

## Plot Study

<b>Lesson Concept</b>	Ecosystems are made of abiotic and biotic components that interact with each other.
<b>Link</b>	In the previous lesson, students learned the difference between biotic and abiotic things. In this lesson, they learn that these things interact in an ecosystem. In the next lesson, students will learn that specific types of biotic and abiotic components characterize biomes (specific ecosystems).
<b>Time</b>	60 minutes (includes 10 minutes for 4.2a Formative Assessment #1)
<b>Materials</b>	<u>Whole class</u> Thermometer <u>Per Group (groups of 2-4)</u> 4 Meter length of string for each plot study area or hula hoops 4 Stakes (e.g., golf tees, chopsticks) for each plot if using string 4 Hand lenses Trowel or large spoon <u>Individual</u> Science notebook Recording sheet Clipboard Pencil 3x5 Exit Card
<b>Advance preparation</b>	<ol style="list-style-type: none"><li>1. Gather materials.</li><li>2. Select plot study sites—make sure to make them diverse such as garden, flower bed, under a tree, in open field, edge of concrete. Diversity of plot will enable a “compare and contrast” discussion in terms of what abiotic and biotic factors were found and the types of interactions that were observed.</li><li>3. Set up the plots: take the 4 meter length of string and form a 1 meter square for each plot to which you will assign groups. Lay the string loosely over the area, or to be more precise, use four</li></ol>

stakes (e.g., golf pegs, chopsticks) as corners for the square meter. You can also use hula hoops for the boundaries.

**Procedure:**

**Engage**                      ***(5 minutes) The world is made of abiotic and biotic components***

1. Ask students to work with a partner to recall two biotic and two abiotic components that they learned in the “School Walk” lesson. Have them share their ideas and chart in a class T chart labeled biotic/abiotic.
2. Explain that today they will explore their schoolyard to find out how these components work together.

**Explore #1**                      ***(5 minutes) A system is defined by its parts and their interactions***

3. Write the word “system” on the board. In a think-pair-share, ask students to brainstorm what the word means and give examples (e.g., digestive system, solar system, Wii). Chart their responses. Note: if students are not able to list systems, prompt by giving examples.
4. Ask students to pick one system and describe some of the parts of the system (e.g., digestive system has stomach, intestine) and how they work together (digest food).
5. Write the word “ecosystem” on the board. Ask students to use their knowledge of systems to predict the characteristics of this system (e.g., it has parts that work together).

**Explore #2**                      ***(25 minutes) Abiotic and biotic components interact with each other.***

6. Divide the class into groups of 4 students. Explain that each team will be doing a thorough study of a small section of an ecosystem and looking at how the abiotic and biotic components work together.
7. Distribute recording sheets, clipboards and pencils to each student. Explain what students will observe and record:
  - a. Identify the abiotic and biotic components they observe in their section; if they don't know the name of an object they can describe it.
  - b. Draw the component.
  - c. Look for interactions between abiotic and biotic components. Use a TPR (total physical response) to emphasize the word “interact”. Raise one hand with your fingers spread and identify that hand as the abiotic components; raise your other hand with fingers spread and identify that hand as the biotic

components. Bring your hands together with fingers interlaced, saying that in an ecosystem abiotic and biotic factors interact.

8. Distribute the other supplies to each group: hand lens, trowel and assign each group to a specific area to make their observation (see advance preparation).
9. Establish expectations for outside behavior: work as a group; do not disturb the study area; it is ok to turn over rocks, leaves, etc, but replace them after making observations; do not dig or uproot plants; use the hand lens to make closer observations.
10. Take the students outside. As a whole class, take and record the air and soil temperature. Then allow 15 minutes for groups to complete their observations. Often students will search their area quickly; encourage them to just sit and observe for a while!

**Explain**                      **(15 minutes) An ecosystem consists of abiotic and biotic components that interact with each other.**

11. Ask students to return to the classroom.
12. Have students share by partnering groups from two different plots. How are their observations similar? How are they different? What types of interactions did they notice?
13. Have students summarize their group sharing by sharing with the whole class. Ask several groups to share the types of interactions they observed. Use these sentence frames for sharing:

*I observed a (biotic component) interacting with a (biotic component). It was \_\_\_\_\_.*

For example:

I observed a ladybug interacting with a plant. It was eating the plant.

I observed an ant interacting with a leaf. It was walking on the leaf.

*I observed a (biotic component) interacting with an (abiotic component). It was \_\_\_\_\_.*

For example:

I observed a worm interacting with the dirt. It was crawling through the dirt.

I observed a pill bug interacting with the shade. It was sitting in the shade.

I observed a leaf interacting with the wind. It was being blown by the wind.

**Extend/Evaluate**        **(10 minutes) An ecosystem is a system in which the abiotic and biotic components interact with each other.**

14. Distribute 3X 5 cards and ask students to answer these questions: Before I started this lesson on interactions, I thought \_\_\_\_\_. Now I think \_\_\_\_\_ I still have a question about \_\_\_\_\_

## Plot Study Observation Recording Sheet

Group Members \_\_\_\_\_ Time of Day \_\_\_\_\_

Air Temperature \_\_\_\_\_ Soil Temperature \_\_\_\_\_

### Biotic Components

Name	Picture/Description

### Abiotic Components

Name	Picture/Description

Describe the types of interactions you observed:

<b>Interactions between biotic (living) components</b>	
<b>Type</b>	<b>Description</b>
<b>Food</b>	
<b>Shelter</b>	
<b>Space</b>	
<b>Other</b>	

<b>Interactions between biotic (living) and abiotic (non-living) components</b>	
<b>Type</b>	<b>Description</b>
<b>Water</b>	
<b>Shelter</b>	
<b>Space</b>	