

How Healthy Is Our Pond? Data Collection for Scientist Notebook Rubric.

Scientist Notebook				
Science and Engineering Practices	4	3	2	1
Asking Questions and Defining the Problem, Planning and Carrying Out the Investigation	Research is clear, accurate, and nearly error free.	Research is clear and accurate, but contains some errors.	Research is unclear and contains many errors.	Research is not related to the problem.
Using Mathematics	Data table is complete, organized, and labeled. Data are reasonable compared to acceptable measurements or are explained.	Data table is organized, labeled, and almost complete. Data are reasonable compared to acceptable measurements or are explained.	Data table is organized and labeled, but with missing information. Data are explained.	Data table is not organized and labeled. Data are not explained.
Using Models	Drawing of pond is clear, accurate, and nearly error free.	Drawing of pond is clear and accurate, but contains some errors or difficult to interpret information.	Drawing of pond is unclear and contains many errors.	Drawing of pond is not related to the problem.

How Healthy Is Our Pond? Presentation Rubric.

Presentation – How healthy is our pond?				
Science and Engineering Practices	4	3	2	1
Analyzing and Interpreting Data	Most trends and patterns are identified and logically analyzed. Predictions are based on <u>evidence</u> made about the water quality and the impact on the environment.	Many trends and patterns are identified and logically analyzed. Predictions are based on <u>evidence</u> made about the water quality and the impact on the environment.	Some trends and patterns are logically analyzed. Predictions are not based on evidence made about the water quality and the impact on the environment.	Analysis was not completed.
Constructing Explanations	Explanations are logically coherent and are consistent with available <u>evidence</u> .	Explanations are partly coherent and are somewhat consistent with available <u>evidence</u> .	Explanations are not consistent with available <u>evidence</u> .	A summary is incomplete.
Engaging in argument from evidence	Conclusion includes several <u>evidence</u> based recommendations of the water quality, and what was	Conclusion includes some <u>evidence</u> based recommendations of the water quality, and what was learned from	Conclusion includes few <u>evidence</u> based recommendations of the water quality, and what was learned from	No conclusion was included in the report OR shows little effort and reflection.

	learned from the tests. Shows exceptional effort.	the tests. Shows satisfactory effort.	the tests. Shows minimal effort.	
Obtaining, Evaluating, and Communicating Information	Communicates findings clearly and persuasively. Student is completely prepared and has obviously rehearsed. Shows a full understanding of the topic.	Communicates findings clearly and somewhat persuasively. Student seems mostly prepared but might have needed a couple more rehearsals. Shows a good understanding of the topic.	Communicates unclear findings with some errors. The student is somewhat prepared, but it is clear that rehearsal was lacking. Shows a good understanding of parts of the topic.	Student does not seem at all prepared to present. Does not seem to understand the topic very well.

Description of Common Water Tests

Test	Description
Temperature	Temperature is important to water quality. It is measured using a thermometer. Scientists and most of the world other than the United States measure temperature in degrees Celsius. The scale is based on a 100 equal units between the freezing point of pure water (0°C) and the boiling point of pure water (100°C). Temperature affects the amount of dissolved oxygen in water and the rate of photosynthesis in plants.
pH	pH is a measurement of acidity. It is measured on a scale of 0 (pure acid) to 14 (pure alkaline). Healthy pond water is about 7.0 (neutral) and ranges from 6.0 (slightly acid) to 8.0 (slightly alkaline). Extremes in the pH of pond water cause disease, stress, and even death in plant and animal life. Runoff from the surrounding environment whether parking lots or farm fields can change the pH level of a pond. Acid rain is rain that is more acidic than normal because of pollution from factories, cars, and volcanoes. High levels of acid in water results in decreased levels of oxygen and a lack of oxygen in the water means aquatic animals cannot breathe.
Nitrate	Nitrate is a nutrient needed to build protein in plants and animals and acts as fertilizer for algae. Runoff from fertilized grass causes nitrate levels to rise and high levels can lead to accumulation of algae. Decomposition of dead plants and animals release nitrates into the water and thus increase plant growth and decay. Excessive nitrate levels increase decay and promote bacterial decomposition, which also results in decreased amounts of oxygen in the water.
Dissolved Oxygen	Dissolved oxygen is the amount of oxygen dissolved in water and hence available to support aquatic life. It is an indicator of the health of water to sustain an aquatic ecosystem. Typically it is a warm weather concern. Cold water can hold more dissolved oxygen than warm water. Excessive amounts of rotting plants can cause a decrease of oxygen in water.

	<p>Additionally, algae take up oxygen at night, and an algae bloom will reduce the dissolved oxygen in a pond.</p>
Clarity	<p>The clarity of water decreases as the amount of algae and sediment increases. A Secchi disc can be used to measure clarity of water. A Secchi disc is a 20cm diameter black and white plastic disc on a rope that is lowered by hand into the pond until it disappears. The length of the rope from the water surface to the disc when the disc disappears is the Secchi length. By slightly lowering and raising the disc multiple times at the point where the disc disappears, a stable reading is obtained. The Secchi depth is an approximate measurement and is used primarily for its simplicity. A Secchi disc costs approximately \$30 and is available through many science supply companies.</p>