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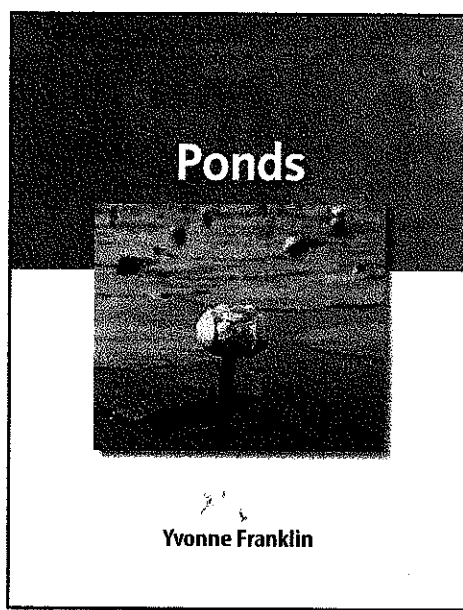
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Science Readers: A Closer Look

Lesson Plans for

Ponds



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Ponds Reader

Learning Objectives

Students understand sequential order in text.
(Nonfiction Reading Objective)

Students compare and contrast information in text.
(Nonfiction Reading Objective)

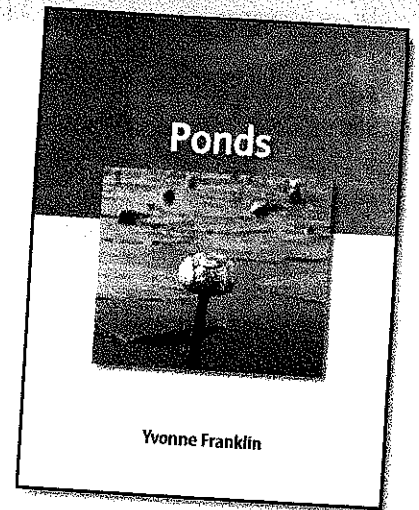
Students use prior knowledge and experience to understand and respond to new information. (Nonfiction Reading Objective)

Students use strategies to write for a variety of purposes.
(Writing Objective)

Students know that plants and animals progress through life cycles of birth, growth, development, reproduction, and death.
(Science Objective)

Students solve real-world problems involving number operations. (Math Objective)

Students understand the effects of climate and weather on vegetation, agriculture, and human activity. (Science/Geography Objective)



Materials

- *Ponds Reader*
- chart and writing paper
- calculators
- *Just the Right Match* activity sheet (page 5)
- *A Pond-Eat-Pond World* activity sheet (page 6)
- *The pH of a Healthy Pond* resource page (page 12)
- *The pH of a Healthy Pond* activity sheet (page 7)
- *Reader Quiz* (page 8)
- materials for the Lab activity (page 11)

Before Reading

- 1 Introduce the vocabulary words that students will encounter in the text. On the board, write the three boldface terms below. Take time to discuss each word. Have students share what they think the words mean and have them try to use the words in sentences. Go over additional vocabulary and use the glossary in the reader as needed.

Vocabulary

aerate	ecosystem	natural	sea level
amphibian	fragile	nutrients	submerged
bacteria	invertebrate	oxygen	
cycle	mammal	pond	
decompose	marsh	prey	

- 2 Discuss what animals need to survive (e.g., food, water, oxygen, shelter). Have students think about how pond animals might find all these things in or near a pond. Make a two-column chart. List on the left, the pond animals that students share. List how the animals find their survival needs on the right. Make sure students include plants on the right. Stop after discussing three or four animals. Circle any plants on the right side of the chart for each animal. Explain that all pond animals rely on the pond plants for survival. Have students read pages 18–19 in the reader to find out how.

Pond Animals	What Pond Animals Need to Survive

- 3 Distribute the *Just the Right Match* activity sheet (page 5). Read the information together. Then, have students work collaboratively to list the animals in the second column, and explain how these plants help the animals in the third column. Hold onto these papers to see if students want to make changes to their answers after the completion of the book (see step 12 on page 4).
- 4 Discuss what a *cycle* is. Have students use the glossary to find a definition of this word. Have them use the index to find an example of a cycle. Draw a circle on a sheet of paper or chart. Have students do the same on a sheet of paper. Explain to students that they will read about many cycles in *Ponds*. When they do, they should list the plants and animals that make up the cycle around the outside of the circle.

