



# Growing with Hydroponics

## Summary:

Hydroponics is a method of growing food without soil and instead using water with nutrients. This makes it the perfect indoor food growing activity to do in schools, as it creates no mess and is a brilliant learning opportunity for learners, where they can watch their food grow in their classroom day by day. This activity links into the curriculum in various ways, for example offering a good way to practise Scientific methods, such as testing variables such as medium, nutrient levels, and type of water. Hydroponic growing, with its lack of soil, is also a good alternative to soil-based growing for learners with sensory sensitivities. Another great element of this style of growing is that you can create a hydroponic growing system using used water bottles that would otherwise be thrown away, encouraging learners to upcycle used materials.

This activity sheet is aimed at educators, to provide you with information and guidance so that you can lead this activity with your learners.

**Key Stage / Age group:** It can be easily tailored to any age group - the links below are from the [National Curriculum for England](#).

## National Curriculum links (Primary):

### KS1 & KS2 - Science

Working Scientifically - please see National Curriculum Guidance for working scientifically objectives

#### Year 1:

- Plants: identify and name a variety of common wild and garden plants.

#### Year 2:

- Plants: observe and describe how seeds and bulbs grow into mature plants; find out and describe how plants need water light and a suitable temperature to grow and stay healthy.

#### Year 3:

- Plants: explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant.

## KS1 & KS2 Geography:

**KS1:** Human and physical geography: identify seasonal and daily weather patterns in the United Kingdom and the location of hot and cold areas of the world in relation to the Equator and the North and South Poles.

**KS1:** Geographical skills and Fieldwork: use simple fieldwork and observational skills to study the geography of their school and its grounds and the key human and physical features of its surrounding environment.

**KS2:** Human and physical geography: describe and understand key aspects of: physical geography, including: climate zones, biomes and vegetation belts, rivers, mountains, volcanoes and earthquakes, and the water cycle: human geography, including: types of settlement and land use, economic activity including trade links, and the distribution of natural resources including energy, food, minerals and water.

**KS2:** Geographical skills and fieldwork: use fieldwork to observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies.

## KS1 & KS2 Design and Technology:

**Make:** Select from and use a range of tools and equipment to perform practical tasks and thinking about creative uses of materials that would otherwise be thrown away.

### Activity Links:

This activity works well alongside our [Vertical Growing activity](#). This is because you can easily set up a vertical growing area indoors using multiple hydroponic growing bottles. Take a look at the activity sheet to get some inspiration about ways to do this. This is an amazing way to bring food growing indoors with no mess while meeting curriculum needs!

**Time needed:** 1-2 hours to create, and 4-6 weeks until produce is ready.



# Using hydroponics to grow food

## Pre-activity discussion: Hydroponics vs. soil-based growing

Hydroponics is a method of growing food without soil. This means that we need to create another way for plants to get what they need to thrive, which they normally get from growing in soil.

Let's have a look at what plants need to grow, and how they get these things in a soil-based growing system compared with a hydroponic system. We will be looking at one particular form of hydroponic growing which reuses old plastic water bottles, so this information is specific to this type of hydroponic growing.

What plants need to grow	Soil-based growing	Hydroponics
<b>Water</b>	There are pockets of water in the soil which keep plants hydrated through their roots.	Water is transferred to plant roots through a wick. Roots are not suspended in water the whole time because this would cause most plant roots to rot.
<b>Nutrients</b>	Nutrients are held in the soil before dissolving in the water and being delivered to the plant's roots. Nutrients in soil-based growing come from decomposing organic matter as well as rock minerals which leach into the soil.	In a hydroponic system, nutrients are dissolved into water directly, and delivered to the roots of the plant by being drawn up through the wick and into the growing medium, which the plant's roots sit within.
<b>Root support</b>	Plant roots are supported by soil. The soil holds the roots in place so that they do not get damaged.	Plant roots in this hydroponic system are supported by the growing medium.
<b>Oxygen</b>	Just like with water, there are pockets of air in the soil which delivers oxygen to plant roots.	The growing medium is porous, so it allows oxygen to reach the plant's roots.
<b>Light</b>	Plants get light from the sun in an outdoor growing system.	With indoor growing, if you grow your plants on a windowsill then your plant will grow with natural light.  You can also use artificial light to grow your plants. This would be a great experiment to do in your Science lessons.

