Year 7 to 10

Technologies

Digital Technologies

September 2022

Scope and sequence

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V2.0

Government of South Australia
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Technologies – Digital Technologies: Years 7 to 10

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Context statement

Digital Technologies is about exciting interest in computer science. It is about empowering students to understand how the devices they use, actually work. Students will develop the skills and confidence to imagine, design and create their own digital solutions and develop a deep knowledge and understanding of digital systems and how to manage the risks using and developing digital systems. Computational, systems and design thinking are fundamental to Digital Technologies learning. Digital systems support new ways of collaborating and communicating and require skills such as computational and systems thinking. Digital Technologies provides students with practical opportunities to use design thinking and to be innovative developers of digital solutions within an ethical framework, considering safety by design principles.

Computational thinking

Computational thinking is a problem-solving process involving:

- pattern recognition: understanding trends, similarities, and patterns in data to define problems
- decomposition: breaking down complex problems into simpler parts
- abstraction: identifying and removing unnecessary details to simplify a problem
- algorithmic design: creating a step-by-step solution to a problem

Systems thinking

Systems thinking is the ability to see the big picture. Students need to understand the interactions and interrelationships between components, devices and people that exist when creating digital solutions. They also need to see their solutions through legal, ethical and sustainability lenses.

Design thinking

Design thinking is the process of imagining, creating, and realising solutions. It involves:

- developing empathy for the end user
- investigating and defining problems
- generating and designing innovative, user-centred ideas and solutions
- producing, creating, and evaluating solutions
- evaluating, responding to user feedback, and redesigning (such iteration may occur at any stage of the design cycle)

When using these thinking strategies together, students can develop powerful digital solutions.

For the SA version of the scope and sequence the Privacy and Security sub strand has been moved to the Knowledge and Understanding strand which best reflects the language used in the content descriptions. However, students will need to apply this knowledge practically during the process and production strand.

This document is designed to:

- provide clarity and context for teaching Digital Technologies in South Australia
- identify the discipline-specific knowledge, skills and understanding learners need at each year level
- guide educators to teach and model Computational, Systems and Design thinking
- support educators with the language and processes to design, create and produce digital solutions.
- examples of knowledge, learning or skills in each sub-strand are not limited to the examples provided but are there to guide educators to make connections between the content descriptions and their sites context and resources.

Achievement standards

Years 7 to 8	Years 9 to 10
By the end of Year 8, students: • **develop** and **modify** creative digital solutions, decompose real-world problems, **evaluate** alternative solutions against user stories and design criteria • **acquire**, **interpret,** and **model** data with spreadsheets and **represent** data with integers and binary • **design** and trace algorithms and **implement** them in a general-purpose programming language • **select** appropriate hardware for particular tasks • **explain** how data is transmitted and secured in networks • **identify** cyber security threats • **select** and **use** a range of digital tools efficiently and responsibly to **create**, **locate** and **share** content; and to **plan**, **collaborate** on and **manage** projects • **manage** their digital footprint	By the end of Year 10, students: • **develop** and **modify** innovative digital solutions, decompose real-world problems, **critically evaluate** alternative solutions against stakeholder elicited user stories. • **acquire**, **interpret,** and **model** complex data with databases **represent** documents as content, structure, and presentation. • **design** and validate algorithms and **implement** them, including in an object-oriented programming language. • **explain** how digital systems manage, control, and secure access to data; **model** cyber security threats and **explore** a vulnerability. • **use** advanced features of digital tools to **create** interactive content, and to **plan**, **collaborate** on, and **manage** agile projects. • **apply** privacy principles to manage digital footprints.

