GreatHearts®

9th Grade Biology:
Ecology and Populations

May 4 – May 8

Time Allotment: 40 minutes per day

Student Name: _____

Period: _____

Teacher Name: *Ms. Carstens*

Packet Overview

Date	Objective(s)	Page #
Monday, May 4	1. Identify the levels of organization in the biosphere. 2. Distinguish between biotic and abiotic factors in an ecosystem.	2
Tuesday, May 5	1. Explain the significance of producers, consumers, and decomposers in an ecosystem. 2. Describe how energy flows within an ecosystem.	5
Wednesday, May 6	1. Identify and describe four major biogeochemical cycles.	8
Thursday, May 7	1. Explain the significance of species adaptations. 2. Identify the types of interactions that occur within an ecosystem.	10
Friday, May 8	1. Distinguish between primary and secondary succession	11

Additional Notes: Hi everyone! I miss y'all! Remember, I am here for you—through email (kelly.carstens@greatheartsnorthernoaks.org) and also my Zoom Guided Instruction.

Be sure you're completing the weekly minor assessment! **At the end of your lesson this Friday, complete the minor assessment at the end of the packet**. You **may use your notes** from the week. It should take approximately 15 minutes.

Academic Honesty

I certify that I completed this assignment independently in accordance with the GHNO Academy Honor Code.

Student signature:

_____

I certify that my student completed this assignment independently in accordance with the GHNO Academy Honor Code.

Parent signature:

_____

Unit Overview:
In our unit this week, we will build on our study of evolution and species by considering them in context of the world and the study of ecology. **The goal of this week's work is to identify the interactions of species with each other and their environment, recognizing the significance of interdependence species share with both living factors and nonliving factors within their habitats.** We'll explore the levels of the biosphere, identify biotic (living) and abiotic (nonliving) factors, discover cycles that affect the success of life in an environment, determine community relationships among species, and energy transfer throughout an ecosystem.

I. Monday, May 4

Unit – Chapters 18, 20: Ecology and Populations
Lesson 1: Interdependence and the Biosphere

Lesson 1 Socratic Guiding Questions: Keep this in mind as you study!
What is the significance of interdependence in the biosphere?

Objectives: Be able to do this by the end of this lesson.
1. Identify the levels of organization in the biosphere.
2. Distinguish between biotic and abiotic factors in an ecosystem.

Introduction to Lesson 1:
In our first lesson, we'll explore Earth's thinnest of layers, which houses all life in delicately balanced and interdependent levels of organization. You'll discover the hierarchy of organization, identify the significance of interconnectedness, and learn about factors that affect the success and endurance of the biosphere.

Read pp. 359 – 363 (up to Organisms in a Changing Environment) in your text. After reading, complete the tasks on the following pages.

Concept and Vocabulary Review:

- ✓ Define **ecology** and **interdependence**:
  a) **ecology -**

  _____

  _____

  b) **interdependence –**

  _____

  _____

  How are these terms related?

