FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Grade 8
Key:
Climate
Equity and Inclusion
SEL
Holocaust
Amistad
Career Readiness, Life Literacies, and Key Skills
Fairfield Township School
Science Curriculum Grade 8 Unit 1

Subject: Science	Grade Level: 8
Unit 1: From Molecules to Organisms: Structures and Processes	Pacing:
Essential Questions	Enduring Understandings

How do organisms live, grow, respond to their environment, and reproduce?	LS1.A: Structure and Function
- How do the structures of organisms enable life's functions? (LS1.A) - How do organisms grow and develop? (LS1.B) - How do organisms obtain and use the matter and energy they need to live and grow? (LS1.C) - How do organisms detect, process, and use information about the environment? (LS1.D)	- 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) (WHST.6-8.7) (6.EE.C.9) - 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) (MS.LS3.A) (SL.8.5) (6.EE.C.9) - 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) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (6.EE.C.9) LS1.B: Growth and Development of Organisms - Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) (MS. LS2.A) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (6.SP.A.2) (6.SP.B.4) - Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4) (MS. LS2.A) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (6.SP.A.2) (6.SP.B.4) - Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5) (MS.LS2.A) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (6.SP.A.2) (6.SP.B.4) 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) (MS.PS1.B) (MS.ESS2.A) (RST.6-8.1) (RST.6-8.2) (WHST.6-8.2) (WHST.6-8.9) (6.EE.C.9) - 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) (MS.PS1.B) (SL.8.5) 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) (WHST.6-8.8)

	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) Cause and Effect - Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) (WHST.6-8.8) - 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), (MS. LS2.A) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (6.SP.A.2) (6.SP.B.4) Scale, Proportion, and Quantity - Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)(WHST.6-8.7) (6.EE.C.9) 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) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (6.EE.C.9) Energy and Matter - Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)(MS.PS1.B) (SL.8.5) - Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6) (MS.PS1.B) (MS.ESS2.A) (RST.6-8.1) (RST.6-8.2) (WHST.6-8.2) (WHST.6-8.9) (6.EE.C.9) 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) (MS.LS3.A) (SL.8.5) (6.EE.C.9)

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Connections to Engineering, Technology and Applications of Science

Interdependence of Science, Engineering, and Technology
- Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1) (WHST.6-8.7) (6.EE.C.9)

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Connections to Nature of Science

Science is a Human Endeavor
- Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3) (RST.6-8.1) (RI.6.8) (WHST.6-8.1) (6.EE.C.9)

Scientific Knowledge is Based on Empirical Evidence
- Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6) (MS.PS1.B) (MS.ESS2.A) (RST.6-8.1) (RST.6-8.2) (WHST.6-8.2) (WHST.6-8.9) (6.EE.C.9)

NJSL Standards	Classroom Applications
MS-LS1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of	Objectives: ● Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. (MS-LS1-1). ● Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. (MS-LS1-2). ● Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. [Clarification (MS-LS1-3)

cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.] MS-LS1-2 Develop and use a model to describe the function of a cell as whole and ways parts of cells contribute to the function. [Clarification Statement: Emphasis is on the cell functioning as a whole and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary:	● Use arguments 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. MS-LS1-4). ● 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 the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (MS-LS1-6) ● 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. MS-LS1-7 ● Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. MS-LS1-8.) ● Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions (MS-ETS1-1) ● Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2) ● Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success (MS-ETS1-3) ● Develop a model to generate for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4) Teaching Strategies/Materials: Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects Materials: Mentor Texts, DVDs, Internet, Technology (SmartBoard, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.] MS-LS1-3 Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. [Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs within a system and the normal functioning of those systems.]	Differentiation Strategies/Modifications (i.e. ESL, Special Education, Gifted & Talented): Extra Support: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework Enrichment: computer-based research, high level task, class presentation Limited English Proficiency: vocabulary support, word/picture association, visual aids

[Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.]

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. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction

could include nest building to protect young from cold, herding animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]

MS-LS1-5
Construct a scientific explanation based on

evidence of how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not	

include genetic mechanisms, gene regulation, or biochemical processes.] 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. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.] 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. [Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]

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. [Assessment Boundary: Assessment does not

include mechanisms for the transmission of this information.]	

