Rigorous Curriculum Design
Unit Planning Organizer

Subject:	Course 1				Grade:	6
Unit Number:	3	Unit Name:	Natural Selection			
Unit Length	Days: 30 days + 5 buffer days			Min./Day:		
Unit Synopsis	"How can one explain the ways cells contribute to the function of living organisms and "How do living organisms pass traits from one generation to the next?"." Students will explore the structure and function relationship of cells, the role of cells in body systems, how those systems work to support the life functions of the organism use models to describe ways gene mutations and sexual reproduction contribute to genetic variation.					

	NGSS	Science and Engineering Practice(s)
Priority Performance Expectations	**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 of 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 for 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-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.]	**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 phenomena. (MS-LS3-2) **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-LS1-5) **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). Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS1-4) **Disciplinary Core Ideas** **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

Crosscutting Concepts		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) ▪ 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.B: Growth and Development of Organisms** ▪ 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) **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) **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** ▪ 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)

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

		NGSS	Math CCSS	Literacy CCSS
	LS1-5)			

	NGSS	Math CCSS	Literacy CCSS
Supporting Performance Expectations	Students who demonstrate understanding can: MS-ETS1-1. 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-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-3. 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-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	**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. (MS-LS1-4),(MS-LS1-5) **MP.4** Model with mathematics. (MS-LS3-2) **6.SP.B.5** Summarize numerical data sets in relation to their context. (MS-LS3-2)	**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3),(MS-LS1-4),(MS-LS1-5),(MS-LS1-6) **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. (MS-LS1-5),(MS-LS1-6) **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. (MS-LS1-3),(MS-LS1-4) **WHST.6-8.1** Write arguments focused on discipline content. (MS-LS1-3),(MS-LS1-4) **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. (MS-LS1-5),(MS-LS1-6) **ST.6-8.9** Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5),(MS-LS1-6) **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. (MS-LS3-1),(MS-LS3-2) **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). (MS-LS3-1),(MS-LS3-2) **SL.8.5** Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-LS3-1),(MS-LS3-2)

	NG ELD Standards	Literacy / Science / History / Other
Interdisciplinary Connections	**Interpretive 6** Reading closely literary and informational texts and viewing multimedia to determine how meaning is conveyed explicitly and implicitly through language. **Productive 10** Writing literary and informational texts to present, describe, and explain ideas and information, using appropriate technology.	**Key Ideas and Details** CCSS.ELA-Literacy.RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. CCSS.ELA-Literacy.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. CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. **Craft and Structure** CCSS.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*. CCSS.ELA-Literacy.RST.6-8.5 Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic. CCSS.ELA-Literacy.RST.6-8.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. **Integration of Knowledge and Ideas** CCSS.ELA-Literacy.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). CCSS.ELA-Literacy.RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. CCSS.ELA-Literacy.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. **Range of Reading and Level of Text Complexity** CCSS.ELA-Literacy.RST.6-8.10 By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Unwrapped Priority Performance Expectations

PE: 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.			
Skills	Concepts	Bloom's	DOK (Rigor Matrix)	Language Demand
Use	Argument based on empirical evidence and scientific reasoning	Evaluate	3	
To Support	An explanation for how characteristic animal behaviors affect the probability of successful reproduction of animals.			
To Support	An explanation for how specialized plant structures affect the probability of successful reproduction of plants.			

PE: MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.			
Skills	Concepts	Bloom's	DOK (Rigor Matrix)	Language Demand
Construct	A scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Create	3	

PE: 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.			
Skills	Concepts	Bloom's	DOK (Rigor Matrix)	Language Demand
Develop, & Use	A model	Apply	2	
To Describe	Why asexual reproduction results in offspring with identical genetic information.			
To Describe	Why sexual reproduction results in offspring with genetic variation.			

Learning Progressions of Skills and Concepts

PE: LS 1-4		
Previous Courses	Current Course	Next Courses
N/A	**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 of animals to protect young	HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. [Assessment Boundary: Assessment does not include specific gene control mechanisms or rote memorization of the steps of mitosis.]

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.]

PE: LS 1-5		
Previous Courses	Current Course	Next Courses
N/A	**MS-LS1-5. Construct a scientific explanation based on evidence for 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.]	HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.] [Assessment Boundary: Assessment does not include specific biochemical steps.]

Previous Courses	Current Course	Next Courses
3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]	**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.]	**HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.** [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.] [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

Big Idea(s)	Corresponding Essential Question(s)
LS1-4 Plants and animals adapt to reproduce. LS1-5 Environment and genetics affect the growth of organisms. LS3-2 Parents transmit genes to their offspring.	LS1-4 How do species survive? LS1-5 How do various factors affect the growth of organisms? LS3-2 How do living organisms pass traits from one generation to the next?

