



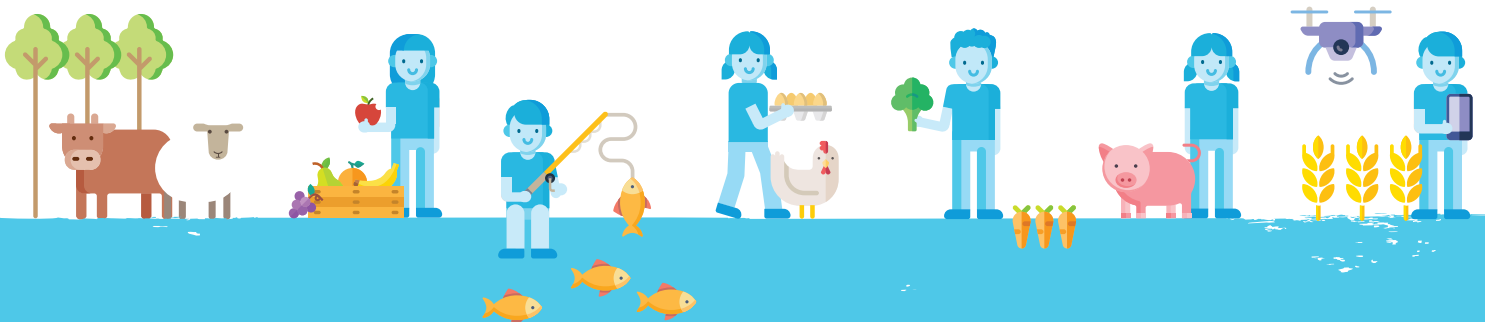
Tools and Technology Over Time

Level: 3/4

Lesson One: Looking to the Future

Time: Approx. 90 mins

Key Vocabulary: Robotics, technology, salinity, efficient, prototype, harvesting, nutrition.



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› Lesson Overview:

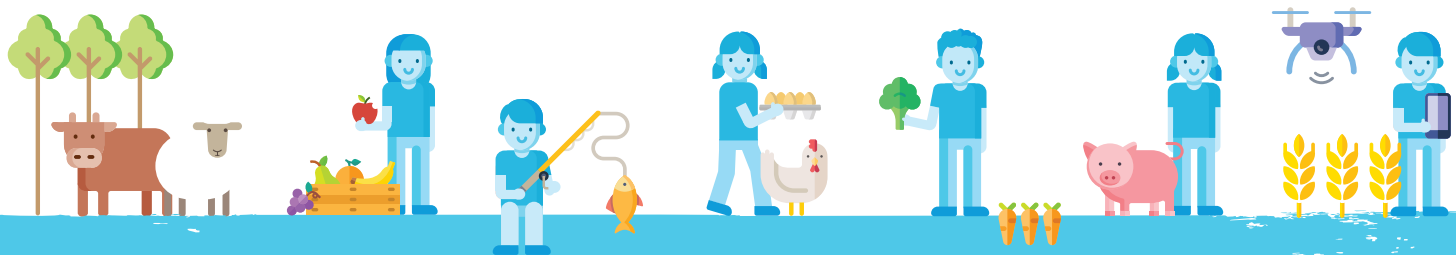
Throughout this lesson, students will develop an understanding of the way robots are being used in agriculture to solve problems and make tasks more efficient. Through a guided investigation, students will have the opportunity to explore the many uses for robots in food and fibre production, and will be challenged to think critically about the advantages and disadvantages this might pose for farmers. Students will work collaboratively to design and build a prototype of a robot to address a concern in agriculture, evaluating their design and reflecting on the design process.

› Students Will Learn To:

- Explore the ways robots are being used in agriculture.
- Consider the advantages and disadvantages of robotics in agriculture.
- Use Design Thinking to solve a problem.
- Apply safe procedures when using a variety of materials and components to produce designed solutions.
- Reflect on the design process and consider modifications or improvements.

