Correlations to the Next Generation Science Standards and the Missouri Learning Standards

Activities in *Nature Unhooked* are correlated to the Missouri Learning Standards (MLS, adopted 2017–2018) as well as the Next Generation Science Standards* (NGSS) to assist teachers and school administrators in aligning curricula to meet state standards. To allow a greater understanding of each standard, the three dimensions supporting each NGSS are included: science and engineering practices (SEP), disciplinary core ideas (DCI), and crosscutting concepts (CC). The integration of the three dimensions provides teachers with a context for the science content, an understanding of how the knowledge is to be attained and understood, and a set of concepts that have a universal meaning across disciplines.

Missouri Learning Standards	Next Generation Science Standards	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Nature Unhooked Activity
MLS	**NGSS**	**SEP**	**DCI**	**CC**	**Activity**
Chapter 1: The Structure and Properties of Water					
6-8.PS1.A.1 Develop models to describe the atomic composition of simple molecules and extended structures.	**MS-PS1-1** Develop models to describe the atomic composition of simple molecules and extended structures.	Develop a model	Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.	Scale, Proportion and Quantity	1.1, 1.4
6-8.PS1.A.2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Analyze and interpret data	*Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. *Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.	Patterns	1.3
Chapter 2: The Incredible Journey					
6-8.PS1.A.4 Develop a model that describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	**MS-PS1-4** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	Develop a model	The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.	Cause and Effect	2.1
6-8.ESS2.A.2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	**MS-ESS2-2** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	Construct an explanation	Water's movements — both on the land and underground — cause weathering and erosion, which change the land's surface features and create underground formations.	Scale, Proportion, and Quantity	2.3, 2.4, 2.6, 2.7

Missouri Learning Standards	Next Generation Science Standards	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Nature Unhooked Activity
MLS	**NGSS**	**SEP**	**DCI**	**CC**	**Activity**
6-8.ESS2.C.1 Design and develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	**MS-ESS2-4** Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	Develop a model	Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. Global movements of water and its changes in form are propelled by sunlight and gravity.	Energy and Matter	2.1, 2.2, 2.5
Chapter 3: Matter and Energy					
6-8.PS1.A.2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**MS-PS1-2** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Analyze and interpret data	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.	Patterns	3.1
6-8.PS1.B.1 Develop and use a model to describe how the total number of atoms remains the same during a chemical reaction and thus mass is conserved.	**MS-PS1-5** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	Develop and use a model	The total number of each type of atom is conserved, and thus the mass does not change.	Energy and Matter	3.1, 3.5, 3.6
6-8.LS1.C Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.	**MS-LS1-6** Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	Construct a scientific explanation	Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.	Energy and Matter	3.2, 3.6
None	**MS-LS1-7** Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	Develop a model	Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.	Energy and Matter	3.2

Missouri Learning Standards	Next Generation Science Standards	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Nature Unhooked Activity
MLS	**NGSS**	**SEP**	**DCI**	**CC**	**Activity**
6-8.LS2.B.1 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	**MS-LS2-3** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Develop a model	Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.	Energy and Matter	3.3, 3.4
Chapter 4: Interactions					
6-8.LS1.B.1 Construct an explanation for how characteristic animal behaviors as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	**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 respectively.	Engaging in Argument from Evidence	*Animals engage in characteristic behaviors that increase the odds of reproduction. *Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.	Cause and Effect	4.2, 4.3, 4.5
6-8.LS1.B.2 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	**MS-LS1-5** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Construct a Scientific Explanation	Genetic factors as well as local conditions affect the growth of the adult plant.	Cause and Effect	4.2

Missouri Learning Standards	Next Generation Science Standards	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Nature Unhooked Activity
MLS	**NGSS**	**SEP**	**DCI**	**CC**	**Activity**
6-8.LS2.A.1 Analyze and interpret data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.	**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.	Analyze and Interpret Data	*Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. *In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. *Growth of organisms and population increases are limited by access to resources.	Cause and Effect	4.5
6-8.LS2.A.2 Construct an explanation that predicts the patterns of interactions among and between the biotic and abiotic factors in a given ecosystem.	**MS-LS2-2** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	Construct a Scientific Explanation	Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.	Patterns	4.1, 4.4
Chapter 5: Biodiversity					
6-8.LS2.A.1 Analyze and interpret data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.	**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.	Analyze and Interpret Data	Growth of organisms and population increases are limited by access to resources.	Cause and Effect	5.1

Missouri Learning Standards	Next Generation Science Standards	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts	Nature Unhooked Activity
MLS	**NGSS**	**SEP**	**DCI**	**CC**	**Activity**
6-8.LS2.C.1 Construct an argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations.	**MS-LS2-4** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Construct an Argument	Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.	Stability and Change	5.2
6-8.LS2.C.2 Evaluate benefits and limitations of differing design solutions for maintaining an ecosystem.	**MS-LS2-5** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Engaging in Argument from Evidence	Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.	Stability and Change	5.2
Chapter 6: People and the Environment					
6-8.LS2.C.2 Evaluate benefits and limitations of differing design solutions for maintaining an ecosystem.	**MS-LS2-5** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Engaging in Argument from Evidence	Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on — for example, water purification and recycling.	Stability and Change	6.1, 6.2
*NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.					