Hydroponics Gr 6-8 Lesson Plan

Date:

Grade:

Lesson 1: DIY Hydroponic System Engineering

Objective:
Students will design and build simple hydroponic systems using recycled materials or kits and apply engineering design thinking.

Materials Needed:

- Plastic bottles, PVC pipes, tubing, or STEM kits (e.g., STEM101 Hydroponics Project Kit)
- Scissors, tape, glue, markers
- Seeds and hydroponic nutrient solution
- Design Logbook printables
- Water and light sources

Duration:
3 weeks; 1-2 hour sessions for build, plus ongoing observations

Hook/Intro: Imagine building your very own garden without any soil! In this project, you're the engineers creating a hydroponic system from scratch. Let's design, build, and test a living system that delivers water and nutrients directly to plants–creating a futuristic way to grow food.

Procedure:

1. Session 1: Review different hydroponic system types (wick, NFT, deep water culture). Discuss design principles.
2. Session 2: Students sketch their system ideas in Design Logbook, listing needed materials.
3. Session 3: Build systems in groups; record build steps and notes in Logbook.
4. Session 4-6: Seed planting and system operation; monitor water levels and plant growth, record observations.
5. Final Session: Groups present systems with findings and build process reflections.

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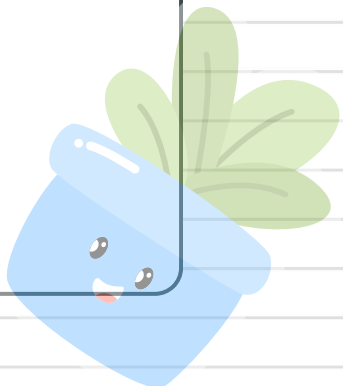
Discussion/Reflection:

- What challenges did the design or build process have?
- How did you solve or improve your system?
- Which design elements worked best and why?

Assessment:

- Completeness and clarity of Logbooks
- Functionality of constructed systems
- Quality and insightfulness of presentations

Notes:



Printable: Hydroponic System Design Logbook

Date	Design Sketch/Descripti	Construction Materials Used	Adjustments Made	Plant Growth Observations	Issues Encountered
Week 1					
Week 2					
Week 3					

Date	Design Sketch/Descripti	Construction Materials Used	Adjustments Made	Plant Growth Observations	Issues Encountered
Week 1					
Week 2					
Week 3					

Date	Design Sketch/Descripti	Construction Materials Used	Adjustments Made	Plant Growth Observations	Issues Encountered
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Week 1					
Week 2					
Week 3					

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Lesson 2: Nutrient Chemistry & Data Science

Objective:
Investigate nutrient effects on plant health, learn to maintain solution pH, and visualize data scientifically.

Materials Needed:

- Nutrient concentrate kits (Lettuce Grow, NY Sun Works, or similar)
- pH test strips or meter
- Measuring syringes/pipettes
- Hydroponic systems for testing
- Nutrient Calculator spreadsheet or worksheet
- Graph paper or digital tools

Duration:
2-3 weeks; multiple science lab sessions

Hook/Intro:
Behind every healthy plant is a perfect recipe of nutrients. Today, we're mixing solutions and experimenting to find the right balance that makes plants thrive. Using chemistry and data, you'll uncover how science flavors the future of farming!

Procedure:

1. Session 1: Teach nutrients essential to plants' health; demonstrate pH importance.
2. Sessions 2-3: Groups prepare nutrient solutions with varied concentrations; test pH, adjust as needed.
3. Sessions 4-5: Apply solutions to plants; observe and record leaf color, texture, and growth.
4. Session 6: Enter data into Nutrient Calculator; plot graphs relating nutrient concentration to plant health.
5. Final discussion: Interpreting graphs–finding optimal nutrient ratios.

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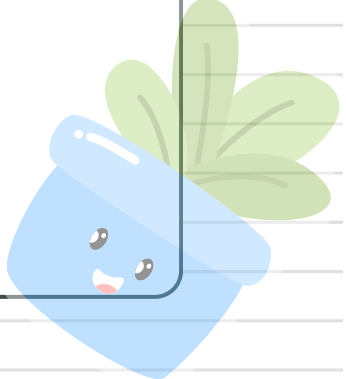
Discussion Prompts:

Assessment:

- Accuracy in preparation and pH maintenance
- Quality and completeness of data and graphs
- Analytical skills demonstrated in discussion

Notes:



Lesson 2 Nutrient Calculator Worksheet

Sample ID	Nutrient Concentration (%)	pH Level	Plant Status	Comments/Observations
1				
2				
3				

Sample ID	Nutrient Concentration (%)	pH Level	Plant Status	Comments/Observations
1				
2				
3				

Sample ID	Nutrient Concentration (%)	pH Level	Plant Status	Comments/Observations
1				
2				
3				

Sample ID	Nutrient Concentration (%)	pH Level	Plant Status	Comments/Observations
1				
2				
3				

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Lesson 3: Data Visualization for Plant Growth

Objective:
Teach students how to collect environmental data and growth measurements, then analyze and visually communicate trends using software or paper-based charts.

Materials Needed:

- Environmental sensors (or manual tools for light, temperature, moisture)
- Measurement journals
- Google Sheets or Excel (or graph paper)
- Data visualization guidance document

Duration:
2-week ongoing data collection with analysis sessions

Hook/Intro:
Numbers tell stories, and today you'll become data detectives. As you collect light, temperature, humidity, and growth measurements, you'll learn how to turn this data into charts and graphs that reveal secrets about what plants need to flourish.

Procedure:

1. Introduce data collection protocols, emphasizing accuracy and consistency.
2. Set schedules for daily or weekly measurements.
3. Record data in journals.
4. Transfer data to spreadsheet or graph paper.
5. Guide students through creating charts (line/bar/scatter plots).

Presentation session: students explain what their charts reveal about relationships between variables and plant growth.

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Discussion Prompts:

Assessment:

- Completeness of journals
- Accuracy of graphs/charts
- Ability to interpret data findings in presentations

Notes: