

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		Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014)		Examine how whole numbers are used to represent all data in digital systems (ACTDIK015)		Acquire, store and validate different types of data, and use a range of software to interpret and visualise data to create information (ACTDIP016)		Define problems in terms of data and functional requirements drawing on previously solved problems (ACTDIP017)		Design a user interface for a digital system (ACTDIP018)		Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019)		Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)		Explain how student solutions and existing information systems are sustainable and meet current and future local community needs (ACTDIP021)		Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)		
Sequence of Lessons / Unit	Approx. time req'd (hrs)	Year 5 or 6	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 #
Data and information	5	5	<input checked="" type="checkbox"/>	3	<input type="checkbox"/>		<input checked="" type="checkbox"/>	3	<input checked="" type="checkbox"/>	3	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	

Years 3 and 4 Achievement Standard	Years 5 and 6 Achievement Standard	Years 7 and 8 Achievement Standard
<p>By the end of Year 4</p> <ul style="list-style-type: none"> Students describe how a range of digital systems (hardware and software) and their peripheral devices can be used for different purposes. They explain how the same data sets can be represented in different ways. Students define simple problems, design and implement digital solutions using algorithms that involve decision-making and user input. They explain how the solutions meet their purposes. They collect and manipulate different data when creating information and digital solutions. They safely use and manage information systems for identified needs using agreed protocols and describe how information systems are used. 	<p>Separated by line. Number in brackets, e.g. (3), can be used as an identifier in various parts of the template.</p> <p>By the end of Year 6:</p> <ul style="list-style-type: none"> Students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. (1) They explain how digital systems use whole numbers as a basis for representing a variety of data types. (2) Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. (3) They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. (4) They explain how information systems and their solutions meet needs and consider sustainability. (5) Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols. (6) 	<p>By the end of Year 8</p> <ul style="list-style-type: none"> Students distinguish between different types of networks and defined purposes. They explain how text, image and audio data can be represented, secured and presented in digital systems. Students plan and manage digital projects to create interactive information. They define and decompose problems in terms of functional requirements and constraints. Students design user experiences and algorithms incorporating branching and iterations, and test, modify and implement digital solutions. (They evaluate information systems and their solutions in terms of meeting needs, innovation and sustainability. They analyse and evaluate data from a range of sources to model and create solutions. They use appropriate protocols when communicating and collaborating online.

Data and information

Year Level 5

TOPIC Digital systems

Time: 5 HOURS

Acquiring data from online sources draws on, and develops, students’ digital literacy skills. Digital literacy skills include navigation skills and information management; synthesis and critical assessment; and the ethical and legal use of information. Spreadsheets are useful tools that enable us to manage, analyse and visualise data such as a chart or graph. Data validation is a key skill of using simple formulas to automate calculations. In this sequence, the students’ inquiry on a chosen context leads to them to design and create digital information that incorporates a data visualisation such as an infographic.