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills :

ELA/Literacy:
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RI.6.8- Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; access the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Math
6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in a relationship to one another; write an equation to express one quantity, thought of as a dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
6.SP.B.4 Summarize numerical data sets in relation to their context.

Career Readiness, Life Literacies, and Key Skills:

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8 Civics DP.1)

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a goal.

9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Climate change activity:

https://mysteryscience.com/lessons?query=climate

Climate change lessons:

https://www.brainpop.com/science/weather/climatechange/

Holocaust

Amistad

African American & Differently abled/LGBTQ Scientists:
https://www.brainpop.com/search/?keyword=scientists

10 famous scientists with disabilities

- Thomas Edison. Born in 1847, Thomas Edison lost much of his hearing by his early twenties. ...
- Temple Grandin. ...
- Ralph Braun. ...
- Sang-Mook Lee. ...
- Stephen Hawking. ...
- Geerat Vermeij. ...
- Farida Bedwei. ...
- Richard Mankin.
  https://royalsociety.org/topics-policy/diversity-in-science/scientists-with-disabilities/

  https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World

Unit Resources:

Savvas Elevate Science Life Science: Topic 1: Living Things in the Biosphere
Savvas Elevate Science Life Science: Topic 2: The Cell System
Savvas Elevate Science Life Science: Topic 3: Human Body Systems
Savvas Elevate Science Life Science: Topic 4: Reproduction and Growth
STEM Quest PBL

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and discussions
- Comprehension Checks in literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (http://www.nextgenscience.org/resources)
- Unit Test
- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Topic Tests

Subject: Science	Grade Level: 8
Unit 2: Ecosystems: Interactions, Energy , and Dynamics	Pacing:
Essential Questions	Enduring Understandings
How and why do organisms interact with their environment and what are the effects of these interactions? ● How do organisms interact with the living and nonliving environments to obtain matter and energy? (LS2.A) ● How do matter and energy move through an ecosystem? (LS2.B) ● What happens to ecosystems when the environment changes? (LS2.C) ● How do organisms interact in groups so	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) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RST.6-8.7) ● In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, and or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RST.6-8.7) ● Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RST.6-8.7) ● 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) (MS-LS1.B) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.2) (6.SP.B.5) 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 entry level. Decomposers recycle nutrients from dead plant or animal matter back to soil in terrestrial environments or to the water in aquatic environments. The atoms that make up

as to benefit individuals? (LS2.D)	the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3) (MS.PS1.B) (MS.ESS2.A) (SL.8.5) (6.EE.C.9) LS.2.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) (MS.LS4.C) (MS.LS4.D) (MS.ESS2.A) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RI.8.8) (WHST.6-8.1) (WHST.6-8.9) ● 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) (MS.ESS3.C) (RST.6-8.8) (RI.8.8) (6.RP.A.3) 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 criteria and constraints of a problem. (secondary to MS-LS2-5) Patterns ● Patterns can be used to identify cause and effect relationships. (MS-LS2-2) (MS-LS1.B) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.2) (6.SP.B.5) Cause and Effect ● Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RST.6-8.7) Energy and Matter ● The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3) (MS.PS1.B) (MS.ESS2.A) (SL.8.5) (6.EE.C.9) Stability and Change

	● Small changes in one part of a system might cause large changes in another part. (MS-LS2-4) (MS-LS2-5) (MS.LS4.C) (MS.LS4.D) (MS.ESS2.A) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RI.8.8) (WHST.6-8.1) (WHST.6-8.9) (RST.6-8.8) (6.RP.A.3) - Connections to Engineering, Technology, and Applications of Science Influence of Science, Engineering, and Technology on Society and the Natural World ● The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-LS2-5) (MS.ESS3.C) (RST.6-8.8) (RI.8.8) (6.RP.A.3) - Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems ● Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3) (MS.PS1.B) (MS.ESS2.A) (SL.8.5) (6.EE.C.9) Science Addresses Questions About the Natural and Material World ● Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5) (MS.ESS3.C) (RST.6-8.8) (RI.8.8) (6.RP.A.3)
NJSL Standards	**Classroom Applications**
MS-LS2-1- Analyze and interpret data to provide evidence for the effects of resource availability on organisms	Objectives: ● Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RST.6-8.7)