› Victorian Curriculum Outcomes:

VCDSTC025, VCDSTC027, VCDSCD028, VCDSCD029, VCDSCD030, VCDSCD031, VCDTCD025, VCELY275, VCELY307.



Learning Tasks

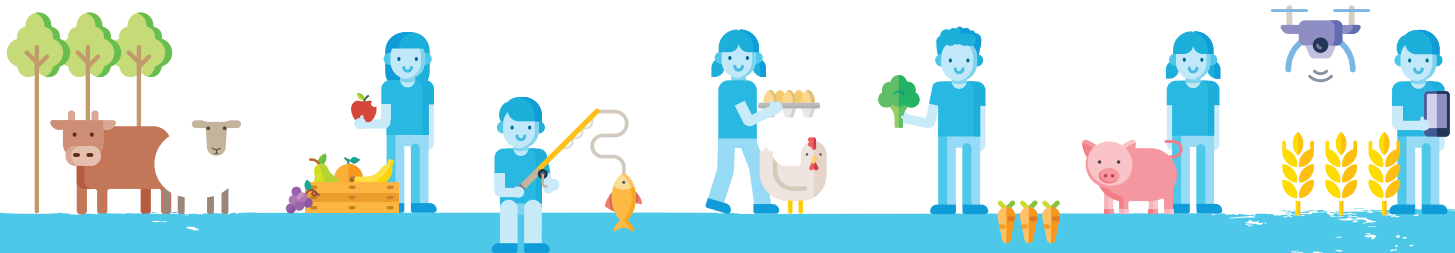
ACTIVITY ONE

Odd One Out (5 mins)

During this activity, students will have the opportunity to reflect on what they learnt in the previous lesson about the purposes of technology in Agriculture. Through stimulus images, students will practice using their analytical skills as they select the 'odd one out' from three images, explaining why they believe that one image might be different to the others on the screen. There are no right or wrong answers in this activity, only different interpretations.

- The teacher will display the first slide of the [Odd One Out presentation \(1.1\)](#) on a projector or interactive whiteboard and explain that during this session, students will be required to observe pictures of technology in agriculture and guess which one is the 'odd one out', justifying why they think it might be different to the other two images.
- The teacher will encourage students to turn to the person next to them and talk about which of the images displayed they think does not belong - and why that might be.
- The teacher will select some students to share their ideas.
- The teacher will show slides two and three of the presentation, following the same process: encouraging students to share their justifications as to why they think the selected image is the 'odd one out'.

> ACTIVITY AT A GLANCE:



ACTIVITY TWO

Robots in Agriculture (15 mins)

During this activity, students will have the opportunity to explore some of the new and exciting technological advances in agriculture using robotics.

- a) The teacher will show students the short video about SwagBot.



SOURCE: *SwagBot: The First Robot Cowboy*, YouTube, New Scientist, 2016 (1.11)

URL: <https://www.youtube.com/watch?v=cZVUYJhXXzo>

- b) At the end of the video, the teacher will record the following questions on the whiteboard or an anchor chart, asking students to turn and talk to the person sitting next to them share their ideas:

- What jobs did SwagBot do on the farm?
- How did SwagBot make the farmer's jobs easier or more efficient?
- Why might a farmer decide to buy a SwagBot?
- What issues could SwagBot cause farmers whilst working on the farm?

- c) The teacher will ask some students to share their answers to these questions, recording them on the whiteboard or anchor chart.

- d) The teacher will ask students to record a table in their books with the headings: **Advantages** and **Disadvantages**. The teacher will explain that students should record any advantages or disadvantages there could be with using SwagBot to complete jobs on the farm.

