

# Upcycled garden

## Introduction

Food waste is a significant problem and contributes to global warming around the world. With this in mind, it's important to make the most out of your produce. Here are some instructions for growing some of your favorite vegetables by upcycling vegetable cuttings and plastic bottles.

## Materials

- Scrap vegetable(s); options include:
  - Green onion (white part with roots attached)
  - Basil, cilantro, or mint leaf with 2–3 in. (5–7 cm) of stem
  - Celery, lettuce, cabbage, or bok choy stump
- Glass cup or bowl big enough to contain your vegetable cutting
- Toothpicks
- An empty 16 oz water bottle or 2 liter soda bottle depending on the size of your vegetable (herbs, small lettuces, and baby bok choy can be grown in a 16 oz water bottle; larger lettuces, celery, and bok choy should be grown in a 2 liter bottle)
- Scissors
- Hammer and nail
- Hole punch (optional for hanging planter)
- Yarn, string, or ribbon (optional for hanging planter)
- Masking tape (optional)
- Craft paint (optional)
- Paint brush (optional)
- Potting soil (see the second discussion question for why you should not use dirt)

## Activity instructions

### Initiating growth of your vegetable

1. Add several inches (5–7 cm) of water to your glass or bowl.  
  
**Important:** If using tap water, let sit out overnight to allow any chlorine in the water to evaporate.
2. Place the vegetable cutting so that the bottom of it is completely submerged in water but not touching the bottom of the glass or bowl. For larger vegetables, pierce the vegetable cutting horizontally with a toothpick on 3–4 sides in order to suspend the vegetable in the water
3. Place your glass or bowl in direct sunlight for approximately 1 week. During this time you should observe new leaf and/or root growth. When the leaves/roots are a few inches (5–7 cm) in length, it is time to transfer your vegetable to soil.



## Making your upcycled planter

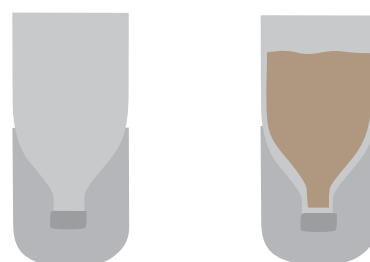
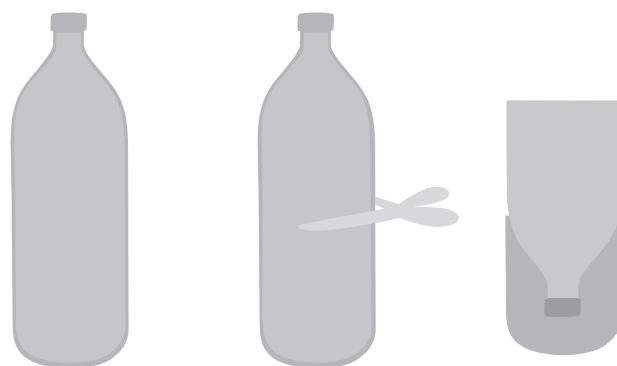
1. Cut your water bottle in half with scissors.

**Optional:** To make a hanging planter, punch holes in the top half of the bottle (2–3 cm from the cut portion) on opposite sides and thread a piece of string, yarn, or ribbon of the desired length through both holes. Tie the ends together.

2. Remove the cap. Place a nail in the center of the cap and hit it with the hammer to create a hole in the cap. Put the cap back on the bottle.

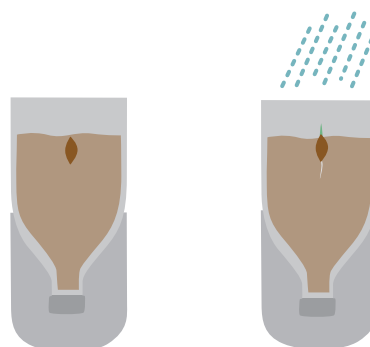
**Optional:** Decorate your planter by first wrapping masking tape around the top half of the water bottle approximately  $\frac{1}{4}$  of the way below the cut edge, then painting the section of the bottle from the tape to the top of the bottle (including the cap if desired). Allow paint to dry.