During Reading

- 5 Read pages 4–7 in the reader. Discuss how people have used ponds. Ask students if they think they could tell the difference between a natural and man-made pond. Ask them how they would know.
- 6 Read pages 8–13 in the reader. Define what a pond is and how it compares to other bodies of water. Have students define the term *pond* and illustrate it on a sheet of paper.
- 7 Read pages 14–19 in the reader. Add animals to the two-column chart from step 2 above. Include how they use plants as part of their survival in a pond.

During Reading (cont.)

- Read pages 20–25 in the reader. Share one pond cycle as a group. Fill in the plants and animals around the circle from step 4 (page 3) to demonstrate how to complete a cycle. Then, have students work in pairs to choose a different cycle to illustrate on the circle they drew. Allow time for students to share their cycles with the group.

Distribute the *A Pond-Eat-Pond World* activity sheet (page 6). Read the information together. Allow time for students to complete the page independently. Then, compare their answers. Discuss the differences among students' activity sheets and how the different answers could all be correct.

- Read pages 26–27 in the reader. Discuss how people influence the life cycles in a pond.

After Reading

- Have students discuss what the author meant when she points out that a pond is a lot like students' own families (pages 14–15).

Redistribute the activity sheet *Just the Right Match* (page 5). Work as a group to discuss whether students wish to make any changes to the table after they have read about all the ways animals depend on plants for survival in a pond.

Discuss what happens to a pond over time and how people may or may not influence this outcome. Give students a copy of *The pH of a Healthy Pond* resource page (page 12). Explain that this is what is known as a "dead pond." This means that there is little to no life in the pond itself. Discuss what students observe about this pond and how it looks different from the "live ponds" they saw in their readers.

- Distribute the *The pH of a Healthy Pond* activity sheet (page 7). Read the introductory information as a group. Allow time for students to complete the page independently or with a partner. Students may need calculators.

Use the *Reader Quiz* (page 8) to further assess student learning.

- Gather students together as a whole class to complete the Lab activity (pages 10–11).

Extension Idea

Have students read "Scientists Then and Now" on the back page of the reader. Both scientists worked or currently work to protect nature. Have students think about what they can do to protect nature. Then have them create a flyer advertising a new nature protection club they have formed. Explain that the flyer should include the name of the club, the nature it is protecting, and when and where to meet.

Name _____

Just the Right Match

Ponds are usually small. But pond plants and animals come in all sizes. Pond life can include even the smallest bacteria and algae. It can also include the largest trees and mammals that live near or in the pond. Every pond plant supports many types of animals. The different animals also support the plants.

Directions: Read pages 18–19 in the reader about how pond plants help the animals that live there. Look at the table below. Use what you know and the information from the *Ponds* reader to fill in the graphic organizer below. In the second column, list the animals from the Word Box that the plants can help. There are four animals per plant. In the third column, explain how the plants help the animals you listed. One example has been done for you.

Word Box:

beaver	fish	leech	dragonfly	heron	salamander
snake	crayfish	mosquito	frog	turtle	flatworm

Kind of Pond Plants	Animals Helped by These Plants	How These Plants Help
Submerged Plants	flatworm	They aerate the water. This means they put in oxygen. These animals need oxygen to live.
Floating and Emerging Plants		
Bank and Marsh Plants		

Name _____

A Pond-Eat-Pond World

Directions: Use information from the *Ponds* reader to complete the energy cycles below. Show what each animal eats as part of the cycle, using the plants and animals in the Word Box.

Word Box:

sunlight	water lilies	frogs	dragonflies	water nutrients
mosquitoes	water lettuce	snails	worms	decaying animals

<p>1.</p> <p>snapping turtle</p>	<p>2.</p> <p>mallard duck</p>
<p>3.</p> <p>beaver</p>	<p>4.</p> <p>crayfish</p>

On a separate sheet of paper, list one way these energy cycles are similar. List one way these energy cycles are different

Name _____

The pH of a Healthy Pond

Scientists can measure the health of a pond. They do this by measuring the acid level in the water. This measure is called a pH level. Think of it like a thermometer. A thermometer measures temperature. A healthy person's temperature is 98.6°F. A healthy pond has a pH level of 6.5–7.0. If a pH level is below 7.0, the water is more acidic. If a pH level is above 7.0, the water is more basic.

