

Grade 7-8

Title- pH Water Testing by Jodi Berry

Objectives- Students will compare and analyze the pH of water samples.

A pH range of 6.0 to 9.0 appears to provide protection for the life of freshwater fish and bottom dwelling invertebrates. PH is a measure of the acidic or basic (alkaline) nature of a solution. The concentration of the hydrogen ion [H⁺] activity in a solution determines the pH. Runoff from agricultural, domestic, and industrial areas may contain iron, aluminum, ammonia, mercury or other elements. The pH of the water will determine the toxic effects, if any, of these substances.

Alignment with MLR:

Science and Technology

B. ECOLOGY

Students will understand how living things depend on one another and on non-living aspects of the environment. *Balance in ecosystems is based on an intricate web of relationships among populations of living organisms and on non-living factors such as water and temperature. Changes in specific populations or conditions affect other parts of the ecosystem. Individual systems continually change in response to human and other factors.*

MIDDLE GRADES 5-8

2. Analyze how the finite resources in an ecosystem limit the types and populations of organisms within it.
5. Describe various mechanisms found in the natural world for transporting living and non-living matter and the results of such movements.

J. INQUIRY AND PROBLEM SOLVING

Students will apply inquiry and problem-solving approaches in science and technology. *Scientific inquiry, problem solving, and the technological method provide insight into and comprehension of the world around us. A variety of tools, including emerging technologies assist, the inquiry processes. Models are used to understand the world.*

MIDDLE GRADES 5-8

Make accurate observations using appropriate tools and units of measure.

1. Design and conduct scientific investigations which include controlled experiments and systematic observations. Collect and analyze data, and draw conclusions fairly.
2. Verify and evaluate scientific investigations and use the results in a purposeful way.

K. SCIENTIFIC REASONING

Students will learn to formulate and justify ideas and to make informed decisions.

This involves framing and supporting arguments, recognizing patterns and relationships, identifying bias and stereotypes, brainstorming alternative explanations and solutions, judging accuracy, analyzing situations, and revising studies to improve their validity.

MIDDLE GRADES 5-8.

6. Support reasoning by using a variety of evidence.
7. Show that proving a hypothesis false is easier than proving it true, and explain why.
8. Construct logical arguments.
9. Apply analogous reasoning.

L. COMMUNICATION

Students will communicate effectively in the applications of science and technology.

Clear and accurate communication employs appropriate symbols and terminology, models, and a variety of media and presentation styles. Communication includes constructing knowledge through reflection, evaluation, refocusing, and critically analyzing information from a variety of sources. Individuals and collaborative groups must communicate effectively

4. Make and use scale drawings, maps, and three-dimensional models to represent real objects, find locations, and describe relationships.

Assessment- Graph displaying collected data and analysis of the data.

Prior Knowledge/Skills-Students will have an understanding of pH levels, and the environmental conditions that result in various pH levels.

Integration- Science and Technology

Modification- NA

Grouping- cooperative group; students will work in pairs or small groups depending upon the number of probes available.

Materials- water samples from studied lake

Tap water

Bottled water

Other various water samples

pH probe and data logger

Student laptops

Strategies: Review with students the definition of pH. Elicit all knowledge on the subject from the class. Students will use the sensor to find the pH levels of water samples. Students will then create and analyze a graph of their data.

Game Plan:

1. Teacher will elicit prior knowledge and engage students in the task ahead. Ask the following questions: What do pH levels indicate? What are the causes of poor pH values? What effect do you think the environment around our lake will have on the pH of this sample? How do you think the sample from our lake will compare to the other samples? Why?
2. Teacher will review the correct procedure for using the pH probe and entering the data into the program
3. Students will generate a hypothesis to answer the question of which water sample will have the poorest pH level.
4. Teacher will distribute water samples to students at their tables or set up at lab stations (make sure samples are labeled)
5. Students will use the pH probe to analyze each sample.
6. The students will create a graph from the collected data (this is computer generated, students did not have to create on their own)
7. Students will analyze the graph to determine which samples had the highest and lowest pH values
8. Students will write a conclusion from their data either proving or disproving their hypothesis. Conclusion should be based on collected data and graph analysis.