**Curriculum Sample Template**
Max.8Pages

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| **Grade Level** | 10 | **Content Area** | Science |
| **Course Title** (grades9-12Only) | Biology | | |
| **Expected Prior Knowledge**<br>*The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.* | Student are expected to master the knowledge of Mendelian traits, the concept of genotype and phenotype, and the concept that organisms adapt to survive in specific environments. | | |
| **Alignment to Program of Instruction**<br>*Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.* | As project based learning is a key feature in the school's mission, students will apply knowledge gained in science to complete projects and solve real world issues, and some may even be cross curricular. Lessons are aligned to both the program of instruction and common core standards by scaffolding knowledge, engaging students and requiring them to use higher depths of knowledge to demonstrate mastery and solve real world problems. | | |
| **Standard Number and Description**<br>*List the Number* and full description for the required Standard.* | 4S.C4.PO3<br>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** | All required class worksheets and tests | | |

****StandardNumber**:ForEnglishLanguageArts(ReadingandWriting),useGrade,Strand,Standard(e.g.,3.RI.2).ForK-8Math,useGrade,Domain,Standard(e.g.,6.EE.7).ForHSMath,useConceptualCategory-Domain,Standard(e.g.,A-REI.6).ForScience,useGrade,Strand,Concept,PO(e.g.,4.1.3.1).*

| Lesson (add | Instruction | Student Activities |
|---|---|---|
| 1 | **Objective: SWBAT 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.** Teacher introduces the standard and vocabulary of natural selection. Teacher emphasizes how natural selection occurs and address common misunderstandings that an individual within a species can spontaneously change in order to adapt, emphasizing the adaptations to changes occur within an entire population based on variation of that species. Teacher will give examples of the peppered moth, as it was seen in a both light and dark colors. However, after the 19th century and the pollution from the Industrial Revolution, the darker moths were better able to camouflage themselves on the lichen covered trees stained dark from pollution, the lighter moths were more visible to prey. Therefore, they produced less offspring, and were eventually almost replaced by the darker colored moth. Teacher will implement quick write Common Core strategy while teaching about the moth, asking students to respond to the following questions during instruction: How is the peppered moth varied? What is the difference between adaptation and natural selection? How does this lead to biodiversity? | Students will learn and take notes on the topic of representing complex numbers on a complex plane both in rectangular and polar form. Students will take notes on instruction and follow along with practice problems on the board by taking notes in their math notebooks. Students then complete an independent practice worksheet. After completion of the worksheet, students will then have the opportunity to compare answers to a partners' and correct any incorrect work. During the direct instruction, students will participate in a quick write Common Core activity while learning about the moth, asking students to respond to the following questions during instruction: How is the peppered moth varied? What is the difference between adaptation and natural selection? How does this lead to biodiversity? |
| 2 | **Objective: SWBAT 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.** Teacher first instructs students to recall what natural selection is, and instructs students to write one fact about natural selection on the board until all facts have been added. Teacher then distributes handout with questions about Darwin's Theory of Evolution in which he emphasizes natural selection as a means of evolution creating biodiversity based on variation within that population. Students read the handout and answer questions. Teacher then instructs students to complete Venn diagram comparing the peppered moth to the Galapagos finches, and then facilitates discussion in which students compare the finches observed by Darwin to the peppered moths discussed yesterday, and breaks down the roles played by variation and biodiversity, and how this could lead to the origin of a new species. | Students recall what natural selection is and how it works, and then students take turns writing one fact about Natural Selection on the board. Students must write a fact that has not already been written on the board. Students then read and answer questions about natural selection and Darwin's Theory of Evolution based on natural selection. Students then complete a Venn diagram comparing the peppered moths to the Galapagos finches, identifying how natural selection leads to biodiversity. Students participate in class discussion sharing their Venn diagram, and answering the question how this creates greater biodiversity and the origin of a new species. |

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| **3** | **Objective: SWBAT 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.** Teacher will assign student first summative assessment project, which is to research an assigned natural selection example, students may choose from the catydid, the Colorado River toad, The creosote bush, or the coral snake. Teacher will direct students to use 5 paragraph graphic organizer and facilitate brainstorm of examples of possible 3 main ideas for use in their papers. Teacher will allow 3 days in class to research, write a rough draft, edit, and write final draft. Teacher will assign presentation design, which demonstrates knowledge gained, as homework. Teacher will then facilitate student presentions to the class in a professional and well prepared manner using digital media as an aid per Common Core Standard (see rubric). | Students begin their first summative assessment, in which they will complete a research paper on an organism which demonstrates a history of natural selection, and may choose from the catydid, the Colorado River toad, The creosote bush, or the coral snake. Students will begin research in class, completing a 5 paragraph graphic organizer. Students will also create a presentation demonstration knowledge gained. Students will then present their research to the class in a professional and well prepared manner using digital media as an aid per Common Core Standard (see rubric). |
| **4** | **Objective: SWBAT Describe how the continuing operation of natural selection leads to biodiversity and the origin of a new species.** Teacher will give definition and examples of biodiversity or trees and dogs, and will also use humans as examples, citing biodiveristy in humans (skin color, eye color, height, body shape). Teacher will facilitate class discussion about how these adaptations benefited specific groups, i.e., height is adaptation to conserve or reduce body heat depending on climate. Teacher will distribute second summative assessment in which students write an extended response explaining in detail certain it is in fact the same number post-apocalyptic world, which variations would be useful to have? Teacher will stress the use of the Common Core Anchor Standard in the rubric. Teacher will allow students to complete writing assessment during the class period, and may complete if not finished as homework. | Students will complete an extended writing summative assessment during the entire class period. Students will use the instructions given with the rubric and use the Common Core Anchor Standard stated in the directions to guide them through their extended writing assignment). |
| **5** | **Objective: SWBAT Describe how the continuing operation of natural selection leads to biodiversity and the origin of a new species.** Teacher will distribute third summative assessment, a written comprehensive assessment. | Students will complete a written summative assessment during the entire class period. |

