

## Define the Problem

1. Read the “What is Sustainability?” article. As you do, look for information answering: What is sustainable agriculture? How can it be achieved? Record notes below:

2. Visit <https://wwf.to/3DU9SDz> and look for details that help you understand how traditional farming can negatively impact the environment. Record notes below:

3. The United Nations has developed 17 Sustainable Development Goals that are designed to be a “blueprint (or plan) to achieve a better and more sustainable future for all.”

Visit <https://sdgs.un.org/goals> and briefly review the goals. Which goals may be threatened by farming’s negative effects?

### **Perform Background Research**

1. You just watched a video about Re-Nuble, which is one existing solution for sustainable agriculture. Visit [www.re-nuble.com](http://www.re-nuble.com) to learn more about this organization and its agricultural innovation.

Below, further explain the problem that Re-Nuble is trying to solve and how it tries to solve this problem:

2. What other organizations or products are trying to solve this problem in a similar way? Perform your own internet research and try to find at least two other similar solutions. Explain their solutions briefly below:

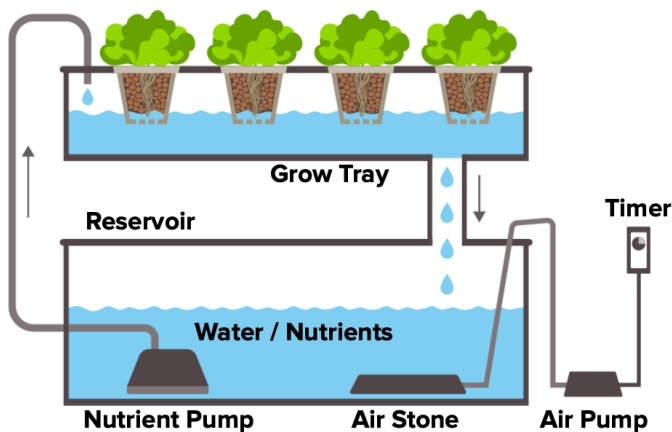
### Ideate and Evaluate

1. Read & Jot: Read the “Hydroponic Systems” article and use what you learn to make sense of the infographic below. Then in the space provided, summarize how hydroponic farming works.

2. Discuss & Jot: Think about the environmental impacts of traditional agriculture, and how hydroponic farming may make a difference. Which Sustainability Goal(s) could hydroponic farming help with?

3. Discuss & Jot: Who in the world could benefit from hydroponic farming? Why?

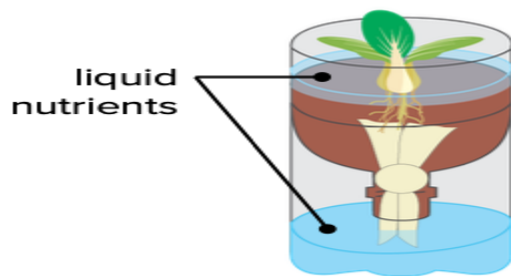
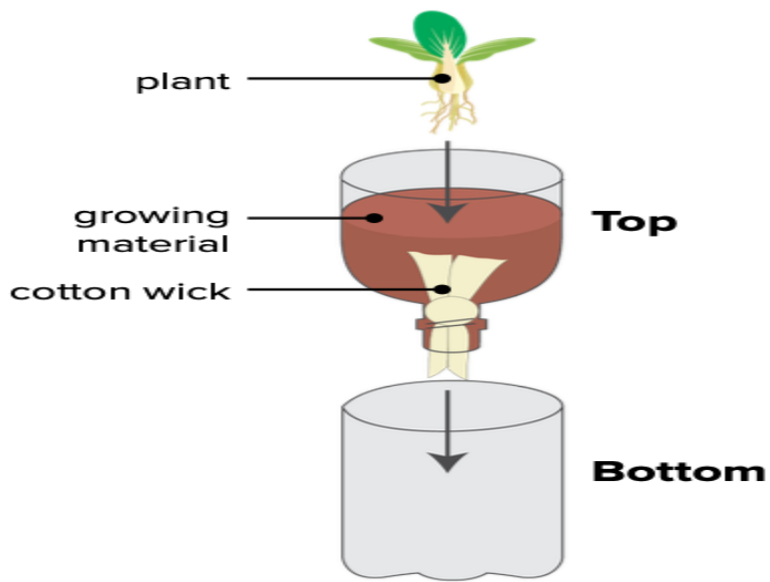
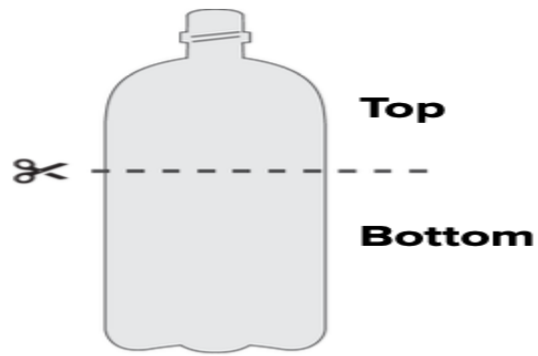
4. Discuss & Jot: In what ways could individual people or families use hydroponic principles to grow their own food? To make this possible, could you adapt a solution that already exists? Or could you engineer a brand-new solution?



## **Design and Build**

### **Procedure**

1. Use the permanent marker to draw a line around the 2-liter bottle just under where the cylinder starts to curve towards the cap.
2. Use your scissors or utility knife to cut along the line, creating two pieces.
3. Pull the two pieces of cotton through the spout. Inside the top part, tie the two pieces into a large knot that keeps it from falling through the hole when you flip it upside down. This will serve as the wick that brings water to the roots of your plant.
4. Flip the top upside down and put it inside the bottom part of the bottle. The top will be where you grow your plant, and the bottom will be where you store your water.
5. Fill the top portion with hydroponic growing material. Make sure that as you fill it, your wick is pulled about  $\frac{2}{3}$  of the way up into the medium.
6. Put on your gloves and pour the water into the second container. As your teacher comes around with the liquid nutrients, add the required amount to the water.
7. Place your plant into the growing medium with the roots close to the wick. Be gentle! You don't want to damage your roots.
8. Pour your prepared nutrient water over the growing medium until your reservoir at the bottom is  $\frac{1}{2}$  to  $\frac{2}{3}$  full. Make sure it doesn't reach the spout of the upside-down bottle!
9. Place your plant near a sunny window and wait for it to grow! Check the water level in your reservoir weekly and adjust as needed.



**Innovate and Reiterate**

In the space below, design one way that an individual person or family could implement hydroponic farming principles in your community on a larger scale. Your idea may be an improvement to an existing product or method, or it may be an entirely new idea. Be sure to label your design as you illustrate your solution as clearly as possible.

A large, empty rectangular box with a thin black border, intended for a student to draw or write a design for implementing hydroponic farming on a larger scale.