Digital Technologies Curriculum		Year Levels: 5-6
Content Descriptors	**Example Can Do Statements - SOLO Taxonomy** https://www.digitaltechnologieshub.edu.au/teachers/scope-and-sequence/5-6 https://aca.edu.au/curriculum/5-6/	**Possible Activities** (All Links work as of April 2020)
Digital Systems **#1 Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014)**	Data and Information (Level 5) • I can LOCATE up-to-date data and information and MANAGE these so I can use them later • I can SELECT information from reputable sites to ensure the data/information is relevant and accurate • I can COLLECT data from online databases, through surveys or websites to answer questions of interest • I can DEMONSTRATE the use of devices that include sensors to collect data to answer questions • I can ORGANISE data using relevant tools such as a spreadsheet Computational Thinking • I can CREATE charts and use other ways to visualise the data to help make sense of patterns and trends • I can CREATE a spreadsheet and use validation to restrict the values that can be entered in each cell; for example, the date only • I can make GENERALISATIONS based on the data I have collected, organised, sorted and analysed Design Thinking • I can CREATE an infographic or use a suitable way of presenting the findings of my inquiry in a way that is related to the question I was trying to answer Connecting Digital Components (Level 6) • I can IDENTIFY and SORT digital system components into input and output • I can DEMONSTRATE the use of a range of digital system components to input information	• https://www.digitaltechnologieshub.edu.au/teachers/scope-and-sequence/5-6 • https://aca.edu.au/resources/#years-5-6 • **Eeek a Mouse**: this lesson explores how a computer mouse was designed and how it works as an input device to direct a computer and create a positive user experience (aspects that affect how an end user interacts with digital systems, such as navigation design, expertise of user and ergonomics). • **Network Communication Protocols:** this lesson idea supports students learning about how messages are sent from one computer to another. • **Inside a computer:** this website explores the various components of a computer and poses a challenge for students to complete. • **Routing and Deadlock in Networks:** students learn about sending messages through the internet and the possibility of 'deadlock'. This activity helps students to work together to find a solution. • **Artificial Intelligence:** activity aims to introduce the topic of what a computer program is and how everything computers do involves following instructions written by computer programmers. It also aims to start a discussion about what intelligence is and whether something that just blindly follows rules can be considered intelligent. • **Inside your computer:** use this video to help students to understand how digital devices work around them. Extension: find a way to explain learning, including make a video, writing a blog, animation, writing a report or create a

	Systems Thinking • I can DESCRIBE an input and an output when discussing how a digital system processes data • I can describe how parts of the digital system work together to perform a task or function • I can DEMONSTRATE multiple ways of inputting data into a digital system using multiple devices. I can relate the input to the output and relate this to the way a system works • I can DEMONSTRATE the use of a programming board to replace the keyboard input such as the use of arrows as a command • I can EXPLAIN some advantages and challenges when using Bluetooth low energy technology • I can CONTROL devices using Bluetooth low energy technology Computational and Design Thinking • AND I can EVALUATE the effectiveness of my digital solution based on how well it meets its intended purpose • I can CREATE a digital solution that uses a programming board as a way the user interacts • I can DESIGN a digital solution in response to a problem involving a robotic device (eg a maze) and can create a program to control a robotic device to negotiate the maze	drawing. • **How the Internet Works:** this unit plan provides a sequence of lessons to support students learning and understanding about how the internet works, including learning about different types of hardware required. • **How computers work**: is a video about how data is transferred in a processor of a computer. • **How computer programs work:** supports students to understand how computers work and that they are not as smart as they seem, they just process data quickly. • **Animal adaptations** - To describe the adaptations of animals and how these functions help the animal to survive, using a digital system. • **CSER Videos and Activities**

