Curriculum Sample Template

Grade Level	High School	**Content Area**	Science
Course Title (grades 9-12 Only)	Biology		
Length of Unit	5 Days	**Time of Year**	2nd Quarter
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students have mastered analyzing relationships among various organisms and their environment. They comprehend how organisms are influenced by a particular combination of biotic and abiotic factors in an environment(HS.4.3.2) They also completed a unit on modern genetics in which they described the molecular basis of heredity including DNA replication and protein synthesis, explained how genotypic variation occurs and results in phenotypic diversity, and described how neiosis and fertilization maintain genetic variation(HS.4.2.2; HS.4.2.3.; HS.4.2.4)		
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.*	*RTI:* Main ideas in reading materials are highlighted for Tier 3 students. Teacher may organize small group guided instruction for students who need it. T. may shorten the amount of lab questions for tier 3. *What Works* Strategies: Graphic organizers used throughout unit. Student self-reflection is used for formative assessment and ticket out the door. Daily and unit objectives are clearly communicated to students at the beginning of every lesson and written on the board. Cooperative learning used in lessons. *SIOP:* Sts. are given multiple opportunities to discuss their ideas and new information in pairs, in small groups and with the class. *Content Area Reading:* Students use pre-reading strategy of surveying text features before reading to create pre-reading questions and a purpose for reading.		
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	Students will demonstrate comprehension of how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment by answering 10 multiple choice questions and then explaining the concept in written responses to four questions.		
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 summative assessment will be scored using an answer key. The test is worth 100 points total. The 5 multiple choice questions are each worth 8 points. The four written response questions are each worth 15 points. The written response points are awarded as follows: 15 points = A correct response that includes all the important and most relevant information. The student demonstrates a thorough understanding of the concept. 10 points = A correct response that includes important ideas and details but may have gaps in information, or a smaller detail may be incorrect. Although the answer is not thorough, the student demonstrates a		

	broader understanding of the concept in the question. 5 = The student provides some important information or key details, but the response shows little understanding of the concept in the question. 0 = The answer is completely incorrect or no response was provided. Sample correct responses are provided on the answer key. Mastery is demonstrated with a score of 75% or above. The percentage is determined by dividing the student's points by 100(the total points possible). The grading scale is as follows: 100%-90% = A, 89% - 80% = B, 79%-70% = C, 69%-60% = D, 59% - 0% = F
Materials/Resources Needed	Textbook: * Prentice Hall *Science Explorer: Life Science* KWL chart, "Using Text Features" Handout Video: *Genetic 101, Part 4, What are Phenotypes?* from Khan Academy online, 3x5 cards, butcher paper and markers, "Bird Beak Adaptations" lab handout, teacher-created study guide **Note: 2013-2014 Pearson textbooks, as mentioned in A.3 Program of Instruction, were not available at time of planning and publication, so earlier editions of Pearson/Prentice Hall textbooks were used.*

	Instruction	Student Activities
1	Lesson Objectives(on board): Comprehend the following concepts: adaptation, variation, evolution, natural selection, Anticipatory Set: T. explains the day's objective and tells students they will take a test at the end of the week to assess their ability to explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment (unit objective). T. asks Sts. to complete K and W on KWL chart. T. has sts share answers with partners and then asks them to share with class. **1.** T. explains that Sts. will read pages 174-179 in their Biology textbooks. T. passes out "Using Text Features" handout to record, describe and use information in headings, subheadings, bold words, graphics and then develop pre-reading questions and a purpose for reading. (Tier 3 may have main ideas highlighted in text.) **2.** Sts. share and discuss their answers on the handout and share their pre-reading questions. T. then asks Sts. to share pre-reading questions with the class. T. writes these responses on the board. **3.** T. asks Sts. to read assigned pages and answer pre-reading questions as they	Anticipatory Set: Listen to T. explain objective. Identify and record what they know about the objective in a KWL Chart **1**.Record and describe text features in Pages 174-179 of textbook. Use information to develop pre-reading questions and a purpose for reading. **2**.Share handout answers and pre-reading questions with partner and then with class. **3**.Read text and look for answers to their pre-reading questions. **4.** Share answers to pre-reading questions with T. and classmates. Closure: Self-reflect on learning and identify new information that has been learned. Write new information in KWL Chart.

