

STRAND			Knowledge and understanding				Processes and production skills																											
			Digital systems		Representation of data		Collecting, managing and analysing data				Creating digital solutions by:																							
											Investigating and defining		Generating and designing				Producing and implementing		Evaluating		Collaborating and managing													
Content Description			Investigate the role of hardware and software in managing, controlling and securing the movement of and access to data in networked digital systems (ACTDIK034)		Analyse simple compression of data and how content data are separated from presentation (ACTDIK035)		Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)				Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using structured data (ACTDIP037)				Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs (ACTDIP038)		Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039)				Design algorithms represented diagrammatically and in structured English and validate algorithms and programs through tracing and test cases (ACTDIP040)		Implement modular programs, applying selected algorithms and data structures including using an object-oriented programming language (ACTDIP041)		Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)		Create interactive solutions for sharing ideas and information online, taking into account social contexts and legal responsibilities (ACTDIP043)				Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability (ACTDIP044)			
Sequence of lessons / unit	Approx. time req'd	Year A or B	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #	CD	Achievement standard #										
Robotics and embedded systems	10-12 hrs	10	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input checked="" type="checkbox"/>	4	<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	9	<input type="checkbox"/>		<input type="checkbox"/>											

Years 7 and 8 achievement standard	Years 9 and 10 achievement standard
<p>By the end of Year 8</p> <ul style="list-style-type: none"> Students distinguish between different types of networks and defined purposes. (1) They explain how text, image and audio data can be represented, secured and presented in digital systems. (2) Students plan and manage digital projects to create interactive information. (3) They define and decompose problems in terms of functional requirements and constraints. (4) Students design user experiences and algorithms incorporating branching and iterations, and test, modify and implement digital solutions. (5) They evaluate information systems and their solutions in terms of meeting needs, innovation and sustainability. (6) They analyse and evaluate data from a range of sources to model and create solutions. (7) They use appropriate protocols when communicating and collaborating online. (8) 	<p>By the end of Year 10</p> <ol style="list-style-type: none"> Students explain the control and management of networked digital systems and the security implications of the interaction between hardware, software and users. They explain simple data compression, and why content data are separated from presentation. Students plan and manage digital projects using an iterative approach. They define and decompose complex problems in terms of functional and non-functional requirements. Students design and evaluate user experiences and algorithms. They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and predict results and implement digital solutions. They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.

Robotics and embedded systems

A selection of four projects is presented to accommodate a range of student skill levels and interest, teacher background and school resources. Select the relevant project for your students or allow them to choose a project that appeals to them.

Project 1: Intro to robotics

Brainstorm ideas about what a robot is and what it is not. Discuss intelligence and list things according to their level of intelligence. Students can investigate a line-following robot or an obstacle-avoiding robot.

Project 2: Robotic hand

This project incorporates a social aspect as well as innovation and sustainability. Design and fabricate an assistive device such as a robotic hand. Once the function requirements are defined, a prototype that involves some level of programming is designed and created.

Project 3: Electronics

Students with experience in robotics explore the role of sensors and use this to design their own robotic device using a robotics kit or using electronic components and a development board. Evaluate the robot based on the intended functionality.

Project 4: Sewable electronics

As alternative to robotics investigate sewable electronics, which are a form of wearable electronics. This will enable students to demonstrate their creativity by incorporating the use of electronics with textiles. Evaluate the solution using sustainability, innovation and/or enterprise as criteria.