Data and Information
#2 Examine how whole numbers are used to represent all data in digital systems (ACTDIK015)
	Binary Numbers (Level 5)
	• I can IDENTIFY the use of 0 and 1 in binary digits
	• For example:
	  ○ binary digits up to 8 bits
	  ○ using binary cards to make a binary digit to show ON/OFF state
	• I can write a binary digit up to 8 bits
	Computational Thinking
	• I can DESCRIBE
	  ○ … the use of representing binary numbers and counting in binary when converting binary digits to decimal numbers
	  ○ … the use of binary digits and a table of characters when
		• https://www.digitaltechnologieshub.edu.au/teachers/scope-and-sequence/5-6
		• **Binary:** Google presentation to support student learning about binary and how computers store information using this type of code.
		• **CISCO Binary Game**: use this binary based game to help students become more proficient with calculating numbers with the binary system.
		• **Binary Numbers Count the dots**: this lesson plan will help students to understand how data of all kinds is stored on computers.
		• **Binary Baubles:** this lesson explores the concept of binary to illustrate how a computer codes data that will be stored for

---------- **Data and Information** **#3 Acquire, store and validate different types of data, and use a range of software to interpret and visualise data to create information (ACTDIP016)**	encoding messages. ○ For example: ▪ using a table with headings 1, 2, 4, 8, 16, etc to write binary numbers and their decimal equivalent ▪ writing dates and other everyday numbered information in binary ▪ referring to a binary character table to encode a message • I can independently convert binary digits to decimal numbers BUT I sometimes need support to convert the larger binary digits to the correct decimal number • I can encode a word such as my name using a binary character table • I can use a spreadsheet made by someone else to convert a binary number to a decimal number • … AND I can EXPLAIN how binary digits are used to represent text and how to convert between binary digits and decimal numbers • I can ANALYSE information for relevance and give reasons for inclusion in an infographic to explain how binary is used by computers • I can independently and confidently convert binary digits to decimal numbers • I can independently encode messages using binary following a binary character table • I can create my own spreadsheet to convert a binary number based on a sample file • I can create an infographic that explains how computers use binary Computational and Design Thinking • AND I can EVALUATE the effectiveness of my infographic based on: meeting its intended purpose • I can independently create an infographic • AND I can seek and act on feedback to improve the infographic	later use. Students will explore computer language and how information can be stored with different combinations of just two choices. • **Explore the Bit by Bit comic:** use this comic to help students understanding of binary and how it works. • **Introduction to binary** – students will be able to define a binary number, understand what a decimal number is (revision), understand why binary numbers are important in digital systems, understand how to read and understand a binary number • **Using binary to create on/off pictures** – students will understand how a bitmap stores images using pixels and colours them using binary numbers. • **CSER Videos and Activities** --- • **The Knight's Tour Activity:** with a focus on graphs, data representation, generalisation and computational thinking, this lesson idea asks students to solve a puzzle where they must find a way for a knight to visit every square on the board exactly once. (unplugged) • **Patterning activities and assessment for year 5/6 students:** this unit has been written with a maths focus. However the pattern recognition skills in these lessons can be connected to the Digital Technologies curriculum with explicit teaching to be directed at the use of data by computers (FUSE) • **Information Salvation:** an activity in Information theory explaining the concept of compression for the students. • **Text Compression:** explores with students how computers have a limited amount of space to store data and information and how they represent it. (unplugged) • **Investigating conductivity with Makey Makey boards** - To investigate the conductivity of different materials using