and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources. MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]	● ==Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (==MS-LS2-2) ● ==Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (==MS-LS2-3) (MS.PS1.B) (MS.ESS2.A) (SL.8.5) (6.EE.C.9) ● ==Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.== (MS-LS2-4) (MS.LS4.C) (MS.LS4.D) (MS.ESS2.A) (MS.ESS3.A) (MS.ESS3.C) (RST.6-8.1) (RI.8.8) (WHST.6-8.1) (WHST.6-8.9) ● Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5) (MS.ESS3.C) (RST.6-8.8) (RI.8.8) (6.RP.A.3) ● Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions (MS-ETS1-1) ● Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2) ● Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success (MS-ETS1-3) ● Develop a model to generate for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4) Teaching Strategies/Materials: Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conversation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.] MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making	Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects Materials: Mentor Texts, DVDs, Internet, Technology (SmartBoard, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations Differentiation Strategies/Modifications (i.e. ESL, Special Education, Gifted & Talented): Extra Support: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework Enrichment: computer-based research, high level task, class presentation Limited English Proficiency: vocabulary support, word/picture association, visual aids SEL - https://www.brainpop.com/social-emotional-learning/ SEL Biographies: https://www.brainpop.com/social-emotional-learning/

warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.] MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.] ●	

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills.

ELA/Literacy-

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RI.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.

WHST.6-8.1 Write arguments focused on discipline-specific content.

WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 9 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics-

MP.4 Model with mathematics

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, though of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the equation.

6.SP.B.5 Summarize numerical data sets in relation to their context.

Career Readiness, Life Literacies, and Key Skills:

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8 Civics DP.1)

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a goal.

9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Unit Resources:

Savvas Elevate Science Life Science: Topic 5: Ecosystems
Savvas Elevate Science Life Science: Topic 6: Populations, Communities, and Ecosystems
STEM Quest PBL

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and discussions
- Comprehension Checks in literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (http://www.nextgenscience.org/resources)
- Unit Test
- Lesson Checks
- Lesson Quizzes
- Performance Expectations Activities
- Topic Tests

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Grade 8 Unit 3

Subject: Science	Grade Level: 8
Unit 3: Heredity: Inheritance and Variation of Traits	Pacing:
Essential Questions	**Enduring Understandings**
How are characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics? ● How are the characteristics of one generation related to the previous generation? (LS3.A) ● Why do individuals of the same species vary in how they look, function, and behave? (LS3.B)	LS1.B: Growth and Development of Organisms ● Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2) 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) (MS.LS1.A) (MS.LS4.A) (RST.6-8.4) (RST.6-8.7) (SL.8.5) ● 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) (RST.6-8.7) (Sl.8.5) (MP.4) (6.SP.B.5) 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)(RST.6-8.7) (Sl.8.5) (MP.4) (6.SP.B.5) ● 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) (MS.LS1.A) (MS.LS4.A) (RST.6-8.4) (RST.6-8.7) (SL.8.5)

	Cause and Effect ● Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2) (RST.6-8.7) (SI.8.5) (MP.4) (6.SP.B.5) 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) (MS.LS1.A) (MS.LS4.A) (RST.6-8.4) (RST.6-8.7) (SL.8.5)
NJSL Standards	Classroom Applications
MS-LS3-1- 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 structure. [Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.] [Assessment Boundary: Assessment does not include specific changes at the molecular level, mechanisms for protein synthesis, or	Objectives: ● 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. (MS-LS3-1) (MS.LS1.A) (MS.LS4.A) (RST.6-8.4) (RST.6-8.7) (SL.8.5) ● 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. (MS-LS3-2) (RST.6-8.7) (SI.8.5) (MP.4) (6.SP.B.5) ● Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions (MS-ETS1-1) ● Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2) ● Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success (MS-ETS1-3) ● Develop a model to generate for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4)

specific types of mutations.] MS-LS3-2- 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. [Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.]	Teaching Strategies/Materials: Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects Materials: Mentor Texts, DVDs, Internet, Technology (SmartBoard, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations Differentiation Strategies/Modifications (i.e. ESL, Special Education, Gifted & Talented): helper, visual aids, modified tests/quizzes, modified homework Enrichment: computer-based research, high level task, class presentation Limited English Proficiency: vocabulary support, word/picture association, visual aids

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills :

ELA/Literacy –

RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

SL.8.5 (Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Mathematics –

MP.4 Model with mathematics.
6.SP.B.5 Summarize numerical data sets in relation to their context.

