

 Education  
Life Science

**Grade 5:** Life Science Module

# Student Science Notebook

EL Education Curriculum

Grade 5: Life Science Module: The Cycle of Matter and Energy in Healthy Ecosystems, Student Science Notebook

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# About EL Education

***“There is more in us than we know. If we can be made to see it, perhaps, for the rest of our lives, we will be unwilling to settle for less.” – Kurt Hahn***

EL Education (formerly Expeditionary Learning) is redefining student achievement in diverse communities across the country, ensuring that all students master rigorous content, develop positive character, and produce high-quality work. We create great public schools where they are needed most, inspiring teachers and students to achieve more than they thought possible.

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EL Education’s curriculum is a comprehensive, standards-based core literacy program that engages teachers and students through compelling, real world content. Our Language Arts curriculum is used across the country, and has been downloaded more than 8 million times. The curriculum has received the highest marks from EdReports.org and Educators Evaluating the Quality of Instructional Products (EQuIP).

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# Anchoring Phenomenon Entry Directions

## Opening



### Guiding Question:

- How do we assess and improve the health of an ecosystem?



### Learning Target:

- I can make observations and participate in a Scientists Meeting to share my ideas about the health of an ecosystem

## Obtaining Information

Make and record observations of the ecosystem from the photos that support the claim that the ecosystem is healthy or the claim that it is not healthy.

## Anchoring Phenomenon Entry

**Opening:**

None.

**Obtaining Information**

### Assessing Ecosystem Health Chart

Evidence that the ecosystem is healthy	Neutral evidence	Evidence that the ecosystem is not healthy

# Anchoring Phenomenon Entry Directions

## Scientists Meeting

What does it mean to for an ecosystem to be healthy?

What should we measure to assess the health of an ecosystem?

**Revisions and additions from subsequent lesson sequences:**

# Anchoring Phenomenon Entry

## Scientists Meeting

Take your notes here. You may write or draw your ideas.

## Defining Matter Entry Directions

### Opening

Focusing Question:

- What are the parts of an ecosystem made of?



Learning Target:

- I can collect evidence to support my own argument about what things in an ecosystem are made of.

### Carrying Out Investigation

Demonstrations with Balloons

Record your observations from each demonstration.

*In what ways do you observe space being taken up by air?*

*What are your observations about weight?*

## Defining Matter Entry

### Opening:

Write or draw something to capture your ideas about the learning target and focusing question.

### Carrying Out Investigation:

Demonstrations with Balloons

## Defining Matter Entry Directions

### Obtaining Information:

#### Reading Closely about Three States of Matter

As you read:

- Read small chunks of the text slowly and think about the gist.
- Talk with my partner or group about the text.
- Circle or underline words I don't know.
- Write notes or answer questions about the text.

### Engaging in Argument

#### Scientists Meeting

What are the parts of an ecosystem made of?

#### Making the argument:

1. Make a claim (answer the question).
2. Use the evidence and scientific reasoning to support the claim.
3. Explain why the evidence is sufficient and relevant.

#### Consensus about matter:

What things in the ecosystem are made of matter?

**How might matter be important to the health of an ecosystem?**

## Defining Matter Entry

### Obtaining Information

"Three States of Matter" Graphic Organizer

Paragraph (Record any Heading)	1. Gist	2. Facts, Definitions, Details	3. Notes/ Pictures
1.			
2.			
3.			
4.			

### Engaging in Argument

#### Scientists Meeting

Claim:

Evidence and scientific reasoning:

Evidence is sufficient:

# Plant Growth Entry Directions

## Opening

### Focusing Question:

- How do plants use energy and move matter through an ecosystem?



### Learning Target:

- I can design an experiment to test how different types and amounts of matter affect plant growth.

## Obtaining Information

### "From Questions to Conclusions: The Experimental Process"

#### Close reading routine:

- Read small chunks of the text slowly and think about the gist.
- Talk with my partner or group about the text.
- Circle or underline words I don't know.
- Write notes or answer questions about the text.