	read. T. monitors St. work during this time. **4.** T. goes back to board to see if Sts. can answer recorded pre-reading questions after reading. T. writes in answers as Sts. share what they read. Closure: T. has Sts. write in all the new information they learned during the day's lesson in the "L" section of the KWL Chart. Sts. turn in as Ticket Out the Door.	
2	Objective: Explain how the concepts of adaptation, phenotypic variation, genotypic variation, evolution and natural selection relate to one another. Anticipatory Set: T. tells Sts the objective for the day and asks who remembers the difference between genotypic traits and phenotypic traits. After Sts. respond. T. tells Sts that they will watch a short 2-minute video clip to review the terms. 1. T. shows first 2 minutes of *Genetic 101, Part 4, What are Phenotypes?* 2. T. says: "Now that we have reviewed genotypic and phenotypic variations, let's see if you remember the important concepts we read about yesterday and can explain how they relate to one another. T. forms multi-ability, cooperative groups and gives each groups a stack of 3x5 cards. On each word is a key term from the previous day's reading. T. tells Sts. to discuss each term in their group and then create a graphic representation with the cards on butcher paper showing how the terms relate to one another. For example, the group could make a web, an outline, a visual hierarchy, etc. Terms include adaptation, variation, phenotypic, genotypic, evolution, natural selection, environment, fur color, immunity to disease, different claw sizes, poisonous flowers,etc. Groups can also add headings, subheadings or details with marker on the butcher paper as part of the graphic representation. 3. T. facilitates a round robin sharing structure (one person is randomly chosen to stay behind to explain graphic representation to other groups; other group members travel to see the other graphic representations) T. monitors student discussion, taking notes to record who is learning and who may need additional instruction. 4. T. asks groups to reconvene and add any additional information they may have left out of their graphic representations that they learned from other groups or correct any errors in their representation. Ticket Out the Door: T. asks Sts. to rate their understanding of the unit objective (written on the board) from 1 – 5 (5 = "I totally get it!" and 1 = "Help!")	Ant. Set: Listen, provide response to T. question 1. Watch video to review information from previous unit 2. Synthesize information about concepts related to the week's objective. After terms and conceptual information are provided on 3x5 index cards, discuss the terms and information in multi-ability cooperative groups and with group members. Use cards and butcher paper to create a graphic representation to show how terms and concepts relate to one another. 3. One member of each group: Share graphic representation and information on butcher paper with other students. Other members circulate, listen to representative from other groups explain their graphic representations, and note any information they may want to add to their graphic organizer. 4. Discuss the graphic representation one more time with their group. Add new information learned from other groups or correct any errors. 5. Self-reflect on learning and ability to do the unit objective.
3	Objective: Analyze how variations in bird beaks may lead to adaptations. Explain	Ant. Set: Listen to T.

	how a phenotypic variation can result in adaptations that influence an organism's success in an environment(weekly objective becomes daily objective) Anticipatory Set: T. explains the day's objective and explains that the unit objective involves being able to explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment. 1. T. provides lab handout entitled "Bird Beak Adaptations" to Sts. T. reads through it with Sts. and asks if they have any questions about what to do. 2. Sts. do lab in groups of 3-4 students. 3. After lab is complete, T. tells Sts. to discuss and orally answer the questions in the "Analyze and Conclude" section of the lab handout. 4. T. tells St. to answer the "Analyze and Conclude" section of the lab in writing in their lab journals independently. 5. T. leads class through discussion of lab, specifically asking Sts. to explain how bird beak variations may become adaptations in a given environment. Ticket Out the Door: Give an example of a phenotypic variation that can result in an adaptation that helps the organism survive.	1. Read through lab instructions and ask clarifying questions if needed. 2. Sts. scatter bird seed and raisens on a plate; raisens represent insects. Sts. use tweezers, hair clips, clothes pins to pick up seeds; these objects represent bird beaks. Sts. see how many seeds and raisens they can pick up in 10 seconds using different "beaks." As instructed in handout, Sts. record data in lab journals. 3. Discuss answers to "Analyze and Conclude" lab questions, analyzing lab data. 4. Write answers to lab questions in lab journal independently. (Tier 3 may have fewer lab questions. Tiers 2 and 3 may do lab questions in guided small group if needed) 5. Share analysis of lab data/answers to lab questions orally. 6. Utilize information from the day's lesson to answer question addressing unit objective.
4	Objective: Explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment. Anticipatory Set: T. asks St. volunteers to explain the objective for the class and tells class they will have a test over the information the following day. 1. T. has students open their textbook to P. 180 to do Nature at Work lab. T. reads through it and ask Sts if they have any questions. 2. Sts. do lab in multiability groups. 3. After lab, Sts. answer "Analyze and Conclude" questions in their lab journals independently. T. adds additional questions to this section: What variations may become adaptations that help mice survive in white sand dunes? Are these variations genotypic or phenotypic? Give an example of a genotypic variation that could become an adaptation in a species of mice. T. collects lab journals when Sts. are done. 4. T. reviews all the "Analyze and Conclude" questions with the students orally, asking St. to explain their responses. 5. T. assigns a study guide for the Sts to complete at home to prepare for the	Ant. Set: Listen to T. and respond to question orally. 1. Read through lab instructions with T. 2. Sts. do lab: Create cards with phenotypic variations (fur color) for mice. Then create cards for different events that can happen to mice(disease kills mice, predator kills, etc.). Sts. use cards to chart how 3 generations of mice change over time based on their phenotypic and genotypic variations. Sts. record data in the lab journals. 3. Analyze data and answer critical thinking questions in the lab journal independently. (Tier 3 may have fewer lab questions. Tiers 2 and 3 may do lab questions in guided small group if needed)

	test.	4. Share responses to critical thinking questions orally with class. 5. Use information from the textbook to answer questions on a study guide to prepare for test.
5.	Sts. take summative assessment. RtI Accomodations: Test may be read aloud for Tier 3 Sts. if necessary.	Answer multiple choice and written response questions to demonstrate the ability to explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment.