Career Readiness, Life Literacies, and Key Skills:
9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8 Civics DP.1)
9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a goal.
9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Unit Resources:
Savvas Elevate Science Life Science: Topic 7: Genes and Heredity
STEM Quest PBL

Unit Assessment Opportunities:

- Journal Entries and Response Sheets
- Observations, Questioning, and discussions
- Comprehension Checks in literature
- Class Webs
- Presentations
- Collaboration

- Projects
- Rubrics (http://www.nextgenscience.org/resources)
- Unit Test
- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Topic Test

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 8 Unit 4

Subject: Science	Grade Level: 8
Unit 4: Biological Evolution: Unity and Diversity	Pacing:
Essential Questions	Enduring Understandings
How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms? How does biodiversity affect humans? • What evidence shows that different species are related? (LS4.A)	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) (MS.ESS1.C) (MS.ESS2.B) (RST.6-8.1) (RST.6-8.7) (6.EE.B.6) • 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) (MS.LS3.A) (MS.LS3-B) (MS.ESS1.C) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.4) (6.EE.B.6) • Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3)(RST.6-8.1) (RST.6-8.7) (RST.6-8.9) LS4.B: Natural Selection

- How does genetic variation among organisms affect survival and reproduction? (LS4.B) - How does the environment influence populations of organisms over multiple generations? (LS4.C) - What is biodiversity, how do humans affect it, and how does it affect humans? (LS4.D)	- Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) (MS.LS2.A) (MS.LS3.A) (MS.LS3.B) (RST.6-8.1) (RST.6-8.9) (WHST.6-8.2) (WHSt.6-8.9) (SL.8.1) (SL.8.4) (6.RP.A.1) (6.SP.B.5) (7.RP.A.2) - 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) (RST.6-8.1) (WHST.6-8.8) 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) (MS.LS2.A) (MS.LS2.C) (MS.LS2.B) (MS.ESS1.C) (MP.4) (6.RP.A.1) (6.SP.B.5) (7.RP.A.2) Patterns - Patterns can be used to identify cause and effect relationships. (MS-LS4-2) (MS.LS3.A) (MS.LS3-B) (MS.ESS1.C) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.4) (6.EE.B.6) - Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1),(MS-LS4-3) (MS.ESS1.C) (MS.ESS2.B) (RST.6-8.1) (RST.6-8.7) (RST.6-8.9) 6.EE.B.6) 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) (MS.LS2.A) (MS.LS2.C) (MS.LS2.B) (MS.LS3.A) (MS.LS3.B) (MS.ESS1.C) (RST.6-8.1) (WHST.6-8.8) (RST.6-8.1) (RST.6-8.9) (WHST.6-8.2) (WHStT.6-8.9) (SL.8.1) (SL.8.4) (MP.4) (6.RP.A.1) (6.SP.B.5) (7.RP.A.2) - Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology

	● Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5) (RST.6-8.1) (WHST.6-8.8) ‑ Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence ● Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-LS4-1) (MS.ESS1.C) (MS.ESS2.B) (RST.6-8.1) (RST.6-8.7) (6.EE.B.6) Scientific Knowledge Assumes an Order and Consistency in Natural Systems ● Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS4-1) (MS-LS4-2) (MS.LS3.A) (MS.LS3-B) (MS.ESS1.C) (MS.ESS2.B) (RST.6-8.1) (RST.6-8.7) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.4) (6.EE.B.6) Science Addresses Questions About the Natural and Material World ● Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5) (RST.6-8.1) (WHST.6-8.8) ●
NJSL Standards	**Classroom Applications**

