Marietta City Schools

District Unit Planner

Everything on the unit planner must be included on the unit curriculum approval statement.

Science Grade 7 Advanced Studies

Unit title	*Natural Selection*	**MYP year**	*2*	**Unit duration (hrs)**	*20 Hours*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

GSE Standards

Standards

S7L3. Obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring.
c. Ask questions to gather and synthesize information about the ways humans influence the inheritance of desired traits in organisms through selective breeding.

S7L5. Obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution of living organisms through inherited characteristics.
a. Use mathematical representations to evaluate explanations of how natural selection leads to changes in specific traits of populations over successive generations.
(Clarification statement: Referencing data should be obtained from multiple sources including, but not limited to, existing research and simulations. Students should be able to calculate means, represent this data in a table or graph, and reference it when explaining the principles of natural selection.

b. Construct an explanation based on evidence that describes how genetic variation and environmental factors influence the probability of survival and reproduction of a species.

c. Analyze and interpret data for patterns in the fossil record that document the existence, diversity and extinction of organisms and their relationships to modern organisms.
(Classification statement: Evidence of evolution found in comparisons of current/modern organisms such as homologous structures, DNA, and fetal development will be addressed in high school.)

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)
In third grade, the SWBAT
S3L1.b. Construct an explanation of how external features and adaptations (camouflage, hibernation, migration, mimicry) of animals allow them to survive in their habitat.

MCS Gifted Standards K-12
MCS.Gifted.S5B. Recognize and build upon strengths and limitations.
MCS.Gifted.S5D. Develop a shift in actions, feelings, and thoughts.
MCS.Gifted.S6E. Seek opportunities for self-growth risk-taking, and curiosity in various situations.
MCS.Gifted.S6F. Seek opportunities to be productive and proactive in various situations.

Concepts/Skills to be Mastered by Students

- Inheritance of Traits
- Variation of Traits
- Natural Selection
- Adaptation
- Evidence of Common Ancestry and Diversity

Key Vocabulary: (KNOWLEDGE & SKILLS)
Artificial selection, natural selection, evolution, theory, overpopulation, variation, survival of the fittest, reproduction, allele, frequency, trait, generations, mean/average, probability, adaptation, fossil record, diversity, extinction

Year-Long Anchoring Phenomena: (LEARNING PROCESS)
Humans have the ability to positively and/or negatively impact biological and ecological systems.

Unit Phenomena (LEARNING PROCESS)
How do modern day organisms compare in structure, function, and appearance to their ancestors?

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)
- Students may believe that an individual can intentionally change and pass on its genes so that its offspring will be adapted.
- Students may perceive the change in the frequency of a trait due to natural selection as a process that happens over one to two generations, rather than over a long period of time.
- Students may have the perception that a belief in evolution and religion are mutually exclusive, and that evolution is a myth.
- Students may have difficulty using the fossil record to determine whether an organism is simpler or more complex, or older or younger.
- Students may have difficulty calculating mean and interpreting data in tables of trait frequency in a given population.
- Students may confuse natural selection with artificial selection.

Key concept	Related concept(s)	Global context
Change Change is a conversion, transformation or movement from one form, state or value to another. Inquiry into the concept of change involves understanding and evaluating causes, processes and consequences.	Patterns (MYP/CCC) Evidence (MYP)	**Orientation in space and time** Where we are in place and time: an inquiry into orientation in place and time; personal histories; homes and journeys; the discoveries, explorations and migrations of humankind; the relationships between, and the interconnectedness of, individuals and civilizations, from local and global perspectives.
Statement of inquiry		
The fossil record can be used as evidence to determine the relationships, patterns, and changes in organisms over time.		

Inquiry questions
Factual ● How does natural selection differ from artificial selection? ● What steps are involved in the process of natural selection? ● How do I calculate means? ● What is the fossil record? ● What are some examples of species that no longer exist today? **Conceptual** ● How does the theory of natural selection explain changes in populations over successive generations? ● How can I interpret data to determine changes and trends of traits in a population? ● How can we use patterns in the fossil record to learn more about the existence, diversity, and extinction of past organisms? ● How do genetic variation and environmental factors influence a species' probability of survival? **Debatable** ● Could the extinction of certain species of organisms have been prevented?