Biology Test

Part I: Choose the letter of the best answer. Each question is worth 4 points.

1. Which of the following is an example of a phenotypic trait that has influenced an organism's success in its environment?
   a. Finches that eat seeds have strong, wide beaks.
   b. Certain insects are able to eat food that other insects avoid.
   c. A small amount of monkey flowers are able to grow in soil that has a high concentration of copper.
   d. Ducks may be white, grey, or black.

2. If helpful variations may gradually accumulate in a species, what happens to unfavorable variations?
   a. They become stronger until the species becomes a different organism.
   b. They disappear.
   c. They cause illness in the organism.
   d. They spread to other species.

3. What is an example of a phenotypic variation that could influence a rabbit's ability to survive during winter?
   a. Strong appetite
   b. White fur
   c. Ability to survive disease
   d. A warm habitat

4. What is an example of a phenotypic variation that is likely to become an adaptation?
   a. Some lizards in the jungle are bright green.
   b. Some turtles will lay many eggs.

c. Some penguins have black backs.
d. Some pine trees have become immune to bark beetles.

5. What is an example of a genotypic variation that is NOT likely to become an adaptation?
   a. Some rabbits in the dessert have brown fur.
   b. Some saguaro cacti could not survive without water.
   c. Some bats are able to see extremely well in the dark.
   d. Some cholla cacti have sharp thistles.

Part II. Short Answer: Write a well-developed paragraph to answer each question. For full credit, each response must answer the question correctly and provide all the important and relevant information in a thorough explanation. Each question is worth 15 points.

6. Darwin noticed that organisms on Galapagos shared similarities and differences with organisms on the South American mainland. For example, iguanas on the Galapagos Islands had large claws that allowed them to grip slippery rocks. Smaller claws allowed mainland iguanas to climb trees. Explain how the claws of the iguanas could be adaptations that influence their ability to thrive in their environments.

7. Each turtle has slightly different traits. Some turtles can move faster than others. Explain how this variation could result in an adaptation in the species?

8. Some insects look like sticks. How could this effect an organism's success in the environment? Could it become an adaptation?

9. A small amount of monkey flowers are able to grow in soil near a mine that has a high concentration of copper. Normally, monkey flowers cannot grow in copper-contaminated soil. How could this genotypic variation have resulted in this adaptation and influenced its success near the mine?

Answer Key

Part I:

Scoring: Each question is worth 8 points. If student answer incorrectly, he/she receives zero point.

1. A
2. B
3. B
4. A
5. B

Part II:

Scoring: Each question is worth 15 points. The points are awarded as follows:

15 points = A correct response that includes all the important and most relevant information. The student demonstrates a thorough understanding of the concept.

10 points = A correct responses that includes important ideas and details but may have gaps in information, or a smaller detail may be incorrect. Although the answer is not thorough, the student demonstrates a broader understanding of the concept in the question.

5 = The students provides some important information or key details, but the response shows little understanding of the concept in the question.

0 = The answer completely incorrect or no response was provided.

Sample Correct Responses:

11.) Over time, organisms adapt to their environments by developing variations. In this case, iguanas from two different environments have two different types of claws. These phenotypic variations are adaptations because each claw type helps the iguanas survive. For the iguana on Galapagos, the claws help them climb up and move around slippery rocks, which then helps them feed off seawood. The iguanas on the mainland, however, eat leaves off trees, so they need smaller claws to climb trees and access food. The claw variations help each iguana species survive in their environments. In doing so, the variations have become adaptation.

12.) If some turtles swim faster than others, this trait could become an adaptation because it enables the faster turtles to survive. If predators are in the environment, faster turtles can escape and survive. The slower turtles may be eaten. As a result, the faster turtles are the ones who reproduce. They pass on the genetic trait of swimming fast, and over time, the species of turtles all develop the ability to swim faster, which becomes an adaptation.

13.) If some insects look like sticks, this trait could become an adaptation. The insects that look like sticks may blend in with their environment and in a sense, be camouflaged. This, of course, is a helpful characteristic for survival, and these insects are likely to reproduce and pass on the characteristic to their offspring. After many generations, more members of the species will have the helpful variation. They will continue to survive and reproduce with this adaptation.

14.) Monkey flowers may not usually grow in copper-contaminated soil. However, by the mine, a few monkey flowers have adapted to the environment and grown. This adaptation resulted from a genetic mutation. The surviving monkey flowers then reproduce and pass on this mutation to their offspring. Over time, the genotypic variation has become an adaptation that has allowed more of the species to survive in the contaminated soil near the mine.