Scope and sequence

Strand: Knowledge and Understanding

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Digital Systems This sub-strand focuses on the components of digital systems: hardware, software, and networks. In the early years, students learn about a range of hardware and software and progress to an understanding of how data is transmitted between components within a system, and how the hardware and software interact to form networks.	**Explain how particular hardware performs particular tasks.** • **recognise** hardware components in a variety of settings and explain the tasks they can perform. • **Identify** the differences between similar digital devices explaining why specifications may differ. For example, why do smartphones often come with different size data storage.	**Explain how hardware specifications affect performance and select appropriate hardware for particular tasks and workloads.** • **explain** how hardware specifications affect what, and how quickly, a digital system can perform tasks, for example: ○ different bandwidth networks affect download speed and lag or ○ how much RAM is required for multimedia authoring? • **compare** digital devices making recommendations so they are fit for purpose	**Explain how the hardware and software manage and control data in a networked digital system.** • **investigate** how an operating system manages the relationship between hardware, applications, and system software. • **discuss** how the network components that control the movement of data operate in regard to security and speed, for example: ○ routers ○ hub ○ switches and bridges. • **understand** the advantages and disadvantages of encrypting and decrypting data • **investigate** how routers learn to move packets of data securely around a network.	**Investigate how hardware and software manage, control and secure access to data in networked digital systems** • **investigate** the role of a network operating system and its ability to manage: ○ users (passwords) ○ groups ○ permissions. ○ and access control • **investigate** the role of a firewall as a network security tool • **discuss** a range of systems (process and procedures) that organisations using a network should implement to ensure systems are kept safe and secure. For example: ○ password and group permissions ○ location of digital systems that store private/confidential data ○ confidential agreements for staff and clients. • **investigate** why and how different types of encryptions work. For example: ○ secret keys and 'exclusive or' (XOR) ○ hashing algorithms.
	Examine how data is stored and transmitted within a digital system and how networks are formed. • **understand** the materials used to transmit data within a digital system	**Investigate how data is transmitted and secured in wired and wireless networks including the internet** • **describe** physical networks and compare their properties, including		

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	and between them, as well comparing reliability and speed. For example: ○ circuit boards ○ copper cables ○ fibre cables ○ radio waves. • **understand** that data travelling on a network needs to know where it is going. This could include knowing about: ○ IP Addresses – Internet Protocol Addresses ○ DNS – Domain Name System ○ URLs – Uniform Resource locator. • **explain** why cryptography is necessary for securing data	bandwidth, latency, and reliability of wired versus wireless networks • **realise** that data is transmitted via different paths depending on the network configuration and required purpose • **discuss** the different communications protocols for network communication and how they operate. • **explain** how problems occur in network communication and how they can be solved, for example routers can drop packets and how TCP uses acknowledgements to confirm packets have been received • **explore** simple encryption and decryption algorithms, for example ROT13 and XOR		
Data Representation This sub-strand looks at how data is represented and structured symbolically for use by digital systems. Different types of data are studied from Foundation to Year 8 including text, numeric, images (still and moving) and sound with relational data being introduced in Years 9 and 10.	**Explain how digital systems represent text, all data using binary digits** • **investigate** how text is represented, secured, and presented in digital systems. For example, that a character is represented by a byte and text by a series of bytes. • **discuss** the difference between a Raster (bitmap) and vector image • **investigate** file size and its relationship to text. For example: ○ 8 bits = 1 byte ○ 1 byte = 1 character (ASCII) ○ 1024 Bytes = 1 Kilobyte ○ 1024 Kb = 1 Megabyte.	**Investigate how digital systems represent text, image and audio data using integers** • **investigate** how digital systems represent text as a sequence of individual characters numbered using a character set, for example uppercase and lowercase letters, punctuation, and emoji • **explain** how digital systems represent: ○ bitmap images (for example PNG and JPEG) as the colour of each pixel in separate red, green, and blue (RGB) channels ranging from 0-255 ○ represent vector graphics (for example SVG) using the geometry of lines and shapes • **explain** how digital systems represent audio using whole numbers as it records, stores and outputs sound.	**Represent documents online as content (text) and structure (markup) and explain why such representations are important** • **create** web pages using Hyper Text Markup Language (HTML) for content and structure and Cascading Style Sheets (CSS) for styling.	**Represent documents online as content (text), structure (markup) and presentation (styling) and explain why such representations are important** • **create** documents by separating content (the text in the document), the structure (the document structure such as headings and paragraphs), and presentation (how the document is laid out and styled) • **explain** how representing content, structure, and presentation separately allows each of them to be designed, edited, manipulated, and stored independently of the others and why this is important

