Wonder Project

Plant Challenge

Module 1: Future farms

Explore the future of growing our kai using innovation and the power of STEM thinking. In this module your students will meet their ambassador, unpack their Plant Kit, and head outdoors to explore environmental conditions that affect plant growth.

Use this overview as a reference as you go through Module 1 in the student Learning Hub with your class.

Week 1: 2 hours

Activity sequence

Pre challenge survey

Video: Farm of the future

Get ready to grow!

- Meet your ambassador
- Unpack your kit
- Use your STEM smarts

How does food get to your table?

- Food for thought
- Lab 1.1: Carbon footprint champions

Explore and enhance our environment with technology

- Use your sensors
- Lab 1.2: Sensor time trial

Module outcomes

- Discover sustainable food practices
- Understand the concept of a carbon footprint and what impacts it
- Understand the way we grow, move and eat our food has an impact on the environment
- Use 'sensor' technology to monitor environmental conditions that help plants to grow

Resources

From your plant kit:

- Lab book (1 per rōpū/team of 4)
- Lab 1.2: Sensor time trial resources
  - Sensor kit (1 per class)
  - 12 AAA batteries (3 per sensor)

School to supply:

- Technology for the ambassador's PowerPoint presentation

Activity overview	What students will do	Teacher role	Ambassador role
Student and teacher pre challenge survey An important tool for us to improve the programme each year and continue our funding to keep the Wonder Project free for schools.	Each participating student should complete the Student pre challenge survey before they begin the Plant Challenge. Students can access the survey via the Survey Monkey link in the Online Learning Hub and follow the prompts to submit their responses.	Each participating teacher should complete the Teacher pre challenge survey before they begin the Plant Challenge. Teachers can access the survey via the Survey Monkey link in the Online Learning Hub and follow the prompts to submit their responses.	
Farm of the future Gets students ready for the Plant Challenge. Introduces big issues such as food security and highlights how innovators are creating smart, sustainable solutions for growing food using STEM skills.	Discuss the big question: 'I wonder how to grow food sustainably?' Understand their challenge will be to create a farm of the future. Watch 'farm of the future' video and get inspired by local innovators who are creating smart solutions to global problems. Take notes during the video that will help them later in the challenge.	Facilitate a brief 'I wonder' discussion. Before the video ask: "Have you ever wondered where your food comes from?". Spark students' curiosity by brainstorming what they already know about food production in Aotearoa and what they think could be done differently. Watch the video and then highlight the solutions local innovators have come up with (i.e. vertical farms, hydroponics etc). **Ask**: *Why do you think these solutions are sustainable?* Extend the discussion based on answers. Write keywords on the whiteboard.	Get students excited about the challenges they'll be tackling – including growing hydroponic microgreens, creating grow houses, and designing a farm of the future.
Get ready to grow			
Meet your Ambassador STEM professional shares their STEM career story.	Meet their ambassador, listen to their career story and ask questions.	Introduce the ambassador to the class and help set up their presentation. Facilitate questions.	Meet the class and share your career story presentation. Remember to leave time for questions! Use the tips provided in the Wonder Project video 'telling your story'.

Activity overview	What students will do	Teacher role	Ambassador role
Unpack your Plant Kit Unpack the kit and discuss what each item is for.	Help the ambassador unpack the Plant Kit. Discuss how each item may be used.	Facilitate questions as the kit is unpacked. *Refer to 'unpack your Plant Kit' in the teacher support notes.*	Help unpack the Plant Kit in front of the class with key students. Call up students to pull an item out of the box and ask what they think it is for. Explain how each item might be used.
Note: Collect your resources! Identify recyclable materials students will need for the challenge.	Write down a list of materials they need to collect for their microgreen trials, grow houses and farm of the future.	Advise students to start collecting the materials they'll use for later in the challenge. Make suggestions. *Refer to the teacher support notes for a full list of materials we suggest collecting.*	Support the class by discussing the properties and benefits of different materials.
Using your STEM smarts Introduce the key skills students will need to succeed in the challenge.	Brainstorm the skills they will need for the challenge in a short class discussion.	Lead discussion. Refer to the farm of the future video for context. Introduce skills such as creativity, problem solving, resilience, communication, and teamwork. Write each skill on the white board. Ask students what they think each one means. *Refer to the STEM skills list in the teacher support notes.*	Support discussion. Provide real life examples of using STEM skills in context. This could be a project, situation, or task you've experienced. Keep the example short – no more than 2 minutes.
Smile for the camera Start to think about what parts of the Challenge students would like to capture on film.	Document their Plant Challenge experience through video and pictures. Students will edit this footage into a short video. This video can be entered into a competition at the end of the Challenge to win a prize!	Support students to film their videos. **Ask**: *What story do you want to tell? How? What messages do you want to include?*	Support students to film their videos.
How does food get to your table?			