***Paste Summative Assessment Here:***

1. ***Research Paper and Poster***

Directions: Choose one of the following organisms: the catydid, the Colorado River toad, the creosote bush, or the coral snake. Using your 5 paragraph graphic organizer, research and write a research report about the organism you choose. Pick your 3 main ideas based on your organism's features, and explain how they display natural selection. You will then present your findings using digital media (powerpoint or equivalent) to clearly present to the Common Core Speaking and Listening Standards (Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.)

| Category | Level 4:<br>Achieves Standards at a<br>High Level | Level 3:<br>Performance at Standard | Level 2:<br>Performance below<br>Standard | Level 1:<br>Demonstrates<br>Minimal Success |
|---|---|---|---|---|
| Quality of Information/ Mastery of Standard | Information clearly relates to the main topic. It includes several supporting details and/or examples. Clearly describes how natural selection underlies a population's ability to change. 25 points. | Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples. Describes how natural selection's a population underlies a populations' ability to change. 20 points. | Information clearly relates to the main topic. No details and/or examples are given. Somewhat describes how natural selection underlies a population's ability to change.15 points. | Information has little or nothing to do with the main topic. Does not describes how natural selection underlies a population's ability to change. 10 points. |
| Writing Process | Graphic organizer or outline has been completed and shows clear, logical relationships between all topics and subtopics. Rough draft is of intended final draft quality ad has been thoroughly edited thoroughly. 25 points. | Graphic organizer or outline has been completed and shows clear, logical relationships between most topics and subtopics. Rough draft is complete and of good quality, and has been edited. 20 points. | Graphic organizer or outline has been started and includes some topics and subtopics. 15 points. Rough draft is present and poorly edited. | Graphic organizer or outline has not been attempted. Rough draft is of poor quality and/or has not been edited.10 points. |
| Final Draft | Detailed draft is neatly presented and includes all required information. 25 points. | Draft includes all required information and is legible. 20 points. | Draft includes most required information and is legible. 15 points. | Draft includes most required information and is legible. 10 points. |
| Presentation | Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. 25 points | Present information, findings, and supporting evidence such that listeners can usually follow the line of reasoning. Make use of digital media and visual displays of data to express information and enhance understanding of presentations. 20 points | Present information, findings, and supporting evidence such that listeners can sometimes follow the line of reasoning. Make use of digital media and visual displays of data to express information and enhance understanding of presentations. 15 points. | Information, findings, and supporting evidence such that listeners can sometimes follow the line of reasoning. No use of digital media and visual displays of data. 10 points. |

***2. Extended Writing Summative Assessment***

Directions: In the near future, a catastrophic event has occurred and has altered the Earth. Humans are an endangered species as only 5% of the Earth's population exists, and populations are small and isolated from each other. Different regions of the planet have changed drastically, and is barely recognizable. You must write an imaginary event that caused this post-apocalyptic world, and describe the environment of your small group of humans in detail. Be sure to follow the Common Core Anchor Standard: Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences. Describe the temperature, precipitation, terrain, food and water sources, and any treats or dangers faced by humans. Next, list at least 5 traits that would be useful for these humans to possess in this post-apocalyptic world. How would natural selection ensure these traits are passed on? What role does biodiversity play in passing on these traits? How might these traits and the role of natural selection and biodiversity lead to a new species?

