Grade Level	8	**Content Area**	Science
Course Title (grades 9-12 Only)	NA		
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	The students identified differing structural traits and adaptations that aide in an organism's survival for its specific environment, region, climate, and habitat. (i.e. ecosystem or biome). The students have explained how an organism's behavior allows it to survive in an environment. The students recognize that characteristics of populations are inherited traits that are favorable in a particular environment. The students have analyzed the following behavior cycles of organisms: hibernation, migration, and dormancy. The students identified environmental factors that affect an organism's needs (Food, water, living space, and stable internal conditions), and its ability to adapt to its surroundings (i.e. temperature, environment, predators, and prey). The students have used various scientific method skills to perform investigations (i.e. observations, predictions, collecting data, communicating results, and drawing conclusions).		
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 become active learners of the scientific method, practicing applications of learning by engaging in experiments, active learning and presentations. They will learn to solve problems through observations, formulating predictions, and creating and testing hypotheses. Students apply the scientific process to a self designed, controlled experiment as well as display and analyze data from these experiments on lab reports. Hands-on, inquiry based science projects and units are enhanced and integrated with reading content area texts.		
Standard Number and Description *List the Number* and full description for the Required Standard or Science Performance Objective listed in section A.6.*	**8.4.4.2** Describe how an organism can maintain a stable internal environment while living in a constantly changing external environment.		
Materials/Resources Needed	Lesson 1:Materials box (1 per group), project packet with data sheets, internet access, assorted art materials: colorful drawing and painting supplies, cardboard, construction paper, tissue paper, paper towel and toilet paper tubes, glue, tape, modeling clay, feathers and leaves, cloth and cotton balls, bendable wire and pipe cleaners, glitter, and paper Mache materials Lesson 2: Prentice Hall *Science Explorer* Book, KWL Worksheet, "Adaptation, Diversity, and Behavior" word splash worksheet, computers, Internet access, composition books Lesson 3: Computer, Smart Board, Discovery Education Video: Planet Earth "Pole to Pole," Discovery Education video questions and writing prompt Lesson 4: Computer, Smart Board, *National Geographic* Video: Great Migrations Episode 1 "Born to Move," *National Geographic* Monarch butterfly migration route map, Migration Cues worksheet: What Spurs Migration?		

* ***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** **The teacher will:**	**Student Activities** **The students will:**
1	**Before the Lesson**: Students will be grouped in pairs. **Review**: Students will be prompted to think about an animal that they would like to learn more about. Discuss the importance of the animal's niche in its habitat. (i.e. its needs, environmental factors, eating habits, day to day behaviors, and predator/prey relationships). **Vocabulary**: Identify key terms to be used throughout the activity: Adaptation, behavior, hibernation, environment, niche, predict, data, communicate, conclusion, adaptations, analyze, and inference. **Introduction**: Students will be introduced to the materials that are provided to them by the teacher. Model safe techniques for using tools and objects during the project. Utilizing the inquiry model, explain that the purpose of the project is to **Identify how different animals are well suited to survive and maintain stable internal environments, while living in a constantly changing external environments.** Provide each pair of students with a 5 page design animal adaptations packet. The packet includes Purpose, Process Skills, Background Information, Procedure List, Data Tables, Data Analysis Questions, and Drawing Conclusion sections. **Warm Up**: Use a local animal from the desert climate (i.e. rattle snake) to model the expectations of the project. Teacher will ask students to explain why and how the animal has been successful at surviving in a desert ecosystem. Prompt the students to think of individual traits and behaviors that allowed the animal to be successful in its environment. Ask students what might happen to the animal if it didn't have these traits or behaviors. **Demonstration**: Teacher will document the answers provided by the students on data sheet 1. Teacher will ask for examples of why certain traits help the animal to adapt in its environment. **Model** how to document responses on data sheet 1. Use art materials provided to create a 3-D model of the animal and draw a picture on data sheet 1. Teacher will now invent a change to the animal's environment that is realistic or imaginary (i.e. temperature, predator, prey, loss of habitat, etc). **Instruct** the students to come up with physical or behavioral adaptations the	**Review**: Provide examples and share the reasons they believe their animal's needs are met in their particular environments. **Vocabulary**: Recall and discuss terms used in previous explorations and projects. **Introduction**: Observe the teacher modeling safety and use of tools during the investigation. Ask relevant questions. Preview the project packet, while the instructor explains each section. **Warm Up**: Respond to questions. **Demonstration**: Observe the teacher while the materials are set up. Students are encouraged to question and clarify any procedures for the project and its expectations.