## Plant Growth Entry

### Opening:

Write or draw something to capture your ideas about the learning targets and focusing question.



### Obtaining Information

"From Questions to Conclusions: The Experimental Process"

Gist:

What are the parts of a successful investigation?

## Plant Growth Entry Directions

### Planning and Carrying Out Investigation

1. Pose a question that can be investigated with trials.
2. Decide what can be changed (variables).
3. Set up the procedure.
4. Record observations.

### Data/Observations:

## Plant Growth Entry

### Planning and Carrying Out Investigation

Investigative Question:

Variable being tested: \_\_\_\_\_

What do you predict will happen?

Procedure:

Materials:

How will observations be organized and recorded?

**Data/Observations:**

# Plant Growth Entry Directions

## Analyzing and Interpreting Data



### Learning Target

- I can develop a model to explain how plants use matter and energy to produce food.

## Drawing Conclusions from Plant Investigation:

Based on the data collected by your class, answer your investigative question.

## Developing a Model

Draw the photosynthesis explanatory model created by the class.  
Be sure to include all labels.

## Plant Growth Entry

### Analyzing and Interpreting Data

Write or draw something to capture your ideas about the learning target.



### Drawing Conclusions from Plant Investigation:

Can plants live without water/sunlight/air? How do you know?

### Developing a Model

## Flow of Energy Entry Directions

### Opening

#### Focusing Question

- How does energy change and flow? How do scientists know this?



#### Learning Target

- I can evaluate the argument that energy is neither created nor destroyed, but flows.

### Carrying Out Investigation:

#### Demonstrating Energy:

Think about:

- What do you see happening?
- What do you think allows this to happen?
- What energy do you think is causing this to happen?
- What can we name these types of energy?

Draw a picture (or model) of what you observed in each demonstration and add labels based on the class discussion.

### Obtaining Information:

#### Reading Closely about the Law of Conservation of Energy

## Flow of Energy Entry

### Opening:

Write your own claim about energy. Include your current thinking as evidence.

*Energy (can be or cannot be) lost.*

Claim:

### Carrying Out Investigation:

Demonstrating Energy:

Demonstration with ball:

Demonstration with hands:

Demonstration with Newton's cradle:

# Flow of Energy Entry

## Obtaining Information

Paragraph	1. Gist	2. Facts, Definitions, Details	3. Notes/ Pictures
1.			
2.			
3.			
4.			
5.			

Paragraph	1. Gist	2. Facts, Definitions, Details	3. Notes/ Pictures
6.			
7.			
8.			
9.			
10.			

## Parts of an Ecosystem Entry Directions

### Opening:

#### Focusing Question

- How do the parts of a forest ecosystem interact?

#### Learning Target

- I can name the abiotic and biotic parts of a particular forest ecosystem.
- I can develop a model that shows how the biotic and abiotic parts of a forest ecosystem interact.

### Obtaining Information

#### Viewing Forests

First viewing: Gist and new vocabulary:

#### Second Viewing

What are the abiotic and biotic parts of this ecosystem?

How do the abiotic and biotic parts interact?

#### Class Discussion

How might these interactions affect the health of the rest of the ecosystem?

## Parts of an Ecosystem Entry

### Opening:

Write or draw something to capture your ideas about the learning target and focusing question.