Projects				
	Project 1: Intro to robotics	Project 2: Robotic hand	Project 3: Electronics	Project 4: Sewable electronics
Questions to guide exploration	<i>What is a robot and how does a robot safely move within its surroundings?</i>	<i>How can robotics emulate a human hand?</i>	<i>Which sensors does my robot need?</i>	<i>What can I create using sewable electronics?</i>
Australian Curriculum alignment	<i>Investigating and defining</i> (ACTDIP038) <i>Generating and designing</i> (ACTDIP039) / (ACTDIP040) <i>Producing and implementing</i> (ACTDIP041) <i>Evaluate</i> (ACTDIP042)	<i>Investigating and defining</i> (ACTDIP038) <i>Generating and designing</i> (ACTDIP039) / (ACTDIP040) <i>Producing and implementing</i> (ACTDIP041) <i>Evaluate</i> (ACTDIP042)	<i>Investigating and defining</i> (ACTDIP038) <i>Generating and designing</i> (ACTDIP039) / (ACTDIP040) <i>Producing and implementing</i> (ACTDIP041) <i>Evaluate</i> (ACTDIP042)	<i>Investigating and defining</i> (ACTDIP038) <i>Generating and designing</i> (ACTDIP039) / (ACTDIP040) <i>Producing and implementing</i> (ACTDIP041) <i>Evaluate</i> (ACTDIP042)
What's this about?	<p>Interestingly there is not widespread agreement on what a robot is. There are varying definitions of what constitutes a robot. Most roboticists, however, agree that a robot has a physical form, senses its surroundings, undertakes some form of automated action and is able to make decisions requiring a level of intelligence.</p> <p>A theme worth exploring in robotics is risk vs innovation. The risks may include:</p> <ul style="list-style-type: none"> choosing the wrong system to automate when something goes wrong what happens? system being hacked inaccurate programming out of control artificial intelligence (AI). <p>Material handling is one application of robotics. A simple solution to automate the process of material handling is to paint colour strips on the floor for the robot to follow. This form of robot can be investigated using line-tracking robots. These robots, sometimes referred to as automated guided vehicles (AGV), are portable robots that follow markers or wires in the floor, use vision, magnets or lasers for navigation.</p> <p>A line-following robot uses the behaviour of light and the way light behaves when it hits surfaces of different colour. Infrared sensors mounted at the front of the</p>	<p>Projects that incorporate a social aspect quite often provide a high level of engagement, particularly for female students.</p> <p>Designing and fabricating assistive devices for a person in need can include a social aspect and a focus on innovation. This can result in a more meaningful robotics project.</p> <p>There is a range of projects where students can design and fabricate an assistive device such as a robotic glove for someone who has limited hand use.</p> <p>For each person, the particular needs (functional requirements) are first defined. This feeds into the requirements for the assistive device. An example of this might be that the person has a functional wrist, but might be missing fingers or have fingers that lack mobility.</p> <p>These projects incorporate the use of a 3D printer. A focus here could include the sustainability of materials used, and/or of processes. Schools may not necessarily need a 3D printer onsite, as there are now options to send designs offsite to be printed and collected.</p>	<p>When investigating embedded systems using a context such as robotics, students will use a development board and a range of electronic components connected in a circuit to complete a design challenge.</p> <p>An Arduino development board is a single circuit board that contains a built-in microcontroller. It can be connected to a range of electrical components and be programmed using a general purpose programming language. Like other development boards that contain a microcontroller, Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings (output) by controlling lights, motors, and other actuators.</p> <p>There are a range of sensors that enable a robot to gather data about its environment. These include:</p> <ol style="list-style-type: none"> Light sensor (measures light intensity) Proximity sensor (detects the presence of an object) Ultrasonic sensor (measures distance) Infrared sensor (detects the intensity of received light that reflects off an object or surface) Sound sensor (detects ambient noise) Thermal sensor (measures temperature) Magnetometer (detects magnetic fields) Barometric sensor (measures atmospheric pressure) Contact switch (can be used to detect a collision) 	<p>Instead of a robotics context you may find some students are more likely to engage with an Arts or Design and Technologies focus that integrates electronics.</p> <p>Sewable electronics such as the Arduino LilyPad are a form of wearable electronics that enable students to demonstrate their creativity incorporating the use of electronics with textiles. These pieces of tech are highly compatible with costume design or interactive arts projects.</p> <p>Sewable electronics are made up of a central board that contains the microprocessor; this is what stores the Arduino sketch (the computer program). Depending on the central board, it may also contain an RGB LED, ON/OFF switch, push button, power supply socket and a number of pins. Sewable electronics kits come with conductive thread that acts as a wire to join components via an electric circuit. A range of common sensors enable data inputs such as:</p> <ul style="list-style-type: none"> light sensors (detect light), which can be used to program connected LEDs to illuminate accelerometer sensors (for basic motion sensing), which can be used when programming to trigger an output such as blinking LEDs or making sound produced by a LilyPad buzzer