	animal would need to develop over time to survive in the new environment. Teacher will model how to record the adaptations on data sheet 2. Use art materials provided for the project to add the physical adaptation(s) to the animal and draw a picture of the model on data sheet 2. **Inform** students that they will decide on another change to the environment as well and will repeat the documentation on their data sheets. **Interaction**: Tell students that it is time to start their projects. Distribute required materials for each pair of students. Rome the classroom during the activity providing assistance when needed for setup, design, ideas, drawings, observations, or documentation of results. **Analyze Data**: Prompt students to analyze their data. In the project packet, students will find the Analysis section. The groups are asked to respond to 4 analysis questions. 1.) Could the environmental changes you selected really happen? Explain why or why not. 2.) Explain how the adaptations you chose would help your animal's species survive the environmental changes. 3.) How likely would it be for your animal's species to survive the changes you chose? Explain. 4.) How did the second set of adaptations you chose affect your animal's other adaptations? Consider which of the previous adaptations would still be useful in the new environmental conditions, and whether any of them would no longer be useful. **Wrap up**: Ask students to share and compare results with other partnered groups in the class. Then allow students to draw conclusions about which animal adaptations were beneficial to their new environments, and which adaptations were no longer beneficial to the species. Prompt students to think about other animals in the new environment, and how their animals might affect those animals who live in the same environment.	**Interaction**: Use a computer to look up an animal that they would like to use for their project. Receive materials to perform the project. Use their packets to follow directions and procedures to complete the project. **Analyze Data**: Discuss with your partner the data collected, answer the 4 analysis question, and document findings in project packets. **Wrap Up**: Partners will compare results with other partnered groups. After comparing results with other groups in the class, they will draw conclusions about which adaptations might affect other animals in their new environments. Write conclusions in project packets. **Formative Assessment/Independent Practice**: Use the animal constructed in the project to write a story about your animal and the environmental changes it faced. Responses should be written in complete sentences, and be at least 3 paragraphs.