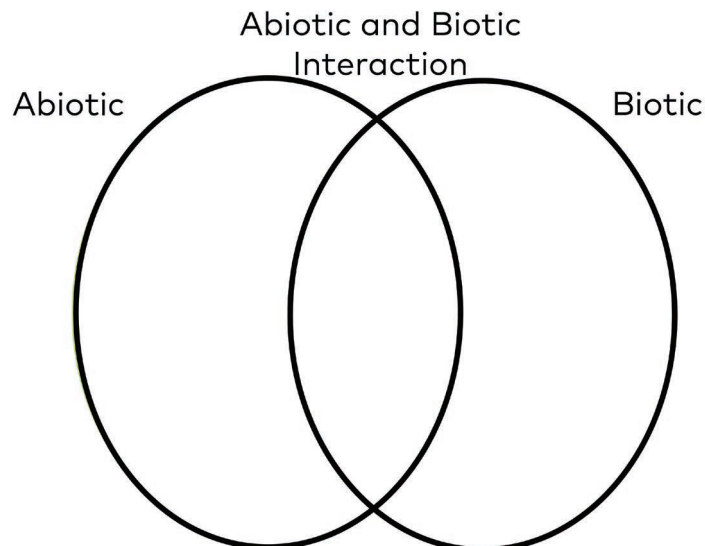


### Obtaining Information

#### Viewing Forests

First Viewing:

Second Viewing:



#### Class Discussion

## Parts of an Ecosystem Entry Directions

### Developing a Model: Ecosystem in a Baggie

Name the abiotic and biotic parts in your ecosystem in a baggie.

How do you think the abiotic and biotic parts of the ecosystem might interact?

Over time, record observations of the ecosystem in a baggie.

*What changes have you noticed?*

*What interactions do you see?*

### Building Understanding:

About ecosystems.

How is an ecosystem a "system"?

## Parts of an Ecosystem Entry

### Developing a Model: Ecosystem in a Baggie

Abiotic	Biotic
<b>Interaction Prediction:</b>	
<b>Observations:</b>	
<b>Building Understanding:</b>	

## Parts of an Ecosystem Entry Directions

### Collecting Information for Expert Ecosystem

My expert forest ecosystem is:

My group members are:

Look at the chart of Parts of a Forest Ecosystem. Categorize the parts of your expert ecosystem into abiotic and biotic.

## Parts of an Ecosystem Entry

### Collecting Information for Expert Ecosystem

Abiotic	Biotic

Part	Details
Soil	
Climate	
Plants	
Animals	

# Producers, Consumers, and Decomposers Entry Directions

## Opening:

### Focusing Question

- How are matter and energy transferred among organisms in an ecosystem?



### Learning Targets

- I can create a model of a food web.
- I can use a food web to show how matter and energy are transferred among organisms in an ecosystem.

## Obtaining Information

### "The Food Chain" Video

*First, watch the video for gist. Record any new vocabulary words.*

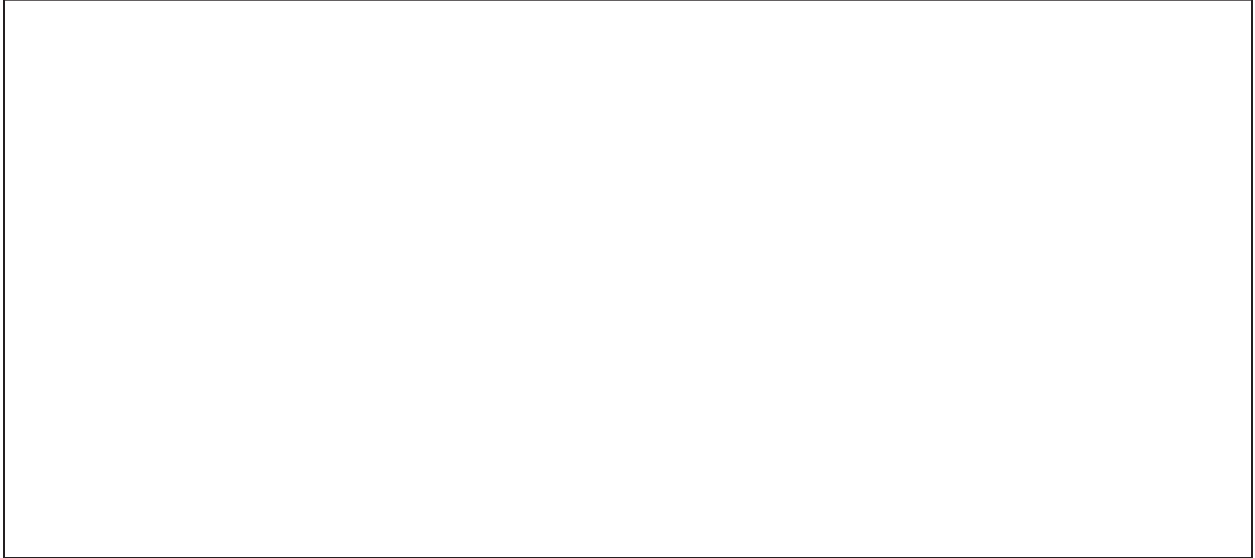
*Second, watch the video and think about each of these questions:*