	Representing Images Using Binary (Level 6) Computational Thinking • I can IDENTIFY the use of 0 or 1 in representing the colours black and white (e.g. in an image made up of black and white pixels) • I can identify numbers on a grid as ones and zeros which represent black (0) or white (1) • I can DESCRIBE how to make an image made up of black and white pixels • I can DESCRIBE how a combination of binary digits is used to represent RGB colours • I can encode a grid made up of black and white pixels and vary the width and height • I can encode a grid using a red, green or blue colours that combine RGB; for example, (1,0,0) to make red or (0,0,1) to make green • AND I can EXPLAIN my binary digit choices – when creating an image for a particular purpose such as an avatar for a game or sprite for an animation • I can independently and confidently shade a grid with up to 8 colours by combining binary digits in RGB • AND I can debug as I build an image to ensure the correct intended colours are represented Computational and Design Thinking • AND I can EVALUATE how effectively my image, which is made up of different coloured pixels, meets its functional requirements and intended purpose • I can GENERALISE about the effect on file size, comparing my image with one that has more pixels and a bigger range of colours • AND I can seek out and act on feedback to improve the effectiveness of my programming choices as I go	Makey Makey boards. • **Understanding your location's rainfall data -** Students understand the importance of data in effective decision-making, and are able to find, sort and interpret Bureau of Meteorology (BOM) rainfall data, and to collect their own data and analyse the resulting datasets. • **Grade 5 Maths – Patterns and Recognition** • **Analysing Data: TeacherVision lessons** • **What is a QR Code?** Brief intro into QR code technology • **History of the QR Code** • **What is encryption** - An encryption is basically an algorithm that any type of data can be run through, thus presenting a new version of the data. Discover how to write a decryption to pull the encryption back out with help from a software developer in this free video on encryption. • **CSER Videos and Activities (QR Codes)**
Data and Information **#4 Plan, create and**	Digital Citizenship (Level 5) • I can IDENTIFY dangers when communicating online	• **Advertising with QR Codes:** links with Design and Technology and Maths. As a part of a Mathematics Rich Assessment Task, The Restaurant Project, the students will

communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols (ACTDIP022)	• I can DEFINE attributes of a good digital citizen
	• I can use online collaboration tools with help
	Systems Thinking
	• I can DESCRIBE protocols that guide me to be safe online and be a responsible digital citizen
	• I can use online collaboration tools such as Padlet or OneNote following agreed protocols
	• I can EXPLAIN the needs (HOW and WHY) for social, ethical and technical protocols; for example:
	  ○ social protocols when collaborating with others or providing feedback on other people's work
	  ○ ethical protocols when referring to and using other people's digital content
	  ○ technical protocols to protect digital identity and restrict access to personal information
	• I can create a blog with support and apply relevant protocols
	• With guidance I can create a personal webpage about myself and can apply relevant protocols
	• AND I can EVALUATE the effectiveness of my blog or webpage based on:
	  ○ how well it meets its intended purpose
	  ○ the degree to which I've followed agreed protocols
	• I can independently create a blog or webpage
	• AND I can seek out and act on feedback to improve the blog or webpage
	
	<u>Collaborative Project (Level 6)</u>
	Design Thinking
	• I can IDENTIFY ways to collaborate safely online
	• I can SHARE ideas using a collaboration tool with some help
	• I can look at existing information systems and IDENTIFY the types of information that are used
	• I can IDENTIFY the needs of a user.
	  ○ empathise
		publish an advertisement of their 'restaurant'. Students will then create a QR code which will link to their video and can be put on a business card to promote their restaurant. (FUSE)
		• **Home Internet Survey:** use this interactive game to support students to explore how data is collected, sorted and represented. As an extension they could start looking at other organisations which collect large quantities of data including the Australian Bureau of Statistics. (ABC)
		• **Databases Unplugged:** this activity introduces the idea of database queries and leads to digital based experience as a follow up.
		• **Class blog** - To develop the initial content to be used during the creation of the class blog.
		• **Biometrics** – identifying people using data such as fingerprints, DNA, facial structure, eyes, etc
		
		Common Sense Education
		• What is your digital footprint
		• Mindful Messaging

	○ define Computational and Design Thinking • I can DESCRIBE protocols that guide me to be safe online and be a responsible digital citizen • I can DESCRIBE the pros and cons of existing information systems that we are studying • I can use online collaboration tools such as Padlet or OneNote following agreed protocols • I can look at existing information systems and IDENTIFY the types of information that are used and the technology used to transmit/store/display data • I can ELABORATE on these needs by sketching out different options for information system • I can ANNOTATE each design to clarify the different options for information system ○ Ideate Computational and Systems Thinking • AND I can EXPLAIN HOW and WHY particular technologies might be used in an information system • I can use collaborative tools to effectively build on the ideas of others using agreed protocols • I can DESIGN an information system that considers how personal data needs to be protected and that the solution is sustainable • I can BUILD models or representations (prototypes) of an information system to learn more about the digital design solution ○ prototype (eg I can SEQUENCE (storyboard) the development of an information system) • I can annotate the sequence to EXPLAIN how the prototype development ensures an information system better meets user needs Systems and Design Thinking • AND I can EVALUATE the effectiveness of my design of an information system based on functional requirements to accommodate: ○ user needs	

