

# 8. Seasonal Pond Exploration

## *Probing a Vernal Pool*

### Driving Question

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How can life exist in a vernal pool?

### Materials and Equipment

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#### *For each student or group:*

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| <input type="checkbox"/> Mobile data collection system | <input type="checkbox"/> Temperature sensor |
| <input type="checkbox"/> pH sensor                     | <input type="checkbox"/> Hand lens          |

### Safety

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Add these important safety precautions to your normal outdoor class procedures:

- Before going to any body of water, discuss field trip procedures and guidelines with your teacher. Discuss the importance of not disturbing or polluting the ecosystem at the site.
- Wear proper shoes and other appropriate clothing because you will need to wade into the water to obtain many of the readings.

### Thinking about the Question

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If you are walking or hiking on a spring day, you may see many wet places. Many of these wetlands are called vernal pools. Vernal pools are depressions that hold winter and spring rain, but remain dry for the rest of the year. These temporary ponds may seem inhospitable to life, but many plants, as well as amphibians and invertebrate animals, are adapted to this wet-dry cycle.

If you look closely you will see many arthropods, which include insects, spiders, and fairy shrimp.

Discuss with your partners the changes that occur in a vernal pond throughout the year.

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## Sequencing Challenge

The steps below are part of the Procedure for this lab activity. They are not in the right order. Determine the proper order and write numbers in the circles that put the steps in the correct sequence.

○	○	○	○	○
Locate a suitable vernal pond to study.	Make certain that each lab group member is aware of the safety rules and procedures for this lab.	Compare your observations and findings with others in your class.	Connect temperature and pH sensors to your data collection system.	Record the temperature and pH of the vernal pond's water at three times during the day.

## Investigating the Question

**Note:** When you see the symbol "◆" with a superscripted number following a step, refer to the numbered Tech Tips listed in the Tech Tips appendix that corresponds to your PASCO data collection system. There you will find detailed technical instructions for performing that step. Your teacher will provide you with a copy of the instructions for these operations.

### Part 1 – Conducting a site assessment

- Choose a vernal pool site according to your teacher's instructions.
- Conduct a site assessment. Be sure to note any special conditions that occur at your site.
- Record your site assessment of the vernal pond you investigated.

Name: \_\_\_\_\_

Country: \_\_\_\_\_

State: \_\_\_\_\_

Town: \_\_\_\_\_

Watershed: \_\_\_\_\_

Date: \_\_\_\_\_

### Weather:

Today's weather: \_\_\_\_\_

Past two days: \_\_\_\_\_

**What the water looks like:**

What color is it? : \_\_\_\_\_

Is there an oily film on it? : \_\_\_\_\_

Is there any algal growth? : \_\_\_\_\_

Do you smell any chemicals? : \_\_\_\_\_

**What the vernal pond looks like:**

Is it rocky? : \_\_\_\_\_

Is it sandy? : \_\_\_\_\_

What habitats are available for animals and plants in the water? \_\_\_\_\_

\_\_\_\_\_

**What the surrounding area looks like:**

Are there shrubs, grass, softwood trees, or hardwood trees along the water? \_\_\_\_\_

\_\_\_\_\_

Is there any vegetation at all? \_\_\_\_\_

Is the bank surrounding the vernal pond eroding? \_\_\_\_\_

\_\_\_\_\_

**What does the land in the area get used for?**

Cropland? \_\_\_\_\_

Grazed pasture? \_\_\_\_\_

Housing? \_\_\_\_\_

Industry? \_\_\_\_\_

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### Part 2 – Making predictions

4.  Predict how you think the temperature of your site will change throughout a day. Explain your reasoning. Be prepared to share your thoughts with the class.

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5.  Predict how you think the pH of your site will change throughout a day. Explain your reasoning. Be prepared to share your thoughts with the class.

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### Part 3 – Making measurements

6.  Start a new experiment on the data collection system. ♦<sup>(1.2)</sup>
7.  Connect the pH and temperature sensors to the data collection system. ♦<sup>(2.2)</sup>
8.  Display pH and temperature in a digits display. ♦<sup>(7.3.1)</sup>
9.  Change the number of digits with which pH data is displayed to two digits past the decimal point. ♦<sup>(5.4)</sup>
10.  Change the sample rate to 1 sample per second. ♦<sup>(5.1)</sup>
11.  Carefully place the pH and temperature sensors into the pool, making sure that the tip of each sensor is immersed in the water. Do not wade into the water unless your teacher has instructed you to do so.
12.  Start data recording. ♦<sup>(6.1)</sup>
13.  After the readings have stabilized, stop data recording. ♦<sup>(6.1)</sup>
14.  Take pH and temperature measurements three times throughout the day, each time following the same procedure as you did in the previous steps.

15.  As you measure the pond's temperature throughout the day, record these values below:

Morning: \_\_\_\_\_ °C

Noon: \_\_\_\_\_ °C

Afternoon: \_\_\_\_\_ °C

16.  As you measure the pH throughout the day, record these values below:

Morning: \_\_\_\_\_

Noon: \_\_\_\_\_

Afternoon: \_\_\_\_\_

### Answering the Question

#### Analysis

1. How do your results from Part 3 compare to your predictions in Part 2? Are your results close to what you expected? Why or why not?

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2. How will conditions in the vernal pool be affected by a storm?

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3. How will conditions change as the season progresses?

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4. From information gathered at your vernal pool, what particular animal and plant life survive in specific conditions (for example, high pH, high temperature, et cetera.)?

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5. The term "vernal" comes from the Latin word for the season of spring. What evidence from your investigation supports spring as an important season in the life cycle of this ecosystem?

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### Multiple Choice

Circle the best answer or completion to each of the questions or incomplete statements below.

1. Which measurement describes a pond's level of acidity?

- A. Temperature
- B. pH
- C. Dissolved oxygen

2. The sun's energy is captured by plants and converted into chemical energy during the process known as:

- A. Photosynthesis
- B. Neutralization
- C. Transpiration

3. Which of the following is *not* an abiotic factor of a vernal pond?

- A. Amount of sunlight
- B. Algae
- C. Sand, gravel, and clay

4. A vernal pool that forms a habitat for many organisms is most likely to have a pH in the range of:

- A. pH 3 to pH 5
- B. pH 9 to pH 12
- C. pH 6 to pH 8

5. What is the original source of all of the energy available to the organisms that live in or near a vernal pond?
- A. The type of bedrock or soil that forms the pond
  - B. The amount of dissolved oxygen in the water
  - C. The sun

**True or False**

Enter a "T" if the statement is true or an "F" if it is false.

- \_\_\_\_\_ 1. Biotic factors in an ecosystem are those that are living.
- \_\_\_\_\_ 2. A vernal pond changes very little with the seasons.
- \_\_\_\_\_ 3. Vernal ponds are dependent upon rainfall for most of their water.
- \_\_\_\_\_ 4. Every species of organism that lives in a vernal pond is microscopic.
- \_\_\_\_\_ 5. It is possible for the pH in a vernal pond to be too high or low for all organisms to survive.
- \_\_\_\_\_ 6. One factor that has no effect on the ecosystem of a vernal pond is the temperature at the hottest part of the day.
- \_\_\_\_\_ 7. A storm would probably have no effect on the conditions in a vernal pond.
- \_\_\_\_\_ 8. Vernal ponds can be home to a variety of plants and animals.