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	Explore how and why digital systems represent data as binary digits • **explain** the design of digital electronics and its ability to operate in two states. • **explain** how digital systems represent data in binary, for example by converting a character to its Unicode value, then converting that value into binary.	**Explain how and why digital systems represent integers in binary** • **analyse** how an image is represented when the number of colours increases and the use of Hexadecimal to solve file size issues. • **explain** how whole numbers can be represented in binary, for example counting in binary from 0 to 31, and recognising that one byte = 8 bits, which can represent from 0-255	**Understand that data compression reduces the amount of space needed to store files** • **examine** and explain why the size of files used every day differs depending on the software or saved format used, For example**:** ○ txt vs Docx ○ CSV vs Xls ○ BMP vs jpeg. • **understand** run length encoding and Huffman coding	**Investigate simple data compression techniques** • **analyse** how Lossy (JPG/MP3) and lossless file (PNG/TIFF/RAW/Codec) compression work.
Privacy and Security Privacy and security involve students developing appropriate techniques for managing data, which is personal, and effectively implementing security protocols. In the early years, this begins with knowledge that data can be personal, collated and connected and progressively moves to students developing skills in managing the collection of their own or another user's data. Students learn the importance of effective security protocols. They effectively access school or personal accounts and progress from using simple usernames and passwords in the early years to using unique passphrases and multi-factor authentication which considers cyber security threats. Evidence of Privacy and security can be found in the process and production strand as students will need to apply this knowledge practically.	**Explain the risks of password reuse and the range of cyber security threats** • **Explain** that password reuse: ○ Risks their other accounts ○ increases hacking attacks on their accounts ○ lead to loss of financial and sensitive data • **develop** ways to create complex passwords to protect the privacy of information for their accounts • **identify** their behaviours in person or online that can lead to cyber security threats • **list** common cyber security treats to them and or their family	**Explain how multi-factor authentication protects an account when the password is compromised and identify phishing and other cyber security threats** • **explain** how multi-factor authentication prevents unauthorised access by prompting the account owner for a token or single use password • **identify** the common techniques used in phishing scams to identify and exploit susceptible users • **explore** a range of online systems that are used to reduce phishing like CAPTCHA screens • **understand** and can identify online phishing, spam, and malicious emails	**Explain and model how a cyber security threat occurs.** • **create** simple data flow diagram to understand how data moves through a system • **explore** a range of cyber security threats and how they operate in a business environment • **Understand** those who are motivated to commit cybercrimes (Threat Actors) and the main paths (Threat Vectors) they use to enter a computer system	**Develop cyber security threat models, and explore a software, user, or software supply chain vulnerability** • **use** a data flow diagram to understand how private information moves through a system and when it would be the most likely target of a cyber attack • **explore** the impact of a cyber security threat by systematically following the steps involved in bypassing a known vulnerability in their own design solution • **Create** documentation for a designed solution to outline ways to reduce a cyber threat
	Explain the creation and permanence of their digital footprint and consider privacy when collecting user data • **understand** that digital footprints are built from: ○ interactions on social media, ○ your friend circle on social media sites,	**Investigate and manage the digital footprint existing systems and student solutions collect and assess if the data is essential to their purpose** • **investigate** how recommendation algorithms used in media services rely on data that tracks your use habits	**Understand the Australian Privacy Principles and how it applies to data collection and the need for students to manage their digital footprint.** • **understand** what personal and sensitive information is • **understand** how organisations and or government agencies:	**Apply the Australian Privacy Principles to critique and manage the digital footprint that existing systems and student solutions collect** • **assessing** whether their social media accounts allow them to update their contact information if these details change, and who else can see that