Fossil fuels, power plants, and car exhaust can all make rain more acidic. Sometimes, the water in a pond can become too acidic. The pH level gets too low. Animals start to die. Fish die. Plants die. Pretty soon, the pond is called a "dead pond." Little, if any, life survives in the pond.

Directions: Read the situations below. Use what you know, the *Ponds* reader, and the resource page *The pH of a Healthy Pond* to answer the following questions. Use a separate sheet of paper to calculate your answers. You may need to use a calculator.

- Eric and Jeremiah are testing the pH level of a nearby pond. On the first day of May, the acidity level was 6.7. On June first, it was 6.5. On July first, it was 6.3. If this trend continues, what will the pH level be on October first? _____
- At the beginning of summer, a pond measured 136,000 sq. meters (446,194 sq. feet) and was 7 meters (23 feet) deep. People could catch perch, pike, and bullhead fish there. A year later, the pond measured 98,000 sq. meters (321,522 sq. feet) and was 5.8 meters (19 feet) deep. People caught fewer fish. How many square meters did the pond shrink? How much shallower was it? What could have caused the pond to shrink? _____

- An environmental group conducted a study of waterfowl at a local pond. They counted 527 ducks that lived at the pond one summer. The following year, they counted 764 ducks that nested in or near the pond. How many more ducks nested there the second year of the study? How many ducks do you think the group counted during the third year of their study? _____

- Look at the picture provided by your teacher. What signs of life do you see? _____

- Look at the picture provided by your teacher. What other signs of life do you think survive in the pond that you can't see? _____

- What do you think will happen to the pond over the next several years? _____

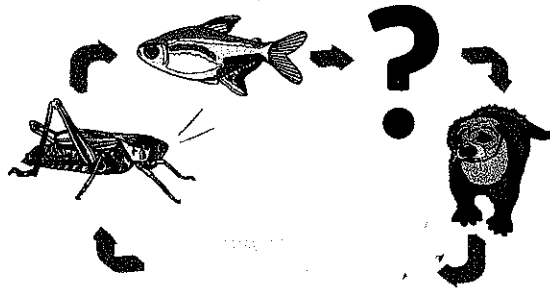
Name _____

Reader Quiz

Directions: Circle the best answer.

- If a pond is left undisturbed, what will eventually happen to it?
 - It will get bigger and may turn into a lake.
 - It will get smaller and dry up.
 - It will be around for hundreds of years.
 - Every pond will eventually be disturbed by people.
- What is the main difference between a pond and other bodies of water?
 - size
 - saltwater or freshwater
 - location
 - the plants and animals that live there

- What is missing from this energy cycle example?



- person
 - algae
 - bird
 - plant
- In the energy cycle above, how do the bacteria help the cycle continue?
 - Bacteria decompose dead animals.
 - Bacteria bring nutrients back to the pond.
 - Bacteria keep the pond clean and healthy.
 - all of the above
 - How does pollution make it difficult for bacteria and other small animals to keep a pond clean?
 - Pollution kills all of the bacteria in the pond.
 - Pollution cleans the pond, so the bacteria does not have to.
 - Pollution decreases the amount of oxygen in a pond.
 - none of the above

Directions: Answer the following question on a separate sheet of paper. Use information and examples from the *Ponds* reader to explain your answer.

- How do plants and animals depend on each other as they live their life in a pond? Give examples from the *Ponds* reader.

Ponds Answer Key

Just the Right Match

Submerged Plants: fish, crayfish, leech; (students could have added shelter and food)

Floating and Emerging Plants: dragonfly, mosquito, frog, salamander; shelter and food

Bank and Marsh Plants: beaver, turtle, heron, snake; shelter and food

A Pond-Eat-Pond World

Accept reasonable cycles; samples follow:

1. Snapping turtle, frogs, dragonflies, mosquitoes
2. Mallard duck, snails, water lettuce, sunlight
3. Beaver, water lilies, water nutrients
4. Crayfish, worms, decaying animals

Check students' answers. Sample similarity: Cycles seem to start with larger animals and move to smaller animals. Sample difference: Some animals eat other animals, but some eat plants.

