animals change with each stage of life. Plants have predictable and observable characteristics at each developmental stage (germination, growth, reproduction, and seed dispersal). Most plants are stationary so they depend upon animals or the wind for seed dispersal. Plants and animals are similar to their parents and resemble other plants and animals of the same kind.	Level 1 M1 L1–3, 25–29 Level 2 M3 L3–29
Standard	Students will demonstrate an understanding of how living things change in form as they go through the general stages of a life cycle.	Level 3 M2 L16–19
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.1.2.1	Investigate, using observations and measurements (non-standard units), flowering plants (pumpkins, peas, marigolds, or sunflowers) as they change during the life cycle (i.e., germination, growth, reproduction, and seed dispersal). Use drawings, writing, or models to communicate findings.	Level 2 M3 L3–6
L.1.2.2	Obtain, evaluate, and communicate information through labeled drawings, the life cycle (egg, larva, pupa, adult) of pollinating insects.	Level 3 M2 L17–19

Disciplinary Core Idea: L.1.3 Ecology and Interdependence		
L.1.3A		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	The needs of plants must be met to survive. Sunlight, water, nutrients, and space to grow are necessary for plant growth and repair.	Level 1 M1 L3–8, 19–21, 27–29
Standard	Students will demonstrate an understanding of what plants need from the environment for growth and repair.	Level 2 M3 L1–7, 25–29
Performance Objective		Aligned <i>PhD Science</i> Lessons
L1.3A.1	Conduct structured investigations to make and test predictions about what plants need to live, grow, and repair including water, nutrients, sunlight, and space. Develop explanations, compare results, and report findings.	Level 1 M1 L19–20
L.1.3B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Animals, such as insects, depend on other living organisms for food. Many plants depend on insects or other animals for pollination or to move their seeds around so the plant can survive.	Level 2 M3 L8–29 Level 2 M4 L7–8
Standard	Students will demonstrate an understanding of the interdependence of flowering plants and pollinating insects.	Level 2 M3 L8–29
Performance Objective		Aligned <i>PhD Science</i> Lessons
L1.3B.1	Identify the body parts of a pollinating insect and describe how insects use these parts to gather nectar or disburse pollen. Report findings using drawings, writing, or models.	Level 1 M1 L9

Disciplinary Core Idea: L1.4 Adaptations and Diversity		
L.1.4		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Plants respond to stimuli to adapt to changes in the environment. There are distinct environments in the world that support certain types of plants. Plants have features that help them survive in their environment.	Level 1 M1 L19–21
Standard	Students will demonstrate an understanding of the ways plants adapt to their environment in order to survive.	Level 1 M1 L19–21
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.1.4.1	Explore the cause and effect relationship between plant adaptations and environmental changes.	Level 1 M1 L19–20
L.1.4.2	Describe how the different characteristics of plants help them to survive in distinct environments.	Level 1 M1 L19–21
L.1.4.3	Create a solution for an agricultural problem. Use an engineering design process to define the problem, design, construct, evaluate, and improve the solution.	Level 2 M3 L14–18 Level 5 M3 L19–23


Physical Science		
Disciplinary Core Idea: P.1.6 Motions, Forces, and Energy		
P.1.6A		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Some objects allow light to pass through them and some objects do not allow any light to pass through them, creating shadows. Very hot objects give off light. Objects reflect light, and objects can only be seen when light is reflected off them. Mirrors and prisms can be used to change the direction of a light beam.	Level 1 M2 L1–22
Standard	Students will demonstrate an understanding that light is required to make objects visible.	Level 1 M2 L1–9, 21–23
Performance Objective		Aligned <i>PhD Science</i> Lessons
P.1.6A.1	Construct explanations using first-hand observations or other media to describe how reflected light makes an object visible.	Level 1 M2 L1–22
P.1.6A.2	Use evidence from observations to explain how shadows form and change with the position of the light source.	Level 1 M2 L10–12, 15–18, 21–22
P.1.6B		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Vibrations of matter can create sound, and sound can make an object vibrate. Humans use sound and light to communicate over long distances.	Level 1 M3 L1–29
Standard	Students will demonstrate an understanding of sound.	Level 1 M3 L1–17, 26–29
Performance Objective		Aligned <i>PhD Science</i> Lessons
P.1.6B.1	Conduct an investigation to provide evidence that vibrations create sound and that sound can create vibrations.	Level 1 M3 L1–17 Level 1 M3 L26–29
P.1.6B.2	Create a device that uses light and/or sound to communicate over a distance. Use an engineering design process to define the problem, design, construct, evaluate, and improve the device.	Level 1 M3 L18–29