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	○ sites you visit, ○ online purchases ○ locations visited through Facebook check-ins etc. • **review** and **manage** their digital footprint across online digital tools and platforms that they use • **participate** in class discussions about media literacy and online safety. • **demonstrate** knowledge of when to share personal information.	• **assess** the appropriateness and relevance of data collected by surveys from other students and organisations they complete online • **aware** that what goes online is never completely erased, and can be easily replicated and reused for unintended purposes • **explore** the impact on themselves, family and community when sharing images and texts without consent • **understand** digital reputation is equally important and is controlled by your digital footprint	○ collect personal information ○ use or disclose personal information • **understand** how organisations and government agencies deal with correcting your personal information if it is: ○ inaccurate ○ out of date ○ incomplete ○ irrelevant ○ misleading • **understand** under what conditions you can access your personal information	information on the platform line with the Australian Privacy Principles • **implement** the Australian Privacy Principles to protect information in their designed solutions • **understand** privacy issues and how personal data is archived and publicly available • **explain** the positive and negative impact the use of technology can have on personal, professional and community relationships • **research** professional bodies guidelines on managing a professional digital footprint

Strand: Process and Production (Creating solutions using Design and computational Thinking)

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Acquiring, managing, and analysing data Acquiring, managing, and analysing data involves students exploring the properties of data, how it is acquired and interpreted using a range of digital systems and peripherals, and analysing data when creating information. Students use computational thinking elements such as pattern recognition, abstraction, and evaluation. They progress from exploring data acquisition strategies and looking for patterns to validating the data and data integrity. **Pattern recognition**: look for similarities between and within data. **Decomposition:** break information down into smaller components of data to make management easier. **Abstraction:** identify and remove irrelevant data that can be created another way (i.e., Age = Date Now – DOB). **Algorithmic design:** identify and organise the data so it can solve the problem or create information.	**Acquire and store data from a range of sources using software, including spreadsheets and databases** • **acquire** and organise data from a range of sources, primary and secondary. • **design** user interface for data collection to make collection easier to manage for example, the use of radio buttons or date pickers • **understand** that data is stored in a table and a cell is data, but a row is information. • **judge** how meaningful data is to a question, its correctness, and how up to date the data is.	**Acquire, store, and validate data from a range of sources using software, including spreadsheets and databases** • **acquire**, store, and validate data, from a reputable source, to analyse with the aim to highlight past and emerging trends • **store** acquired data using specialised and general software appropriate for how it will be accessed and manipulated	**Examine techniques to acquire, store and validate data from a range of sources using software, including spreadsheets and databases** • **investigate** ways to capture accurate and usable data of different formats • **discuss** the difference between quantitative and qualitative data • **create** a system to store quantitative and qualitative data • **investigate** different organisations and the data they hold and the methods they use to collect this data, i.e., social media, Shopping reward cards, etc.	**Develop techniques to acquire, store and validate data from a range of sources using software, including spreadsheets and databases** • **identify** strengths and weaknesses of collecting data using different methods, for example: ○ online surveys, ○ face-to-face interviews, ○ observation, ○ browser history • **develop** systems that: ○ access and store data in a format that is useful for analysis ○ acquire, use, and protect data according to the Australian Privacy Principles • **construct** an electronic form that gathers quantitative and qualitative data that validates the data being entered • **discuss** an organisation's data collection and storage processes considering how secure it is and how they ensure the data is kept private. • **show** that two or more tables of data may be used to find information, through unique identifiers (primary key).
	Analyse and visualise data using a range of software, including spreadsheets and databases, to make predications	**Analyse and visualise data using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends**	**Analyse and visualize data using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends and outliers**	**Analyse and visualise data interactively using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends and outliers**