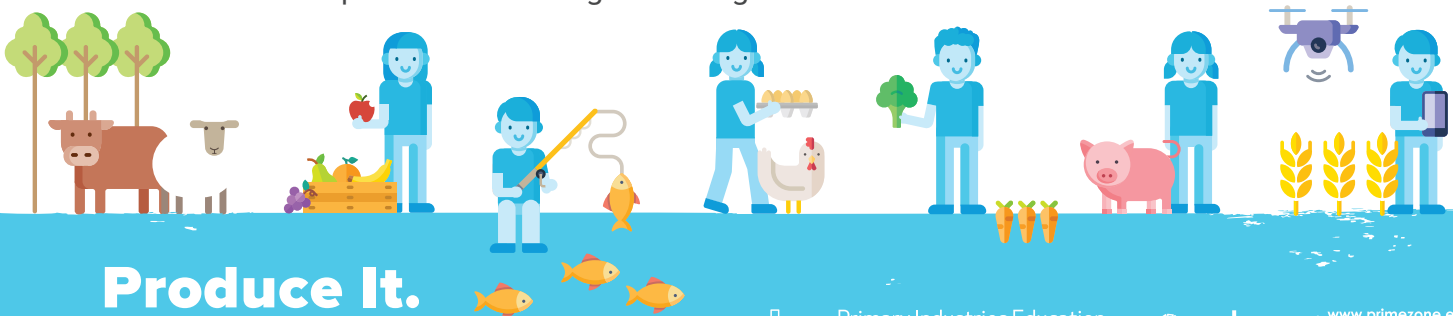
Advantages could include: *Farmers have to do less work; it is safer if the farmer does not have to go too close to the cows (could get kicked).*

Disadvantages could include: *SwagBot is very expensive; it might scare the cows; if the technology is too advanced, farmers might not know how to use it.*

- e) The teacher will remind students from the previous lesson that technology is used in agriculture to solve many problems, such as pest and weed control, making hard tasks on farms easier (eg. Using drones to check crops instead of visiting them each individually), making slow tasks faster (eg. Harvesting crops mechanically rather than by hand), and addressing environmental concerns (eg. Breeding salt tolerant crop varieties that can grow in salt affected areas).

The teacher will ask students to consider:

- What problems was SwagBot solving on the farm?



ACTIVITY THREE

Guided Research Task (15 mins)

During this activity, students will log onto the Produce It. Protect It. Virtual classroom to complete a guided research task about robots in agriculture. Students will require a device that has internet access to complete this activity. Teachers may wish to have students work independently or in pairs to complete this task. *(Should devices not be available for students to use, teachers may wish to print off the [Graphic Organiser task \(3.1\)](#) for each student and share the video with the whole class on a projector or interactive whiteboard).*

- The teacher will explain that during this activity, students will use their own devices to conduct research about different robots in Agriculture and how they are solving problems.
- The teacher will model accessing the [Produce It. Protect It. Virtual Classroom Technology in Agriculture](#) activities on an interactive whiteboard or projector, before providing students with the link or a QR code to take them to this page.



SOURCE: VIC Farmer Time Produce It. Protect It

URL: <https://farmertime.com.au/technology-in-agriculture>

- When students have accessed the [Produce It. Protect It. Virtual Classroom Technology in Agriculture](#) page, the teacher will instruct them to follow the instructions to complete the guided research task.

TASKS:

- Watch the video about robots in Agriculture.



SOURCE: *The Future of Farming Robots- 13 High Tech Examples (Compilation)*, YouTube, VentureX Future Tech, 2021, (8.32)

URL: <https://www.youtube.com/watch?v=uD4mJCgsmdM>

- Complete the Graphic Organiser accessed via the [Virtual Classroom Technology in Agriculture](#) page.



SOURCE: VIC Farmer Time Produce It. Protect It


URL: <https://farmertime.com.au/technology-in-agriculture>

- Record three questions about robots in agriculture on the [Robots in Agriculture question template \(3.2\)](#).



- Post one of these questions on the [Open Gate Conversations](#) page. (Link to the [Open Gate Conversations page](#) can be found on the [Virtual Classroom Technology in Agriculture](#) page).
- When students have completed the Virtual Classroom tasks, the teacher will ask them to find a partner and share three things they learned during this session.
 - The teacher will provide each student with a sticky note and ask individuals to record their most interesting fact or question about technology in agriculture.
 - When students have completed recording their fact/question, they should stick them on the whiteboard or an anchor chart at the front of the classroom.