- What is the beginning, or bottom, of the food chain?
- What is the food chain?
- How does energy move from organism to organism?
- Why are plants producers?
- How do dead animals pass on energy?
- What is fertilizer?
- What are primary consumers?
- What are secondary consumers?
- What are scavengers?

# Producers, Consumers, and Decomposers Entry

## Opening:

Write or draw something to capture your ideas about the learning target and focusing question.



## Obtaining Information:

### "The Food Chain" Video

1. First watch—gist and new vocabulary:
  
  
  
  
  
  
  
  
  
  
2. Second watch—more information:

## Producers, Consumers, and Decomposers Entry Directions

### Food Web Video

*First, watch the video for gist. Record any new vocabulary words.*

*Second, watch the video and think about this question:*

- How are food webs different from food chains?

### Food Web Organism Cards

Define:

Herbivore:

Carnivore:

Omnivore:

### Ecosystem Expert Group:

*From the provided text or video, create a list of the organisms in your particular ecosystem.*

*Record the type of organism: Is it a producer, consumer (herbivore, carnivore, or omnivore), or decomposer?*

*List where each organism gets its energy (what it eats or if it is a producer).*

## Producers, Consumers, and Decomposers Entry

### "Food Web" Video

1. First watch—gist and new vocabulary:
2. Second watch—more information

### Food Web Organism Cards

Sketch the food web you created:

### Ecosystem Expert Group:

Producers	Primary Consumers	Secondary Consumers

## Energy Transfer Entry Directions

### Opening

#### Focusing Question

- What happens to energy as it is transferred among organisms in an ecosystem?



#### Learning Target

- I can revise a food web model to explain what happens to energy as it is transferred among organisms in an ecosystem.