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	• **identify** statistical information from tables of data. • **explore** software to create visual representations of data.	• **visualise** data by choosing appropriate graphs or diagrams to reveal trends, outliers, or other information	• **summarise** data, its attributes, and their relationships, identifying trends and outliers to draw conclusions and make predictions	• **use** software to develop interactive visualise and compare data to identify patterns, relationships, and trends in data • **explore** machine learning, a form of artificial intelligence where an algorithm is trained using a dataset, for example classifying images into categories
	Model and query the attributes objects and events of data • **find** information from a single table database or spreadsheet through such processes as filtering and or sorting	**Model and query the attributes of objects and events using structured data** • **realise** that to ensure integrity of data, it needs to have a defined structure like: ○ field names ○ types of data ○ sizes ○ keys – unique identifiers ○ required values and the appropriate validation rules ○ default values ○ formats ○ input masks. • **devise** visual or simple queries including using Boolean operators	**Model and query entities and their relationships using structured data** • **create** queries to gather required data.	**Model and query entities and their relationships using structured data** • **model** entities and processes, their attributes, and the relationships between them • **use** structured data to help in decision-making • **interpret** and query multi-table databases using complex queries with SELECT, WHERE, and simple JOIN/GROUP BY clauses and counting.
Investigating and defining Investigating and defining involves students creating solutions and defining problems clearly by identifying appropriate data and requirements. As designers, students consider how users will interact with the solutions, and check and validate their designs to increase the likelihood of creating working solutions. Defining and communicating a problem precisely and clearly is an important part	**Define and decompose a problem with design criteria and by creating user stories** • **recognise** a problem or need locally or within a community • **identify** the key steps in a current system and where problems might be occurring • **recognise** factors that could influence the design of a solution	**Define and decompose real-world problems with design criteria and by creating user stories** • **identify** a problem or need locally or within a community • **ask** a series of questions and sub-questions to understand the problem and break it down into manageable parts, considering the end user or role of the user	**Define and decompose real-world problems with design criteria and by interviewing stakeholders to create user stories** • **analyse** a problem or need locally, within a community, or globally • **analyse** the factors that impact design decisions when designing a solution • **analyse** existing solutions as part of a broader design thinking strategy	**Define and decompose real-world problems with design criteria and by interviewing stakeholders to create user stories** • **critically analyse** a problem or need locally, within a community, or globally through stakeholder engagement • **critically analyse** the factors (functional and non-functional) that impact design decisions when designing a solution.

Sub-strands:	Year 7	Year 8	Year 9	Year 10
of this process. Students need to define a problem precisely and clearly, identifying the requirements, and breaking the problem into manageable pieces. **Pattern recognition:** Organise information so that similarities can be easily seen, and problems identified. **Decomposition:** break the current problems down into simpler, less complex steps. **Abstraction:** identify and remove irrelevant details. **Algorithmic design:** identify and organise the current system into steps. Evidence of investigating and defining can be found in • the design folio as students document the investigation of the solution, • through the production of the prototype or solution, • and when evaluating.	• **develop** a range of user stories using the template. As a <type of user>, I want <some goal> so that <some reason> • **discuss** the strengths and weaknesses of existing solutions • **respond** to or create a design brief that: ○ provides a clear outline of the situation ○ provides constraints and other considerations ○ develops specific criteria for success • **discuss** a logical production plan for creation of a solution • **compare** some existing solutions, and consider similar design features of each that will impact on the solution • **develop** the skills needed to produce and implement a designed solution to create models, prototypes, samples, and the solution. • **revisit** the design brief and production plan and its criteria as more information becomes available	• **consider** factors that might influence the design of a solution. • **develop** a range of user stories using the template. As a <type of user>, I want <some goal> so that <some reason> • **investigate** the strengths and weaknesses of existing solutions • **create** a design brief that: ○ provides a clear outline of the situation ○ provides constraints and other considerations ○ develops specific criteria for success • **discuss** and document a logical production plan for creation of a solution using a design thinking strategy • **contrast** existing solutions, and consider different design features of each that will impact on the solution • **develop** the skills needed to produce and implement a designed solution to create models, prototypes, samples, and the solution. • **revise** the design brief and production plan and its criteria as more information becomes available	• **create** user stories by interviewing a stakeholder and apply logical thinking to deduce new information. • **create** an initial design brief based on an established need, including: ○ a clear outline of the situation ○ constraints and other considerations ○ specific criteria for success • **create** and document a logical production plan for creation of a solution using an empathetic design thinking model and setting realistic milestones • **analyse** a range of existing solutions, and consider design features that will impact on the solution • **develop** the skills needed to produce and implement a designed solution to create models, prototypes, samples, and the solution. • **refine** the design brief and production plan and its criteria as more information becomes available	• **critically analyse** existing solutions as part of a broader design thinking strategy • **create** and decompose large user stories 'epics' into multiple user stories by interviewing stakeholders and apply logical thinking to deduce new information. • **create** and **validate** an initial design brief based on an established need, including: ○ a clear outline of the situation ○ constraints and other considerations ○ specific criteria for success • **create** and document an in depth, logical production plan for creation of a solution using an empathetic design thinking model and setting realistic milestones • **critically analyse** a range of existing solutions, and consider design features that will impact on the solution • **develop** the skills needed to produce and implement a solution to create models, prototypes, samples, and the solution • **refine** the design brief and production plan and its criteria as more information becomes available

