LAB 5 Probeware Activity

Biodiversity and Ecosystems

What lives in your home or on your school lawn? What lives in the wooded areas at the local park? You probably have noticed that some organisms' habitats include both a grassland and a wooded area while other organisms live only in one type of area. In this activity you will play the role of an ecologist in the field. You will observe plant and animal organisms at two different sample sites and collect data using a graphing calculator and a temperature probe.

What You'll Investigate

- What plants and animals live in two ecosystems?
- What is the effect of plant diversity on temperature?

Goals

Observe living organisms in a measured area.
Count the plant types observed using percentages.
Collect temperature data.
Compare the temperature data for two different sites.

Materials

CBL 2 or LabPro unit
TI graphing calculator
link cable
DataMate program
temperature probe
meterstick
string
8 wooden dowels or craft sticks
10 acetate grids (10 cm × 10 cm)
colored transparency markers
trowel
drawing compass
protractor

Safety Precautions

CAUTION: Do not touch or harass animals in the field. Do not eat any fruits, berries, or plant material from the site. Beware of poisonous and thorny plants.

Pre-Lab

1. Predict the type of living organisms you might find in a small plot of lawn.

2. Predict the types of animals you might find in a small plot with more diverse vegetation.

3. List any abiotic factors you could observe at a small site in the field.

**4.** Describe how you could measure one of the abiotic factors.

Probeware Activity 5 (continued)

Procedure

Part A: Collecting Plant and Animal Data

1. At your assigned site, measure a one-meter square area and mark it with string and sticks as demonstrated by your teacher.

2. Examine your area carefully. Count the different types of plants. Look for any animals or signs of animal life. Record your observations in **Data Table 1.** You do not need to know the exact name of the plants and animals, but include measurements. A description such as "short (4 cm), thin, yellowish-green grass" is acceptable.

3. Use a trowel to carefully lift out a section of soil. Describe how much effort was needed to remove the soil. Observe the humus layer and record its depth in **Data Table 1.** Replace the soil.

4. Randomly lay five of your 10-cm × 10-cm acetate grids on the ground within your square meter, as shown in **Figure 1.**

5. Using transparency markers, code each small square with a color, number, or symbol to represent the type of plant visible within that square.

6. Repeat steps 1–5 for your second assigned site.

Figure 1
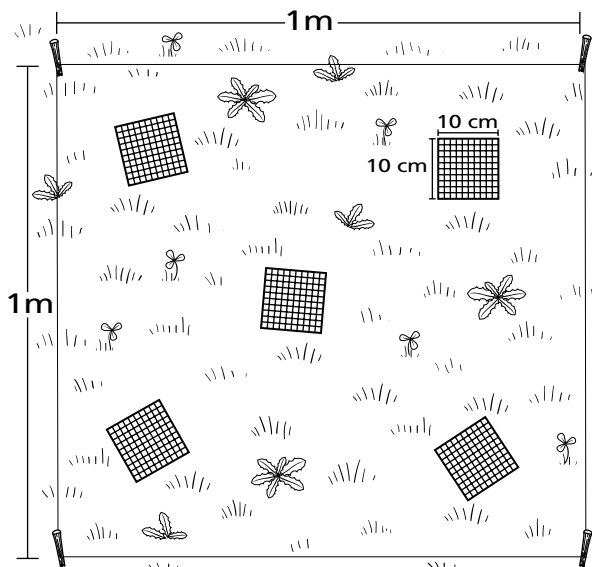
Part B: Collecting Temperature Data

1. Plug the temperature probe into channel 1 of the CBL 2.

2. Turn on the graphing calculator and start DataMate. Press CLEAR to reset the program. The temperature probe should be recognized automatically. If not, turn to page *vi* for instructions on how to set up the probe manually.

3. To investigate the effect of height above the ground on temperature, stand a meterstick in the middle of your sample site. Place the "zero" end on the ground.

4. Put the temperature probe on the ground next to the meterstick. The temperature reading is located in the upper right-hand corner of the calculator screen. Allow enough time for the temperature reading to stabilize. After 30 seconds have passed, record the temperature in **Data Table 3.**

5. Move the probe to the 10-cm mark and repeat the procedure. Measure and record the temperature at each 10-cm increment. Your last reading will be at 100 cm.

6. Repeat steps 1–5 for your second assigned site.

7. After all of your data is collected, select **QUIT.** Follow the directions on the calculator screen.

Cleanup and Disposal

1. Turn off the calculator and disconnect the temperature probe and CBL 2.

2. Return all lab materials to the appropriate location as directed by your teacher.

3. Collect personal belongings and pick up any trash at your site.

Probeware Activity 5 (continued)

Data Table 1: Soil Conditions and Organisms

	Site A	Site B
Plants found		
Animals/Animal signs found		
Depth of humus (cm)		
Ease of penetrating ground		

Data Table 2A: Plant Analysis at Site A

Plant Type	Number of Squares out of 100					Total (of 500)	Percent (%)
	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5		

Data Table 2B: Plant Analysis at Site B

Plant Type	Number of Squares out of 100					Total (of 500)	Percent (%)
	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5		

Probeware Activity 5 (continued)

Data Table 3: Temperature vs. Height

Height (cm)	Temperature (°C)	
	Site A	Site B
0		
10		
20		
30		
40		
50		
60		
70		
80		
90		
100		

Part C: Analyzing Data

1. Count the number of small squares for each plant type and record it in **Data Table 2A** or **2B.** Convert the total count from the five grids to percentages.

2. Construct two circle graphs to compare the plant percentages for Site A and Site B. If you have a TI-73 your teacher may want you to make your circle graphs on the graphing calculator. See **Appendix E** for directions.

3. Construct a graph that shows the relationship between temperature and height for each site. Place the independent variable on the *x*-axis and the dependent variable on the *y*-axis. Include a key.

Conclude and Apply

1. Compare the diversity of organisms in your two ecosystems. List at least two similarities and three differences between Site A and Site B. Be specific.

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2. In your temperature-height graph, what was your independent variable? What was your dependent (responding) variable? Why does the graph need a key?

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3. Describe any differences in the temperature vs. height at Sites A and B. Explain how this factor might affect the plants and animals found there.

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