

5E Lesson Plan	
Vocabulary & Accessory Videos Webb Depth of Knowledge (DOK)	Lesson Procedures & Extension Activities
Engage DOK 1 & 2-Recall & Categorize Key Vocabulary: <ul style="list-style-type: none">• Biotic• Abiotic• Producers• Consumers• Decomposer• Cell• Tissue• Organs• Organ Systems• Organism• Population• Community• Ecosystem• Biome• Biosphere Accessory Video https://youtu.be/EtWknf1g	<p>1. https://aptv.pbslearningmedia.org/resource/lps07.sci.life.oate.ecosystem/analyzing-an-ecosystem/ Use this link as a hook to engage learners in lesson. Students view interactive page where they must sort biotic and abiotic components of an ecosystem as well as further dividing biotic components into producers and consumers. This will activate prior knowledge from earlier grades. This can be done as a demonstration or with students working in smaller groups. 10 minutes</p> <p>2. Provide students with an image of another ecosystem (for example: https://aptv.pbslearningmedia.org/asset/lps07_doc_lpawildarea/ a Yellowstone Wilderness Area image from PBS learning media). Students may also require access to the internet to assist in completing this activity. Working in small groups, students view the image provided and attempt to make lists of biotic and abiotic components. They will further divide the biotic components into producers and consumers. After 15 minutes, class comes back as a whole group and a master list is created on the board (overhead projector). 20 minutes</p> <p>Extension Activity Show the accessory video and discuss the biological levels in biology, cells through biosphere.</p>

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<p><u>zKo</u> “Biological Levels in Biology: The World Tour” by the Amoeba Sisters</p>	
<p>Explore DOK 2 & 3-Organize & Construct</p> <p>Key Vocabulary:</p> <ul style="list-style-type: none"> • Food chain • Food web • Energy pyramid • Biodiversity • Autotroph • Heterotroph <p>Accessory Video: https://youtu.be/-oVavgmveyY “Food Webs & Energy Pyramids: Bedrocks of Biodiversity” by the Amoeba Sisters</p>	<p>3. Begin a classroom discussion that continues conversation about the classification points from ‘Engage’: biotic/abiotic and producer/consumer.</p> <ul style="list-style-type: none"> • Ask students where the energy comes from in the area pictured in the image from step 2. • Ask the students where they personally get their energy. • Ask how other biotic organisms get their energy. • What happens to an organism’s energy when it dies? <p>Challenge students to create a food chain or food web from the class list created in part 2. After they have arranged their organisms into a chain or web, the students can challenge themselves to complete the ‘Antarctic Food Web Game’ from PBS learning media http://d3tt741pwxqwm0.cloudfront.net/WGBH/conv16/conv16-int-oceanfoodweb/index.html. This challenging and requires students to pay attention to the direction of energy as it flows through the ecosystem. 30 minutes</p> <p>Extension Activity Show the accessory video and discuss the differences in complexity between a food chain and a food web.</p> <ul style="list-style-type: none"> • Ask why food chains are not what is typically found in nature. • Ask students to explain the 10% rule that is represented by an energy pyramid. • Ask students what happened to the energy that is not passed on to the consumer of an organism.

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<p>Explain DOK 4-Apply Concepts Key Vocabulary:</p> <ul style="list-style-type: none"> • Chemical energy • Photosynthesis • Symbiotic relationships • Parasitism • Mutualism • Commensalism <p>Accessory Video: https://youtu.be/rNjPI84sApQ “Ecological Relationships” by the Amoeba Sisters</p>	<p>4. Remind students about previously discussed content and the activities performed during ‘engage’ and ‘explore’. Distribute the <i>Analyzing Ecosystems</i> handout. https://aptv.pbslearningmedia.org/asset/lsp07_doc_lpaanalyzeco/ Allow students to brainstorm and collaborate in small groups to complete the pages. Suggest that students imagine a local ecosystem for the purposes of answering the prompts on the handout. After approximately half the period has passed, discuss the answers to the questions as a whole class, examining student responses for comprehension and misconceptions. 60 minutes</p> <p>Extension Activity Show the accessory video and discuss symbiotic relationships. Brainstorm with class to create additional examples of parasitic relationships, mutualistic relationships, and commensalistic relationships.</p>
<p>Elaborate DOK 4-Create</p> <p>Suggested steps for the script writing challenge:</p> <ol style="list-style-type: none"> 1. What is the challenge? 2. What are the requirements? 3. Brainstorm ideas 	<p>ART INTEGRATION Script Writing</p> <p>5. Divide the class into small groups of 3-4. Direct each group to choose an ecosystem and then to research the interactions that occur there. Distribute rubrics. Students must create a narrative script with a distinct beginning, middle, and ending in the style of a fairy tale or an adventure. Scripts must include detailed descriptions of the ecosystem and the interactions among abiotic and biotic factors, including producers, decomposers, and consumers. The path of energy must be emphasized throughout the food web tale. Allow for research time, writing time, revision time, and practicing time. 3 60-minute periods</p> <p>Helpful website “Strategies for group script writing that addresses the 4C’s” https://educationcloset.com/2016/11/01/strategies-group-script-writing-address-4cs/ (This is a great opportunity for collaborative lessons with English classes regarding linear narrative writing.)</p>