	<p>robot, for example, can detect light reflected from a white surface that it reads as a value of 1 or high. Conversely, light from a black surface is absorbed and therefore detected by the sensor as a value of zero or low. These values can be used in creating a program for a development board such as an Arduino. If the value is high, the robot moves in a specified direction; if low, it moves in a different direction.</p> <p>Ultrasonic sensors emit sound waves and use the reflected sound wave from an object to measure distance. Distance is then estimated by the time interval between sensor and object. A program is written to command the robot to change direction to avoid an obstacle. This can be investigated by designing a robot that move autonomously within its surroundings.</p>	<p>To create a robotic hand these types of projects typically incorporate the use of a microcontroller which is ‘embedded’ within the robotic hand-control system. Examples of common microcontrollers include Arduino, Hummingbird and Raspberry Pi.</p> <p>Robotic hands and arms also have a place in space exploration. This may prove to be a useful alternative context in which students have an interest, and it can be used to engage students in designing their robotic device.</p>	<p>10. Accelerometer (measures the linear acceleration) 11. Gyroscope (measures the angle of tilt) 12. GPS (uses the signals from several satellites orbiting the planet to help determine its geographic coordinates). Accurate only to within 5 m.</p> <p>When connecting these sensors and other electrical components such as LEDs in an electrical circuit, a resistor is often used in conjunction with the component to protect it from overload. When creating electrical circuits, be mindful about the use of resistors, a topic often identified in the electronics related tutorials.</p>	<ul style="list-style-type: none"> • GPS to log your position • temperature sensors (receive temperature from a physical touch, based on body heat and ambient conditions) • Pulse Sensor, a heart-rate sensor for Arduino, which can be used to easily incorporate live heart-rate data into a project. <p>Outputs typically include the LilyPad buzzer or LEDs.</p>				
<p>Focus of learning (in simple terms)</p>	<p>Brainstorm ideas about what a robot is and what it is not. There is not a widely accepted definition, therefore it’s a useful activity to undertake.</p> <p>Provide a graphic organiser that supports students to describe what they think a robot is, list its characteristics and provide examples and non-examples.</p> <table border="1" data-bbox="278 919 715 1192"> <tr> <td data-bbox="278 919 501 1056">A robot is ...</td> <td data-bbox="501 919 715 1056">An example of a robot is ...</td> </tr> <tr> <td data-bbox="278 1056 501 1192">Characteristics of a robot are ...</td> <td data-bbox="501 1056 715 1192">This is not a robot ...</td> </tr> </table> <p>Through discussion distill the main characteristics of a robot, which may include these points:</p> <ul style="list-style-type: none"> • A physical thing: not a computer program such as a bot • Sensing: a way to sense its surroundings • Some form of automation: works without human intervention • Performing a task: designed to do something useful to help humans • Movement: ability to move within its surroundings • Energy: some form of power source • Level of Intelligence: programmed to know what to do; does it use user input or data to make decisions? Can it learn from its previous experiences? <p>Students may raise the issues of bots, and whether bots are robots. According to most roboticists a bot is not actually a robot.</p> <p>If possible, bring in a floor-cleaning robot. Is it intelligent? Intelligence is a concept worth exploring when learning about robotics. Are robots intelligent?</p>	A robot is ...	An example of a robot is ...	Characteristics of a robot are ...	This is not a robot ...	<p>Use relevant stories about people who need a prosthetic to improve their quality of life. Connect these stories to the design and fabrication of a robotic hand.</p> <p>Build a robotic hand Decide on a relevant project, based on the resources available. For example, what programming boards does the school have, what electronics components and equipment are available, and is there access to a 3D printer? Select relevant online resources to provide guidance for students as needed.