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Generating and designing Students develop computational thinking strategies by creating algorithms which clearly define steps which may lead to creating a digital solution. Students progressively move from following algorithms in their daily activities to designing algorithms and validating them against test cases. They make choices, weigh up options and consider alternatives. Students use critical and creative thinking and systems thinking strategies to generate, evaluate and document ideas to meet needs or opportunities that have been identified by an individual, a group or a wider community. Generating creative and innovative ideas involves thinking differently; it entails proposing new approaches to existing problems and identifying new design opportunities considering preferred futures. It also involves identifying errors that may occur within an algorithm and how control structures can improve the flow through a program. **Pattern recognition:** look for repetitive steps. **Decomposition:** break the current problems down into simpler, less complex parts. **Abstraction:** remove unnecessary details to identify a more efficient set of steps. **Algorithmic design:** organise into a specific sequence of steps.	**Design algorithms involving nested control structures and represent as flowcharts and pseudocode** • **generate** step by step sequence of instructions of design ideas including: ○ Flowcharts ○ Structure charts ○ pseudocode • **develop** design ideas that include the use of branching and iteration.	**Design algorithms involving nested control structures and represent them using flowcharts and pseudocode** • **generate** step by step sequence of instructions of design ideas including: ○ Flowcharts ○ Structure charts ○ pseudocode • **develop** design ideas that include the use of nesting, branching and iteration	**Design algorithms involving logical operators and represent them as flowcharts and pseudocode** • **generate** step by step sequence of instructions of design ideas including: ○ Flowcharts ○ Structure charts ○ pseudocode • **develop** design ideas that include the use of logical operators, nesting, branching and iteration	**Design algorithms involving logical operators and represent them as flowcharts and pseudocode** • **generate** step by step sequence of instructions of design ideas including: ○ Flowcharts ○ Structure charts ○ pseudocode • **develop** design ideas that include the use of logical operators, nesting, branching and iteration • **use** Boolean operations (AND, OR and NOT) to express complex conditions in control structures.
	Trace algorithms to predict output for a given input and to identify errors • **document** and test a range of inputs against an algorithm showing predicted outcome and the actual outcome.	**Trace algorithms to predict output for a given input and to identify errors** • **follow** an algorithm precisely to confirm it produces the expected output for the given input, (desk check) • **follow** instructions and make predictions of how a set of instructions would need to be modified to enable it to be adapted for another purpose	**Validate algorithms by comparing their output against a range of test cases** • **analyse** types of errors in terms of their effect on the running of the program • **investigate** methods to reduce the occurrence of errors • **test** components of the solution by using invalid inputs and user errors to test that they are handled appropriately by a program	**Validate algorithms and programs by comparing their output against a range of test cases** • **analyse** types of errors in terms of their effect on the running of the program • **investigate** methods to reduce the occurrence of errors • **test** components of the solution by using invalid inputs and user errors to test that they are handled appropriately by a program
	Design a user interface for a digital system • **identify** a range of possible user interface solutions based on the initial design brief and constraints. • **generate** annotated sketches (hand or digital) of design ideas for a user interface. seeking feedback for improvements	**Design the user experience of a digital system** • **develop** a range of possible user interface solutions based on the initial design and constraints. • **generate** annotated sketches (hand or digital) of design ideas for a user interface. seeking feedback for improvements	**Design and prototype the user experience of a digital system** • **analyse** the initial design brief and constraints to devise an appropriate user interface that focusses on: ○ engagement ○ aesthetics ○ functionality	**Design and prototype the user experience of a digital system** • **critically analyse** the initial design brief and constraints to devise an appropriate user interface that focusses on: ○ engagement ○ aesthetics ○ functionality

