

First Grade Lesson Plan - Exploring Aquaponics

Suggested time: 45 minutes

Lesson Snapshot:

In this lesson, students will demonstrate proficiency illustrating how systems have parts or components that work together to accomplish a goal. Students will work collaboratively to develop a functional aquaponics system, designed to create a sustainable system for both a plant and a fish to live and grow.

A focus on innovative agricultural techniques is embedded into this lesson, providing natural opportunities and exploration for the disciplinary core idea of solving a problem through engineering.

Discussions centered around the key concept that aquaponics has great potential in advancing current farming techniques are also embedded within this lesson.

Background Information:

Aquaponics describes the production of fish and plants using water. Growing plants without soil is known as hydroponics. Many foods can be produced using aquaponic techniques such as lettuce, beans, broccoli, cucumbers, peas, herbs, strawberries, and tomatoes. The goal of aquaponics farming is to improve efficiency and sustainability of agriculture.

For this lesson, aquaponics is a system with three main parts: plants, fish, and water. The plants submerged into the water provide oxygen to the fish to breathe through its gills. The fish then produces waste, that is then in the water. This waste provides nutrients to the plants roots to help the plant grow.

Fun Fact: The Walt Disney Resort uses hydroponic and aquaponic techniques as part of Epcot's "Living with the Land" attraction. The produce from this greenhouse is served in many restaurants on the Disney property. Food this is not used in the restaurants is used to feed the animals at Disney's Animal Kingdom!

Science, Technology & Engineering, and Environment Literacy & Sustainability (STEELS)

Standard(s):

3.5.K-2.Z: Illustrate how systems have parts or components that work together to accomplish a goal.

Connections to Other Standard(s):

CC.1.5.K-2.A: Participate in collaborative conversations with peers and adults in small and larger groups.

Objective(s):

Students will illustrate the three components of a system and how they work together for aquaponics.

Materials:

- *The World's Best Class Plant* by Audrey Vernick
- Aquaponic planter and fish habitat
- Betta fish
- Student observation worksheet used to test PH levels
- Student worksheet to draw and label aquaponics system (at the end of this file)
- Betta fish food
- Plant (mint, basil, spider plant, etc....)
- Betta water conditioner
- PH test kit (3 test strips per student)
- Water samples with varied PH levels from (basic to acidic)

- Crayons
- Pipettes (1 per student)

Advanced Preparation:

Prepare water samples using PH Up and PH Down to adjust PH level in advance for student use throughout the lesson.

Suggested Implementation:

Part 1: Shared Read Aloud

Read *The World's Best Class Plant* by Audrey Vernick.

Explore Students' Background Knowledge:

“What are the basic needs of plants?” (water, air, sunlight)

“What do you need to survive?” (food, water, air, and shelter)

“Do humans and fish have the same basic needs?”

Discuss student responses, guiding students to understand that the basic needs are the same. Discuss aquaponics.

Part 2: Investigation(s)

Model testing water using the PH test strips and pipettes.

Students will test three types of water and record results and observations on their PH worksheet.

Discuss findings.

Part 3: Design

Students will use the worksheet provided to design and label aquaponics system to meet the needs of the fish and the plant.

Part 4: Summation

Review/discuss key components needed for an aquaponics system.

Review/discuss the basic needs of plants.

Review/discuss the basic needs of fish.

Review/discuss the role of the fish and plant in this system.

Set up class aquaponics system.

Extension Activities:

- If possible, provide time each day for students to feed the fish and observe the aquaponic system. Provide opportunities to observe, gather, record, and interpret data focusing on the system's water quality, water temperature, fish behavior, and plant growth. Make necessary adjustments to maintain a balanced system.
- Use plants grown in the aquaponics system to make a simple class recipe.
- Conduct research on the pros and cons of aquaponics for food production to develop a persuasive writing piece or informational writing.
- Take a virtual trip to an aquaponics farm.

PBS Resources and Links:

[Farming the Aquaponics Way](#) (video short: 6:39 minutes)

[Miami Science Barge](#) (video short: 8:58)

[Feed the Fidgets Game](#) . [DESIGN SQUAD GLOBAL](#) | [PBS KIDS](#) (interactive game)

Connections to Other Standard(s):

CC.1.4.1-2.U: With guidance and support, use a variety of digital tools to produce and publish writing including in collaboration with peers.

CC.1.4.1-2.V: Participate in individual or shared research and writing projects.

CC.1.4.K-1.W: With guidance and support, recall information from experiences or gather information from provided sources to answer a question.

