

Life Science: A Water Field Study

Grade 8

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Dora Carnevali 8th Grade Science
2 days

Life Science: A Water Field Study

Targeted Standards:

Academic Expectations

2.3 Students identify and analyze systems and the ways their components work together or affect each other.

Program of Studies

S-8-LS-4 Students will investigate and analyze populations and ecosystems.

Core Content for Assessment

SC-M-3.5.4 The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

Major Content:

pH, conductivity, dissolved oxygen, using technology (thermometers, pH kits, conductivity testers, dissolved oxygen kits), using tables to record data

Essential Question:

What are the conditions necessary for life?

Activity:

Water Study (see attached handout)

Resources:

A Water Field Study Handout

LaMotte The Monitor,s Handbook

Literature included with kits

thermometers

LaMotte wide range pH kits

Waterproof ECTestr Low Conductivity Testr

LaMotte dissolved oxygen kits

Procedure:

Class demonstrations and explanations of all procedures.

Safety instructions for use of materials.

Field Safety instructions reviewed.

Field Study at local stream (see A Water Field Study handout).

Students complete data tables, discuss, and write answers to conclusion questions.

Evaluation:

Group work evaluation form.

Completed data tables.

Written answers to Conclusion questions.

Unit test.

Name _____ Science ____ Group # ____ Date ____/____/____

A Water Field Study

In this activity, you will measure air temperature, water temperature, pH, conductivity, and dissolved oxygen. Water temperature in the stream is one factor in determining which species may or may not be present because temperature affects metabolism, reproduction, and even the feeding habits of aquatic animals. Problems can occur in the stream even if the temperature is high for only one or two weeks during the year.

The best pH range for most aquatic organisms is between 6.4 and 8.3. The pH

measurements must be made at the stream because the pH of a sample will rapidly change.

Aquatic animals must have dissolved oxygen (DO) to live. The amount of dissolved oxygen in the water is limited by factors such as the temperature and salinity of the water. Fish cannot live in water with dissolved oxygen levels at 2 ppm or lower.

Some sample data are listed in table 1.

Table 1: Water Temperatures, pH, and Conductivity in the Licking River

Site	Date	Air Temperature (BC)	Water Temperature (BC)	pH	S.U. Conductivity	DO
Moore's Ferry	06/16/04	27	19	7.3	100	7.6
Blue Lick	06/16/04	33	23	7.4	160	7.0
Falmouth	06/17/04	27.5	25	7.7	330	7.4
Wilder	06/17/04	29	24	5.5	220	5.5
Licking River Mouth	06/18/04	28.5	23	6.3	260	6.3

Objectives

In this activity, you will
use a thermometer to measure air and water temperature

use a LaMotte wide range pH kit to measure the pH of water
use a Conductivity Testr to measure the conductivity of water
use a LaMotte dissolved oxygen kit to measure the dissolved oxygen of water
make visual observations at the stream site
compare water quality

Materials

thermometer
LaMotte wide range pH kit
Waterproof ECTestr Low Conductivity Testr
LaMotte dissolved oxygen kit
waste jug
pencil
science notebook
A Water Field Study Handout
Name _____ Science ____ Group # ____ Date ____/____/____

Procedure

Part A Measuring Air and Water Temperature

1. Measure air temperature first. Place thermometer in a convenient location and wait several minutes. Check and record temperature.
2. Place lower half of thermometer in water for 1-2 minutes. Check and record temperature.

Part B Measuring pH

1. Fill the test tube to the 5.0 line with water.
2. Add 10 drops of Wide Range Indicator solution..
3. Cap and mix.
4. Insert test tube into Octet Comparator.
5. Match test tube sample color to a color standard.
6. Record pH number.

(Directions adapted from instructions included with pH kit)

Part C Measuring Conductivity

1. Remove electrode cap.
2. Press on/off button to turn unit on.
3. Dip electrode into water. Make sure sensor is covered.
4. Wait 1 minute for reading to stabilize.
5. Press hold button.
6. Record number.
7. Press on/off button to turn unit off.

(Directions adapted from instructions included with testor)

Part D Measuring DO

1. Fill Water Sampling Bottle.
2. Add 8 drops of Manganese Sulfate Solution.
3. Add 8 drops of Alkaline Potassium Iodide Azide.
4. Cap and mix.
5. Allow precipitate to settle.
6. Use the 1.0G spoon to add Sulfamic Acid Powder.
7. Cap and mix until reagent and precipitate dissolve.
8. Fill test tube to the 20 ml line.
9. Add 8 drops of Starch Indicator.
10. Fill Titrator with Sodium Thiosulfate.
11. Titrate until blue color just disappears and solution is colorless.
12. Read result in ppm Dissolved Oxygen.
13. Record number.

(Directions adapted from instructions included with DO kit)

Name _____ Science ____ Group # ____ Date ___/___/___

A Water Field Study

Data and Observations

Table 1: Water Temperatures, pH, and Conductivity

Site	Date	Air Temperature (BC)	Water Temperature (BC)	pH
S.U.		Conductivity	DO	
		mg/L		
1.	/	/		
2.	/	/		
3.	/	/		
4.	/	/		
5.	/	/		

Table 2: Other Observations

Site	Date
1.	/ /
2.	/ /
3.	/ /
4.	/ /
5.	/ /

Conclusions

1. What differences did you find? Explain.
2. What similarities did you find? Explain.
3. How did the water quality at the different sites compare?
4. At which site was the water the „worst%? Explain.
5. At which site was the water the „best%? Explain.
6. What ideas for testing water quality did you and your group come up with while doing this activity?