Unit Vocabulary Words	
Academic Cross-Curricular Vocabulary (Tier 2)	Content/Domain Specific Vocabulary (Tier 3)
Environmental Factors, Probability, Transferring, Varieties/Variation, Influence, Evidence	Genetic Factors, Germination, Species, Organism, Sexual Reproduction, Asexual Reproduction, Gene, Punnett Square, Offspring
Supporting Vocabulary (Tier 2)	Supporting Vocabulary (Tier 3)

Resources for Vocabulary Development (Strategies, Routines and Activities)			
• Instagram vocab activity • Vocabulary Matchbooks/Frayer model/Looping • Vocabulary Flashcards	• Vocabulary Flipbook/Foldable • Vocabulary around the World • Vocabulary Snowball Fight	• Vocabulary Examples/non-examples • Vocabulary Matrix • Vocabulary Web	• Vocabulary Focus Word Wall • Mnemonics

21st Century Skills	
☐ Creativity and Innovation	☐ Initiative and Self-Direction
☐ Critical Thinking and Problem Solving	☐ Social and Cross-Cultural Skills

☐ Communication and Collaboration	☐ Productivity and Accountability
☐ Flexibility and Adaptability	☐ Leadership and Responsibility
☐ Globally and Financially Literate	☐ _____
☐ Communicating and Collaborating	☐ _____

Connections between 21st Century Skills, NGSS, and Unit Overview:

Unit Assessments	
Pre-Assessment	Post-Assessment
[6th_science_cfa_unit_3 Pretest.docx](#)	[6th Science CFA Unit 3 Post.docx](#)

Scoring Guides and Answer Keys	

Assessment Differentiation		
Students with Disabilities	**Accommodations** Reference IEP to ensure appropriate testing environment	English Language — Emerging

	Modifications		Expanding

Engaging Scenario

Situation: A movie producer wants to produce an alien movie. This movie is about many alien planets being destroyed and those aliens coming to Earth to escape their own planet's devastation.

Challenge: To determine realistic outcomes and survival rates of aliens coming to live on Earth.

Role: You have been hired to help produce this movie about aliens. Since scientist are a large audience of sci-fi movies, the producer wants this movie as scientifically correct as possible.

Audience: Producers and directors of the movie

Product/performance: Present alien family and habitat possibilities.

Performance Task Synopses

Task 1: Students will receive a gene card. Students will identify dominant and recessive traits based on their gene card. A capital letter on the gene card will represent a dominant trait. Students will create a picture to show what their creature looks like based on the gene card.

Task 2: Students will receive another gene card. Students will identify dominant and recessive traits based on their second gene card. They will next draw a picture for that gene card. Students will create an offspring using their gene cards from tasks 1 and 2. They will use the genes from each card to make Punnet squares to decide what genes are passed onto the offspring. The teacher will use guidelines below to decide which of the four sections of the Punnet square will be the trait that is expressed in the offspring. Once they have the genes

of their offspring they will draw a picture of what their offspring would look like.

Task 3:
Can your creature survive living in Riverside? Why or why not?
- Students will determine if their offspring can survive in Riverside.

- Include needs for food, climate, space, and shelter.

- How would the creature need to **adapt** so it would be able to survive in Riverside?

Task 4: (optional)
Students will create a habitat suitable for their offspring alien's survival.
- In partners, students will create a display of their offspring's suitable habitat.

  - Mural

  - Diorama

  - Book/story

  - Comic strip

  - Etc.

- Students will present to the class.

Performance Task # 1 Scoring Guide

Exemplary
- ☐ Student will create an alien with a complete description paragraph including all 6 features.
- ☐ Student's drawing will represent all features listed.
- ☐ Student will describe more than 4 features of the alien's habitat
- ☐ Includes where the alien will live (land, water, air, trees, etc.)
- ☐ Includes needs for alien

Proficient

- ☐ Student will create an alien with a complete description paragraph including at least 6 features.
- ☐ Student's drawing will represent each of the 6 features.
- ☐ Student will describe at least 4 features of the alien's habitat
- ☐ Includes where the alien will live (land, water, air, trees, etc.)
- ☐ Includes needs for alien

Progressing

- ☐ Meets <u>4</u> of the "Proficient" criteria

Beginning
- ☐ Meets fewer than 4 of the "Proficient" criteria

Feedback to Curriculum Team	
Reflect on the teaching and learning process within this unit of study. What were some successes and challenges that might be helpful when refining this unit of study?	
Successes	Challenges
Student Perspective		
Teacher Perspective		