Curriculum Sample Template

Max. 8 Pages

Grade Level	9	**Content Area**	Science
Course Title (grades 9-12 Only)	Environmental Science		
Length of Unit	1 week	**Time of Year**	Block 8 of 10
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students will know what genetic variation, students will have studied about Darwin's journey to the Galapagos, and students will have studied some of the people that influenced Darwin (Hutton, Lyle, Malthus, etc...)		
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.*	Students will use their knowledge of natural selection, learned in class, to analyze results from a lab. Students apply their knowledge to solve new problems which fits with the rigor/ relevance model and is aligned to the Program on Instruction.		
Standard Number and Description *List the Number* and full description for the required Standard.*	HS.4.4.2 Explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment		
Summative Assessment *Describe a cumulative and comprehensive activity, clearly separate from instruction and guided or independent practice, which allows each student to individually demonstrate mastery of the required Standard. A copy of the summative assessment must be attached to the curriculum sample.*	The assessment for this standard will be an essay question that is given as part of a unit test on natural selection. The essay question will be: Explain how genetic variation can effect or influence an organism's success in an environment. Provide an example.		
Scoring Scale and Mastery Level *Explain how the assessment is scored, to include points per question, how points are awarded, total points possible, criteria necessary to demonstrate mastery, and grading scale. A copy of the answer key and scoring rubric (whichever applicable) must be attached to the curriculum sample.*	The essay question will be part of a larger test on natural selection. The essay will be worth 6 points. Students will receive 0-4 points for identifying the role genetic variation plays in natural selection, and 0-2 points for citing an example of genetic variation and an organism's success. The grading scale for the essay will be 0-4 points =no credit for essay (must correct and redo), 5-6 points (83%) = demonstrates mastery (score will be accepted for unit test).		
Materials/Resources Needed	Document camera and projector, M&Ms, different colored backgrounds, poster board, calculators		

* ***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)	**Instruction**	**Student Activities**
1	Students will have bell work reviewing the term genetic variation, and giving examples of genetic variation. After bell work students will take notes on natural selection from a lecture. Lecture will include information on: genetic variation, artificial selection, struggle for survival, fitness, adaptation, descent with modification, natural selection and common descent. The lecture will take 2 class periods and will contain several checks for understanding. Over the two class periods students will complete think-pair-shares, vocabulary exercises (vocabulary cards, Frayer models, etc...), and summaries of notes. Students will have review questions that they can answer from their notes as homework.	Students will review and cite examples for genetic variation Students will take notes on natural selection Students will complete think-pair-shares Students will complete vocabulary exercises Students will write summaries of notes Students will complete review questions
2	Students will review how genetic variation and environmental pressures drive evolution by natural selection. After bell work students will be introduced to a lab assignment in which they will simulate a real-world predator - prey relation, and how a changing environment and genetic variation will cause changes in the prey species. Students will be told that for this exercise the students will be predators, and their prey will be M & Ms. Students will be told that they hunt by site. Students will be placed 20 ft. away from a table. At the table will be poster board that covers an environment. Students will be told that the way they get to eat is by identifying how many of a color is on the table (to begin the surface of the table will be a random series of colored dots the same color and size as the M & Ms). Four students at a time will have 3 seconds to try and count how many of a certain color M & M are on the table. If students answer correctly 4 of the M & Ms of that color are removed from the board. After each round 2 new M & Ms of the color of each survivor will be added to the population. The environment will be covered, a new handful from the population of M & Ms will be added to table and 4 new students will attempt to "capture" M & Ms. After four rounds on the random background students will count the number of each color of M & Ms and record it in their data tables (Students will be given the initial number for the M & M population). Students will then be told that a new invasive species of plant has moved into the environment and	Students will review the role genetic variation plays in evolution Students will perform an M & M evolution lab

	grows with much more green foliage. The random background will be replaced with a bright green one that matches the color of the green M & Ms. Students will then go through another 4 rounds of capturing prey. Again data on the populations will be recorded. Students will be instructed to note any changes in certain groups. Next the students will be told that warming in the area has caused the foliage to dry out. The green background will be replaced with one that is yellow and matches the color of the yellow M & Ms. Students continue for 4 more rounds then the population numbers are recorded. Students will then clean up the lab, and told they will review the data and write lab reports the next day.	
3	Students will review the procedure from the previous day lab. Then students will analyze the data to see if populations of M & M s changed after backgrounds changed. Students will then write a discussion as to why populations changed and how it relates to the real-world. Students will share their thoughts within groups. Groups will refine ideas then present them to the class using the document camera	Students will analyze data Students will write a discussion on the role of genetic variation in a changing environment Students will share discussions with in small groups Students will revise discussions based on peer review Students will present discussions
4	Students will take the assessment on evolution by natural selection	Students will complete exam on natural selection

Paste Summative Assessment Here:

Natural selection

Now that we have completed the unit on natural selection please write a five paragraph essay that summarizes your understanding of genetic variation. Explain how genetic variation can effect or influence an organism's success in an environment. Provide an example.

Paste Answer Key/Scoring Rubric Here:

The essay question will be part of a larger test on natural selection. The essay will be worth 6 points. Students will receive 0-4 points for identifying the role genetic variation plays in natural selection, and 0-2 points for citing an example of genetic variation and an organism's success. The grading scale for the essay will be 0-4 points =no credit for essay (must correct and redo), 5-6 points (83%) = demonstrates mastery (score will be accepted for unit test).

Natural Selection key

Provided below is an example of an exemplary response. The essay will be graded by the rubric that follows.

Example of response:

Genetic variation along with environmental pressure is the driving force behind evolution. All species of organisms have genetic variation. For example, not all people have the same eye color, hair color, or height. These differences may increase an organisms overall ability to survive or reproduce in its environment (fitness). As a result, certain variations will be favored by the environment. Over several generations the favored variations will result in adaptations that could eventually result in the divergence of species. This is the change with modification that is the result of natural selection. An example of this can be seen in the color of organisms. Like in our lab, some organisms of the same species have different color patterns. If the environment changes, the variations that cause a prey organism to blend in could increase its fitness. Over several generations the favored color could become more dominant replacing other colors and causing a change in the species. Other examples of this could be found in Darwin's time and the favoring of darker colored moths during the industrial revolution.

Rubric
Content 0-4: points

0	1	2	3	4
No response	Response attempts to show how genetic variation is connected to evolution by natural selection, but contains several errors	Response shows connection with minor errors	Response correctly shows importance of genetic variation and species survival, but does not use much of the vocabulary associated with the concept	Exemplary response. Excellent use of vocabulary and exemplary description of connection

Example: 0-2 points

0	1	2
No response	Has an example, but not clearly explained	Example with clear explanation how it relates