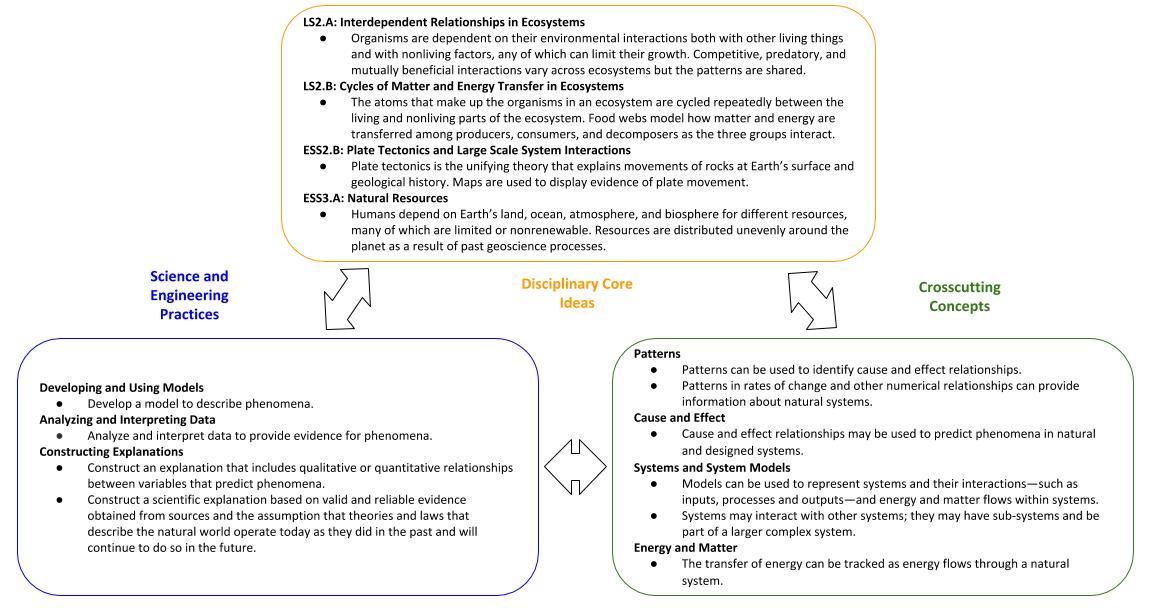
**Unit Essential Question:** *How have natural processes and human activities created the ecosystems we see today?*

**Introduction**

Every ecosystem on Earth is unique, with its own set of geologic features, essential natural resources, and interacting plants and animals. Each ecosystem is unique because of a complicated history of natural geologic processes, like plate movements, and human activities, such as resource use and removal. We can better understand why an ecosystem works the way it does by looking at these important processes.

Many students have seen the movie or read the book, *The Hunger Games*. This book is about a country where children from 12 districts are selected to participate in a mandatory televised death match called *The Hunger Games*. In this movie, gamemakers in the powerful district create an arena that mimics, or looks like, many parts of a natural ecosystem. The context for this unit’s culminating project is that a new film based off *The Hunger Games* is coming out next year. Each group of students is tasked with using what they learn about how Earth’s ecosystems are formed in order to design a new arena for the film that is like the biosphere they observed in the Lift-Off; in other words, it mimics, or looks like, an ecosystem they might see on Earth. As a group of arena designers, they will decide how its geological structures were made, what natural resources it has, and how its organisms will interact. Each group then presents their arena design to the director as a candidate for the next film. They have the option of presenting their arena as a diorama or poster-sized annotated map. Individually, each student will then create a self-guided tour of their group’s arena, in the form of a brochure or flyer, so that the director has additional materials to consider as she makes her decision.

