Fairfield Public Schools
Science Curriculum

Draft Units

Grade 7

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Grade 7 Science: Description

Students in middle school develop understanding of key concepts to help them make sense of life science. The ideas build upon students' science understanding from earlier grades and from the disciplinary core ideas, science and engineering practices, and crosscutting concepts of other experiences with physical and earth sciences. There are four life science disciplinary core ideas in middle school: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics, 3) Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity. The performance expectations in middle school blend the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing useable knowledge across the science disciplines. While the performance expectations in middle school life science couple particular practices with specific disciplinary core ideas, instructional decisions should include use of many science and engineering practices integrated in the performance expectations.

Standards for this course are taken from the *Next Generation Science Standards* and are of three types:

Disciplinary Core Ideas: Shown as content objectives, these standards define what students should know about the most essential ideas in the major science disciplines. The focus is on a limited number of core ideas in science and engineering both within and across the disciplines to avoid the shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reduction of the sheer sum of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve depth of understanding of the core ideas presented.

Science and Engineering Practices: These standards enable students to apply the content in the DCI's and the skills of practicing scientists and engineers to explain phenomena and solve real world problems. Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science.

Cross-cutting Concepts: These standards provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These broad concepts tie together the influence of engineering, technology, and science on society and the natural world.

http://www.nextgenscience.org/next-generation-science-standards

CROSS CUTTING CONCEPTS

Patterns: Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

Energy and matter: Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Grade 7 Science: Overview

Course Essential Questions
● Why are the interactions of living and non-living things on Earth so critical to the survival of all living things? ● What evidence do we have of the changes that have taken place in the past? ● What can we learn from those changes to better our lives and the lives of other organisms?

Course: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	Ecosystems: Interactions, Energy and Dynamics	● How do we distinguish living from non-living things? 1-1 ● Why do changes to or interruptions in ecosystems cause changes to occur in organisms and populations? 2-1 ● What patterns of interactions exist among organisms and their environments? 2-2 ● How does energy move through various ecosystems? 2-3 ● How can changes to an ecosystem affect the organisms living there? 2-4 ● What solutions can humans develop to help to maintain biodiversity? 2-5 ● What characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants? 1-4 ● What environmental and genetic factors influence the growth of organisms? 1-5
2	From Molecules to Organisms: Structures and Processes	● What evidence supports the understanding that living things may be made of one cell or many and varied cells? 1-1 ● What is the structure and function of a cell? 1-2 ● What is the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms? 1-6 ● How are molecules broken apart and put back together to release energy? 1-7
3	Heredity: Inheritance and Variation of Traits	● How do changes in genetic material result in the creation of different proteins? 3-1 ● How does gene transmission from parent to offspring result in genetic variation? 3-2 ● How and why do cells work together to create systems? 1-3 ● What processes do organisms use to gather information about the world around them by responding to stimuli? 1-8 ● What is the influence of humans on genetic outcomes in artificial selections? 4-5
4	Biological Evolution: Unit and Diversity	● What evidence do we have of the relationships between fossils and modern organisms to support the theory of evolution? 4-1 ● What is the evolutionary relationship among organisms in terms of gross appearance of anatomical structures? 4-2

		● What is the general pattern of relatedness among embryos of different organisms based on macroscopic appearance? 4-3 ● How does genetic variation of traits in a population increase some individuals' probability to survive and reproduce in a specific environment? 4-4 ● What is the influence of humans on genetic outcomes in artificial selections? 4-5 ● What evidence can be obtained to support that natural selection can increase or decrease some traits over time? 4-6

Ecosystems: Interactions, Energy and Dynamics

Overview

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 may limit their growth and reproduction. 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.

Unit Content Objectives

At the conclusion of this unit, students will be able to:

- Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem
- Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- 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.
- Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Unit Essential Questions

- How do we distinguish living from non-living things? 1-1
- Why do changes to or interruptions in ecosystems cause changes to occur in organisms and populations? 2-1
- What patterns of interactions exist among organisms and their environments? 2-2
- How does energy move through various ecosystems? 2-3
- How can changes to an ecosystem affect the organisms living there? 2-4
- What solutions can humans develop to help to maintain biodiversity? 2-5

- What characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants? 1-4
- What environmental and genetic factors influence the growth of organisms? 1-5

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)
- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4),(MS-LS1-5)

Energy and Matter

- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4),(MS-LS2-5)

Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

♣All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)

LS2.A: Interdependent Relationships in Ecosystems

♣ Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)

♣ 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. (MS-LS2- 1)

♣ Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

♣ 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. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

♣ 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. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

♣ 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. (MS-LS2-4)

♣ 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. (MS-LS2-5)

LS4.D: Biodiversity and Humans

♣ 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. (secondary to MS-LS2-5)

ETS1.B: Developing Possible Solutions

♣ There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)

LS1.B: Growth and Development of Organisms

♣ Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
♣ Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
♣ Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)
♣ Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

♣ Develop a model to describe an ecological phenomena. (MS-LS2-3)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