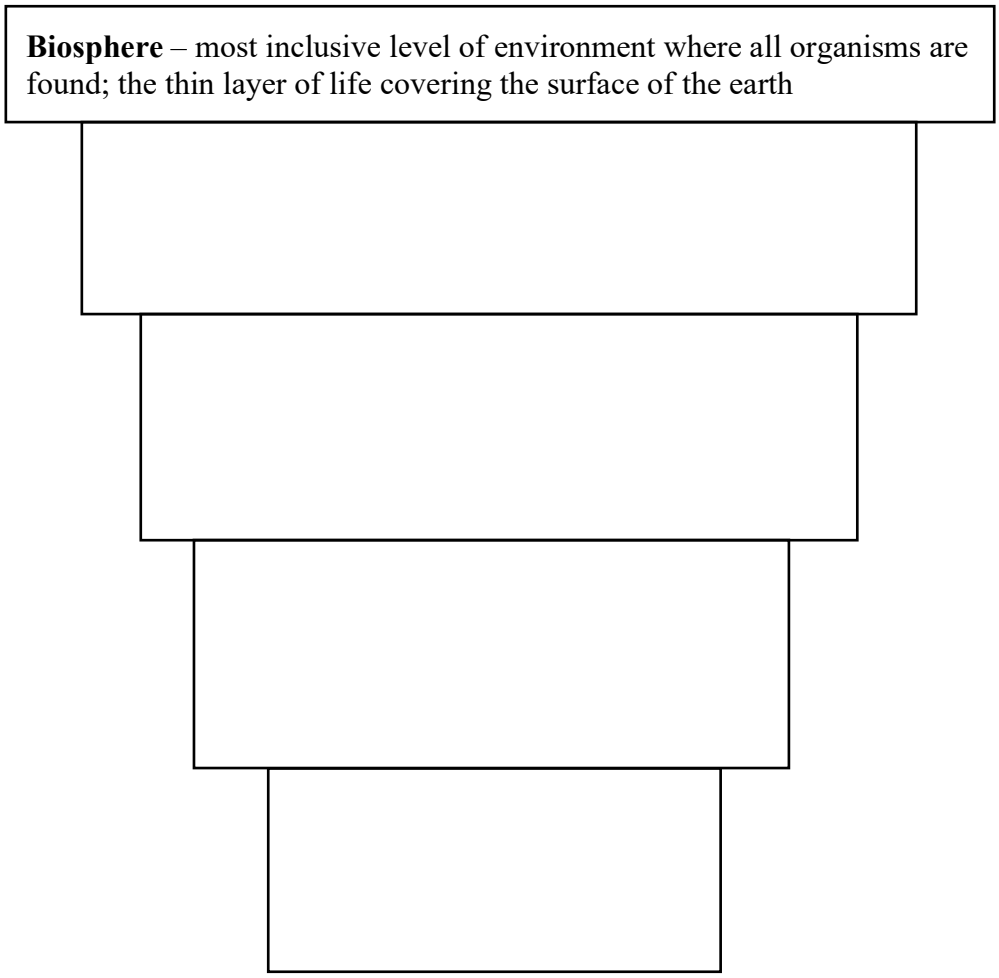
  _____

  _____

  _____

- ✓ Think of **three organisms** that exhibit interdependence. **List them below and explain how they are interconnected.**

- ✓ Using *Figure 18-2* on pg. 361, **identify and write a short definition** in the box for each organizational level in the biosphere diagram below. The first one is done for you.



- ✓ What is a **habitat**? Give an example of an organism and its habitat.

_____

_____

- ✓ Compare and contrast the terms, **biotic** and **abiotic**.

_____

_____

_____

- ✓ Identify the following items as *biotic* (B) or *abiotic* (A).
  - Temperature _____
  - Sunlight _____
  - Plants _____
  - Decomposers (such as fungi) ____
  - Humidity ____
  - Water ____

Read the following excerpt written by Edward O. Wilson from his book, *The Diversity of Life*.

The most wonderful mystery of life may well be the means by which it created so much diversity from so little physical matter. The biosphere, all organisms combined, makes up only about one part in ten billion of the earth's mass. It is sparsely distributed through a kilometer-thick layer of soil, water, and air stretched over a half billion square kilometers of surface. If the world were the size of an ordinary desktop globe and its suface were viewed edgewise an arm's length away, no trace of the biosphere could be seen with the naked eye. Yet life has divided into millions of species, the fundamental units, each playing a unique role in relation to the whole.

For another way to visualize the tenuousness of life, imagine yourself on a journey upward from the center of the earth, taken at the pace of a leisurely walk. For the first twelve weeks you travel through furnace-hot rock and magma devoid of life. Three minutes to the surface, five hundred meters to go, you encouter the first organisms, bacteria feeding on nutrients that have filtered into the deep water-bearing strata. You breach the surface and for ten seconds glimpse a dazzling burst of life, tens of thousands of species of microorganisms, plants, and animals within horizontal line of sight. Half a minute later almost all are gone. Two hours later only the faintest traces remain, consisting largely of people in airliners…

Short Response.

- ✓ Your text describes the biosphere as being comparable to the "skin of an apple." In this excerpt, Dr. Wilson says that on a leisurely stroll from the center of the earth, you would encounter the biosphere for a mere 10 seconds before leaving it again. What are your thoughts on this—your reactions and reflection?

II. Tuesday, May 5

Unit – Chapters 18, 20: Ecology and Populations
Lesson 2: Niche, Biotic Factors, and Energy Flow

Lesson 2 Socratic Guiding Questions: Keep these questions in mind as you study!
How do organisms interact in an environment? What role(s) do they play in an ecosystem?

Objectives: Be able to do this by the end of this lesson.