MS-LS4-1
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. [Clarification
	Objectives:
	   ● 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. (MS-LS4-1) (MS.ESS1.C) (MS.ESS2.B) (RST.6-8.1) (RST.6-8.7) (6.EE.B.6)
	   ● 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. (MS-LS4-2) (MS.LS3.A) (MS.LS3-B) (MS.ESS1.C) (RST.6-8.1) (WHST.6-8.2) (WHST.6-8.9) (SL.8.1) (SL.8.4) (6.EE.B.6)
	   ● 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. (MS-LS4-3) (RST.6-8.1) (RST.6-8.7) (RST.6-8.9)

Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.] [Assessment Boundary: Assessment does not include the names of individual species or geological eras in the fossil record.] MS-LS4-2 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. [Clarification Statement: emphasis is on explanations of the evolutionary relationship among organisms in terms of similarity or differences of the gross	• 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. (MS-LS4-4) (MS.LS2.A) (MS.LS3.A) (MS.LS3.B) (RST.6-8.1) (RST.6-8.9) (WHST.6-8.2) (WHSt.6-8.9) (SL.8.1) (SL.8.4) (6.RP.A.1) (6.SP.B.5) (7.RP.A.2) • Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS4-5) (RST.6-8.1) (WHST.6-8.8) • Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS-LS4-6) (MS.LS2.A) (MS.LS2.C) (MS.LS2.B) (MS.ESS1.C) (MP.4) (6.RP.A.1) (6.SP.B.5) (7.RP.A.2) Teaching Strategies/Materials: Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects Materials: Mentor Texts, DVDs, Internet, Technology (SmartBoard, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations Differentiation Strategies/Modifications (i.e. ESL, Special Education, Gifted & Talented): Extra Support: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework Enrichment: computer-based research, high level thinking tasks, class presentations Limited English Proficiency: vocabulary support, word/picture association, visual aids

appearance of anatomical structures.] MS-LS4-3 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. [Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.] [Assessment Boundary: Assessment of comparison is limited to gross appearance of anatomical structures in embryological development.] MS-LS4-4 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. [Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.] MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. [Clarification Statement: Emphasis is on synthesizing information reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on	

society as well as the technologies leading to these scientific discoveries.] MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.] [Assessment Boundary: Assessment does not include Hardy Weinberg calculations.]	

Connections to other content areas, including Career Readiness, Life Literacies, and Key Skills.

ELA/Literacy-

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; access the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 9 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Mathematics-

MP.4   Model with mathematics.

6.RP.A.1 Understand the concept of a ratio and use ration language to describe a ratio relationship between two quantities.

6.SP.B.5 Summarize numerical data sets in relation to their context.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or depending on the purpose at hand, any number in a specified set.

7.RP.A.2 Recognize and represent proportional relationships between quantities.

Career Readiness, Life Literacies, and Key Skills:

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8 Civics DP.1)

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a goal.

9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.

Unit Resources: Savvas Elevate Science Life Science: Topic 8: Natural Selection and Change Over Time
Unit Assessment Opportunities: ● Journal Entries and Response Sheets ● Observations, Questioning, and discussions ● Comprehension Checks in literature ● Class Webs ● Presentations ● Collaboration ● Projects ● Rubrics (http://www.nextgenscience.org/resources) ● Unit Test ● Lesson Check ● Lesson Quiz ● Performance Expectations Activities ● Topic Test

Technology

8.1.5.A.1 to 3 – Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
  – Understand and use technology systems.
  – Select and use applications effectively and
    productively.
8.1.5.D.1 to 4 – Digital Citizenship : Students understand human, cultural, societal issues related to technology and practice legal and ethical behaviors
  – Advocate and practice safe, legal, and
    responsible use of information and technology.
  – Demonstrate personal responsibility for lifelong
    learning.
  – Exhibit leadership for digital citizenship.

8.1.5.E.1 – Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
  – Plan strategies to guide inquiry.
  – Locate, organize, analyze, evaluate, synthesize,
    and ethically use information from a variety of
    sources and media.
  – Evaluate and select information sources and
    digital tools based on the appropriateness for
    specific tasks.