Resources/Acknowledgments:

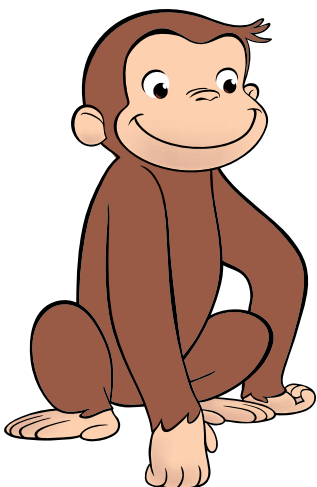
[STEELS Hub - SAS](#)

[National Agricultural Library](#)

[US Department of Agriculture](#)

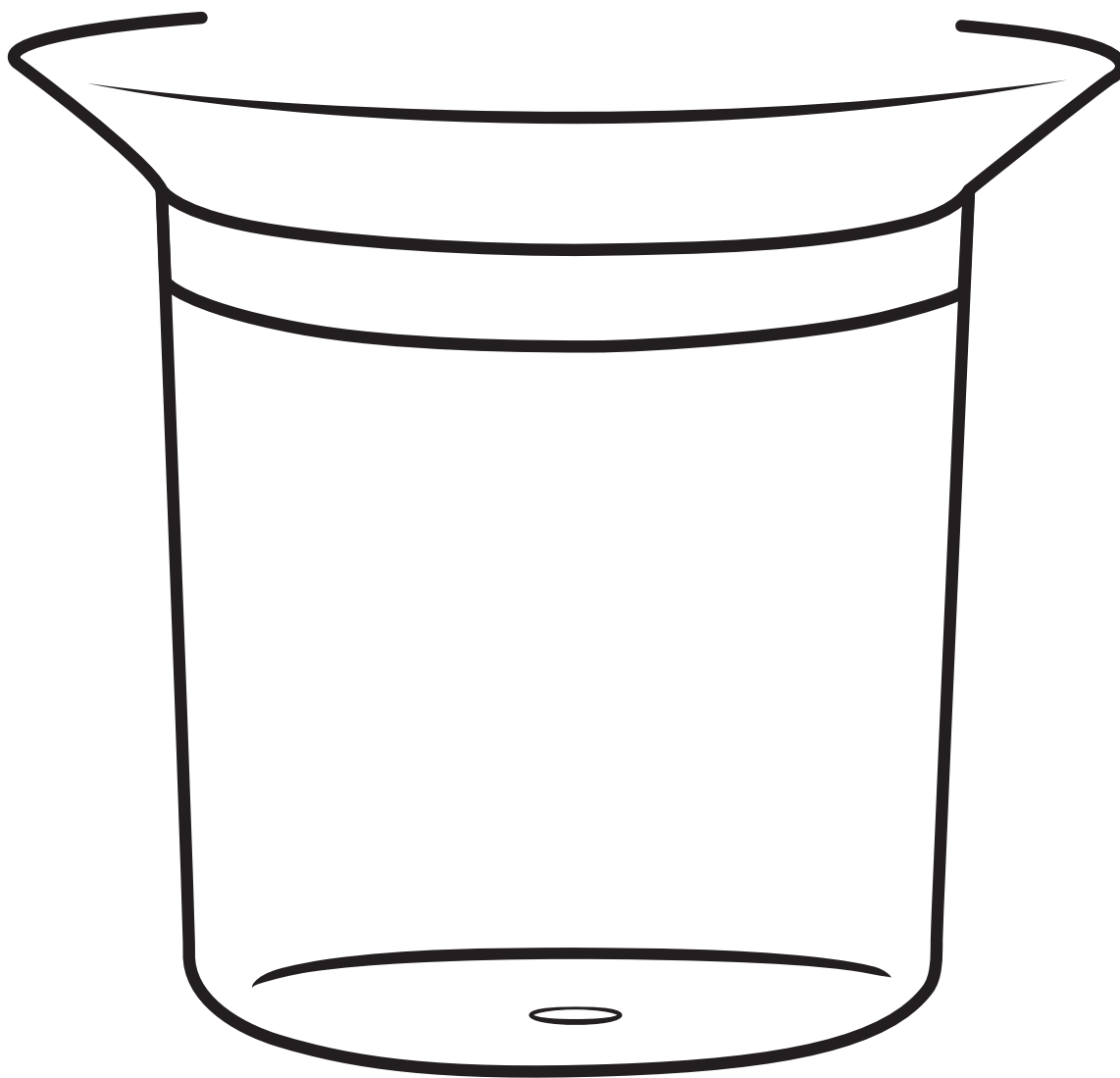
[National Agriculture in the Classroom](#)

[Epcot Living with the Land- The Happiest Garden on Earth](#)



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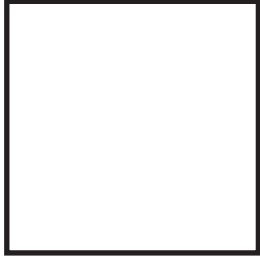


The 3 Components of Aquaponics

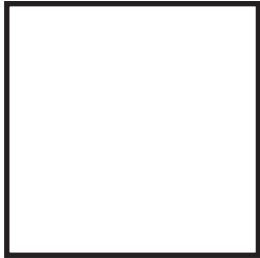
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Test Strip #1



Test Strip #2



Test Strip #3