2	**Before the Lesson**: Display the Diversity, Adaptations, and Behavior Word Splash document on the Smart Board. The Word Splash has all of the vocabulary words that will be used throughout the unit, scrambled throughout the document. Ask students if they know the definitions or can provide examples for any of the vocabulary words. The students will go to the Smart Board and highlight the term being defined. **Review**: Pass out a KWL chart to each student. Students have used a KWL chart in the past. The chart allows students to write what they **K**now, **W**ant to know, and what they **L**earned throughout the unit. After the student completes the **K and W** portions. The teacher will collect and save until the end of the unit, when it will be redistributed for students to complete after they have completed the summative assessment. **Vocabulary**: Explain that organisms have inherited traits from their parents that are favorable to their environment. These are combinations of structural, behavioral, and instinctual adaptations, and have been passed down for generations. Explain how organisms inherited traits and characteristics can maintain a stable internal environment while living in a constantly changing external environment. Essential vocabulary words include the following: characteristic, extinct, habitat, heredity, estivation, hibernation, dormancy, genes, instinct, migration, homeostasis, diversity. **Introduction**: Pass out the *Science Explorer* textbooks to each student. Instruct students to turn to the table of contents section of the book. Preview with students the book title, table of contents, pictures, special features, and glossary. Invite students to predict what the chapter is about. Direct students to page 146, Chapter 5 Animal Behavior. Remind students that some of the material in the chapter is review, and that they will use the book as a tool to examine their prior knowledge, and verify the new content. **Interaction**: Instruct students to take out their science composition books. Identify the key vocabulary words from the word splash worksheet projected on the Smart Board. Instruct students to list the vocabulary words in their composition books, and complete the list by recording the definitions from the informational text and glossary sections in the textbook.	**Before the Lesson:** Volunteer to go to the Smart Board to share their understanding of the vocabulary words that they highlight. Offer alternative descriptions of the vocabulary terms as well. **Review**: Describe at least three things that they know about diversity, adaptations, and behavior. Write at least 3 things that they **K**now, and **W**ould like to know about the unit. Turn in their incomplete KWL charts when the **K** and **W** portions are complete. **Vocabulary**: Students repeat vocabulary words aloud with the teacher to master pronunciation. **Introduction**: Students follow along in their books as the teacher highlights sections of importance and emphasis. Predict what they think the chapter will be about, and what they will learn. **Interaction**: Students copy words from the word splash worksheet off of the Smart Board into their science composition books. **Independent Practice**: Read chapter 5 in the *Science Explorer* text book for homework. Students have 2 days to complete reading chapter 5 and completing the vocabulary definitions in their composition books

3	**Before the Lesson**: Ask students how much they have read of Chapter 5 in *Science Explorer text.* Answer any questions or concerns the students have. **Review**: Ask students to recall from the project in lesson 1, how certain adaptations (physical and behavioral) are favorable for survival to maintain a stable internal environment. While living in a constantly changing external environment. **Introduction**: Let students know that they will watch the Planet Earth video "Pole to Pole." Have students write the video questions in their composition books. Questions: 1.) Why do emperor penguins mate and breed in the fall? What advantages does this behavior provide the penguins? 2.) How do male emperor penguins cooperate to stay warm in the Antarctic winter? Could this behavior be considered an adaptation? 3.) Describe the parenting roles played by male and female emperor penguins. What is unique about how emperor penguins raise their young? 4.) What challenges do emperor penguins face to survive in their habitat? What adaptations and behaviors have they developed to survive? Play the portions of the video that were chosen to identify successful adaptive physical and behavioral traits of the emperor penguins in their extreme Antarctic environment to incubate and raise their young. **Wrap up:** Teacher will introduce and assign a descriptive writing prompt Titled "Team Work". Instruct the students to read the statement. Male emperor penguins huddle together for four months without sun or water to protect their eggs, which they are holding in the bulge under their stomachs. Without the body warmth of each other, the penguins and their young will not survive the Arctic winter. Write a 3 paragraph descriptive essay explaining how the male emperor penguins structural and behavioral adaptations help them maintain homeostasis, while living in an extremely volatile external environment like the Antarctic.	**Before the Lesson**: Share any parts of the reading presenting difficulty. **Review**: Share their experiences from the project in Lesson 1 to identify physical and behavioral characteristics that allowed their organisms to survive in changing environments. **Introduction:** Students write the video questions in their composition books to reference while viewing the Planet Earth Video "Pole to Pole". **Formative Assessment:** Students will use short answers, in complete sentences identify successful adaptive physical and behavioral traits of the emperor penguins in their extreme Antarctic environment to incubate and raise their young. **Wrap up:** Formative Homework Assessment Students will complete a 3 paragraph response to the descriptive writing prompt Titled "Team Work" .