**3-Dimensional Assessment**

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**Time Needed (Based on 45-Minute Periods)**

9 days at end of unit

* Group Project: 4 periods (includes 1 presentation day)
* Individual Project: 5 periods
  + First draft: 3 periods
  + Feedback: 1 period
  + Revision: 1 period

**Materials**

Poster-sized Map

* Poster Paper
* Color pencils/markers or computer graphics
* Computers with internet capabilities

Diorama (Optional)

* Shoebox
* Colored cardstock
* Sandpaper
* Glue
* Paint
* Brushes
* Scissors
* Pipe cleaners
* Etc.

Self-Guided Tour (Brochure or Flyer)

* Blank Paper or Computer Program
* Color pencils/markers or computer graphics

**Instructions for the Culminating Project**

1. Introduce the Culminating Project at the end of the Lift-Off task, including both group and individual components outlined in the Challenge.
2. Read over the Culminating Project Task Card with the students. We recommend only reading the Challenge, and Group Project Criteria for Success at this time in order to not overwhelm students with information.

* Take questions for clarification.
* Optional: You may want to take a student volunteer to give a more detailed description of *The Hunger Games* for students who are interested but have not read the book or seen the movie; this is however, not necessary for success on the Culminating Project.
* Optional: Show a clip from the first Hunger Games movie that shows the arena and a clip that shows the digitized map of the arena.

1. Remind students that as they go through the Project Organizer, they will be planning pieces of their arena and recording scientific concepts they will likely need for their individual project. However, there is nothing wrong with going back and changing their ideas over the course of the unit. The students won’t fully design their arena until the end of the unit, so change during the imaginative and creative time is acceptable and often experienced.
2. Make sure the students fill out the Project Organizer after each task, which will help the students think about different parts of their arena along the way. This process allows students to both apply and document relevant scientific concepts as they move throughout the unit. This will inform both their group and individual projects.

* We recommend that students complete the Project Organizer individually, with the exception of choosing a location as a group after Task 1. They might discuss ideas first as a group, but should then respond individually. This allows students time to process concepts on their own and generate their own ideas, which can be used later when it comes to developing their group project.

1. The table below summarizes how the Project Organizer guides the students through developing different components of their arena and self-guided tour brochure or flyer.

|  |  |  |
| --- | --- | --- |
| **Task** | **Project Organizer** | **Group and Individual Culminating Project** |
| **Lift Off**  A Well-Functioning Biosphere | * What parts of an ecosystem should you be thinking about including in your arena? | * None |
| **Task 1**  Pangaea Puzzle | * On what continent would your arena be located? * What features would you find (mountain ranges, types of rock, glaciers, etc)? * How can you use plate motions to explain these features? | * Map of arena shows where arena is located and geographic features present * Self-guided tour uses patterns in data to explain how plate motions led to the geographic features in the arena |
| **Task 2**  Using Available Resources | * What natural resources will your arena have the most and least of? * What geoscience processes will have caused these resources to be available in your arena? * What evidence is there for why these resources are unevenly distributed? | * Map of arena shows which natural resources are available * Self-guided tour uses evidence to explain how geoscience processes and current human activities affect which resources are available in the arena |
| **Task 3**  Produce, Reuse, Recycle | * Draw a visual diagram showing how non-living matter will cycle through your environment. | * Map of arena shows the non-living things needed to support life in the arena * Self-guided tour models and explains how matter and energy are cycled in the arena ecosystem |
| **Task 4**  Interactions Between Organisms | * Identify what plants and animals you will include in the arena. * Create a flowchart, tracing one organism to another using at least two different organism interactions studied. | * Map of arena shows the contestant challenge to locate a specific plant/animal by using information about another plant/animal * Self-guided tour describes how the contestant challenge works, including at least two different organism interactions |
| **Task 5**  A Chain of Resources | * If budget constraints resulted in removal of one main resource, predict what will happen to the populations of different organisms in your arena. | * Self-guided tour uses past data to predict the potential effects on the entire ecosystem if budget constraints lead to the removal of a major resource |

1. After all the learning tasks are completed, and all the Project Organizers are completed, the students can start to design the poster-sized map or diorama of their arena. Students will then create a presentation that explains all the components of their arena and meets all the criteria in the student handout. The Project Organizers and Group Project Criteria for Success should be used as reference for the students to remind them of all components of their arena.