	○ relevant technologies • AND I can seek out and act on feedback to improve the effectiveness of my information system design as I go • I can repeatedly TEST the prototypes and use the results to continually inform improvements to the information system ○ test • I can EVALUATE the effectiveness of the information system against clearly established criteria for the user's needs.	
Creating Digital Solutions **#5 Define problems in terms of data and functional requirements drawing on previously solved problems (ACTDIP017)** **Creating Digital Solutions** **#6 Design a user interface for a digital system (ACTDIP018)** **Creating Digital Solutions** **#7 Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019)**	<u>Problem Solving Process (Level 5)</u> Design Thinking • I can DEFINE a problem identifying functional and data requirements • I can IDENTIFY the use of isolated visual programming skills when programming ○ For example, the use of: ▪ an if/then statement ▪ loops or repetition ▪ user input • I can interpret an algorithm presented as a flow chart • I can use a visual programming language IF I copy programming examples created by someone else Computational and Design Thinking • I can DESCRIBE the use of isolated and combined visual programming skills when programming ○ For example, the use of loops when: ▪ incorporating repeat instructions ▪ allowing for varied user input ▪ selecting options (for example, in a quiz) • I can create an algorithm that I use to plan out a program for a digital solution. • I can create a paper prototype of my design to show screen transitions • I can independently program a digital solution using a visual programming language BUT I am not sure about my programming and I struggle to debug any errors that occur Computational Thinking	• https://www.digitaltechnologieshub.edu.au/teachers/scope-and-sequence/5-6 • **Rock, Paper, Scissors:** this activity builds on the classic game of Rock, Paper, Scissors. Students start by playing the traditional game and then explore the context of computer modelling by viewing a model that uses the same rules. Students decode a computer program to learn basic concepts. (unplugged) • **Conditionals with cards:** students learn about algorithms and conditional statements. Students explore circumstances when certain parts of programs should run and when they should not and determine whether a conditional is met based on criteria. • **Eco-calculator** - To understand the impact that people have on the environment and to use this to calculate people's eco-footprints using key pieces of information • **Home/School communications** - To solve a real-life problem: using big data sets and school surveys to discover a way to improve home/school communications by designing (and as an extension activity, making) a new digital communication solution for the school. • **Making maths quizzes** - Plan, create and edit a program that will ask maths questions that are harder or easier depending on user performance, Implement a digital solution to create the program, and then test and assess how well it works

Creating Digital Solutions
 	
#8 Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)
	• AND I can EXPLAIN my programming choices – when programming a digital solution such as an animation, quiz, choose your own adventure story or controlling a robotic device
	• I can independently and confidently create a digital solution using a visual programming language
	• AND I can debug as I build (correct my own code)
	Systems Thinking
	• AND I can EVALUATE the effectiveness of my digital solution in meeting its functional requirements for:
	  ○ meeting its intended purpose
	  ○ user input
	• AND I can seek and act on feedback to improve the effectiveness of my programming choices as I go
	