4	**Review**: Ask students how much they have read of Chapter 5 in *Science Explorer text*. Answer any questions or concerns the students might have. Check students science composition books for vocabulary terms and definitions. **Warm up:** Challenge students to think about animals that migrate. Ask students to think of at least 3 reasons that organisms migrate. Explain that some organisms can only maintain homeostasis by changing the environment in which they live by moving, or migrating. Hold up a map of monarch butterfly migration routes. Ask students why they think monarchs travel so far south? Then pose the problem. If most monarchs only live for 6 weeks, how is this possible? **Vocabulary:** Identify the key terms that will be used throughout the lesson: Internal migration cues, external migration cues, photoperiod, circadian rhythms, and hibernation. **Interaction**: Put students in groups of 3-4. Each group will receive a copy of National Geographic's Migration cues worksheet. Prompt the groups to read through the vocabulary words and definitions. Ask students in groups ask for clarity if needed. **Introduction:** Informs students that they will watch National Geographic's Great Migrations "Born to Move" video. Read through all of the Internal, and external migration cues with the students. Inform the students that they will see migrations from Wildebeests, Red Crabs, Sperm Whales, and Monarch Butterflies as stated on the worksheet. They are to use their science composition books to take notes during the video. Students are to identify at least 1 Internal, and 1 external migratory cue for each of the species listed. They are also instructed to take down as much information as possible on the monarch butterfly, and the multi-generational migratory cycle for their homework assignment. **Wrap Up**: Ask students in their groups to share and compare their results with other groups in the class analyzing the migratory cues of the four species identified in the video. Give groups an opportunity to explain why they believed that the cues were external or internal. Ask groups if some of the species had more than one internal or external cue.	**Review**: Participate in class discussion. Provide composition books for the teacher to give independent practice credit. **Warm up:** Share their opinions and ideas with the class. **Vocabulary:** Repeat pronunciation of terms by teacher. Ask for clarity. **Interaction**: Engage in cooperative learning with their group members. They will discuss the different migration cues identified on the worksheet. Ask for clarity if needed. **Introduction:** Group participation and cooperative Formative assessment. Use their composition books to take notes. Watch video, and provide responses to internal and external migration cues for the 4 species discussed, and that are on the worksheet. Document as much information on the multi-generational migratory cycle of the monarch butterfly. **Wrap Up**: Participate in the group discussion. Expected to be a part of the group's responses. Ask any addition questions that arise due to questions that were not fully understood. **Independent Practice:** Write a 2 paragraph summary of the Monarch butterflies multi-generational migratory cycle.

Summative Assessment Items:

1. _____ is the ability or tendency of an organism or cell to maintain internal equilibrium by adjusting its physiological processes.
2. How do male emperor penguins cooperate to stay warm in the Antarctic winter?
   A. Male emperor penguins dig burrows for their eggs in the frozen ground and take turns lying down on them.
   B. Male emperor penguins constantly move in groups to keep their metabolic rates up to keep warm in the winter.
   C. Male emperor penguins huddle together with their eggs and offspring in a bulge on top of their feet for up to 4 months to stay warm in the winter.
   D. None of the above.
3. What challenges do emperor penguins face to survive in their Antarctic wintery habitat?
   A. Predators that prey on their young while huddling for warmth.
   B. Temperatures of -110 degrees Fahrenheit, and blistery winds for up to 4 months.
   C. Human influence on their habitat, and its destruction.
   D. Protecting their young from other penguins who might kill and eat offspring from other penguins
4. True or False? All species that migrate, migrate for the same reasons and share the same internal and external migratory cues.
5. Which factor spurs the multi-generational migratory cycle for the monarch butterfly?
   A. Inherited traits from their parents to complete the 2500 mile journey to a warmer climate
   B. Circadian rhythms that monarchs have inherited from their parents.
   C. The photoperiod external migratory cue that uses the sun to determine length of visible sunlight in a 24 hour period.
   D. Their instinct to find a warm habitat to migrate to, and hibernate with other individuals.
   E. all of the above

Answer Key: Each correct answer is awarded one point. No partial credit will be awarded. A score of 4/5 demonstrates mastery.

1. Homeostasis
2 C
3. B
4 False
5. E