MYP Objectives	**Assessment Tasks**	
*What specific MYP **objectives** will be addressed during this unit?*	***Relationship** between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
Science: Criterion A: Knowing and Understanding i. describe scientific knowledge ii. apply scientific knowledge to solve problems set in familiar and unfamiliar situations iii. analyze information to make scientifically supported judgments Criterion B: Inquiring and Designing	SOI: The fossil record can be used as evidence to determine the relationships, patterns, and changes in organisms over time. In this unit, students will investigate how the process of natural selection results in changes in populations over time. These changes can be evaluated by collecting evidence from the fossil record. In the Natural Selection Unit Assessment, students will demonstrate their ability to apply the concept of natural selection to determine changes in populations. They will predict and infer changes in allele frequency based on environmental changes. They will also analyze samples from the fossil record and compare them with modern day organisms. Students will also use the fossil record to hypothesize probable changes in environmental factors that lead to changes in a species. In the natural selection lab, students will model the process of natural selection to see how environmental changes may impact a species' ability to survive. They can then apply their modeling experience to changes that have taken place in species based upon evidence from the fossil record.	**Formative Assessment(s):** Natural Selection Common Formative Assessment **Summative Assessment(s):** Natural Selection Unit Assessment Paper I and Paper II

iii. describe how data will be collected Criterion C: Processing and Evaluating i. present collected and transformed data ii. interpret data and describe results using scientific reasoning Criterion D: Reflecting on the Impacts of Science i. describe the ways in which science is applied and used to address a specific problem or issue ii. discuss and analyze the various implications of using science and its application in solving a specific problem or issue iii. apply scientific language effectively Design Criterion B: Developing Ideas iii. present the chosen design and outline its reasons for its selection iv. develop accurate planning drawings/diagrams and outline requirements for the creation of the chosen solution		
Approaches to learning (ATL)		
Category: Thinking **Cluster:** Critical-Thinking		

Skill Indicator: Use models and simulations to explore complex systems and issues. Gather and organize relevant information to formulate an argument.

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
S7L3. Obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring. c. Ask questions to gather and synthesize information about the ways humans influence the inheritance of desired traits in organisms through selective breeding.	Compare & Contrast: Selective Breeding vs. Natural Selection	• Capstone Connections • Discovery Education High School Biology Techbook • NGSS Case Study 7: Gifted and Talented Students • NGSS: All Standards, All Students • Extensions - Enrichment Tasks/Projects Task-Specific Differentiation • Use of Mosa Mack Phenomenon for Increased Level of Rigor • Antibiotic Resistance Lab • Mosa Mack Engineering Design Challenge: Building a Product Based on a Plant/Animal Adaptation • Engineering Design (Student Choice of Product) • SB6.c. (examining comparative morphology and embryology as evidence for natural selection)
S7L5. Obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution of living organisms through inherited characteristics. a. Use mathematical representations to evaluate explanations of how natural selection leads to changes in specific traits of populations over successive generations. (Clarification statement: Referencing data should be obtained from multiple sources including, but not limited to, existing research and simulations. Students should be able to calculate means, represent this data in a table or graph, and reference it when explaining the principles of natural selection.)	Mosa Mack: Selection & Adaptations -Lesson 1: Phenomenon -Lesson 2: Bird Beak Challenge Peppered Moth Simulation	
S7L5. Obtain, evaluate, and communicate information from multiple sources to explain	Mosa Mack: Selection & Adaptations -Lesson 1: Phenomenon -Lesson 2: Bird Beak Challenge	

the theory of evolution of living organisms through inherited characteristics. b. Construct an explanation based on evidence that describes how genetic variation and environmental factors influence the probability of survival and reproduction of a species.	Peppered Moth Simulation	
S7L5. Obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution of living organisms through inherited characteristics. c. Analyze and interpret data for patterns in the fossil record that document the existence, diversity and extinction of organisms and their relationships to modern organisms. (Classification statement: Evidence of evolution found in comparisons of current/modern organisms such as homologous structures, DNA, and fetal development will be addressed in high school.)	Mosa Mack: Evidence of Evolution -Lesson 1: Phenomenon -Lesson 2: Lab & Evidence Journal	

Content Resources

Mosa Mack: Evidence of Evolution (L1, L2)
Mosa Mack: Selection & Adaptations (L1-L3)
-Lesson 3: Engineer: Build a Product from an Animal or Plant Adaptation

Discovery Education Science Techbook
-Unit 4: Evolution; Concept 4.1: Evidence for Evolution; Concept 4.2: Change over Time and the Fossil Record; 4.3: Adaptations; Concept 4.4: Darwin and Natural Selection

Discovery Education High School Biology Science Techbook
-Unit 4: Heredity; Concept 4.6: Evolution

Carolina Biological Antibiotic Sensitivity Kit

Biomimetic Design Examples

GaDOE Instructional Segment: I Can't Eat This Food, But My Sibling Can."

DE Exploration: Natural Selection

PhET: Natural Selection SIM

Capstone Connections

Influence of Genetic Variation and Environmental Factors on Gene Frequency & Population Health:
-Peppered Moth Simulation
-Elephant Tusks
-Antibiotic Resistance