</p> <p>Integrating data, programming and materials Organise students into groups to investigate a robotic hand and create a working model that is controlled by a sensorised glove. Build the sensorised glove, which should incorporate the use of sensors connected via an Arduino board to visualise real-time data in an Excel spreadsheet. Use this data to make adjustments to the operation of the robotic hand and run a series of trials to investigate its dexterity.</p> <p>Social aspect Students may want to take the project to the next level and create a robotic hand for a particular person. This can be accomplished by accessing the e-NABLE Community website. Alternatively, students can use the downloadable website resources of existing designs to create the parts using a 3D printer. These parts can then be put together to build the working robotic assistive device.</p> <p>Discuss how to evaluate the solution, discussing criteria related to a focus on sustainability, innovation and/or enterprise.</p>	<p>When designing their own robotic devices its useful for students to know what sensors would be of use considering particular functions, and the ways they want the robot to operate. Predicting what sensors a robot might have, helps students think about the role of sensors. Provide a list of some basic robotic design challenges that may include a robot:</p> <ol style="list-style-type: none"> 1. that tracks movement 2. that operates within a set boundary 3. that is able to pick up and move differently sized small objects 4. that is able to transport a payload from one set of coordinates to another 5. that is able to climb stairs 6. that is able to recognise and identify familiar objects; for example, knowing the difference between a dog and a cat 7. that is controlled by voice. <p>Students choose one of the challenges and identify the types of sensors that may be required and how a system might be used to carry out the task. They create design drawings to explain their ideas.</p> <p>Students negotiate their own project to create a robot to complete a specific task. The robot challenges above can be used as inspiration or a starting point.</p> <p>Before students create the robotic device, consider using the following process:</p> <ol style="list-style-type: none"> 1. Group selection (consider skills and assign roles) 2. Defining and researching the project, then creating a materials list 3. Checking what materials are available (and refining the project based on required available materials) 4. Generating design options in drawings or flow charts and raising challenges, main points or questions that require answering prior to building 5. Building the prototype, testing, redesigning and debugging along the way 	<p>Whatever the development board used, students will need assistance to learn how to program using the relevant programming language.</p> <p>If using the Arduino LilyPad, students will use the Arduino Integrated Development Environment (IDE) to create a sketch (computer program). Students unfamiliar with this software will require an introduction both to its use and to program-writing steps.</p> <p>A suggested first step is to follow a modelled demonstration of how to create a blinking LED.</p> <p>Once familiar with the way a sketch is written, students can investigate using values to trigger behaviours. For example, make some decisions based on the light sensor’s readings. If the light value is low, turn on LED, or else turn off LED. Refer to a relevant tutorial that will help students to create the code and debug as they go. Have a number of lengths of wire with an alligator clip at each end so that they can easily build the test circuits.</p> <p>Once students have had success in programming an output based on data from a sensor, they can design their own sewable electronics project. Instead of alligator clips, students can use conductive thread. Refer to a relevant tutorial to get handy tips on how best to carry out this part of the project.</p> <p>Discuss how to evaluate the solution, discussing criteria related to a focus on sustainability, innovation and/or enterprise.</p>
A robot is ...	An example of a robot is ...							
Characteristics of a robot are ...	This is not a robot ...							