➤ ACTIVITY AT A GLANCE:



Robots in Agriculture

GRAPHIC ORGANISER

Name: _____
 Date: _____

Choose one robot from the video and answer the following questions about the robot you have selected.

Robot name: _____

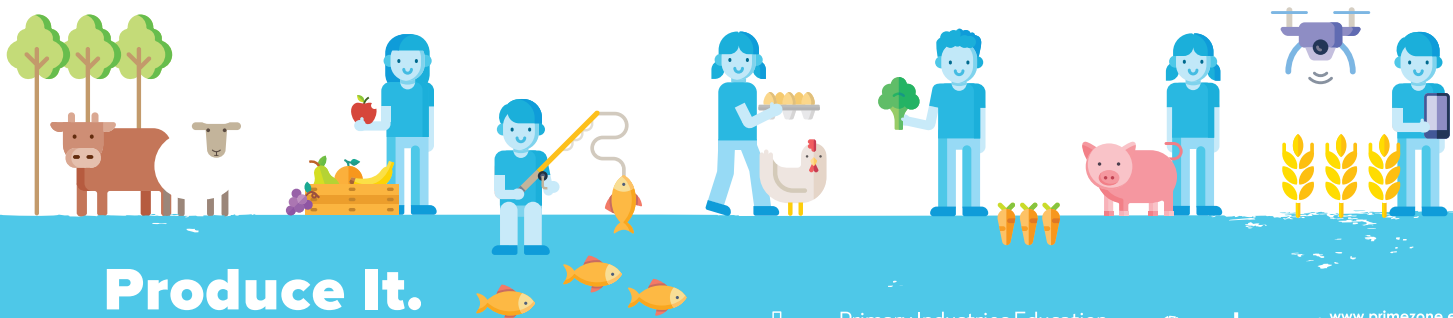
 Purpose: _____

Draw and label a diagram of the robot:

What problem in agriculture does this robot solve?

Word Bank:

Artificial Intelligence (AI): A machine or computer program that can think and learn. Sensors: Devices that sense and respond to changes in the environment.	Autonomous: Able to complete tasks on its own. Pest Plants: Weeds that impact the growth of plants or pasture.
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ACTIVITY FOUR

Design a Robot to Solve a Concern in Agriculture (15 mins)

During this task, students will associate problems with solutions and design a robot to address issues facing food and fibre production.

- a) The teacher will re-introduce that farmers and scientists are using robots to address concerns in agriculture today (eg. SwagBot is making cattle farming safer and more productive, harvesting robots make tedious and hard manual labour easier and faster. Some robots aim to make food and fibre production more sustainable and address environmental concerns such as climate variability, salinity and erosion).
- b) The teacher will explain that during this task, students will be working in pairs to design a robot that will solve a concern in agriculture.
- c) The teacher will display the [Concept Cartoon – Teacher \(4.1\)](#) on a projector or interactive whiteboard and talk with students about the issues faced by each farmer:
 - Slugs and snails keep eating my crops (pest management).
 - Harvesting my apple crops by hand takes too long and is very hard work (making tasks more efficient and easier).
 - Salinity (too much salt in the soil) caused by cutting down trees on my farm is stopping my crops from growing (environmental concern).
 - I need to know how much food my cows have eaten to make sure they are healthy and receiving all the nutrition they need (collecting data and information).
- d) The teacher will explain that students will be working with a partner to pose suggestions as to how robotics could be used to solve each of the concerns faced by these farmers.
- e) The teacher will select student pairs and provide each pair with a copy of the [Concept Cartoon – Student worksheet \(4.2\)](#) to record their ideas.