# How to grow food using hydroponics: water bottle method

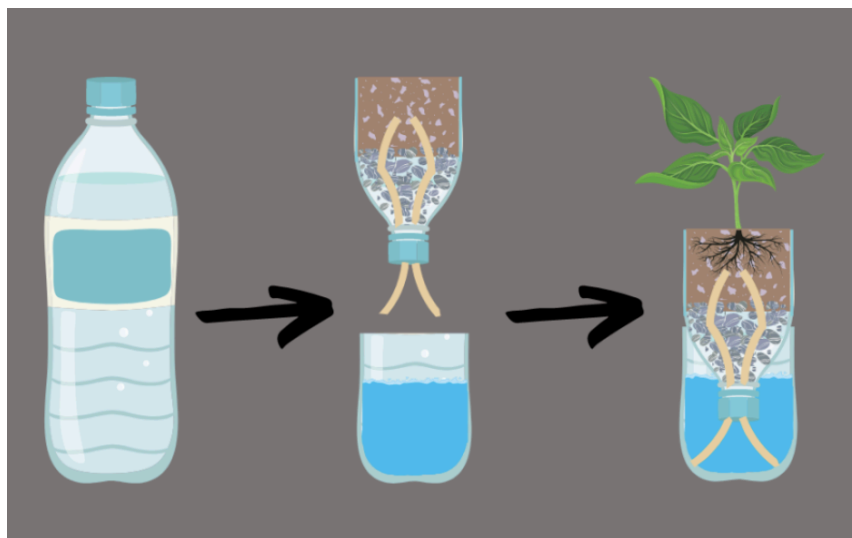


Photo from: <https://ponicslife.com/hydroponic-wick-system-the-best-system-for-beginners/>

## What you'll need:

- Seeds or transplants - the best plants to grow using this method are salads (such as lettuce), microgreens, and soft herbs (such as basil, parsley, or coriander).
- 2 litre plastic water bottle - Remember to upcycle, using an old bottle rather than buying a new one!
- Scissors
- Blu-tac
- Growing medium - Such as rockwool, gravel, clean sand, or perlite. This works as a substitute for soil.
- Water
- Nutrients - Use prepared nutrient solutions specifically for hydroponic growing
- A wick - This works best when made out of cotton or nylon. The wick will draw water and nutrients up through the growing medium and to the roots. By leaving roots exposed in the medium, they can access oxygen in the air.

## How to:

1. Cut off the top third of your water bottle. You can use some blu-tac with a pair of scissors to make the initial incision, so that you don't have to cut the bottle in half longways.
2. Turn the top of the bottle upside down, and make some holes in the cap. If you have an adult's help, you can do this with a soldering iron or a sharp instrument. Otherwise, seal the top of the bottle with blu-tac, making a hole just big enough for the wick to fit through. Put the upside down top part of the bottle inside the bottom part of the bottle. The top of the bottle will now be facing downwards into the bottom part.
3. Mix your nutrients with water, following the instructions on the bottle of your nutrient solution. Pour this solution into the bottom of the bottle.
4. Thread the wick through the inner funnel (which used to be the top of the bottle) so that it is dipped into the water-nutrient solution) and while holding the top of the wick, and the growing medium to the inner part of your bottle so that the wick is stable.
5. Finally, either plant a few seeds into the medium, or place your plant plug into it. The water will be drawn up through the wick and into the medium, keeping your plant well watered and fed so that it should thrive!

## Additional Information:

<https://kidsgardening.org/resources/gardening-basics-hydroponics/><https://www.epicgardening.com/hydroponics-for-kids/>