### Obtaining Information

#### "Pass the Energy, Please":

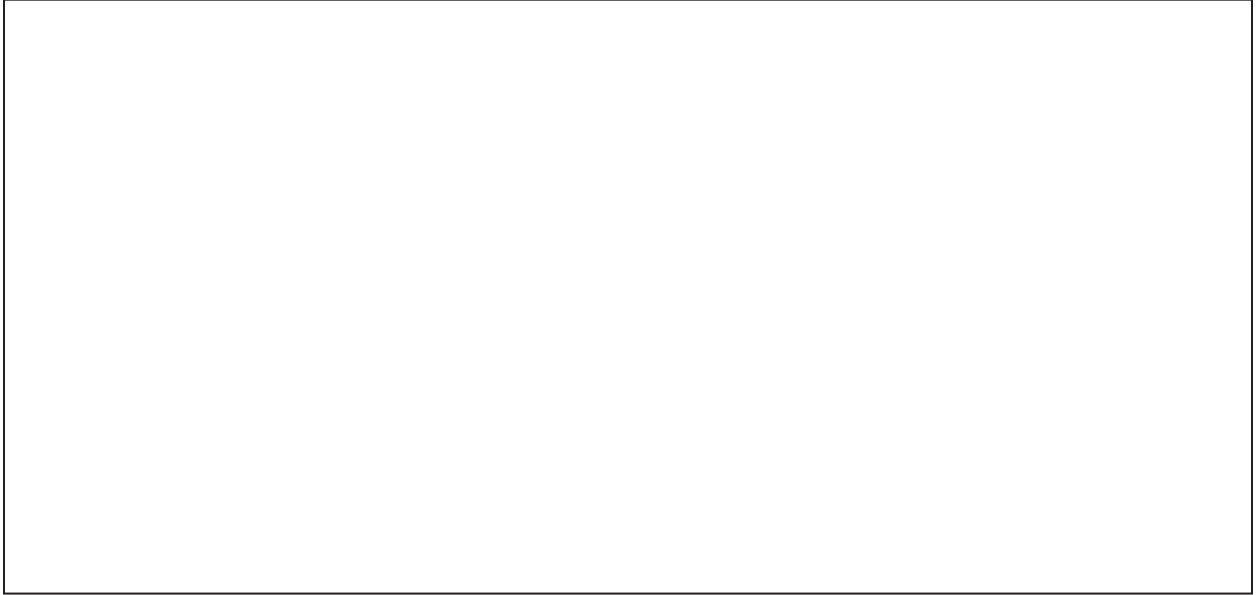
After completing the activity and discussion, record your thoughts about the following questions:

1. Why do you think the sun did not give all of its energy to the plants? Where do you think that energy might have gone?
2. Why do you think the directions told you to not pass on all your energy to whoever consumed you?
3. What do you think happens to the energy that doesn't get passed on?
4. Where do you think the energy might go?

# Energy Transfer Entry

## Opening

Write or draw something to capture your ideas about the learning target and focusing question.



## Obtaining Information:

"Pass the Energy, Please" Reflection Questions:

- 1.
- 2.
- 3.
- 4.

## Energy Transfer Entry Directions

Reading "How Animals Use Energy":

- Read small chunks of the text slowly and think about the gist.
- Talk with my partner or group about the text.
- Circle or underline words I don't know.
- Write notes or answer questions about the text.

### Communicating Information

Create a model to show:

*What happens to matter and energy as they are transferred among organisms in an ecosystem?*

- How does matter move from organism to organism?
- Where does the energy come from?
- Where does the energy go?
- How does the energy move and change?
- What happens to energy as it moves from organism to organism?

## Energy Transfer Entry

Reading How Animals Use Energy:

Paragraph	1. Gist	2. Facts, Definitions, Details	3. Notes/ Pictures
1.			
2.			
3.			
4.			
5.			
6.			
7.			

**Communicating Information**

# Water, Air, and Waste Matter Entry Directions

## Opening:

### Focusing Question

- How does water, air, and waste matter flow within an ecosystem?



### Learning Target:

- I can develop a model to explain how water, air, and waste matter flows within an ecosystem.