- f) The teacher will model completing the **Concept Cartoon – Student worksheet (4.2)** by recording solutions to these concerns using robotics in the thought bubbles above each farmer. (Slugs and snails keep eating my crops — eg. A robot designed to detect slugs and snails in crops and collect them with a bionic arm, storing them and moving them to a different habitat to protect the crops).
- g) When pairs have completed the Concept Cartoon for each problem, the teacher will ask them to select one of the robotic ideas they have generated. They will need to draw a design of their idea on the back side of the sheet they are working on.
- h) The teacher will remind students to label the specific parts of their design and record the purpose of their robot.

ACTIVITY AT A GLANCE:



ACTIVITY FIVE

Creating a Prototype (20 mins)

During this activity, students will create a prototype of the robot they designed in Activity Four. Students will work in pairs to apply safe procedures when using a variety of materials and components to produce designed solutions.

- The teacher will explain that during this task, students will use their design idea to create a prototype of a robot using different materials.
- The teacher will show students the assortment of materials they can use to create their prototype (these may include cardboard, paper, wood, robotics kits, string, recycled materials collected from students' homes, etc.).
- Students will be asked to select appropriate materials to build their prototype with their partner.

(It is suggested that teachers have each of the materials needed for the design challenge prepared prior to the session and placed on a bench or on the floor in an area that is easily accessible for students during this task.)

ACTIVITY SIX

Presenting the Designs (10 mins)

During this activity, pairs will present their robot to the rest of the class, highlighting the features of their robots and the way these features address a concern in agriculture.

- Upon completing their prototypes, the teacher will ask each pair of students to present their design and prototype to the rest of the class.
- During their presentation, the teacher will ask pairs to explain:
 - Which of the farmers' problems does your robot solve?
 - What are the special features of your robot?
 - What did you enjoy about completing this task?
 - What did you find challenging about this task?



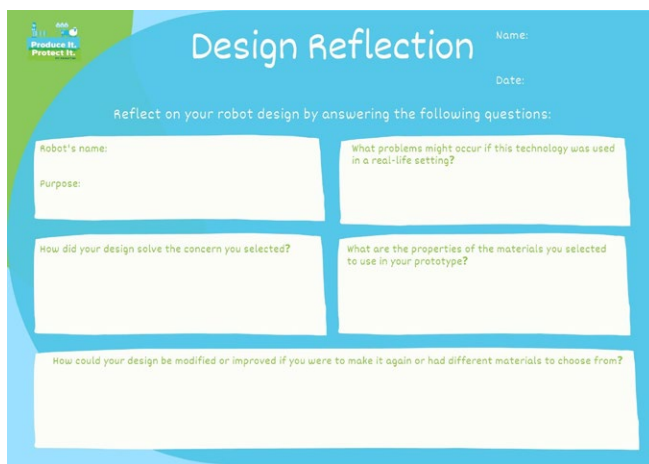
ACTIVITY SEVEN

Reflecting on the Designs (10 mins)

During this activity, students will have the opportunity to reflect on the design process, the criteria of the design challenge, and any possible areas for improvement.

- The teacher will explain that students will complete a reflection task to review their design and consider the advantages and disadvantages of their robot.
- The teacher will provide each pair with the [Design Reflection worksheet \(7.1\)](#), reading through the questions together before asking students to complete their answers to the following questions:
 - How did your design solve the concern you selected?
 - What are any problems that might occur if this technology was used in a real-life setting?
 - What are the properties of the materials you selected to use in your prototype?
 - How could your design be modified or improved if you were to make it again or had different materials to choose from?
- The teacher will select a few students to share their responses to the reflection questions.

➤ ACTIVITY AT A GLANCE:



The worksheet is titled "Design Reflection" and includes a "Name:" and "Date:" field. It instructs students to "Reflect on your robot design by answering the following questions:" and provides five text boxes for responses:

- Robot's name:
- Purpose:
- What problems might occur if this technology was used in a real-life setting?
- How did your design solve the concern you selected?
- What are the properties of the materials you selected to use in your prototype?
- How could your design be modified or improved if you were to make it again or had different materials to choose from?