Earth and Space Science		
Disciplinary Core Idea: E.1.9 Earth's Systems and Cycles		
E.1.9A		Aligned PhD Science Lessons
Conceptual Understanding	Weather is a combination of temperature, sunlight, wind, snow, or rain in a particular place at a particular time. People measure weather conditions (temperature, precipitation) to describe and record the weather and to notice patterns over time. Temperature and precipitation can change with the seasons. Some kinds of severe weather (hurricane, tornado, flood, and drought) are more likely to occur in certain regions. Meteorologists forecast severe weather so that communities can prepare for and respond appropriately.	Level K M1 L1–30
Standard	Students will demonstrate an understanding of the patterns of weather by describing, recording, and analyzing weather data to answer questions about daily and seasonal weather patterns.	Level K M1 L1–11, 17–24, 28–30 Level K M4 L25
Performance Objective		Aligned PhD Science Lessons
E.1.9A.1	Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).	Level K M1 L3–7, 11, 17–24, 28–30 Level K M4 L25 Level 2 M4 L7–8, 11–13, 22
E.1.9A.2	Develop and use models to predict weather conditions associated with seasonal patterns and changes.	Level K M1 L1–11, 17–24, 28–30
E.1.9A.3	Construct an explanation for the general pattern of change in daily temperatures by measuring and calculating the difference between morning and afternoon temperatures.	Level K M1 L3–5, 9, 17–21
E.1.9A.4	Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.	Level K M1 L22–30
E.1.9B		Aligned PhD Science Lessons
Conceptual Understanding	The Earth is made of different materials, including rocks, soil, and water (nonliving things). Plants and animals, including humans, depend on the Earth's land, water, and air to live and grow. Animals, including humans, can change the environment.	Level 2 M2 L3–7
Standard	Students will demonstrate an understanding of models (drawings or maps) to describe how water and land are distributed on Earth.	Level 2 M2 L1–2, 5–6 Level 2 M4 L1–6, 11–16, 20–21, 23–25

Performance Objective		Aligned <i>PhD Science</i> Lessons
E.1.9B.1	Locate, classify, and describe bodies of water (oceans, rivers, lakes, and ponds) on the Earth’s surface using maps, globes, or other media.	Level 2 M2 L1–2 Level 2 M4 L1–5, 10–16 Level 2 M4 L20–25
E.1.9B.2	Generate and answer questions to explain the patterns and location of frozen and liquid bodies of water on Earth using maps, globes, or other media.	Level 2 M4 L1–5, 10–16, 20–25
E.1.9B.3	With teacher guidance, plan and conduct a structured investigation to determine how the movement of water can change the shape of the land on Earth.	Level 2 M2 L5–17, 20, 22–24

Disciplinary Core Idea: E.1.10 Earth’s Resources		
E.1.10		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Water is essential to life on Earth. Humans and other living things are dependent on clean water to survive. Water is an Earth material, and like all of Earth’s resources, the amount of water is limited. Continued health and survival of humans are dependent on solutions that maintain clean water sources.	Level 2 M4 L1–3, 10–25
Standard	Students will demonstrate an understanding of human dependence on clean and renewable water resources.	Level 5 M3 L4-5 L19-23 L24-27
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.1.10.1	Obtain and evaluate informational texts and other media to generate and answer questions about water sources and human uses of clean water.	Level 5 M3 L4–8
E.1.10.2	Communicate solutions that will reduce the impact of humans on the use and quality of water in the local environment.	Level 5 M3 L19–23
E.1.10.3	Create a device that will collect free water to meet a human need. Use an engineering design process to define the problem, design, construct, evaluate, and improve the device.	Level 5 M3 L19–23

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Key: Module (M), Lesson (L)

***PhD Science* Level 2**

The Grade 2 *2018 Mississippi College- and Career-Readiness Standards for Science* are almost entirely covered by the Level 2 *PhD Science* curriculum. A detailed analysis of alignment appears in the table below.

Grade 2 Disciplinary Core Ideas, Conceptual Understandings, Standards, and Performance Objectives		
Life Science		
Disciplinary Core Idea: L.2.1 Hierarchical Organization		
L.2.1		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Animals have unique physical and behavioral characteristics that enable them to survive in their environment. Animals can be classified based on physical characteristics.	Level 1 M1 L1–29
Standard	Students will demonstrate an understanding of the classification of animals based on physical characteristics.	Level 1 M1 L1–15, 27–29

Performance Objective		Aligned <i>PhD Science</i> Lessons
L.2.1.1	Compare and sort groups of animals with backbones (vertebrates) from groups of animals without backbones (invertebrates).	Level 3 M2 L1
L.2.1.2	Classify vertebrates (mammals, fish, birds, amphibians, and reptiles) based on their physical characteristics.	Level 3 M3 L1–6
L.2.1.3	Compare and contrast physical characteristics that distinguish classes of vertebrates.	Level 3 M3 L16
L.2.1.4	Construct a scientific argument for classifying vertebrates that have unusual characteristics, such as bats, penguins, snakes, salamanders, dolphins, and duck-billed platypuses.	Level 5 M2 L8