	<p>How would you rate and order the intelligence of certain things? Provide a list of 6–10 things for students to order from lowest to highest intelligence; for example, a virus, a human, a floor-cleaning robot, a heater with thermostat, a dolphin, a dog, a chess-playing robot, a social robot such as Kismet, a chimpanzee and a fly. To undertake this task, students need to agree on characteristics or functions that can be performed or are not able to be performed, then use this reasoning to differentiate between levels of intelligence. This task will provide an opportunity to discuss Artificial Intelligence (AI).</p> <p>Students could debate risk vs innovation or social impacts. Prompts might include these:</p> <ol style="list-style-type: none"> 1. How far would you trust a robot? 2. What is already automated? What shouldn't be automated? Why? 3. The driverless car: who is at fault if a driverless car is involved in an accident? Can we guarantee its systems won't be hacked? <p>Line-tracking robot Investigate how we might build a robot that moves a small payload. Use commercially available robotic kits to build a robot that uses infrared (IR) sensors to detect and follow a line to move along a predetermined path. Alternatively, for a more challenging electronics-based project, have the students design and create their own robot using robotic kit materials and electronics components such as a breadboard, development board such as an Arduino, Raspberry Pi or Hummingbird and relevant sensors, servos (motors) and resistors.</p> <p>Collision detection Investigate how to build a robot that avoids collisions. Use commercially available robotic kits to build a robot that uses ultrasonic sensors. As a further challenge, have students design and build their own robot (instead of using a kit robot) that detects obstacles and avoids collisions.</p> <p>Build a robot with AI functionality Use a robotic kit such as Lego Mindstorms or Edison and incorporate some form of AI where the robot uses data to improve performance. An example: a robot that rolls 'lawn bowls' or takes in data to make decisions.</p>		<ol style="list-style-type: none"> 6. Completing the prototype. 7. Evaluating the prototype based on the intended functionality. 	
<p>Supporting resources and tools and purpose/context for use.</p>	<p>Define a robot What is a robot? Watch this video that discusses different definitions of a robot.</p> <p>How robots work This brief article introduces the idea of AI in relation to robots.</p>	<p>Learning hook e-NABLING Aden – Yemen Use this video to introduce the design and fabrication of 'prosthetics' to enable people to use assistive devices such as robotic hands.</p> <p>7 ways to engineer your health</p>	<p>Challenge: robots! Use this interactive to solve real-world problems that need a robotic solution. This is a good warm-up to get students thinking about the types of sensors that a robot uses to gather data about its surroundings and make decisions.</p> <p>How to make a robot – Lesson 7: Using sensors</p>	<p>Planning a wearable electronics project Here's a guide to planning a project with LilyPad or other wearables products.</p> <p>Getting started with LilyPad Described this way: 'The LilyPad system is a set of sewable electronic pieces designed to help you build</p>

