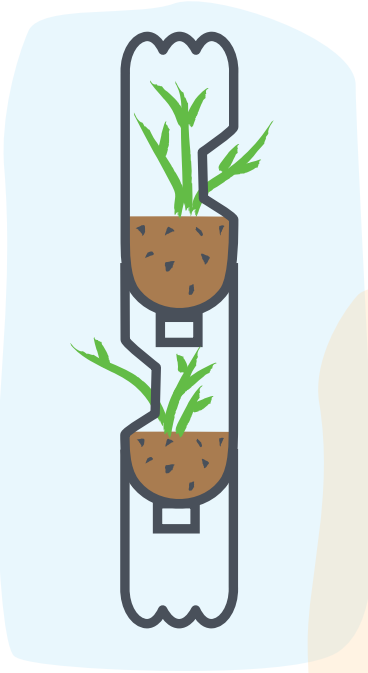
GROW INDOORS

INTRODUCTION

As urban populations grow, indoor gardening has become very popular around the world. Less space outside means less space to grow fresh food. Indoor planting can be easily done and has enormous benefits. It can provide year round food availability, requires less water than outdoor gardening, and minimizes the risk of fertilizers entering our environment. It also requires very little resources. This means people can grow food indoors at low cost!

Plastic drink bottles can be recycled and reused in many ways. In this activity, you will build an indoor garden using plastic drink bottles. You will enforce the concepts of reusing and recycling. You will also learn more about plants and from where our food comes.



Activity Components

- Introduction
- Activity Outline
- Student Outline

Goals

- Strengthen engineering and design skills
- Reinforce concepts of recycling and sustainability

Materials

- Plastic bottles
- Potting soil
- Seeds
- Water
- Scissors
- Tape
- String

GROW INDOORS - ACTIVITY OUTLINE

This experiment requires students to reuse plastic bottles. In the days and weeks leading up to this activity, ask your class to collect them from family or friends - then clean and bring them to school. Any size will work, but it might be easier with one liter or two liter soda bottles.

While any seed will work, white beans sprout more easily and quickly. Dry white beans are usually sold in large bags in grocery stores. It will be up to your students to design the planters and watering tool. Allow them to choose what materials they will need to construct their designs out of the materials you provide them. There are some building requirements. Note: bottles will need to be modified in order to meet the design requirements. Younger students may need assistance with cutting plastic.

YOU WILL NEED TO BUILD THE FOLLOWING:

One hanging planter

This can be made by punching holes in the side of the planter and running a string through it.

One horizontal planter

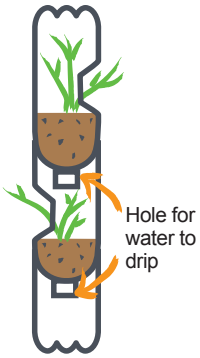
Students will need to design a planter that utilizes a plastic bottle laying on its side, while resting on a surface.

One vertical planter

Students will need to design a planter that utilizes an upright plastic bottle, while resting on a surface.

One planter that holds more than one plant

Students can experiment with stacking one bottle on top of another or creating a horizontal chain on an incline. The goal is to be able to water multiple plants by pouring water over just one.



One "watering can"

A successful watering can will allow water to pour slowly over the plant. If the water comes out too fast, it can cause divots in the soil.

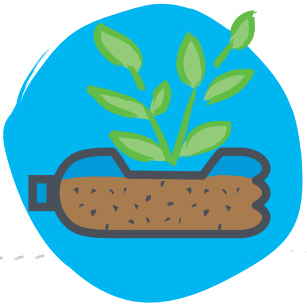
Note: *Each one of these items can be made using as many plastic bottles as needed.*

Remind your students that their planters are homes in which the seeds will grow. Don't forget plants need air, sunlight, and water. Keep in mind, plants that are not aquatic (live in water their whole lives) don't really like their roots sitting in water. Like us, roots need to breathe. Drainage is important to your plant. Encourage your students to think of some way extra water can escape the planters. We don't want roots sitting in water after you hydrate your plants. Ask them to also think about where they want the extra water to go. Will it run onto the floor or could they design a way to catch extra water?