## Carrying Out Investigation

### Lab for Exploring What Animals Breathe Out

1. Blow onto a mirror.
2. Observe what happens.
3. Record observations in words or a model.

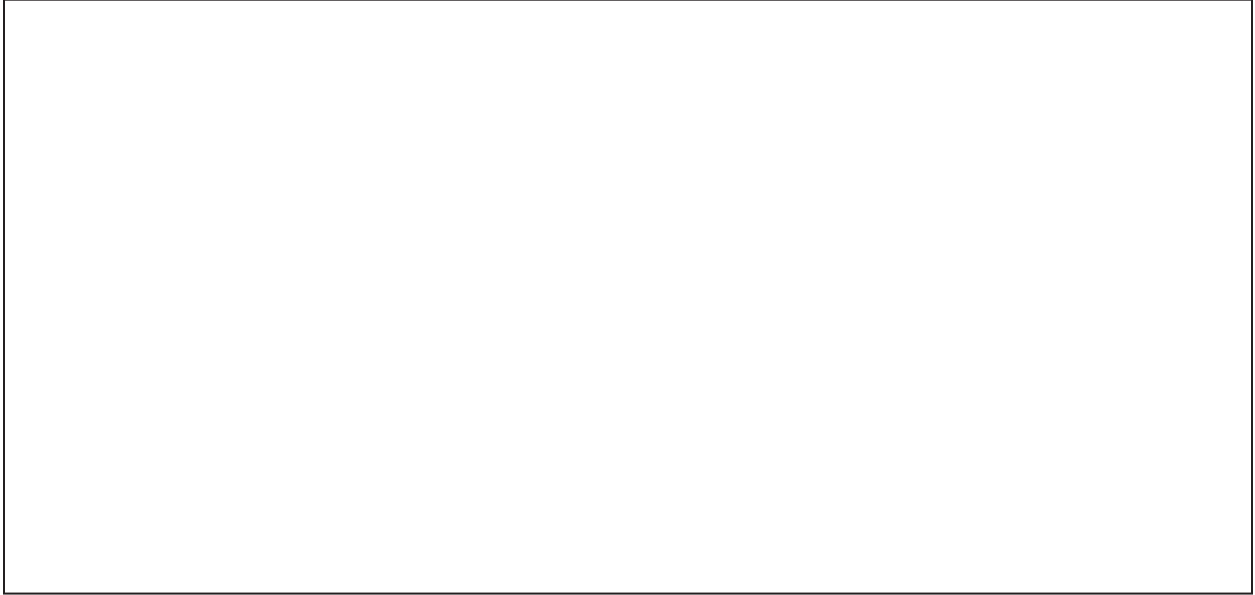
### Questions for Reflection:

1. What does this mean about the difference between the air from our bodies and the air all around us?

## Water, Air, and Waste Matter Entry

### Opening:

Write or draw something to capture your ideas about the learning target and focusing question.



### Carrying Out Investigation

Lab for Exploring What Animals Breathe Out

Observations:

Reflection:

## Water, Air, and Waste Matter Entry Directions

### Ecosystem in a Baggie Observations:

1. Make observations of the ecosystem in a baggie that you created.
2. What do you notice about the water, air, and waste matter?
3. Record your observations.
4. Look more closely at the water in the baggie.
5. What do you wonder about this water?

### **Obtaining Information**

- As you watch each video, think about how plants, animals, and decomposers interact with solids, liquids, and gases.
- Complete the table as you watch each video and discuss with your class.

## Water, Air, and Waste Matter Entry

Ecosystem in a Baggie Observations:

### Obtaining Information

Type of Matter	Examples of Matter Interactions
Liquid	
Gas	
Solid	

## Stability and Balance Entry Directions

### Opening:

#### Focusing Question

- How is the flow of matter and energy stable and balanced in a healthy ecosystem?



#### Learning Target

- I can explain balance and stability in an ecosystem.
- I can evaluate evidence about the health of an ecosystem.

### Carrying Out Investigation

1. Record your observations from the "Modeling: Stability and Balance" demonstration.
  - What was the difference between each of the nets you created? Why?
  - Which one was more stable? Why?
  - Which was one more balanced? Why?
  - Which one was healthier? Why?

Use words and/or pictures to explain what you saw.

2. Write your class's definition of *stability* and *balance*. How is this related to the criteria of a healthy ecosystem?

### Developing Arguments about the Health of an Ecosystem

Question: Is your group's poster-sized ecosystem explanatory model a healthy ecosystem?

#### Making the argument:

1. Make a claim.
2. Use the evidence and scientific reasoning to support the claim.
3. Explain why the evidence is sufficient and relevant.

### Revising After Peer Critique

## Stability and Balance Entry

### Opening:

None.

### Carrying Out Investigation

Modeling Stability and Balance in an Ecosystem

### Developing Arguments about the Health of an Ecosystem

Claim:

Evidence to support claim:

- 
- 
- 
- 

How is the evidence sufficient and relevant?