3. Flip the top half of the bottle upside down and fill  $\frac{3}{4}$  of the way with potting soil (up to the line of paint if you painted it).
4. Place the top half of the bottle (cap side down) into the bottom half of the bottle so that it stands on its own.



## Transferring your vegetable to soil

1. Create a 1–2 in. (3–5 cm) depression in the top of your soil to accommodate the roots of your vegetable.
2. Place the vegetable in the soil with the roots facing downward.
3. Add additional soil to cover the roots and pat down until the plant can stand on its own.
4. Add water until you see it drip through the cap into the bottom reservoir.
5. Water regularly and watch your vegetable grow. Remember to keep in an area with good sunlight.



## The science behind the activity

Plants are an important source of nutrients and energy for humans and animals. Ensuring our communities have an adequate food supply is a constant challenge for farmers around the world. In order to work together to meet the global demand for produce, farmers need to evaluate the available resources before determining which crops to raise in their region. Scientists can assist farmers by helping them test their soil composition to determine available nutrients and ensure their crops are free of harmful bacteria. Additionally, scientists can help farmers reduce the use of pesticides, decrease water needs, and increase crop yield and quality through genetic engineering.

### Discussion questions

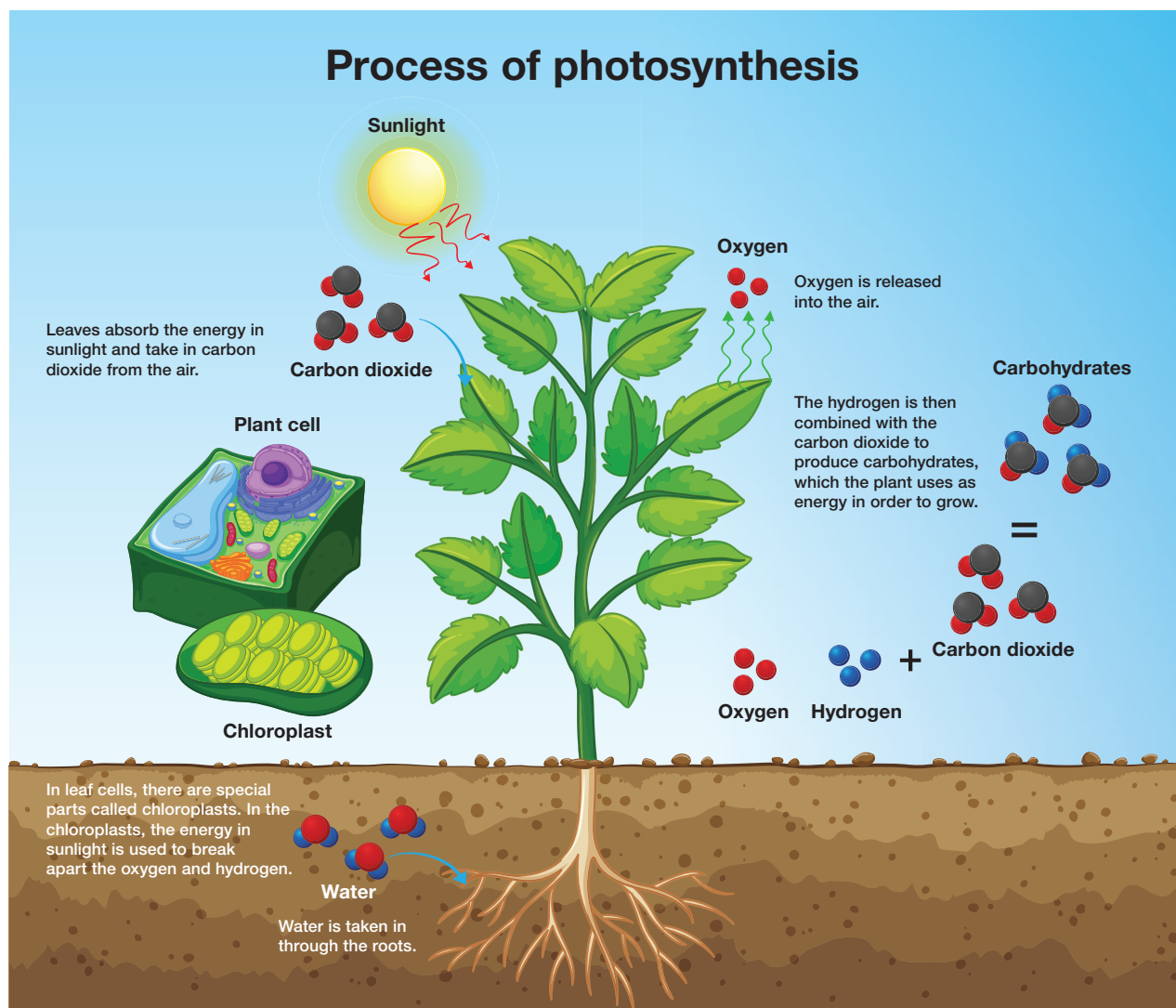
#### How is it possible for a new vegetable to grow from just a cutting?