1. Explain the significance of producers, consumers, and decomposers in an ecosystem.
2. Describe how energy flows within an ecosystem.

Introduction to Lesson 2

Of the biotic factors in an environment, producers, consumers, and decomposers are vital parts to the fulfilling roles and supplying energy flow within an ecosystem.
The role, or specific way of life, of a species within an environment is its niche. Some organisms have a very specific niche, such as consuming single food sources, while others adapt to a broader niche, such as an organism that can migrate through a variety of environments or eat a variety of food sources. Some species can even fulfill more than one niche in a lifetime.
Energy flow is the amount of energy that is passed on from one organism to the next in a food chain within an environment. A series of interrelated food chains create food webs. Producers, a variety of consumers, and decomposers create the energy flow relationships within these webs.

Read pp. 365 – 369 in your text. After reading, complete the tasks on the following pages.

Concept and Vocabulary Review:

✓ Fill in the chart.

Type of Niche	Description	Example
Generalists		
Specialists		

Give an example of a species that has more than one niche in a lifetime.

_____

_____

_____

✓ Complete the chart below.

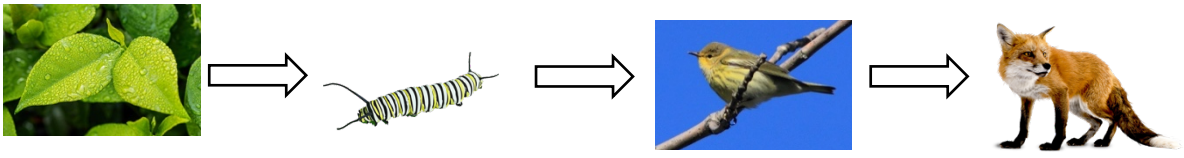
Biotic Factors	Description	Examples
Producers		
Consumers	Herbivore -	
	Carnivore –	
	Omnivore –	
	Detritivore –	
Decomposers		

✓ In the space below, complete the following:

✓ **Define** the following terms:

- **Trophic level –**
- **Food chain –**
- **Food web –**

✓ **Label** the following organisms in the food chain by identifying them as *producers* and *consumers* (along with what type of consumer).



_____ _____ _____ _____

What is the significance of the direction of the arrow?_____

_____

- ✓ Give two reasons for the low rate of energy transfer within ecosystems.

  1)_____

  2)_____

- ✓ **Food Web**

  Directions: In the space below, **create a food web** from the ecosystem of your choice. You **may draw the organism or write out its name**. **Include arrows showing the flow of energy and labe the organism as *producer and consumer (as well as what type of consumer)***. Remember, the arrow points toward the organism that's getting the energy! Be sure to include the following:

  - ***At least TWO producers***
  - ***At least FIVE consumers***

III. Wednesday, May 6

Unit – Chapters 18, 20: Ecology and Populations
Lesson 3: Biogeochemical Cycles

Lesson 3 Socratic Guiding Question: Keep this question in mind as you study!
How do the earth's cycles affect populations and ecosystems?

Objective: Be able to do this by the end of this lesson.

1. Identify and describe four major biogeochemical cycles.

Introduction to Lesson 3:
Lesson 3 reviews major cycles on Earth, including the water cycle, the carbon cycle, the nitrogen cycle, and the phosphorous cycle. The work of all of these together enriches and allows for all life to be sustained—the water cycle allows for fresh water and habitats for organisms; the carbon cycle includes organism respiration and decomposition; the nitrogen cycle promotes healthy soil, and the phosphorus cycle.

Read pp. 371-374 in your text. Then, complete the tasks below.

Concept and Vocabulary Review:

- ✓ The Water Cycle – Using your text and Figure 18-12 on pg. 371, answer the following:
  - List two ways water reenters the atmosphere. _____

    _____
  - How does water become **groundwater**? _____

    _____
  - Why is water an essential in every ecosystem?_____

    _____

    _____

    _____

    ***TO TRY AT HOME (Optional)*: You can create a mini version of the water cycle with these 3 items: a Ziploc sandwich bag, some soil, and water.

    1. Place 1-2 scoops of soil in the bag.
    2. Add enough water to the bag to moisten the soil and zip the bag closed.
    3. Place outside for 24-48 hours. Then observe the inside of the bag.