## Stability and Balance Entry Directions

### Revising After Peer Critique

Use this space to revise your argument.

# Stability and Balance Entry

## Revising After Peer Critique

## Changing Ecosystems Entry Directions

### Opening:

#### Focusing Question

- How does a change in one part of an ecosystem affect the cycling of matter and energy in the ecosystem?



#### Learning Target

- I can use a model to predict how a change in one part of an ecosystem can affect the other parts of the ecosystem.

### Obtaining Information

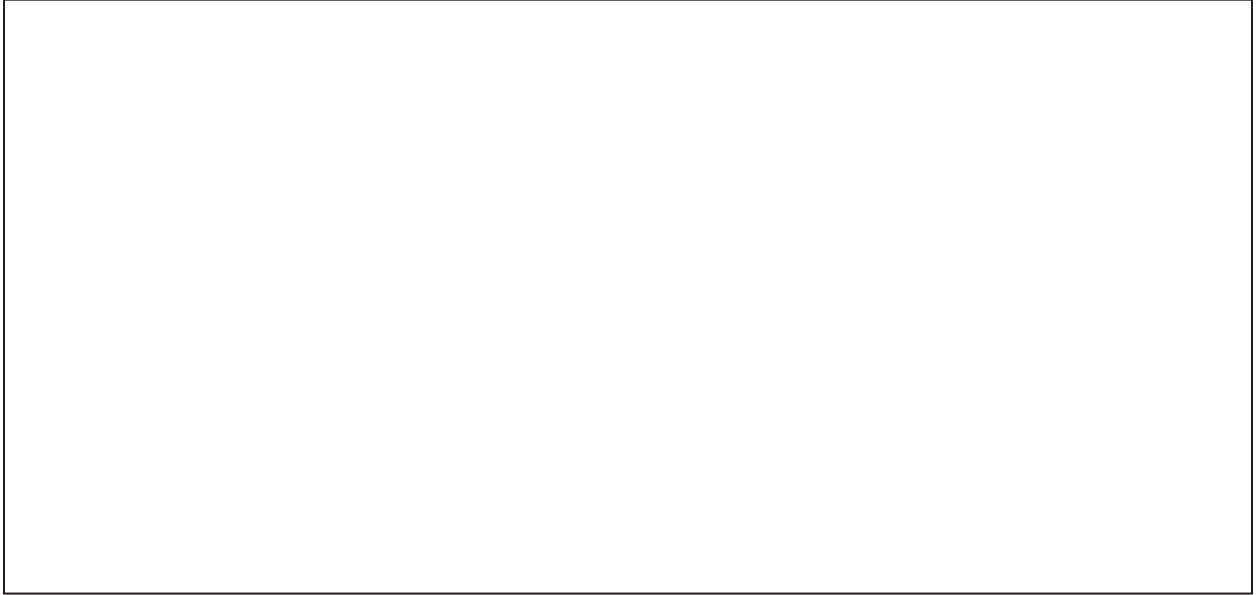
#### Video: "Wolves of Yellowstone"

- View the video first to understand the gist and record any new vocabulary.
- Watch the video a second time for specific examples.

## Changing Ecosystems Entry

### Opening:

Write or draw something to capture your ideas about the learning target and focusing question.



### Obtaining Information

Video: "Wolves of Yellowstone"

1<sup>st</sup> time: Gist and New Vocabulary:

2<sup>nd</sup> time: More information:

## Changing Ecosystems Entry Directions

### Developing and Using Models

Would one change in your forest ecosystem affect the health of your ecosystem?

Make a claim

1. Make a claim (answer the question).

*I'm arguing that ...*

2. Use the evidence and scientific reasoning to support the claim.

Be sure to include the criteria for healthy ecosystems most affected or least affected.