Plants are living things that continue to grow roots and sprout stems with only the presence of sunlight and water.

They can do this even if they have been removed from soil or separated from the main part of the plant they came from. Plants can grow in water for a short while but will eventually need soil to get the proper nutrients and continue growing into a larger plant.

#### Why is it important to use potting soil?

Just like a garden in the ground, soil plays a vital role in the survival and growth of your potted vegetables. For plants to survive in a container, the roots must have access to air and water. This means that your potting soil must be porous enough to allow drainage of excess water so that air can flow through the soil. Potting soil is generally composed of three ingredients: peat moss (the dense dirt base), pine bark (which creates space and allows for airflow), and perlite or vermiculite (fluffy, volcanic materials that make the soil lighter). It also contains minerals that plants need to grow.





# Careers in biology

## Personality traits that make a good biologist

- Someone who is fascinated by living things, like plants, animals, and people
- Someone who is observant and curious about the world around them
- Someone who likes learning and using knowledge to solve problems
- Someone who seeks to understand how things work

## Careers as a biologist

- **Cell/molecular biologist**—studies cells to learn how they work and interact with other living organisms; some cell biologists work in the medical field and use their knowledge to develop treatments for disease
- **Microbiologist**—studies microorganisms, like bacteria, to understand how they help or hurt other living things, and how they can be
- **Bioinformatician**—uses technology to interpret data from biology experiments

## Careers with an education in biology

- **Technical writer**—communicates about biological or experimental processes
- **Sales person**—uses knowledge of biology to help customers identify the right products to make their experiments successful
- **Marketing/product manager**—uses understanding of biological experiments to identify end users and help them realize their need for a particular product

Biology happens all around us and in every aspect of the way we live. It's occurring from the time you eat breakfast and your saliva and stomach start breaking down the food to the minute you lay your head on your pillow at night and begin to have dreams. Have you wondered how your muscles work? How a caterpillar becomes a butterfly? How a flower knows to open up just as the sun hits its petals? The answers to all of these questions and more can be found through biology.

People who study and work in biology influence our lives and society and contribute to moving discovery forward.



# Scavenger hunt

Find the following items around your house so that you can create an upcycled garden

- ☐ Scrap vegetable(s)
- ☐ Glass cup or bowl
- ☐ Toothpicks
- ☐ An empty 16 oz water bottle or 2 liter soda bottle
- ☐ Scissors
- ☐ Hammer and nail
- ☐ Hole punch (optional)
- ☐ Yarn, string, or ribbon (optional)
- ☐ Masking tape (optional)
- ☐ Craft paint (optional)
- ☐ Paint brush (optional)
- ☐ Potting soil

Find out more at [thermofisher.com/csr](https://thermofisher.com/csr)

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