



Name: \_\_\_\_\_

## **STEM Challenge: Growing Plants Hydroponically**

**Time: 1.5 hours**

In the near future, soil-based agriculture is experiencing some major difficulties with overpopulated areas and a decrease in land availability. In addition, rapid urbanization, industrialization, and climate change have created the possibility that feeding an entire population from a soil field system will become obsolete and our planet is facing a crisis. When you accepted the position of a NASA plant physiologist, you never imagined that you would be farming for the future. Using your knowledge of botany and working with a team of scientists, can you create a hydroponic system that will grow edible produce and be aesthetically pleasing? This needs to be done in order to appeal to humankind that this is our best chance for the future of agriculture!

### **Task:**

Working in assigned teams, can you design and make an inexpensive, compact, portable, hydroponic system that can conveniently be used to grow lettuce? You must make your hydroponic system aesthetically pleasing since it will be highly visible in promoting a soil-free method of growing in farming for the future.

### **Criteria and Constraints:**

- \*Decrease the risk of water damage.
- \*Plastic bottle must be cut seven inches from the bottom.
- \*Wick must be near 8 inches.
- \*Well-constructed.
- \*Aesthetically pleasing.
- \*Use materials provided to create and construct a hydroponic system.
- \*Work in a team setting for design and maintain documentation of design & problem-solving process.
- \*Maintain an observation log for a two week period.



**Don't forget to have fun and be creative!**

### **Materials:**

2L empty plastic soda bottle  
Choice of wick material  
Hammer  
Nails  
Scissors  
Anchor Mix  
Hydroponic Nutrients



### **System Components**

The hydroponics system will consist of:

1. Top container
2. Bottom Reservoir
3. Wick
4. Growing Medium (Anchor Mix)
5. Nutrient Solution

<http://www.instructables.com/id/Recycled-Bottle-Self-Watering-Hydroponics/step2/About-the-System-/>

### **Preparing the Anchor Mix**

Create a mixture of 50 to 75% coconut fiber and 25% perlite.

<http://www.instructables.com/id/Recycled-Bottle-Self-Watering-Hydroponics/step5/Prepare-the-Soil/>



Formative Assessment: STEM Challenge: Growing Plants Hydroponically  
Think-Write-Pair-Share

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Name \_\_\_\_\_

Date \_\_\_\_\_

## Evaluate

Why is finding alternatives to growing food using traditional methods essential?

### Think

Why is designing and building models a very important process in goal setting? List three reasons why to support your thinking.

1.

2.

3.

### Write

Write your answers or ideas about how useful the design process is to solve problems. What were are some possible solutions you and your team came up with for this challenge?

How did you ensure that all the criteria and constraints of this task were met?

**Pair**

Discuss your ideas and thoughts with a partner. Check any ideas or thoughts that your partner also wrote down. Write down ideas your partner had that you did not.

1.

2.

3.

**Share**

Review all of your ideas and circle the one you think is most important. One of you will share this idea with the whole group. As you listen to the ideas of others, write down three you liked.

1.

2.

3.

Summative Assessment: STEM Challenge: Growing Plants Hydroponically

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Name

Date

Directions: Write complete responses for the questions below.

1. What is hydroponics?
2. Why are designing rough sketches of all good ideas important? What criteria did you use to choose the best design to construct?
3. Why did you believe your model would be successful? What were the deciding factors in determining whether your model was the best hydroponic system for this challenge?
4. Why is feedback necessary when reaching a conclusion?
5. How did the design and building of a hydroponic system relate to real-world applications?