

# BREAKING IT DOWN

with Dr. Michelle Dickinson



## BOTANY

### Welcome to Breaking It Down with Dr Michelle Dickinson.

This worksheet is to help you to support your teaching after students have watched the 'Botany' episode. It contains a summary of the science knowledge, experiment instructions, topics for further inquiry, and links to the NZ curriculum at levels 3-5.

Use this sheet alongside the video for the Botany episode of "Breaking It Down with Dr Michelle Dickinson" to help with your teaching around the science of plants. During the episode, Dr Michelle Dickinson will cover the different parts of a plant, photosynthesis, and how plants transport water via the water vascular system. She will also talk to expert Associate Professor Cate Macinnis-Ng from Te Pūnaha Matatini, and conduct an experiment which students can follow along with.

### For this session, your students will each need:

- Paper towel
- 2 different colours of food colouring
- 3 glasses
- Water
- Notebook and pen to write down their observations

### Achievement Aims

#### NZ Curriculum Strand: Living World

**Live Processes:** Recognise that there are processes common to all living things and that these occur in different ways

**Evolution:** Begin to group plants, animals and other living things into science-based classifications.

### Learning Outcomes

- Understand the structure of vascular plants, including names of parts of a plant
- Understand how plants grow, with a focus on the root and vascular systems of plants
- Understand that plants are 'primary producers,' and become familiar with the process of photosynthesis
- Conduct an experiment to demonstrate capillary action, and understand how this is used in the vascular system of plants to transport water and other resources around the plant

### BREAKING IT DOWN:

Science of Plants

Plants are 'primary producers' meaning that they make their own food, by converting light into energy via photosynthesis. Photosynthesis is a chemical reaction which uses sunlight, water and carbon dioxide from the air, and produces sugars and oxygen which the plant can use.

This episode focuses on a group of plants called the 'vascular plants,' which are plants that move water, minerals and carbohydrates around their body using their "vascular tissue". Xylem are the vascular tissues that take water and nutrients upwards from the roots towards the leaves to be used in photosynthesis, and phloem are the tissues that take carbohydrates and other substances away from the leaves after being made by photosynthesis.

The root system of a plant is incredibly important for water transport. Roots anchor the plant into the ground, and suck water up from the soil and into the plant. Their 'hairy' appearance gives them a larger surface area over which they can absorb water and minerals.

Once absorbed, the water is then transported from the roots up the stem or trunk into the branches and leaves by the xylem by a process known as capillary action.

In order to turn carbon dioxide into sugar through photosynthesis, the leaf must open its stomata - tiny pores on the leaf's surface - so that carbon dioxide can diffuse into the leaf. However, when it does this, the leaf then starts to lose water through evaporation from these tiny openings. This water loss is called transpiration and creates tension, or negative pressure, in the water in the xylem. Transpiration also helps to move water upwards through the plant.

## EXPERIMENT INSTRUCTIONS

### Experiment: Capillary Action

- Cut a sheet of paper towel in half and fold each strip in half lengthways.
- Arrange 3 empty glasses in a line and fold the strips so they make a 'bridge' joining one glass to the next.
- Add a different food colour to each of the outside glasses then half fill with water.
- Leave for 10 minutes - watch the water wick up the paper towel against gravity and up to the middle glass. Eventually the two colours should mix in the middle.

## EXPLORE FURTHER

(Use these prompts to start a discussion or further inquiry on the topic of plants)

- If plants are primary producers, what's a secondary producer?
- What do plants do if they get hungry at night?
- What else does a plant get from soil, apart from water?
- Why do the leaves on some trees turn brown in the autumn?
- How much water does a massive tree need to drink every day to stay healthy?
- Do plants talk?
- How do carnivorous plants digest their food?
- Why do different flowers grow well in different types of soil?
- What is the oldest plant still living?
- How do plants which grow underwater get their carbon dioxide?

## FURTHER EXPERIMENTS & INFORMATION

What happens if you add food colouring to the water of living plants?  
Investigate the life cycle of plants by growing seeds.



Thank you to  
our Sponsors



Te Pūnaha Matatini  
Data ■ Knowledge ■ Insight

CallaghanInnovation  
New Zealand's Innovation Agency



If you have any questions, please contact [info@nanogirllabs.com](mailto:info@nanogirllabs.com).  
For more science adventures for children visit [Nanogirl's Lab](https://www.nanogirls.co.nz).