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<p>with group.</p> <ol style="list-style-type: none"> 4. First write. 5. Re-write. 6. Peer edit. 7. Re-write. 8. Read aloud with group. 9. Final edit. 	<p>Rubric is attached for this portion of the lesson plan.</p> <p>Extension Activity Students can perform their plays for the class.</p>
<p>Evaluate DOK 2 & 3-Patterns & Differentiation</p> <p>Accessory Video: https://youtu.be/TZk6vcmLcKw “Biomagnification and the Trouble with Toxins” by the Amoeba Sisters</p>	<p>https://aptv.pbslearningmedia.org/asset/lsp07_doc_lpacompareco/ Give each student a handout and arrange the students in groups to share computers as needed. Students will explore three different websites exploring biomes: rainforest, coral reef, and desert. The students will look for examples of abiotic and biotic components of the ecosystems, as well as producers and consumers for each ecosystem. They will demonstrate their understanding of the interactions, energy, and dynamics by giving three examples of energy transfers between components of each ecosystem.</p> <p>First stop, the rainforest. https://www.amnh.org/explore/ology/biodiversity/welcome-to-the-dzanga-sangha2 Second stop, the coral reef. https://aptv.pbslearningmedia.org/resource/tdc02.sci.life.eco.coralreefconnections/coral-reef-connections/</p> <p>Third stop, the desert. https://aptv.pbslearningmedia.org/resource/tdc02.sci.life.eco.desert/desert-biome/ 60 minutes</p> <p>Extension Activity Show the accessory video and discuss biomagnification as a transition into another unit on pollution.</p>

Lesson Materials	Overhead projector Teacher computer Student computers (one per every 2-3 students)
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	<p>Copies of script writing rubric and student checklist Copies of Analyzing Ecosystems handout Copies of Comparing Ecosystems handout Paper and writing utensil for each student</p>
Measurable Objectives & Modified Instruction	<p>With each section of the 5E lesson plan, modifications can be made for learners that are not at grade level by either adding more teacher support and increasing the amount of leading questions for those that are below grade level or by removing these supports for student who are above grade level. The accessory videos and extension discussions associated with them are great connecting activities for all levels of learners. The extension activity on biomagnification found in the evaluate portion of the lesson would be appropriate for independent research for advanced students.</p>
Justification	<p>Through the art integration activity of narrative script writing students will be developing and curating skills from ELA courses while they are solidifying both new and recalled learning in Science class relating to the study of ecology. Allowing for a creative outlet for students provides increased immersion in the learning process and increased ownership in the given activity.</p>

ART INTEGRATION RUBRIC: *Script Writing*

	4. Distinguished	3. Proficient	2. Apprentice	1. Novice
Creativity and Originality: Creative script and original tale.	Script was unique and interesting.	Script was original.	Made a few changes to existing script.	Used existing script with no changes or modifications.
Created linear narrative script with a distinct beginning, middle, and end.	Created linear narrative script with a distinct beginning, middle, and end.	Script had two parts of a narrative script.	Script had one part of a narrative script.	Script did not demonstrate a clear structure of beginning, middle, and ending.

Script told in the style of a fairy tale or an adventure that thoroughly describes the interactions within a given ecosystem.	Script told in the style of a fairy tale or an adventure that thoroughly describes the interactions within a given ecosystem.	Script told in the style of a fairy tale or an adventure that DID NOT thoroughly describe the interactions within a given ecosystem.	Script told in the style of a fairy tale or an adventure that DID NOT describe interactions within a given ecosystem.	Script not written in the style of a fairy tale or an adventure and no interactions described within the given ecosystem.
A minimum of 2 abiotic characters are included and described in script.	A minimum of 2 abiotic characters are included and described in script.	A minimum of 2 characters are included in the script. Only one is described.	Only 1 abiotic character was included in the script with description.	Only 1 abiotic character was included in the script with no description.
A minimum of 1 producer is included and described in script.	A minimum of 1 producer is included and described in script.	A minimum of 1 producer is included in the script with no description.		No producers are included in the script.
A minimum of 3 consumers are included in the script.	A minimum of 3 consumers are included and described in the script.	Two consumers are included in the script with description.	Only 1 consumer is included in the script with description.	Only 1 consumer is included in the script with no description.
A minimum of 1 decomposer is included in the script.	A minimum of 1 decomposer is included and described in the script.	A minimum of 1 decomposer is included in the script with no description.		No decomposers are included in the script.
The role of energy is discussed in the script.	The role of energy is discussed thoroughly in the script.	The role of energy is discussed in the script.		The role of energy is not discussed in the script.
Appropriate volume, correct speech, and behavior is demonstrated during	Appropriate volume, correct speech, and behavior is demonstrated during performance of script.	Either appropriate volume, correct speech, or behavior is missing from performance.	Two of the appropriate volume, correct speech, or behavior are missing.	None of the three criteria are present in presentation.