| Category | Level 4:<br>Achieves Standards at a<br>High Level | Level 3:<br>Performance at Standard | Level 2:<br>Performance below<br>Standard | Level 1:<br>Demonstrates<br>Minimal Success |
|---|---|---|---|---|
| Topic | The entire story is related to the assigned topic and allows the reader to understand much more about the topic. 10 points. | Most of the story is related to the assigned topic. The story wanders off at one point, but the reader can still learn something about the topic. 8 points. | Some of the story is related to the assigned topic, but a reader does not learn much about the topic. 6 points. | No attempt has been made to relate the story to the assigned topic. 4 points. |
| Demonstration of Knowledge | Demonstrates accurate understanding of concepts of adaptations, natural selection, biodiversity, and creation of new species with 100% accuracy.<br>30 points. | Demonstrates accurate understanding of concepts of adaptations, natural selection, biodiversity, and creation of new species with 75% accuracy.<br>25 points. | Demonstrates accurate understanding of concepts of adaptations, natural selection, biodiversity, and creation of new species with 50% accuracy. 20 points. | Demonstrates accurate understanding of concepts of adaptations, natural selection, biodiversity, and creation of new species with less than 50% accuracy. 15 points. |
| Creativity | The story contains many creative and well chosen details and/or descriptions that contribute to the reader's enjoyment. The author has really used his imagination. 30 points. | The story contains a few creative and well chosen details and/or descriptions that contribute to the reader's enjoyment. The author has used his imagination. 25 points. | The story contains a few creative and well chosen details and/or descriptions, but they distract from the story. The author has tried to use his imagination. 20 points. | There is little evidence of creativity in the story. The author does not seem to have used much imagination. 15 points. |
| Mechanics | No grammatical, spelling or punctuation errors. Contains well structured event sequences. 30 points. | Almost no grammatical, spelling or punctuation errors. Contains a structured event sequence. 25 points. | A few grammatical spelling, or punctuation errors. Contains mostly structured event sequences. 20 points. | Many grammatical, spelling, or punctuation errors. Event sequence is confusing to reader.15 points. |

### *3. Written Summative Assessment*

**Answer the following questions. 100 points total.**

1. (5 points) Darwin's primary contribution to biological theory was the idea that
   A) an important mechanism of biological evolution is natural selection
   B) new alleles arise through mutation
   C) evolution is the change in gene frequencies over time
   D) genes are the units of inheritance
   E) characteristics acquired during an individual's lifetime can be passed to its offspring

2. (5 points) Which statement best represents the meaning of the term evolution:
   A) Changes in species toward greater complexity over time
   B) Changes in gene frequencies in a population over time
   C) The strongest individuals survive and produce the most offspring
   D) Changes in an individual over time in response to natural selection

3. (5 points) Over the past several decades, natural selection has caused populations of Staphylococcus aureus (an infectious wound bacterium) to evolve resistance to most antibiotics. If antibiotic use were stopped, what would you predict would happen to these S. aureus populations?
   A) They will go extinct without the antibiotic.
   B) The frequency of resistant forms will increase in these populations.
   C) The populations will begin colonizing new environments.
   D) The frequency of nonresistant forms will increase in these populations.

4. (5 points) Starting from a single wild canine species, humans have developed hundreds of breeds of domestic dogs. Which of the following statements is supported by this observation?
   A. Natural selection had not occurred very frequently in the wild dog populations.
   B. There was enough heritable variation in the wild canine species to create a variety of features.
   C. Heritable variation is low; otherwise the there would be more wild dog species.
   D. Most of the variation in domestic dog species is a result of variation in nutrition and training.

5. (5 points) Which of the following is a human adaptation to survive in cold temperatures?
   A. Turn your thermostat up
   B. Grow hair on your head to keep your head warm
   C. Put Your coat on
   D. Drink a warm beverage

6. (5 points) What did Kettlewell figure out when he studied the English Peppered Moths?
   A. Moths can choose to change color if they want to.
   B. Moths usually move away from areas with pollution.

C. The trees changed colors to prevent moths from resting on them.
**D. Natural Selection was responsible for the change in the color of the population of moths.**

7. (5 points) What did Darwin observe when he studies the Galapagos Tortoises?
A. The animals were too slow to survive long term.
B. They had different shaped shells which seemed to be based on the available food fund on each island.
C. Predators were killing them by the thousands.
D. They were diving into the ocean for food.

8. (5 points) Which of the following is the most fit in an evolutionary sense?
A. A lion who is successful at capturing prey but has no cubs.
B. A lion who has many cubs, eight of which live to adulthood.
C. A lion who overcomes a disease and lives to have three cubs.
D. A lion who cares for his cubs, two of who live to adulthood.
E. A lion who has a harem of many lionesses and one cub.

9. (5 points) Which of the following statements is true?
A. Natural selection acts directly on a population's gene pool, but individuals evolve.
B. Natural selection acts directly on individuals, but genes evolve
C. Natural selection acts directly on genotype, but individuals evolve.
D. Natural selection acts directly on phenotype, but populations evolve.

10. (55 points) Describe the relationship between adaptation, natural selection, biodiversity, and the creation of a new species. Write this in at least 10 sentences, and draw a diagram/flowchart illustrating your description.

Answer Key

1. A
2. B
3. D
4. B
5. B
6. D
7. B
8. E
9. D
10. Answers vary; students must thoroughly describe the relationships between adaptation, natural selection, biodiversity, and the creation of a new species. They must have a flow chart illustrating this. Sentences must be complete. Partial credit is awarded if some, but not all criteria is met.