* As always, we recommend the use of group roles for Culminating Project work time (See “How to Use This Curriculum” for details). We recommend changing the roles every work day.

1. Options: Group presentations of arenas can be done as whole-class or gallery walk presentations. We recommend gallery walk presentations if you are short on time.
2. Once the arena maps are designed and presented, students are ready to move on to their individual project. Students will create a self-guided tour in the form of a brochure or flyer that explains all the parts of their arena and meets all the criteria in the student handout. An optional template for students is provided at the end of this document.
3. Conduct a peer review of the self-guided tours after students have completed a first draft.

* Copy the Self-Guided Tour Peer Review Feedback form found in the Student Instructions. Another option is to use the Student 3-Dimensional Individual Project Rubric.
* Assign each student a partner, preferably a partner from a different group.
* Students switch drafts and assess them using the peer review feedback form.
  + Remind each student to give one positive comment and one constructive comment for each section on the checklist.
  + Allow students time to present their feedback to their partner, so their partner may ask clarifying questions if needed.

1. After receiving feedback, allow students time to complete a final draft based on the feedback they received.

**Assessment**

The Project Organizer can be formatively assessed using:

* *Criteria of your choice.* We recommend using the 3-Dimensional Assessment matrix from the Unit Overview to inform your criteria.

The Group Culminating Project will be summatively assessed using:

* The *Group Project Criteria for Success* Checklist

The Individual Culminating Project will be summatively assessed using:

* The *3-Dimensional Individual Project Rubric*.
* Keep in mind that the Proficient level indicates that the student has successfully demonstrated understanding of the criteria. Because we are in the early stages of NGSS adoption, it may take multiple opportunities throughout the course of the year for students to reach Proficient.
* If you wish to give students a numeric score, you could take the average score of all of their rubrics or add up rubric scores to give students a summation out of the total. Because of the note above, this scoring may not correlate to traditional grading systems.
* While we recommend scoring all of the project criteria with the rubrics for each student, we understand the burden of that level of scoring.
  + One option is to select the rubrics that you wish to focus on for this project and use those to assess each student’s individual project.
  + Another option is to review the Proficient level of each of the project’s rubrics and use the descriptions to generally analyze all student work for trends.

**Digital Template for Self-Guided Arena Tour**

**Welcome to the Next Hunger Games Arena!**

**Geologic Features**

|  |
| --- |
| *Paste photo of arena map here and identify geologic features* |

*Explain how plate motions led to the geologic features in your arena. Describe the patterns in data from Task 1 that provide evidence for these past plate motions.*

**Natural Resources**

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| --- |
| *Paste photo of arena map here and identify where natural resources are found.* |

*Explain how geoscience processes and current human activities affect which resources are available in your arena. Use evidence from Task 2 to support your explanation.*

**Non-Living Things**

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| --- |
| *Draw a model (including arrows and labels) that shows how matter and energy are cycled within your arena ecosystem.* |

*Explain how you can track the flow of energy through your arena’s ecosystem.*

**Living Organisms**

|  |
| --- |
| *Paste a photo of arena map here or draw a flowchart to show how the contestant challenge works.* |

*Explain how each plant or animal leads the contestant to the next plant or animal. In your contestant challenge, you should utilize and identify at least two different types of organism interactions, based on patterns you observed in Task 4.*

**Human Impact**

*Describe the potential effects on the entire ecosystem if budget constraints result in the removal of one major resource from your arena. Give examples of populations of organisms that may be affected in order to explain why removing a resource can result in a chain of effects. Describe data from Task 5 that allows you to predict this outcome.*

**Thank you for your consideration!**