



SELF-SUSTAINABLE GARDEN



3-6



Whole classroom



GARDEN IN A BOTTLE



1 to 2 hours for
initial planting



1. Build an inexpensive hydroponic garden with inverted soda bottle units;
2. Encourage young children to connect with nature and learn more about ecology and where their food comes from;
3. Learn about the full lifecycle of a plant from germination, to seedlings, to vegetative growth, all the way to harvest;
4. Learn how proper nutrition, water, and light help a plant to grow.



- 2 liter clean green (to prevent algae growth) soda bottles (do not use small bottles) with a cap (soda bottles are inexpensive and allows each student to have their own «pet plant»)
- hydroponic nutrient solution
- Felt or cotton towels are best for this
- coconut coir 700 g/bottle as a growing media
- water 700 – 1000 ml Water (let it sit out overnight to evaporate the chlorine)
- nutrients (GH Flora Grow)
- scissors and felt pen
- lettuce plants or seeds (For this experiment, it's best to choose a fast-growing, leafy vegetable like lettuce)



a) Take your 2-litre bottle and draw a line around it right where the curve ends and the bottle transitions to a straight line. It's important to draw the line below the curved area, so you have enough space to grow your plant! Then cut the bottle as straight as possible! The top area is where your growing media and seed will go, and the bottom section houses the water and nutrient mixture.



b) Let's prepare the water. Take a look at the nutrient mixing chart on the back of your bottle of nutrient. This will give you the exact amount to mix into your system. After you prepare your water, pour it into your 2 litre bottle until it reaches the point where the cap would touch, then move on to the next step!

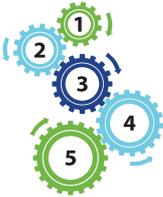
c) Add Wick and Growing Media. Take your wick and thread it through the cap hold in the 2 litre bottle.

Pull it through to around 2/3 of the height of the smaller growing area. It must be high enough so that when the seeds sprout, the roots will not have to travel far to get to the wick area (where the growing media is moist and filled with nutrients).



Hold the end of the wick inside the open cavity created by the top of the bottle with your finger while filling the cavity with coconut coir. Make a small indentation in the planting media with your fingers, and place 3-4 seeds in the hole. Firm the coconut coir around the roots to secure the seedling in place. Nestle the top of the bottle inside the bottom so that the cotton wick extends into the solution. Check the unit frequently, and refill the bottom with hydroponic solution when needed by gently lifting the plant and pouring the solution into the bottom of the bottle.





Place your bottles in an area that gets as much natural sunlight as possible. Ideally, you want an area that's getting at least six hours a day.

Taking care of your 2 litre Garden is simple.

All you have to do is make sure that you keep the water at the correct level. As your plant grows, it will suck up water and nutrients, so keep some properly prepared nutrient mixture ready to fill it back up to normal levels when the reservoir drops.



The end: Have your child cut off the outer lettuce leaves and leave the smaller, less developed leaves to grow. You can keep harvesting over and over for at least a month using this method!

WHAT DOES THE PLAN NEED

When preparing your hydroponic indoor garden explain the following principles:

Water: Water is required for photosynthesis (production of food) and transpiration (evaporation of water from leaves into the air, cooling the plant and creating pressure to move water from roots to leaves); it also aids in the absorption of some nutrients.

Air: Plants take in carbon dioxide (CO₂) and oxygen (O₂) to use during photosynthesis. When we breathe we provide carbon dioxide.

Light: Plants capture light energy for use in photosynthesis, the process by which plants make "food".

Nutrients: Plants require certain minerals for proper biological function and growth. Nutrients exist naturally in soil on Earth as a by-product of the decomposition of organic matter or they can be added through applications of fertilizer. (Fertilizer is sometimes referred to as "plant food," but because plants make their own food through the process of photosynthesis, fertilizer should more accurately be compared to a multivitamin.)

Growing media: Plants need somewhere to grow. On Earth, most crops grow in soil. Scientists are experimenting with different media such as gels and soil less mixes, along with techniques like hydroponics to devise an acceptable alternative to soil.