    Some questions to consider when you make observations:

    - What represents groundwater in the water cycle?
    - Where did the water on the inside of the bag come from? What process is this an example of?
    - Do you see anything that might represent precipitation?

- ✓ The Carbon Cycle – Using pages 372-373 and Figure 18-13 on pg. 372, answer the following:
  - What are three major ways carbon dioxide enters the atmosphere?

    _____

    _____
  - Why is some carbon dioxide important in the atmosphere? _____

    _____

    _____
  - How have humans influenced the carbon cycle (called our "carbon footprint")?

    _____

    _____

    _____
- ✓ The Nitrogen Cycle – Using pages 373-374 and Figure 18-14 on pg. 373, answer the following:
  - Why do all organisms need nitrogen? _____

    _____
  - What significance to **nitrogen-fixing bacteria** hold for most organisms? What do they do? _____

    _____

    _____
  - List three ways nitrogen is recycled. _____

    _____
- ✓ The Phosphorus Cycle – using pg. 374, answer the following:
  - Define **phosphorus cycle**. _____

    _____

    _____
  - Why is phosphorus essential to plants and animals? (List 1-2 reasons for each)

    _____

    _____

    _____

    _____

IV. Thursday, May 7

Unit – Chapters 18, 20: Ecology and Populations
Lesson 4: Species Interactions

Lesson 4 Socratic Guiding Question: Keep these questions in mind as you study!
What is the significance of interactions among ecosystems? How do these interactions affect the balance of the ecosystem?

Objectives: Be able to do this by the end of this lesson.

1. Explain the significance of species adaptations.
2. Identify the types of interactions that occur within an ecosystem.

Introduction to Lesson 4
In this lesson, we will **explore interactions among species,** including predation and symbiosis and how they affect species populations.

Read pp. 399-403. After reading, complete the following tasks.

Concept and Vocabulary Review:

✓ Complete the chart below using pp. 399-400.

Predation is _____ _____	
What is a predator?	What is prey?
Examples of predator adaptations (at least 2):	Examples of prey adaptations (at least 2):

✓ Define **interspecific competition**. Identify two reasons species might compete.

_____

_____

_____

_____

- ✓ Complete the chart below.

Symbiosis is _____		
Parasitism is…	**Mutualism is…**	**Commensalism is…**
Example:	Example:	Example:

- ✓ Identify the following as *parasitism (P), mutualism (M),* or *commensalism (C).*
  - Remoras feeding off of scraps from a shark _____
  - Pollination of a flower by a bee _____
  - A tick living on the skin of a dog _____

V. Friday, May 8

Unit – Chapter 18, 20: Ecology and Populations
Lesson 5: Succession and Chapter Review

Lesson 4 Socratic Guiding Question: Keep these questions in mind as you study!
How do ecosystems heal?

Objectives: Be able to do this by the end of this lesson.

1. Distinguish between primary and secondary succession.

Introduction to Lesson 4
As populations, including humans, make use of ecosystems, they can sometimes be destroyed or overused which can lead to the need for complete rebirth. Extreme deforestation, wildfires, and/or other natural disasters can affect a landscape once inhabited by organisms. **When catastrophes like this occur, the ecosystem must rebuild or be reborn**. In today's lesson, we will explore how this happens.

Read pp. 408-410 in your text. Then, complete the following tasks.

Concept and Vocabulary Review

- ✓ **Define** the following terms:
  - **Ecological succession -** _____
    _____
  - **Primary succession –** _____
    _____
  - **Secondary succession -** _____
    _____
- ✓ Give an example of primary and secondary succession in the boxes below. You may write to describe each OR draw your examples.

Primary succession:
Secondary succession:

- ✓ Why is succession—primary, secondary, or both—necessary for ecosystems?

_____
_____
_____

Minor Assessment: Chapters 18, 20 – Ecology and Populations

Directions: Complete the following.

Look outside your home. Observe the ecosystem around you and describe the environment in terms of biotic and abiotic factors, species interactions, human impact, and relationships. Include a sketch of your ecosystem. Consider and include observations using these guiding questions:

- ✓ What biotic factors exist in this ecosystem?
- ✓ What species exist in this ecosystem (include humans)?
- ✓ How do these species interact? Consider and describe food chains, food webs, symbiotic relationships, and human impact.
- ✓ How do you think the ecosystem would be different if humans weren't around?

Response:

Sketch: