

Abiotic and Biotic Factors

Summary

This lesson helps students understand abiotic and biotic factors. Once the concept has been grasped, they can trace the interactions of these factors within a system.

Time Frame

2 class periods of 45 minutes each

Group Size

Small Groups

Life Skills

Thinking & Reasoning, Communication

Materials

- String
- Wooden stakes or rulers to tie string to
- Venn diagram for each student (two intersecting circles)
- A picture of a small system for each student

Background for Teachers

The term biotic means living or having lived. Examples of biotic factors would include a frog, a leaf, a dead tree, or a piece of wood. The term abiotic means non-living, or never having lived. Examples of abiotic factors would include gold, rock, bicycle, brick, and cement.

A Venn diagram is a math diagram that is used to show differences and commonalities between objects. Two circles are drawn so that they overlap. The place where they overlap is called the intersection; it must contain things that are common between both circles. For example, if one circle were labeled 'Sea Creatures' and the other 'Mammals', in the first circle you could list things like salmon, coral, perch etc. In the second circle you could list things like humans, gorillas, and mice. In the intersection you could list whales, because a whale is a sea creature that is also a mammal. Writing whale in either of the circles would not be correct because it belongs to both circles and must be put in the intersection.

Intended Learning Outcomes

- Make observations.
- Develop and use categories to classify observations.
- Identify variable and describe relationships between them.
- Know science terminology appropriate to grade level.
- Understand science concepts and principles.
- Distinguish between examples and non-examples of each concept.
- Use the language and concepts of science as a means of thinking and communicating.
- Construct a diagram to describe data.

Instructional Procedures

DAY ONE

1. Have the students respond to the following statement in their science journals or on a sheet of

paper:

Explain the difference between a rock and a wooden plank. Include such things as physical make up and how it was made.

Give the students four or five minutes, then discuss their answers. Accept all answers but try to steer them toward the idea that a rock has never lived and a wooden plank was living at one time.

Introduce the terms 'biotic' and 'abiotic'. Talk about the concept that a wooden plank is biotic because it was once living, where a rock is abiotic because it has never lived.

2. Divide students in groups of three or four for the this activity. Give them the following list to be entered into a Venn diagram, where the circles are labeled ABIOTIC and BIOTIC. Students do not need to enter any list items into the intersection at this point.

LIST:

- | | | |
|------------|----------|-----------|
| - Whale | - Clouds | - Finger |
| - Clock | - Corpse | Nails |
| - Water | - Snail | - Pipe |
| - Fish | - Steak | - Cotton |
| - Paper | - Pork | Fabric |
| - Glass | Chops | - Wool |
| - Aluminum | - Salad | - Gold |
| - Wooden | - Bread | - Plastic |
| Ruler | - Plant | - Grapes |
| - Sand | - Hair | - Air |

3. After students have had sufficient time to complete this activity, take the time to discuss some of the problems the students might have had entering this list into the circles, such as: Is a steak biotic? It was part of a living organism but does that make it living? (Steak used to be living tissue, it had cells, grew, and carried out respiration. These cells reproduced, and there were complex chemical reactions that took place in this muscle tissue. It was living once, therefore it is biotic).

4. As a class, generate a list of things that could go into the intersection of these two circles. (Examples: matter, energy, atoms.)

5. Reiterate that abiotic is something that has never lived and biotic is something that is living or was once living. On a whiteboard or overhead, list the six characteristics that living things have in common: growth, reproduction, respiration, complex chemical reactions, cells, and movement. Ask the students to write these characteristics at the bottom of their paper for later reference.

6. Have them hand in their diagrams. Check for understanding of the day's concepts.

DAY TWO

1. The students are going to look at sectioned areas around the school for biotic and abiotic factors. Prior to the class period, go around the outside of your school with twine and wooden stakes or rulers, sectioning off several areas. Section off as many areas as there will be groups of students. In these sections, try to include a variety of objects such as plants, bug life, a fence, cement, rocks, dirt etc. The sections do not have to have the same things in them.

2. Take time in class to correct any misconceptions the class may have about biotic and abiotic factors. Explain to the students that there may be things that the items in the two circles have in common (for instance color) but it had to be something in common to abiotic and biotic before it could be listed in the intersection.

3. Give the students a Venn diagram of two large intersecting circles. They are to label the circles Biotic and Abiotic. Label the intersection Things In Common. Divide the students into groups of 4 or 5 (or keep the same groups from Day One). Explain that they will have a sectioned area with abiotic and biotic factors in it. Their job is to: first, list all the abiotic factors, and second: enter them in their Venn diagrams. Have the students bring their diagrams outside. Allow ample time for the students to explore their sections and complete the assignment.

Extensions

The students could then create four smaller Venn diagrams. The circles are now labeled biotic factors in system, abiotic factors in system, and the intersections are labeled things in common.

The students are to list abiotic and biotic factors in the system that have something in common and then list this commonality in the intersection.

Some connecting ideas for the intersection could include color, location, or function. They could connect all the brown things, all the things that have soft surfaces, the things that provide shelter, the things that are in the soil, and things that are moved by the wind.

Assessment Plan

The assessment for this two-day lesson is to have the students bring in a picture of a small system, for instance a picture of a desert, a pond, a forest, waterfall, or any picture of scenery. If your library has magazines that they can cut out have them do this. You can use pictures from several textbooks or even a photograph.

They should make one large diagram where the circles are labeled abiotic, biotic, and the intersection is labeled things in common. This circle should have all of the factors listed and the items that connect them (i.e. matter, energy). They should also make several smaller diagrams that are labeled abiotic factors in system, biotic factors in system, and the intersection is things in common. Each of these smaller diagrams is filled out connecting these factors together (i.e. color, function). Use the assessment rubric to assess the diagrams.

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