Bonus points for thinking of a way to recycle the unused water for their gardens!

Once finished, your students can take their indoor garden planters home or their planters can add a vibrant natural decor to your classroom! Ask your students to use the accompanying worksheet to reflect on the strengths and weaknesses of their designs. Identifying possible improvements will help students strengthen their engineering skills.

GROW INDOORS
Learning Standards



GROW INDOORS - LEVEL 1 - GRADES K-2

NEXT GENERATION SCIENCE STANDARDS & TIE-INS

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. Use this activity as part of a larger dialogue on ways to reduce negative human impact on the environment.

2-LS2-1 Use this activity to help plan and conduct an investigation to determine if plants need sunlight and water to grow.

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

GROW INDOORS - LEVEL 2 - GRADES 3-5

NEXT GENERATION SCIENCE STANDARDS & TIE-INS

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

5-LS1-1 Use this activity to support an argument that plants get the materials they need for growth chiefly from air and water.

GROW INDOORS - LEVEL 3 - GRADES 6-8

NEXT GENERATION SCIENCE STANDARDS & TIE-INS

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Use this, and other activities, that "include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact." (Nextgenscience.org)

GROW INDOORS - LEVEL 4 - GRADES 9-12

NEXT GENERATION SCIENCE STANDARDS & TIE-INS

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. Use this activity as part of a larger dialogue on reducing negative human impacts through local efforts.

GROW INDOORS

As urban populations grow, indoor gardening has become very popular around the world. Less space outside means less space to grow fresh food. Indoor planting can be easily done and has enormous benefits. It can provide year round food availability, requires less water than outdoor gardening, and minimizes the risk of fertilizers entering our environment. It also requires very little resources. This means people can grow food indoors at low cost!

Plastic drink bottles can be recycled and reused in many ways. In this activity, you will build an indoor garden using plastic drink bottles. You will enforce the concepts of reusing and recycling. You will also learn more about plants and from where our food comes.

This experiment will reuse plastic bottles. In the days and weeks leading up to this activity, collect them from family or friends - then clean and bring them to school. Any size will work, but it might be easier with one liter or two liter soda bottles.

It will be up to you to design the planters and watering tool. There are some building requirements, though.

YOU WILL NEED TO BUILD THE FOLLOWING:

One hanging planter

This can be made by punching holes in the side of the planter and running a string through it.

One horizontal planter

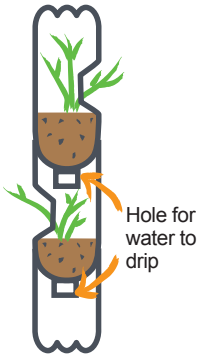
Students will need to design a planter that utilizes a plastic bottle laying on its side, while resting on a surface.

One vertical planter

Students will need to design a planter that utilizes an upright plastic bottle, while resting on a surface.

One planter that holds more than one plant

Students can experiment with stacking one bottle on top of another or creating a horizontal chain on an incline. The goal is to be able to water multiple plants by pouring water over just one.



One "watering can"

A successful watering can will allow water to pour slowly over the plant. If the water comes out too fast, it can cause divots in the soil.

Note: Each one of these items can be made using as many plastic bottles as needed.

Remember, your planters are homes in which the seeds will grow. Don't forget plants need air, sunlight, and water. Keep in mind, plants that are not aquatic (live in water their whole lives) don't really like their roots sitting in water. Like us, roots need air to breathe. Drainage is important to your plant, so think of a way extra water can escape your planters. Think about *where* you want the extra water to go. Will it run onto the floor, or could you design a way to catch extra water?

Bonus points for thinking of a way to recycle the unused water for your gardens!