	<p>Kismet: The social robot Researchers in the Artificial Intelligence Laboratory working to engineer smarter robots are now building a machine that interacts socially with people. Video segment adapted from the Massachusetts Institute of Technology.</p> <p>Robotics applications Automated guided vehicles (AGV) View this commercial solution that uses automated guided vehicles in materials handling and transport without human intervention.</p> <p>Making your own robot Line follower Use this video, or one similar showing a line tracking robot in action, to discuss how the robot might work.</p> <p>Mindstorms NXT Line Follower Building and programming instructions for LEGO® MINDSTORMS® NXT.</p> <p>mBlock Simple line-following program</p> <p>Line Tracker (3-pack) This site provides VEX line tracker sensors for purchase and downloadable supporting materials to build a line tracking robot.</p> <p>How to build a robot – Lesson 3: Build a line tracking robot This tutorial shows the electronics parts, including sensors and Arduino programming board, that can be used to create and program a line tracking robot.</p> <p>Tracking a line This tutorial explains how to use a Hummingbird LED and light sensor to make a mobile robot follow a line.</p> <p>AI classroom activity: Machine learning In this article, Dr Joshua Ho discusses how to build an artificial intelligence (AI) system that can exhibit another behaviour often associated with human intelligence: learning.</p> <p>Edison: Lesson 7: Detect obstacles Described as: 'Introduction to the concept of obstacle detection and artificial intelligence. Students program the robot to make decisions (artificial intelligence) in response to obstacles in the robot's environment.'</p>	<p>Use this poster as a discussion starter about engineering body parts.</p> <p>Building machines that emulate humans This video describes the sequence of ideas as students investigate the human hand and how this can be used to influence the building of a robotic hand.</p> <p>Lesson ideas Building machines that emulate humans Students build robotic models from cardboard and straws to understand the anatomy and biomechanics of the human hand. Then, they conduct trials visualizing data in Excel to generate new ideas for improving its performance.</p> <p>Build a hand Described this way: 'The e-NABLE community has developed a collection of different 3D-printable assistive devices that are free for download and fabrication by anybody who would like to learn more about the designs or fabricate a device for somebody in need.'</p> <p>Arduino: Making a robotic hand (low cost) In this tutorial, learn how to make a robotic hand and how to control it.</p> <p>Robotic arm and 3D modeling Described as 'a 3D printed robotic arm, controlled through an arduino, also being 3D rendered in Python OpenGL, using the Ci20 board'.</p> <p>Robotic hand wireless control This project is described as '3D robot hand assembly, servo control, flex sensor control, wireless control with nRF24L01 are available'.</p> <p>Creating a robotic hand with the Raspberry Pi This project provides you with the knowledge needed to begin building your own robotic hand using Raspberry Pi and Linux programming code.</p> <p>Making a robot hand with Hummingbird This simple project will provide you with the knowledge to begin building your own robotic hand using Hummingbird programming board and easy visual programming.</p>	<p>Use this site to find out the multitude of sensors and electronic components that can be used in the design of a robot. It will help students answer the question: Which sensors do my robots need?</p> <p>Different types of sensors A basic list of common sensors and their uses.</p> <p>148 robot projects These are Arduino-based projects that may be used to provide a starting point for students to design their own robots to complete a task.</p> <p>Prototyping with microcontrollers and sensors Use this lab is to better understand the basics of electronics, the Arduino board, and the Arduino IDE (Integrated Development Environment).</p> <p>You can learn Arduino in 15 minutes. This YouTube video is a great intro to Arduino. Learn how to choose an Arduino, dim LEDs, build a motor speed controller and more.</p>	<p>soft, sewable, interactive e-textile (electronic textile) projects.'</p> <p>ProtoSnap LilyPad development simple hookup guide The ProtoSnap series is a way to prototype your project without a breadboard. Everything is wired together on a single board, which makes it easy to explore the possibilities of the components before snapping them apart and building them into your project.</p> <p>LilyPad Light Sensor Hookup Guide This tutorial takes you through how to hook up a light sensor and read values, and incorporate them into a computer program to create a sketch.</p> <p>Sound page guide Use this tutorial to make some interactive art. Use conductive paint, conductive thread or alligator clips.</p> <p>FLORA - Wearable electronic platform: Arduino-compatible - v3 Flora is a wearable electronics platform. It's a round, sewable, Arduino-compatible microcontroller designed to be used to create wearables projects.</p> <p>Flora sensors This video describes high-tech sewable sensors available for use with Adafruit Flora.</p> <p>Circuit Playground Express An alternative to LilyPad and Flora is Circuit Playground Express which can be programmed using visual block code for students that need a simpler programming environment but still able to design a wearable tech project, musical instrument or other creation.</p> <p>The Tilt Trumpet Create an instrument that enables you to change the pitch and volume by tilting the Circuit Playground Express in various directions.</p>
<p>Assessment</p>	<p>Suggested approaches may include: Teacher checklist recording level of engagement in discussion about what a robot is and what it is not. List</p>	<p>Suggested approaches may include: Description of problem and solution. List of functional and non-functional requirements.</p>	<p>Suggested approaches may include:</p>	<p>Suggested approaches may include: Description of problem and solution. List of functional and non-functional requirements. Presentation and</p>

	<p>of functional and non-functional requirements for robotic design. Presentation and explanation of their robot.</p> <p>Achievement standard Define and decompose complex problems in terms of functional and non-functional requirements.</p> <p>Test and predict results and implement digital solutions.</p>	<p>Presentation and explanation of their robotic hand.</p> <p>Achievement standard Define and decompose complex problems in terms of functional and non-functional requirements.</p> <p>Test and predict results and implement digital solutions.</p>	<p>Description of problem and solution. List of functional and non-functional requirements. Presentation and explanation of their robot.</p> <p>Achievement standard Define and decompose complex problems in terms of functional and non-functional requirements.</p> <p>Test and predict results and implement digital solutions.</p>	<p>explanation of their design incorporating sewable electronics.</p> <p>Achievement standard Define and decompose complex problems in terms of functional and non-functional requirements.</p> <p>Test and predict results and implement digital solutions.</p>
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