Disciplinary Core Idea: L.2.2 Reproduction and Heredity		
L.2.2		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Plants and animals experience different life cycles as they grow and develop. Plants and animals exhibit predictable characteristics at each developmental stage throughout the life cycle.	Level 3 M3 L7–8, 23
Standard	Students will demonstrate an understanding of how living things change in form as they go through the general stages of a life cycle.	Level 3 M2 L17, 19
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.2.2.1	Use observations through informational texts and other media to observe the different stages of the life cycle of trees to construct explanations and compare how trees change and grow over time.	Level 5 M2 L3–5
L.2.2.2	Construct explanations using first-hand observations or other media to describe the life cycle of an amphibian (birth, growth/development, reproduction, and death). Communicate findings.	

Disciplinary Core Idea: L.2.3 Ecology and Interdependence		
L.2.3A		Aligned PhD Science Lessons
Conceptual Understanding	Animals thrive in environments where their needs (air, water, food, and shelter) are met. The environment where plants and animals live sometimes changes slowly and sometimes changes rapidly. If living things are unable to adapt to changes in the environment, they may not survive.	Level 2 M3 L1–11, 24–29 Level 2 M4 L7–9
Standard	Students will demonstrate an understanding of the interdependence of living things and the environment in which they live.	Level K M4 L14–24, 26–28
Performance Objective		Aligned PhD Science Lessons
L.2.3A.1	Evaluate and communicate findings from informational text or other media to describe how animals change and respond to rapid or slow changes in their environment (fire, pollution, changes in tide, availability of food/water).	Level 2 M3 L1–2, 24–29
L.2.3A.2	Construct scientific arguments to explain how animals can make major changes and minor changes to their environments. Communicate findings.	Level 2 M3 L1–2
L.2.3B		Aligned PhD Science Lessons
Conceptual Understanding	All animals and plants need food to provide energy for activity and raw materials for growth. Animals and plants have physical features and behaviors that help them survive in their environment. All living things in an environment interact with each other in different ways and for different reasons.	Level 1 M1 L21 Level 2 M3 L8–29 Level 2 M4 L1–3, 9–25
Standard	Students will demonstrate an understanding of the interdependence of living things.	Level 2 M3 L8–29
Performance Objective		Aligned PhD Science Lessons
L.2.3B.1	Evaluate and communicate findings from informational text or other media to describe and to compare how animals interact with other animals and plants in the environment.	Level 2 M3 L8–12, 19–29
L.2.3B.2	Conduct an investigation to find evidence where plants and animals compete or cooperate with other plants and animals for food or space. Present findings.	Level 2 M3 L8–12

Disciplinary Core Idea: L.2.4 Adaptations and Diversity		
L.2.4		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Living things need air, food, water, and space to survive. Different environments support different types of plants and animals. Animals have adaptations allowing them to grow and survive in the climate of their specific environment.	Level 2 M3 L1–12, 24–29 Level 2 M4 L1–3, 7–9, 11–25
Standard	Students will demonstrate an understanding of the ways animals adapt to their environment in order to survive.	
Performance Objective		Aligned <i>PhD Science</i> Lessons
L.2.4.1	Evaluate and communicate findings from informational text or other media to describe how plants and animals use adaptations to survive in distinct environments.	Level 3 M3 L9–13
L.2.4.2	Create a solution exemplified by animal adaptations to solve a human problem in a specific environment. Use an engineering design process to define the problem, design, construct, evaluate, and improve the solution.	Level 1 M1 L10–15

Physical Science		
Disciplinary Core Idea: P.2.5 Organization of Matter and Chemical Interactions		
P.2.5		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Matter exists in different states, including solid, liquid, and gas forms. Solids have a definite shape, weight, and size (length). Liquids have a definite size (volume) but not a definite shape. A gas has neither definite shape nor size (volume). Changes to matter can result from changes in temperature. Some changes may or may not be reversible.	Level 2 M1 L1–31
Standard	Students will demonstrate an understanding of the properties of matter.	Level 2 M1 L1–31 Level 2 M4 L1–5
Performance Objective		Aligned <i>PhD Science</i> Lessons
P.2.5.1	Conduct a structured investigation to collect, represent, and analyze categorical data to classify matter as solid, liquid, or gas. Report findings and describe a variety of materials according to observable physical properties.	Level 2 M1 L1–31 Level 2 M4 L1–5
P.2.5.2	Compare and measure the length of solid objects using technology and mathematical representations. Analyze and communicate findings.	Level 2 M1 L9
P.2.5.3	Compare the weight of solid objects and the volume of liquid objects. Analyze and communicate findings.	Level 2 M1 L3–9 Level 2 M2 L13, 29–31
P.2.5.4	Construct scientific arguments to support claims that some changes to matter caused by heating can be reversed, and some changes cannot be reversed.	Level 2 M1 L14–19, 29–31

