Curriculum Sample Template

Max. 8 Pages

Grade Level	9th	**Content Area**	Science
Course Title (grades 9-12 Only)	Biology		
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Strong background in the inquiry process. Knowledge of the scientific method, specifically the ability to form a hypothesis following an observation. Lab etiquette. Knowledge of animal and plant kingdoms.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	Within this biology unit plan, a heavy emphasis is placed upon writing about Science. As a science unit, the content itself is aligned to STEM. Marzano high yield instruction strategies (objective driven vocabulary) and Kagan cooperative learning techniques (i.e. centers, gallery walks, and outdoor labs) are also built into this biology unit. All of the instruction is objective driven and daily formative assessments are built into each lesson.		
Standard Number and Description *List the Number* and the full description for the Required Standard or Science Performance Objective listed in section A.6.*	HS.4.4.3 Describe how the continuing operation of natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species.		
Materials/Resources Needed	Mimeo Board. Permission to use campus grounds in a field experiment. Individual whiteboards.		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

Lesson (add as needed)	**Instructional Strategies**	**Student Activities**

1	**Objective**: Students will understand how variation and mutation within a species affects survival and reproduction of that species **Key Points/Terms:** • Variation: is the divergence in the structural or functional traits of an organism within a species or population • Mutation: a relatively permanent change in hereditary material involving either a physical change or a biochemical change • Survival: the act or fact of living or continuing longer than another person or thing • Reproduction: the process by which plants and animals give rise to offspring **Activation of Prior Knowledge**: Teacher will ("TW") ask students to list all the different types of dogs they know of. **Introduction to New Material ("INM")/Modeling**: TW reference the key points and give examples of variation, mutation, survival, and reproduction within species. **Guided Practice**: TW break the classroom into centers. Each center will be one key point and students will rotate around the room taking notes from the center material and adding their own information **Independent Practice**: TW hand student a "T" chart of organisms. SW compare and contrast the organisms, referencing the key points. **Assessment**: TW put a variation essay prompt on the board. SW respond to the prompt and be scored 1-4 based on how well students reference the key points and make sound arguments about survival and mutation.	Students will ("SW") open their interactive notebooks to a new page and write the objective and key points. SW look up any unknown vocabulary in their science glossary, write the definitions, and rewrite the definitions in their own words. SW actively think about all the dogs they have encountered in their lives. SW actively listen while the teacher introduces how variation and mutation within a species affects survival. SW engage in the centers activity, answer all teacher questions, and make reference the key points in their answers. . SW participate in the independent practice activity and justify answers while referencing the key points. SW complete the assessment activity and justify the answers using key points.
2	**Objective**: SW understand how a population of organisms adapts to threats and changes in it's environment **Key Points/Terms** • Adaptation: How an organism responds to changes in the environment. • Fitness: The physical attributes of an organisms which are	SW open their interactive notebooks to a new page and write the objective and key points. SW look up any unknown vocabulary in their science glossary, write the definitions, and rewrite the definitions in their own words.

	advantageous for survival and reproduction • Differential Reproduction: if a trait is heritable, and allows an organism to have higher fitness in its environment, then it will be more likely to reproduce and pass on that gene.	
	Activation of Prior Knowledge: TW ask for volunteers from the class to reference their variation and mutation notes. These volunteers will reference the key points form last time to engage the classroom and prepare everyone to think scientifically.	SW actively think about and share their key points from the prior lesson.
	INM/Modeling: TW reference the key points and give examples of how adaptation, fitness, and differential reproduction enable an organism to adapt to their environment	SW actively listen while the teacher introduces how adaptation, fitness, and differential reproduction within a species affects survival.
	Guided Practice: TW prepare students for a "galley walk" around the classroom. Each location in the classroom will detail how an organism adapts to threats within their environment. TW ask multiple checks for understanding ("CFUs"; call on non-volunteer to restate instructions, ask students to define key points in their own definitions, ask student to reteach their neighbor). SW take notes, reference key points, and answer checks for understanding built into each location.	SW engage in the gallery walk activity, answer all teacher questions, and make reference the key points in their answers. .
	Independent Practice: TW instruct students to create their own organisms and apply threats to their environments. SW then detail how the organism responds to threats in the environment referencing the key points.	SW participate in the independent practice activity and justify answers while referencing the key points.
	Assessment: Students will trade papers from the independent practice section and grade the word of their peers. Students as graders must reference the key points when grading and will hand the papers back to the student.	SW complete the assessment activity and justify the answers using key points.
3	**Objective:** SW understand biodiversity within their campus during science lab **Key Points/Terms**: • Species: A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding • Biome: A large naturally occurring community of flora and fauna occupying a major habitat	SW open their interactive notebooks to a new page and write the objective and key points. SW look up any unknown vocabulary in their science glossary, write the definitions, and rewrite the definitions in their own words.