The pH of a Healthy Pond

1. 5.7
2. 38,000 sq. meters (124,672 sq. feet); 1.2 meters (4 feet); less rain to keep the pond water full, or more dead plants and animals filling in the bottom
3. 237 ducks; any number between 950–1,050 or 1,001.
4. Answers will vary. Examples: trees, cattails, etc.
5. Answers will vary. Examples: bacteria and algae in the water
6. Accept all reasonable answers. Example: The pond will dry up.

Reader Quiz

1. b 2. a 3. c 4. d 5. c
6. Answers will vary. Example: Fish use floating and emerging plants like water lilies and duckweed to hide behind when being chased by larger animals for food. They also provide food for the fish and other animals that live there. When the fish die, they give nutrients back to the pond so that more lilies and duckweed may grow.

Lab Lesson Plan: Ant Farm

Before the Lab

Discuss what students learned about cycles from their reader. Compare the cycles of plants and animals. Have students explain how they are both similar and different.

Discuss cycles students have observed in nature (e.g., seasons, pets' lives, plants' lives). Explain that they will create an ant farm to observe living things and their cycles.

Introduce the Lab

Read the introductory paragraph of the lab with students.

Read the list of materials. Provide each student or lab group with the necessary materials, or have the materials ready to complete as a demonstration lesson in front of the class.

Read through all of the procedures with students at least once before they engage in the lab. Check for understanding of the required steps.

Conduct the Lab

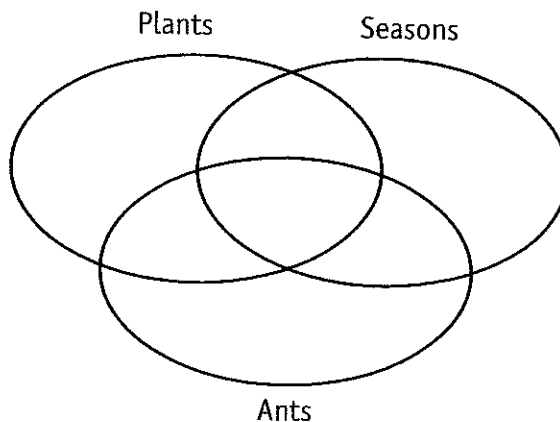
Allow time for students or lab groups to conduct the lab, or follow the steps as a class if conducting a demonstration lab.

Have the lab groups record their observations each day. After a suitable time period (one to two weeks), have them record their overall observations related to ants and cycles.

After the Lab

Discuss how the life cycle of ants is both similar to and different from plants, and one of the ideas from step 2 above. Create a three-circle Venn diagram to compare and contrast the three cycles.

Have students research the life cycle of another plant or animal and report their findings to the class.



Lab: Ant Farm

One of the best ways to learn about cycles in nature is to observe them. Some of nature's smallest creatures have some of the most fascinating lives! Ants, for example, are well organized and work hard all their lives. You can build an ant farm to observe how ants live. Be sure to treat the ants with respect. They are living things, after all.

Materials:

- a small glass jar
- a large glass fishbowl
- about two dozen ants from the same colony
- soil
- sand
- sugar and water
- cheesecloth
- rubber band
- dark heavy paper or cloth to cover fishbowl
- tape

Procedure:

- 1 Carefully collect about two dozen ants from a single colony. If they are not from the same colony, they will fight.
- 2 Put the small glass jar upside down inside the large fishbowl.
- 3 Mix soil and sand so that it is loose. Pour it into the fishbowl.
- 4 Mix a little water and sugar together. Use the eyedropper to put several drops of the mixture in the sandy soil.
- 5 Add the ants to the fishbowl.
- 6 Cover the lid of the fishbowl with cheesecloth and a rubber band to keep the ants from getting out.
- 7 Wrap the dark paper or cloth around the fishbowl and tape it in place. This will make the ants think they are in the dark underground.
- 8 Store the fishbowl at room temperature someplace quiet. Each day, add some drops of water to the soil. Each week, add some drops of sugar water. (Just drop the water or sugar water on the surface this time.)
- 9 Take off the dark covering each day to observe what the ants are doing. They will begin to build tunnels and make rooms in just a few days. Be sure to cover them up again soon so that you do not disturb them.
- 10 Write what you see. What do you notice about ants?

The pH of a Healthy Pond