♣ Analyze and interpret data to provide evidence for ecological phenomena. (MS-LS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K– 5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

♣ Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for an ecological phenomenon or a solution to an ecological problem. (MS-LS2-4) (MS-LS1-4)

♣ Evaluate competing ecological design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

♣ Construct an explanation that includes qualitative or quantitative relationships between variables that predict ecological phenomena. (MS-LS2-2)

♣ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS- LS1-5)

Corresponding CT Core Standards:
ELA/Literacy – RST.6-8.1, RST 6-8.2, RST 6-8.7, RI 8.8, WHST.6-8.1, WHST.6-8.2, WHST 6-8.9, SL.8.5
Mathematics –6.EE.C.9

From Molecules to Organisms: Structures and Processes

Overview

All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. In multicellular organisms, the body is a system of multiple interacting subsystems.

Unit Content Objectives

At the conclusion of this unit, students will be able to:

- Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- 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.
- 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.

Unit Essential Questions

- What evidence supports the understanding that living things may be made of one cell or many and varied cells? 1-1
- What is the structure and function of a cell? 1-2
- What is the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms? 1-6
- How are molecules broken apart and put back together to release energy? 1-7

Crosscutting Concepts

Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

- Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

♣All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)

♣Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)

LS1.C: Organization for Matter and Energy Flow in Organisms

♣ 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. (MS-LS1-6)

♣ 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. (MS-LS1-7)

PS3.D: Energy in Chemical Processes and Everyday Life

♣ The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)

♣ Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

♣ Develop a model to describe unobservable cellular mechanisms. (MS-LS1-7)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

♣ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6.8.8, RI 8.8, SL 8.1, SL 8.4

Mathematics –MP.4, 6.RPA.3. 6.SP B.5

Heredity: Inheritance and Variation of Traits

Overview

Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. 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.

Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. This can affect the subsystems which are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

Unit Content Objectives

At the conclusion of this unit, students will be able to:

- Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
- Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
- Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Unit Essential Questions

- How do changes in genetic material result in the creation of different proteins? 3-1
- How does gene transmission from parent to offspring result in genetic variation? 3-2
- How and why do cells work together to create systems? 1-3
- What processes do organisms use to gather information about the world around them by responding to stimuli? 1-8
- What is the influence of humans on genetic outcomes in artificial selections? 4-5

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8)

Systems and System Models

- Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3)

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

♣In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

LS1.D: Information Processing

♣Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

LS3.A: Inheritance of Traits

♣ Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)

♣ Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

LS3.B: Variation of Traits

♣ In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)

♣ In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)

LS4.B: Natural Selection

♣ In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

♣ Develop and use a model to describe genetic phenomena. (MSLS3-1),(MS-LS3-2)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

♣ Gather, read, and synthesize information from multiple appropriate sources about a genetic phenomenon/problem and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS4-5)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K– 5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

♣ Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a genetics phenomenon or a solution to a genetics problem. (MSLS3-1),(MS-LS3-2)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6-8.2, RST 6-8.4, RST 6.8.7, WHST 6-8.1, WHST 6-8.2, WHST 6-8.8, WHST6-8.9, SL 8.5

Mathematics –MP.4, 6.SP A.2, 6.SP B.4, 6.SP B.5

Biological Evolution: Unity and Diversity

Overview

Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.

Unit Content Objectives

At the conclusion of this unit, students will be able to:

- Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
- Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Unit Essential Questions

- What evidence do we have of the relationships between fossils and modern organisms to support the theory of evolution? 4-1
- What is the evolutionary relationship among organisms in terms of gross appearance of anatomical structures? 4-2
- What is the general pattern of relatedness among embryos of different organisms based on macroscopic appearance? 4-3
- How does genetic variation of traits in a population increase some individuals' probability to survive and reproduce in a specific environment? 4-4
- What is the influence of humans on genetic outcomes in artificial selections? 4-5
- What evidence can be obtained to support that natural selection can increase or decrease some traits over time? 4-6

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS4-2)
- Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1),(MS-LS4-3)

Cause and Effect

- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-4),(MS-LS4-5),(MS-LS4-6)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS4.A: Evidence of Common Ancestry and Diversity

♣ The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1)

♣ Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2)

♣ Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3)

LS4.B: Natural Selection

♣ Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4)

♣ In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)

LS4.C: Adaptation

♣ Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

♣ Analyze displays of evolutionary data to identify linear and nonlinear relationships. (MS-LS4-3)

♣ Analyze and interpret evolutionary data to determine similarities and differences in findings. (MS-LS4-1)

Using Mathematics and Computational Thinking

Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.

♣ Use mathematical representations of evolutionary data to support scientific conclusions and design solutions. (MS-LS4-6)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

♣ Apply evolutionary scientific ideas to construct an explanation for real-world phenomena, examples, or events. (MS-LS4- 2)

♣ Construct an explanation that includes qualitative or quantitative relationships between variables that describe evolutionary phenomena. (MS-LS4-4)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6.8.7, WHST 6-8.9