	• Biota: The animal and plant life of a particular region, habitat, or geological period. **Activation of Prior Knowledge**: TW ask three students to explain the most interesting points from the prior "gallery walk" conducted last class. **INM/Modeling:** TW model a lab exercise to be completed during this class session. TW model proper lab procedure, reference the key points, and lead students outside the school to conduct the lab. **Guided Practice**: TW distribute lab sheets with questions to be completed during guided practice. TW instruct students to examine the biodiversity around the campus and apply the key points to their observations. SW pick one organism found around campus, identify the organism, and identify the environment in which the organism lives. Once complete, SW return to the classroom and document their findings in their scientific notebook. **Independent Practice**: SW present their findings to the class. Each individual must reference the key points in their findings and explain how to the biodiversity around campus affects the larger goal of understanding life sciences. **Assessment**: On a stickie note, SW reference 3 organisms found around campus and explain in one sentence how these three organisms influence each other within their biome.	SW actively think about the most interesting points from the gallery walk activity from the prior lesson. SW actively listen while the teacher introduces how variation and mutation within a species affects survival. SW engage in the lab activity. SW carefully practice good behavior and critical thinking skills during the biodiversity lab. SW answer all teacher questions, and make reference the key points in their answers. SW pick one organism found around campus, identify the organism, and identify the environment in which the organism lives. Once complete, SW return to the classroom and document their findings in their scientific notebook. SW present their findings to the class and justify answers while referencing the key points. SW complete the assessment activity and justify the answers using key points.
4	**Objective**: SW understand how natural selection leads to the formation of new species **Key Points/Terms**: • Phenotype: The set of observable characteristics of an individual resulting from the interaction of its genotype with the environment. • Convergent Evolution describes the acquisition of the same biological trait in unrelated lineages. • Divergent Evolution is the accumulation of differences between groups which can lead to the formation of new species	SW open their interactive notebooks to a new page and write the objective and key points. SW look up any unknown vocabulary in their science glossary, write the definitions, and rewrite the definitions in their own words.

	Activation of Prior Knowledge: TW ask three students to explain how biodiversity around their campus influenced their thinking about life science	SW actively reflect on the biodiversity they found around their campus.
	INM/Modeling: TW explain many of the misunderstandings surrounding natural selection and will reference the key points with examples, notable convergent and divergent evolution	SW actively listen while the teacher introduces the key points and make connections to their own misunderstandings of evolution and natural selection.
	Guided Practice: TW pass out whiteboards to the class. On the Mimeo board, TW put up questions about convergent or divergent evolution. SW write the answers on their whiteboards and share with the class when prompted by the teacher	SW engage in the whiteboard activity, answer all teacher questions, and make reference the key points in their answers. .
	Independent Practice: TW pass out a matching quiz. SW match the questions with the corresponding divergent/convergent answers. Once each pair is matched, SW write 3-5 sentences detailing how they came to their answer.	SW participate in the independent practice activity and justify answers while referencing the key points.
	Assessment: SW write a compare and contrast essay (2 paragraphs) comparing phenotypes in organisms who are exposed to convergent and divergent evolutionary factors.	SW complete the assessment activity and justify the answers using key points.
5	TW instruct students to complete summative assessment.	SW complete summative assessment.

Summative Assessment Items: *Attach here.* For each summative assessment item, include an answer key or scoring rubric describing how points are to be awarded.

1) Write 1-2 informational paragraphs comparing and contrasting the operations of natural selection while emphasizing the role of phenotypic variation, mutation, survival, and reproduction. *(12 possible points)*

2) Write 1-2 informational paragraphs describing our campus's biodiversity and the population's ability to adapt to changes in the environment. *(12 possible points)*

3) Write 1-2 informational paragraphs comparing and contrasting the role of convergent and divergent evolution and how these factors lead to the origin of new species. *(12 possible points)*

Scientific Scoring Rubric for Each Summative Item

Total: _____/12; Grading Scale: 0-8=Incomplete; 9-10=C; 9-10=B; 11-12=A. 80%=Mastery.

PART	**1**	**2**	**3**	**4**
Objective Scientific Accuracy	Science is used seldom throughout the paper with several significant inaccuracies	Science is used sparingly throughout the paper with few significant inaccuracies	Science is used often throughout the paper with no significant inaccuracies	Science is used generously throughout the paper with no significant inaccuracies
Analysis	No analysis or support is offered.	Details and evidence are spotty, incomplete, or inaccurate.	Some details and evidence support students' arguments in regards to natural selection.	Details and evidence clearly and effectively support students' arguments in regards to natural selection.
Natural Selection Information	Natural selection is not linked to populations or their attributes.	Natural selection is not clearly linked to populations and their attributes, although an attempt at describing is made.	Description of natural selection and populations. Natural selection is linked to new species.	Detailed description of how natural selection affects a population. Clear cause and effect between natural selection and new species.