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Evidence of generating and designing can be found in: • the design folio as students document the design of the solution • the prototype or solution • and when evaluating.			• **generate** annotated sketches (hand or digital) of design ideas for a user interface. seeking feedback for improvements	• **generate** annotated sketches (hand or digital) of design ideas for a user interface. seeking feedback for improvements
	Generate, modify, communicate, and evaluate designs. • **identify** a range of possible solutions based on the initial design brief, constraints, and the concept of preferred futures • **revise** the initial design brief including any new criteria to measure the success of the solution • **communicate** design ideas to various audiences seeking improvements and feedback • **test** elements of the solution if required • **develop** a design folio which outlines engagement with a design process	**Generate, modify, communicate, and evaluate alternative designs** • **develop** a range of possible solutions based on the initial design brief, constraints, and the concept of preferred futures • **revise** the initial design brief including any new criteria to measure the success of the solution • **communicate** design ideas to various audiences seeking improvements and feedback • **test** elements of the solution if required • **develop** a design folio which clearly communicates the logical application of a design process to arrive at a working solution	**Generate, modify, communicate, and critically evaluate alternative designs.** • **analyse** the initial design brief and constraints to formulate appropriate solutions that demonstrate: ○ creativity ○ innovation ○ consideration of preferred futures • **revise** the initial design brief including any new criteria to measure the success of the solution • **express** product design ideas using relevant technical language • **evaluate** generated design ideas and possible solutions, then justify a chosen solution • **communicate** design ideas to various audiences seeking improvements and feedback • **test** components of the solution by virtual or real prototyping • **develop** a design folio which clearly communicates the logical application of a design process to arrive at a working solution	**Generate, modify, communicate, and critically evaluate alternative designs** • **critically analyse** the initial design brief and constraints to formulate appropriate solutions that demonstrate: ○ creativity ○ innovation ○ consideration of preferred futures • **revise** the initial design brief including any new criteria to measure the success of the solution • **express** product design ideas using relevant technical language • **evaluate** generated design ideas and possible solutions, then justify a chosen solution • **communicate** design ideas using appropriate technical terms seeking improvements and feedback • **test** components of the solution by virtual or real prototyping • **record** the generation and development of design ideas and processes for an intended audience including justification of decisions