Flow of activities				
Short text	Collecting data Draw on digital literacy skills to collect, manage and analyse data.	Devices to collect data Examine how peripheral devices can be used to collect data.	Organising and analysing data Students use a spreadsheet to organise and analyse data that they have collected.	Create an infographic Design and create information in the format of an infographic.
Questions to guide exploration	<i>How can I source data to answer a question or solve a problem?</i>	<i>What peripheral devices can be used to collect data?</i>	<i>What software help to organise and analyse data?</i>	<i>How can we visualise data to create information?</i>
AC Alignment	<i>Collecting, managing and analysing data (ACTDIP016)</i>	<i>Collecting, managing and analysing data (ACTDIP016) Digital systems (ACTDIK014)</i>	<i>Collecting, managing and analysing data (ACTDIP016)</i>	<i>Investigating and defining (ACTDIP017)</i>
What’s this about?	Navigation skills and information management are important digital literacy skills. Evidence of these skills are demonstrated when students efficiently locate up-to-date, relevant and accessible sources and then organise sources for efficient retrieval. Synthesis and critical assessment are also relevant skills. Students can demonstrate them by selecting appropriate resources from a list of competing resources, identifying credible resources and in particular how data is used (is it used accurately?). Incorporate the ethical and legal use of information.	Data can be collected using peripheral devices; for example, by using a data logger and data probe to collect data about changing soil temperatures for plants. The data can be recorded, interpreted and presented as a digital graph. Electronic kits such as LittleBits and microcontrollers such as BBC Micro:bit and Arduino have sensors that can be used to collect/display data.	Spreadsheet software such as Microsoft Excel and iOS Numbers enables users to do numeric calculations and analysis. The formulas enable automation and allow the user to develop complex calculations that can change based on the numbers entered. The user can also create charts based on the data entered.	Data visualisation involves using tools to present data in a visual context. Visualising data enables us to more easily see patterns, trends and correlations. Data visualisation tools such as spreadsheets enable us to present data as charts and graphs. Other tools provide more sophisticated ways to visualise data such as infographics, geographic maps and heat maps that use colour to communicate relationships between data values.
The focus of the learning (in simple terms)	Choose a relevant context to collect data to answer a question or help solve a problem. After defining the problem and identifying data requirements, students acquire data from online sources by narrowing the focus; for example, filtering data using provided options or performing queries using advanced search functions. Access and sort data from a database. Provide a relevant class context such as learning about convicts and, more specifically, stories of the First Fleet. Learn to navigate the convict database. Another relevant example might be an online database to research Australian reptiles. Alternatively, search online for relevant databases suited to your classroom context. Collect data via a survey using Google Forms, Survey Monkey or similar tool, or by interviewing and recording the data using relevant tools.	Explore the use of data logging equipment and various probes, electronic kits or microcontrollers to gather data. Explore data collection using a wrist-worn wearable device that has some kind of fitness tracking (eg a FitBit type human activity sensor and data logger). As part of a ‘smart garden’ project, students collect data about the growing conditions of their garden and use this data to maintain plant health and create information products.	Provide guidance and support for students to use a spreadsheet to organise and analyse data that they have collected. Useful skills to develop include: <ul style="list-style-type: none"> using data validation to restrict the type of data or the values that users enter into a cell formatting cells to a particular format such as date, currency or numerical entry using autosum to automatically sum a row or column of data creating charts based on the data entered creating formulas to automate calculations. Set up a skills matrix identifying students who are skilled in a particular aspect of using a spreadsheet. Encourage students to share their skills and knowledge.	Students design and create information in the format of an infographic. The infographic incorporates data students have acquired and analysed.
Supporting resources and tools and purpose/ context for use	Is it going to rain today? This lesson examines the importance of data in effective decision-making. Students find, sort and interpret Bureau of Meteorology rainfall data. They collect their own data and analyse the resulting datasets. Design thinking process: Empathising This lesson is about how to reduce litter in the school ground. Students explore the design thinking process of empathising and they seek to understand more about the users and the problem. Students collect data, and use a spreadsheet to organise the data. First Fleet database This is a searchable database of 780 First Fleet convicts. Students use the advanced search function, enabling the convict data to be queried by age, gender, occupation, crime, value of crime, sentence, reason for transportation, date and place of trial, partner in crime, description of looks and behaviour, date of leaving the colony or date of death, and details about marriage and children. Download datasets as a spreadsheet. Australian Reptile Online Database This is a searchable database containing information on all currently recognised Australian reptile species.	Learning environments This lesson guides students to investigate different sensors to collect data on light, noise and temperature. How to use data from FitBit How does exercise affect sleep quality? Using Reflect and one year of FitBit data, this website visualises the way to an unexpected answer. Wearable tracking devices This article provides some background information on tracking devices.	Excel tutorials Select the relevant module for the software version (eg 2013 or 2016). Numbers support Mac and iOS users can follow these tutorials to develop skills in using Numbers.	Eight free tools for creating infographics Choose from this list of options for infographic tools. Choose your own statistic These data visualisations explore different statistics about Australian society. Is it going to rain today? This lesson provides a structure to visualise data collected and analysed through an inquiry. Heat maps of AFL players This is an example of a heat map; it presents data about AFL players’ possessions, showing the locations of possessions on the football field as a heat map.
Assessment	Suggested approaches <ul style="list-style-type: none"> Research plan Checklist (digital literacy skills) Achievement standard Manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.	Suggested approaches <ul style="list-style-type: none"> Presentation or demonstration Artefact analysis Labelling diagram Achievement standard Manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.	Suggested approaches Artefact analysis Achievement standard Manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.	Suggested approaches <ul style="list-style-type: none"> Presentation or demonstration Artefact analysis Design plan Achievement standard Manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.