

COURSE: Middle School

UNIT: Environmental/Agricultural Concepts

EXERCISE: Hydroponics

TIME FRAME: 1-2Hours



PREPARATION: *Summary of “to do’s” that the teacher should understand and prepare before bringing this lesson to the classroom.*

Teachers will need to ensure that the proper supplies are available for students to build their solutions.

Materials:

- Hydroponics kit (purchase from Stem 101)

Tools:

- Outlet to plug in UV light



SAFETY: *Summary of safety strategies in the lesson.*

Please use this space to describe safety procedures or highlights for this lesson.

S1

DESIRED RESULTS:

ESTABLISHED GOALS:

Problem Solving Techniques and Applications Standards:

Teachers should use the STEM Academy Standards Correlation System available in the STEM Connections area of a unit to extract specific standards and insert these standards here.

TRANSFER:

Students will be able to independently use their learning to...

- Understand hydroponic growing techniques

MEANING:

UNDERSTANDINGS

Students will understand that...

- The process and usefulness of experimentation
- Different growth techniques

ESSENTIAL QUESTIONS

Students will keep considering...

- How technology keeps changing the way farming is done.
- How is a given product or system properly maintained?
- How is following directions key to ensuring a healthy growing environment

ACQUISITION OF KNOWLEDGE AND SKILL:

Students will know...

- What the results of an experiment mean
- Knowledge versus wisdom
- Problem solving approaches
- Information gathering
- Data collection
- The processes of plants in our natural world
- The effect hypothesizing has on the knowledge you gain from an experiment

Students will be skilled at...

- Growing vegetation
- Proper care of a hydroponics system
- Evaluating the solution
- Presenting results
- Collecting data in a scientific manner

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S2 EVIDENCE:	
EVALUATIVE CRITERIA:	ASSESSMENT EVIDENCE:
<ul style="list-style-type: none"> Graded Rubric 	<p><i>Performance Task(s):</i></p> <p>Hydroponics Students will need to change water and add nutrients weekly. Also, it is important to collect data. The amount of water and nutrients added along with the weekly growth of the vegetation.</p>
<ul style="list-style-type: none"> Thoughtful, clear, thorough Graded on accuracy, multiple choice questions Completed on time 	<p><i>Other Evidence:</i></p> <ul style="list-style-type: none"> Online test Self-reflection

S3 LEARNING PLAN: *Summary of Key Learning Events and Instruction*

Pre-Assessment:

Testing and Evaluating Pre-Test

Outline:

Learning Activity – Bubbling Plants

1. Introduce:

- Students listen as you give an overview of hydroponics
- Students will build their hydroponics system

2. Test:

- Over the course of 6-8 weeks students will collect data on their hydroponics system, the growth of the vegetation as well as the amount of water and nutrients they add weekly.

3. Communicate Results:

- Have students report their data to you
- Plot the data onto a graph (by hand or on computer if you have access to a projector)
- Discuss results with students

Progress Monitoring:

The teacher will need to monitor student progress. Teachers should move throughout the classroom checking to see that students are keeping up with the lesson. After lecturing, the teacher should use students to help move students forward during the activity by sharing their expertise.

DIFFERENTIATION: *Summary of Key Differentiation Techniques*

Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.

The ASCD Study Guide for Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe

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Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe
ISBN-13: 978-1416602842
ISBN-10: 1416602844

Differentiating Reading Instruction
by Laura Robb.
ISBN13: 9780545022989

A Teacher's Guide to Differentiating Instruction
The Center for Comprehensive School Reform and Improvement

CAREER CONNECTIONS: *Summary of Career Opportunities Associated with this Lesson*

Please use this space to insert careers that might be connected to this lesson. This section will need continuous updating as new careers and emerging technologies change the opportunities available in the workforce.

Good sources for career connections:

Occupational Outlook Handbook
<http://www.bls.gov/ooh>

The National Career Clusters® Framework
<http://www.careertech.org/career-clusters>

KEYWORDS: *Please Insert Keywords from this Lesson with their Definitions*

Please use this space to insert keywords and their definitions
Use resources like dictionary.com to find definitions to your keywords