Activity overview	What students will do	Teacher role	Ambassador role
Food for thought Introduces students to the ways our everyday food choices contribute to climate change and challenges them to shrink their carbon footprints by making sustainable choices at lunch.	Participate in a brief class discussion to understand that everyone has a carbon footprint and we can alter the size of it through the actions we take and the choices we make.	Lead a discussion that introduces students to the idea that our everyday food choices affect our carbon footprint and have positive and negative consequences. *Refer to teacher support notes.*	Support class discussion. **Ask**: *What do you think a carbon footprint is?* Explain that when we burn and use fossil fuels for our own energy needs (food, clothing, heat, transportation) this releases greenhouse gases into the atmosphere – contributing to climate change.
Lab 1.1: Carbon footprint champions Students assess their lunches by completing the carbon footprint champions quiz. This will help them understand how their food choices contribute to their carbon footprint.	Explore the 'lifecycle' of their lunch by thinking about what their lunch is made up of; what their food is stored in; where it came from; and how much waste their lunch generates. Understand that their food choices contribute to their carbon footprint.	Get the class into a rōpū (team) of four. Guide them through the quiz activity. *Refer to the teacher support notes for alternative ways to complete this lab if not all students have lunch.* After the quiz, facilitate a wrap up discussion to help students reflect upon their scores; interpret the results; and think about changes they can make.	During the quiz, facilitate rōpū (team) discussion and help students think about their responses. There are no 'right' or 'wrong' answers. Dig deeper into the idea of food production and sustainability. Throughout the activity, highlight how buying local, and what's available in season will be better for the environment. After the quiz support the wrap up discussion. Encourage students to share and interpret their results. *Refer to teacher support notes.*
Explore and enhance our environment with technology			
Use your sensors Introduces the Plant Kit sensors and how technology can be used to measure environmental conditions.	Watch the 'how to use sensors' video. Discuss why it's important to measure the temperature, light and humidity levels of the microgreen growing environment, and whether its conductive, as well as your five senses.	Facilitate a discussion before starting the video to spark curiosity around the sensors. Help students understand what humidity and conductivity are. *Use teacher support notes for reference.* **Ask**: *Why is it important to measure growing conditions? Why do you think we need to measure the temperature/ light/humidity/ conductivity levels of our growing environment? Why is it important to also use our 5 senses?*	Reiterate the importance of working together to students by giving examples of how you do this in your own workplace. Outline the benefits of using technology to support plant growth. Use your STEM skills to support students by asking questions and encouraging them to use their 5 senses – sight, sound, smell, taste and touch as inquiry tools.

Activity overview

Lab 1.2: Sensor time trial

A hands-on activity to get students moving outdoors and get them familiar with the sensors.

What students will do

Get into their rōpū and discuss what part of the environment will give them the best reading with their allocated sensor.

Take turns racing against the clock to get the highest reading on their allocated sensor.

Teacher role

Pair each rōpū up with another rōpū to establish the challenge opponents.

Distribute one sensor to each pair of rōpū.

Note: *Students using the conductivity sensor will do the challenge differently. They will race to find the highest number of conductive objects.*

Support rōpū discussions on where to get their sensor readings from around the school and outline boundaries on where they cannot go.

After the activity, lead class discussion on the results.

Ask: *What did this rōpū measure to give them a higher number? Why do you think this gave them a higher number?*

Ambassador role

Before the activity, support rōpū discussions on the environmental conditions they could look for to get a high number.

After the activity, record class results on the whiteboard and pick the rōpū with the best results to explain their thinking.

Remember: Ask students to start collecting recyclables that they will use in future modules!