	<u>Creating a Digital Games (Level 6)</u>
	Design Thinking
	• I can DEFINE a problem identifying functional and data requirements
	• I can IDENTIFY the use of isolated visual programming skills in my digital game
	  ○ For example, the use of:
	  ▪ an if/then statement
	  ▪ loops or repetition
	  ▪ user input
	• I can use a storyboard to design a game and identify its functional and data requirements
	• I can create a digital game using a visual programming language IF I copy game programming examples created by someone else
	• I can IDENTIFY the needs of a user (eg a digital design solution – a user input interface)
	  ○ empathise
	  ○ define
	Computational and Design Thinking
	• I can DESCRIBE the programming sequence using the storyboard or flow chart; for example, the use of loops when:
	  ○ incorporating repeat instructions
	  ○ allowing for varied user input
		• **The Muddy City Minimal Spanning Trees:** this lesson supports students to explore different types of networks and investigate ways to efficiently link objects in a network (unplugged)
		• **Microwave Racing Video:** this lesson is focused on human-computer interaction, usability and usability evaluation.
		• **The Emotion Machine Activity:** this lesson introduces students to programming, instruction sequences and computational thinking.
		• **My Robotic Friend:** this lesson idea can be adapted for a variety of age and abilities and could be conducted with a whole class, groups of students with older student support or in small groups. It requires students to problem solve using computational thinking and write a set of instructions for a 'robot' to follow. This idea could be implemented over multiple lessons, enabling students to explore and start thinking about how a real robot works & conduct some research about it.
		• **eSmart Digital License:** The Digital Licence helps young people understand how to behave respectfully and appropriately online. It sets out to help young people learn about the implications of things they do online. The teacher creates an account so that the students can access it and work through the content.
		• **Growing Up Digital Classroom Resources:** link to downloadable classroom activities, videos, interactive learning modules and advice sheets and other useful resources to use in the classroom.
		• **Computer science in a box**- Unplug your curriculum: this resource booklet was produced to be used for students ages 9-14 to teach lessons about how computers work, while addressing critical maths and science concepts such as number systems, algorithms and manipulating variables and logic.

Creating Digital Solutions **#9 Explain how student solutions and existing information systems are sustainable and meet current and future local community needs (ACTDIP021)**		

	○ selecting options • I can independently create a digital game using a visual programming language BUT I am not sure about my programming and I struggle to debug any errors that occur • I can ELABORATE on these needs by sketching out different options for the user input interface • I ANNOTATE each design to clarify the different options for the user input interface ○ Ideate • AND I can EXPLAIN HOW and WHY my programming choices, when integrating the different visual processing skills, meet the user input purpose of my digital game (e.g. explain how a logical sequence of visual programming skills codes for user input) • I can independently and confidently create a digital game using a visual programming language • AND I can debug as I build (correct my own code) • I can BUILD models or representations (prototypes) of the user input interface to learn more about the digital design solution ○ prototype (For example, I can SEQUENCE (storyboard) the development of the user input interface) • I can annotate the sequence to EXPLAIN how the prototype development ensures the user input interface better meets user needs Systems Thinking • AND I can EVALUATE the effectiveness of my game in meeting its functional requirements for: ○ user input ○ game play • AND I can seek and act on feedback to improve the effectiveness of my programming choices as I go, or perhaps when building a game that incorporates user input • I can TEST the prototypes to make sure the solution will work as intended • I can CREATE an online game that incorporates the user input interface ○ test • I can EVALUATE the effectiveness of the user input interface against clearly established criteria for the user's needs	• **Computer Science in Algebra, (free, web):** The twenty lessons focus on concepts including order of operations, the Cartesian plane, function composition and definition, and solving word problems, within the context of video game design. Full lesson plans for teachers to follow, student workbook and self-paced online course for students to complete. Students will need to login to complete the course, however teachers could create generic student logins to protect student identity. Extension: Students use Scratch to design their game with their understanding of coordinates and programming. • **CS Unplugged** • **Studio Code.org** students complete 20 hour courses. The courses are sequential and become more complex. • **Repeat Loops Video:** Mark Zuckerberg explains the concepts of repeat and loops used in programming. • **If and if/else statements:** Bill Gates explains if and if/else statements used in programming. • **How Search Works**: The life span of a Google query is less than 1/2 second, and involves quite a few steps before you see the most relevant results. Also check out the Google page on this. There are also lesson plans. • **Hour of Code** ○ Introduction ○ If/ Else Block ○ Repeat / Until Statements • **CSER Videos and Activities** **Apps and Software (google search the software)** • **Looking Glass (free, computer software, Windows, Mac, Linux):** a programming environment for more advanced students. Create and share animated stories, simple games