*My evidence for this is ...*

*This evidence shows ...*

3. Explain why the evidence is relevant and sufficient.

*This is evidence is sufficient because ...*

*Further evidence could include ...*

## Changing Ecosystems Entry

### Developing and Using Models

Would one change in your forest ecosystem affect the health of your ecosystem?

Summarize the change from your scenario card.

Claim:

Evidence/Reasoning

Evaluation of evidence

# Improving the Health of an Ecosystem Entry Directions

## Performance Task

Use this space to brainstorm ideas and try out ideas for the performance task.

## Improving the Health of an Ecosystem Entry

### Performance Task

Would one change in your forest ecosystem affect the health of your ecosystem?

Use this space to brainstorm ideas and try out ideas for the performance task.

# Glossary

## Lesson Sequence 1

ecosystem = the living and nonliving things that make up an environment

## Lesson Sequence 2

matter = is made of particles, has weight, and takes up space

weight = how heavy something is

solid = has an unchanging shape

liquid = takes the shape of its container

gas = fills whatever space is available

state of matter = when particles are formed into a solid, liquid, or gas

relevant = relating to something; evidence that is relevant is on topic and makes sense

sufficient = enough; the evidence present should provide enough information to be convincing

## Lesson Sequence 3

energy = the ability to do work

control = things that are not changed in an experiment but instead kept constant

variable = something that can be changed in an experiment; the thing that is under investigation in an experiment

## Lesson Sequence 4

energy = the ability to do work

evaluate = determine how good, useful, or successful something is

transfer = to move from one thing to another

law of conservation = energy cannot be created or destroyed; it can be transferred

photosynthesis = the process of plants using solar energy to convert water and carbon dioxide into glucose and oxygen

**Lesson Sequence 5**

biotic = living things

abiotic = nonliving things

ecosystem = the living and nonliving things that make up an environment

biome = a specific geographic area

temperate = region with mild temperatures

boreal = region with cold temperatures

tropical = region with warmer temperatures and lots of moisture

**Lesson Sequence 6**

food chain = a series of organisms that each depend on the next for food; often begins with plants

food web = the system of interlocking food chains that depend on one another

producer = plants produce matter with stored energy that other animals are able to consume

consumer = an animal that eats plants or animals

primary consumer = animals that eat plants

secondary consumer = animals that eat animals that eat plants

tertiary consumer = animals that eat animals that eat animals that eat plants

decomposers = fungi or bacteria that break down plants or animals into nutrients

nutrients = substances that provide nourishment necessary for growth and life

herbivores = animals that eat only plants

carnivores = animals that eat only other animals

omnivores = animals that eat both plants and other animals

### **Lesson Sequence 7**

revise = to change or make different in order to improve

### **Lesson Sequence 8**

waste or waste product = something that is not needed

perspiration = sweat

transpiration = plants release water vapor

stomata = the openings in the leaves of plants through which water vapor exits and gases enter and exit

carbon dioxide = a gas that is exhaled by animals and absorbed by plants

oxygen = a gas that is released by plants and inhaled by animals

bacteria = microscopic living organisms that break things down chemically

chloroplasts = the green parts of plants that can do photosynthesis

fungi = living organisms that are neither plants, animals, nor bacteria

humus = layer of soil that is full of plant decay

casting = worm poop

### **Lesson Sequence 9**

evaluate = to figure out how good, useful, or successful something is

balance = an even distribution, steady; in an ecosystem all organisms are getting their needs met and all cycles are flowing

stable = not likely to change or become unhealthy; a stable ecosystem is unlikely to be affected by small changes

biodiversity = the variety of organisms in a particular place

### **Lesson Sequence 10**

predict = to make an educated guess about what is going to happen

invasive = a plant or animal that is not normally in a particular ecosystem but is recently introduced and typically is destructive

## Acknowledgments

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## Notes

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## Notes

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## Notes

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[illegible]

## Notes

[illegible]

## This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal black lines running across the width of the page, providing a guide for handwriting or typing. The background is a solid off-white color.

## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.