performance of script.				
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Student Checklist for *Script Writing*

1. My script is creative and original, demonstrating characteristics of a fairy tale or an adventure.
2. My script is a representative of a linear, narrative style of writing with a distinct beginning, middle, and end (resolution).
3. My script is told in a fairy tale or adventure style.
4. My script thoroughly describes the interactions within a given ecosystem.
5. My script includes (with descriptions) a minimum of 2 abiotic characters, 1 producer, 3 consumers, and 1 decomposer.
6. The role of energy is discussed in several places in the script.
7. My performance demonstrated appropriate use of volume, correct speech, and behavior.

ALABAMA COURSE OF STUDY OBJECTIVES grade 7 Life Science

- 7.5 Examine the cycling of matter between abiotic and biotic parts of ecosystems to explain the flow of energy and the conservation of matter.
- 7.6 Analyze and interpret data to provide evidence regarding how resource availability impacts individual organisms as well as populations of organisms within an ecosystem.
- 7.7 Use empirical evidence from patterns and data to demonstrate how changes to physical or biological components of an ecosystem can lead to shifts in population.

7.8 Construct an explanation to predict patterns of interactions in different ecosystems in terms of relationships between and among organisms.

ALABAMA COURSE OF STUDY OBJECTIVES grade 7 Writing

7.3 Write narratives to develop real or imagined experiences or events using effective techniques, relevant descriptive details, and well-structured event sequences.

7.3a Engage and orient the reader by establishing a context and point of view and introduce the narrator, characters, or both; organize an event sequence that unfolds naturally and logically.

7.3b Use narrative techniques, such as dialogue, pacing, and description, to develop experiences, events, and/or characters.

7.3c Use a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another.

7.3d Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.

7.3e Provide a conclusion that follows from and reflects narrated experiences of events.

ALABAMA COURSE OF STUDY grade 7 English/Language Arts

7.6 Analyze how an author develops and contrasts the points of view of different characters or narrators in a text.

7.23 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

7.24 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

NATIONAL CORE ARTS STANDARDS

Anchor standard #1 Generate and conceptualize artistic ideas and work.

Anchor standard #10 Synthesize and relate knowledge and personal experiences to make art.

NEXT GENERATION SCIENCE STANDARDS

Middle School-Life Science Ecosystems: Interactions, Energy, and Dynamics

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.</p> <ul style="list-style-type: none">Develop a model to describe phenomena. (MS-LS2-3) <p>Analyzing and Interpreting Data</p>	<p>LS2.A: Interdependent Relationships in Ecosystems</p> <ul style="list-style-type: none">Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and	<p>Patterns</p> <ul style="list-style-type: none">Patterns can be used to identify cause and effect relationships. (MS-LS2-2) <p>Cause and Effect</p> <ul style="list-style-type: none">Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

- Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)

reproduction. (MS-LS2-1)

- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)

Energy and Matter

- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4),(MS-LS2-5)

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

- The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-LS2-5)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)

Science Addresses Questions About the Natural and Material World

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

	<p><u>LS4.D: Biodiversity and Humans</u></p> <ul style="list-style-type: none">• Changes in biodiversity can influence <u>humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)</u> <p><u>ETS1.B: Developing Possible Solutions</u></p> <ul style="list-style-type: none">• There are systematic processes for <u>evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)</u>	
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REFERENCES

Alabama Course of Study ELA/Writing Standards:

<https://alex.state.al.us/standardAll.php?grade=7&subject=ELA2015&summary=2>

Ramsdell, Amy - Lesson Plan

Grade 7 Life Science

6 60-minute periods

Ecosystems: Interactions, Energy, & Dynamics

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Alabama Course of Study Science Standards:

<https://alex.state.al.us/standardAll.php?grade=7&subject=SC2015&ccode=LSC7&summary=2>

Next Generation Science Standards:

<https://www.nextgenscience.org/dci-arrangement/ms-ls2-ecosystems-interactions-energy-and-dynamics>

PBS Learning Media is a free resource for teachers:

<https://aptv.pbslearningmedia.org/resource/lps07.sci.life.eco.lpecosystems/exploring-the-systems-in-ecosystems/>