		and even virtual pets. • **Pencil Code (free, web):** a programming site for drawing art, playing music and creating games with block or text code. It has strong connections with maths including the areas of geometry, graphing and algorithms. Students can create using either block code to extend them they can swap to text coding using Coffeescript. Preload projects from the library or start with a blank page. • **Stencyl (Free starter version, computer software):** for advanced students who have mastered the basics of drag and drop visual coding apps. Stencyl uses the same drag and drop format but provides an open system where students can build their own games and publish them to the web • **Code Club (free):** resources for students and teachers to learn Scratch, HTML and Python • Blocky, Minecraft, CargoBot (iPad), Code Monkey, Gamestar Mechanic (video games), Kodable, Hopscotch, Scratch, Snap, Code Studio, Tynker, Hakitzu (javascript), Kids Ruby

Level 5 to Level 6 Achievement Standard

By the end of Year 6, students explain the fundamentals of digital system components (hardware, software and networks) and how digital systems are connected to form networks. They explain how digital systems use whole numbers as a basis for representing a variety of data types.

Students define problems in terms of data and functional requirements and design solutions by developing algorithms to address the problems. They incorporate decision-making, repetition and user interface design into their designs and implement their digital solutions, including a visual program. They explain how information systems and their solutions meet needs and consider sustainability. Students manage the creation and communication of ideas and information in collaborative digital projects using validated data and agreed protocols.

Learning Area Achievement Standard

By the end of Year 6, students explain how social, ethical, technical and sustainability considerations influence the design of solutions to meet a range of present and future needs. They explain how the features of technologies influence design decisions and how digital systems are connected to form networks.

Students describe a range of needs, opportunities or problems and define them in terms of functional requirements. They collect and validate data from a range of sources to assist in making judgements. Students generate and record design ideas for specified audiences using appropriate technical terms, and graphical and non-

graphical representation techniques including algorithms. They plan, design, test, modify and create digital solutions that meet intended purposes including user interfaces and a visual program. Students plan and document processes and resources and safely produce designed solutions for each of the prescribed technologies contexts. They negotiate criteria for success, including sustainability considerations, and use these to judge the suitability of their ideas, solutions and processes. Students use ethical, social and technical protocols when collaborating, and creating and communicating ideas, information and solutions face-to-face and online.

Years 5 and 6 Band Description

Learning in Digital Technologies focuses on further developing understanding and skills in computational thinking such as identifying similarities in different problems and describing smaller components of complex systems. It also focuses on the sustainability of information systems for current and future uses.

By the end of Year 6, students will have had opportunities to create a range of digital solutions, such as games or quizzes and interactive stories and animations.

In Year 5 and 6, students develop an understanding of the role individual components of digital systems play in the processing and representation of data. They acquire, validate, interpret, track and manage various types of data and are introduced to the concept of data states in digital systems and how data are transferred between systems.

They learn to further develop abstractions by identifying common elements across similar problems and systems and develop an understanding of the relationship between models and the real-world systems they represent.

When creating solutions, students define problems clearly by identifying appropriate data and requirements. When designing, they consider how users will interact with the solutions, and check and validate their designs to increase the likelihood of creating working solutions. Students increase the sophistication of their algorithms by identifying repetition and incorporate repeat instructions or structures when implementing their solutions through visual programming, such as reading user input until an answer is guessed correctly in a quiz. They evaluate their solutions and examine the sustainability of their own and existing information systems.

Students progress from managing the creation of their own ideas and information for sharing to working collaboratively. In doing so, they learn to negotiate and develop plans to complete tasks. When engaging with others, they take personal and physical safety into account, applying social and ethical protocols that acknowledge factors such as social differences and privacy of personal information. They also develop their skills in applying technical protocols such as devising file naming conventions that are meaningful and determining safe storage locations to protect data and information.