



# LESSON PLANS

## LESSON #9: ALGAL BLOOM RESEARCH

3<sup>RD</sup> > 5<sup>TH</sup>  
GRADE

### LEARNING OUTCOMES

Complete a pre-assessment T/F quiz.

Set -up a 1-2 week long experiment using pond water, fertilizer, laundry soap and vinegar to analyze the algae growth.

Facilitate their own learning by creating a group scientific method cycle chart.

Watch 2 videos about algal blooms.

Correct pre-assessment T/F quiz and write personal reflection.

**TIME REQUIRED FOR LESSON: 2 40min periods and 1-2 15min periods (over the course of 2 weeks)**

### BIG IDEA

Students will understand that human choices greatly affect our natural waterways by observing what chemicals do to phytoplankton and other types of algae.

### BACKGROUND

An algal bloom is a build up of usually microscopic algae growing out of control in a body of water. Algal blooms may occur in fresh or salt water and can grow to be millions of cells per milliliter of water. Algal blooms are often green, but depending on the specific species of algae can also may be other colors such as yellow, red or brown. Some algal blooms are actually caused by Cyanobacteria, which are not actually considered to be algae. Some kinds of algal blooms, such as red tides can also be poisonous which often effects our ability to eat shellfish. Algal blooms are often caused by nutrients such as fertilizer or Nitrogen / Phosphorus run off from farms or cities. Large storms can often flush massive amounts of nutrients into our water ways causing algal blooms to grow out of control. When an algal bloom occurs, the algae use up all the oxygen and cause it to be hypoxic which means that it's low in oxygen. Life can not exist in water without balanced levels of nutrients and oxygen, so when this happens all life in the water dies and it becomes known as a "dead zone".

### ESSENTIAL QUESTIONS

- How do phytoplankton react to the imbalance of nutrients in the water?
- What are the long term effects of our choices and the health of the marine food web?
- What actions can humans take to educate other people about this problem?

## MATERIALS/SOURCES

- 4 or more glass mason jars (these could be any clear glass or plastic jars or cups)
- Pond water (preferably with some algae already in them) Get jars ready 1 week before to settle to build suspense
- T/F quiz & Data Reflection (PDF here)
- Scientific Method reference- [https://upload.wikimedia.org/wikipedia/commons/thumb/5/5c/The\\_Scientific\\_Method\\_as\\_an\\_Ongoing\\_Process.svg/2000px-The\\_Scientific\\_Method\\_as\\_an\\_Ongoing\\_Process.svg.png](https://upload.wikimedia.org/wikipedia/commons/thumb/5/5c/The_Scientific_Method_as_an_Ongoing_Process.svg/2000px-The_Scientific_Method_as_an_Ongoing_Process.svg.png)
- Miracle grow fertilizer, vinegar, laundry detergent with phosphorus
- Measuring cups
- Tape and paper to label jars
- Chart paper and markers
- Videos- <https://www.youtube.com/watch?v=35Jprh1VFug> & <https://www.youtube.com/watch?v=YO3Gg3Yfj84>

## ACTIVITIES

### ENGAGE

Ask students if they have noticed the jars with pond water sitting the window and if they have any guesses about what we might do with them. Give students their T/F quiz as a preview to the information they will be learning. Next, break the class up into groups of 3-4 and give each student a copy of the “The Scientific Method as an Ongoing Process” reference and explain that they will be recording their data using this reference on chart paper.

### DISCUSS/EXPLORE

Introduce the materials for the experiment and have select student measure 1/4 cup of laundry detergent, 1/4 vinegar (for acid rain), and 1/4 cup miracle grow fertilizer. Pour each into a different jar and label each one. The fourth jar is your control (with nothing added). Allow students some time to plan out their scientific method posters and add what information they can so far. Give students short amounts of time during the length of experiment to update and add information. Hang posters in a visible place throughout the duration of experiment so students can see how and what information other groups are gathering.

### SHARE/EVALUATE/REFLECT

When there has been adequate time for the experiment to show results, bring the class together to watch the 2 videos (7 minutes) and give groups time to finalize their scientific posters. Have groups present their work to the class by pinpointing a specific area you think they persevered through. Lastly, have them fix their T/F quiz and write short reflection.

## EXTENSIONS

- Take a walking field trip to collect water samples or have students bring in samples from different places and do lots of experiments with the different samples.
- Observe algae under microscopes
- Make a news broadcast to educate others about Red Tides.
- Research acid rain- [https://www3.epa.gov/acidrain/education/site\\_students/whatcauses.html](https://www3.epa.gov/acidrain/education/site_students/whatcauses.html)

## CONNECTIONS TO STANDARDS

### 3rd grade:

- **NGSS. 3-PS2-2** Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- **CCSS.ELA-LITERACY.W.3.8** Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- **CCSS.ELA-LITERACY.SL.3.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

### 4th grade:

- **NGSS. 4-PS3-2** Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- **CCSS.ELA-LITERACY.W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
- **CCSS.ELA-LITERACY.SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

### 5th grade:

- **NGSS. 5-PS1-3** Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- **CCSS.ELA-LITERACY.W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
- **CCSS.ELA-LITERACY.SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