Disciplinary Core Idea: P.2.6 Motions, Forces, and Energy		
P.2.6		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	An object at rest will stay at rest unless it is pushed or pulled by an unbalanced force. Pushes and pulls can have different strengths, directions, or speeds. Friction occurs when two objects make contact. Friction can change the motion of an object, the speed of an object, and can also create heat. Friction can be increased or decreased.	Level K M2 L1–23 Level 3 M4 L1–18 Level 3 M4 L28–30
Standard	Students will demonstrate an understanding of how the motion of objects is affected by pushes, pulls, and friction on an object.	Level K M2 L4–8 Level 3 M4 L1–18 Level 3 M4 L28–30
Performance Objective		Aligned <i>PhD Science</i> Lessons
P.2.6.1	Conduct a structured investigation to collect, represent, and analyze data from observations and measurements to demonstrate the effects of pushes and pulls with different strengths and directions. Communicate findings.	Level K M2 L4–8 Level 3 M4 L1–18 Level 3 M4 L28–30
P.2.6.2	Generate and answer questions about the relationship between (1) friction and the motion of objects and (2) friction and the production of heat.	Level 3 M4 L15–18
P.2.6.3	Develop a plan to change the force (push or pull) of friction to solve a human problem. Use an engineering design process to define the problem, design, construct, evaluate, and improve the plan.	Level 3 M4 L23–27

Earth and Space Science		
Disciplinary Core Idea: E.2.8 Earth and the Universe		
E.2.8		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Patterns of the Sun, Moon, and stars can be observed, described, and predicted. The Sun is the source of heat and light for the solar system. Seasonal changes occur as the Earth orbits the Sun because of the tilt of the Earth on its axis. At night, one can see light from stars and sunlight being reflected from the Moon. Telescopes make it possible to observe the Moon and the planets in greater detail. Space exploration continues to help humans understand more about the universe.	Level 1 M4 L2–25
Standard	Students will demonstrate an understanding of the appearance, movements, and patterns of the Sun, Moon, and stars.	Level 1 M4 L1–8, 14–25
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.2.8.1	Recognize that there are many stars that can be observed in the night sky and the Sun is the Earth’s closest star.	Level 1 M4 L2–6, 14–18, 23–25
E.2.8.2	With teacher guidance, observe, describe, and predict the seasonal patterns of sunrise and sunset. Collect, represent, and interpret data from internet sources to communicate findings.	Level 1 M4 L9–13, 23–25
E.2.8.3	Observe and compare the details in images of the Moon and planets using the perspective of the naked eye, telescopes, and data from space exploration.	Level 1 M4 L19–25
E.2.8.4	With teacher support, gain an understanding that scientists are humans who use observations and experiments to learn about space. Obtain information from informational text or other media about scientists who have made important discoveries about objects in space or the development of technologies.	Level 1 M4 L3, 14–21, 23–25
E.2.8.5	Use informational text and other media to observe, describe and predict the visual patterns of motion of the Sun (sunrise, sunset) and Moon (phases).	Level 1 M4 L4–13, 19–22
E.2.8.6	Create a model that will demonstrate the observable pattern of motion of the Sun or Moon. Use an engineering design process to define the problem, design, construct, evaluate, and improve the model.	Level 1 M4 L5–8, 13, 22–25

Disciplinary Core Idea: E.2.10 Earth's Resources		
E.2.10		Aligned <i>PhD Science</i> Lessons
Conceptual Understanding	Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties. Human life and health are heavily dependent on these materials. Understanding how to best conserve these resources will continue to be a major challenge for humans.	Level 2 M2 L1–24
Standard	Students will demonstrate an understanding of how humans use Earth's resources	Level K M3 L1–3, 9–29 Level K M4 L1–5, 8–9, 11–16
Performance Objective		Aligned <i>PhD Science</i> Lessons
E.2.10.1	Use informational text, other media, and first-hand observations to investigate, analyze and compare the properties of Earth materials (including rocks, soils, sand, and water).	Level 2 M2 L5–6
E.2.10.2	Conduct an investigation to identify and classify everyday objects that are resources from the Earth. Classify these objects as renewable and nonrenewable resources.	Level 4 M1 L23–24
E.2.10.3	Use informational text and other media to summarize and communicate how Earth materials are used.	Level 4 M1 L21–27
E.2.10.4	Use informational text, other media, and first-hand observations to investigate and communicate the process and consequences of soil erosion.	Level 2 M2 L1–24
E.2.10.5	With teacher guidance, investigate possible solutions to prevent or repair soil erosion.	Level 2 M2 L14–17