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Producing and implementing Producing and implementing involves students applying their algorithms as a program through systems to make products or content which have been designed to meet specific user needs. Students apply knowledge about components and how digital systems use and display data to ensure the success of their program. Students develop accurate production skills to achieve quality digital solutions. Students develop the capacity to select and use appropriate systems, components, tools, and equipment; and use techniques and materials that respect the need for sustainability. The use modelling and prototyping to accurately develop simple and complex physical models that support the production of successful digital solutions. **Pattern recognition:** looking for similarities between code. **Decomposition:** break the coding into simpler, less complex parts – use functions. **Abstraction:** identify more efficient ways of writing code. **Algorithmic design:** organise code into functions. Evidence of producing and implementing may be found in: • the folio as students document the production of the solution • the prototype or solution • Evaluating	**Implement algorithms involving control structures, and functions in a general-purpose programming language** • **Create** digital solutions using branching, iteration, variables, and functions in a general-purpose programming language, such as Python, JavaScript, or C# • **understand** the importance of implementing accurate production skills through: ○ code indentation ○ meaningful naming ○ comments that add context ○ reduce code duplication • **effectively** use techniques to produce a solution • **test** and/or troubleshoot issues during production, recording solutions. • **develop** appropriate production practices to achieve quality solutions • **document** and explain the production of a solution including choices made in production techniques	**Implement, modify, and debug programs involving control structures and functions in a general-purpose programming language** • **Create** digital solutions using branching, iteration, variables, and functions in a general-purpose programming language, such as Python, JavaScript, or C# • **understand** the importance of implementing accurate production skills through**:** ○ code indentation ○ meaningful naming ○ comments that add context ○ reduce code duplication • **effectively** use a broad range of techniques to produce a solution • **test** and/or troubleshoot issues during production, recording solutions. • **develop** appropriate production practices to achieve quality solutions • **develop** creative ways of manipulating technologies by comparing and combining the most appropriate options to create a solution • **document** and explain the production of a solution including choices made in coding and production techniques	**Implement, modify, and debug modular programs, applying selected algorithms involving control structures and functions in an object-oriented programming language** • **Create** digital solutions using an object-oriented programming language, such as Python, JavaScript, or C • **understand** the importance of implementing accurate production skills through**:** ○ code indentation ○ meaningful naming ○ comments that add context ○ reduce code duplication • **competently** use a broad range of techniques to produce solutions • **test** and/or troubleshoot issues during production, recording solutions. • **develop** accurate production practices to achieve quality designed solutions • **document** an annotated visual record of the production of the solution that can includes: ○ production process ○ practice samples ○ testing ○ record of discussions that resulted in improvement of the solution	**Implement, modify, and debug modular programs, applying selected algorithms and data structures, including in an object-oriented programming language** • **Create** digital solutions using an object-oriented programming language, such as Python, JavaScript, or C. • **understand** the importance of implementing accurate production skills through**:** ○ code indentation ○ meaningful naming ○ comments that add context ○ reduce code duplication • **competently** use production skills to produce solutions using an extensive range of techniques • **test** and/or troubleshoot issues during production, recording solutions. • **develop** accurate production practices to achieve quality designed solutions • **document** and explain the production of the solution including: ○ choices made in production techniques ○ production process ○ practice samples ○ testing or troubleshooting ○ record of discussions that resulted in improvement of the solution ○ unforeseen challenges

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Evaluating Students evaluate and make judgements throughout the design process and about the quality and effectiveness of their digital solution. Students identify design criteria and develop user stories to support success of the digital solution. In the early years, the teacher may guide the development of these criteria and user stories. Progressively, students develop criteria which become increasingly more comprehensive. Students consider the implications and consequences of actions and decision-making. They determine effective ways to test and judge their digital solutions. They reflect on processes and transfer their learning to other solutions and opportunities. **Pattern recognition:** looking for similarities between and within problems. **Decomposition:** Did we properly identify all the problems? Is it easily understood? **Abstraction:** Did it solve every aspect of the problem? Or is it incomplete? (i.e., some parts of the problem may have been left out accidentally). **Algorithmic design:** Is it fit for purpose? Did it solve the problem, making the best use of the available resources and meet the design criteria? Evaluation is iterative. It can occur at any stage of the design cycle. Evidence of evaluation forms part of the design folio.	**Evaluate existing and student solutions against the design criteria, user stories and their impact on the broader community** • **develop** or use pre-determined success criteria based on the design brief and constraints • **evaluate** the solution against the success criteria • **reflect** on the original analysis, problems encountered during production and how they were solved • **reflect** on initial reasoning or missing information that resulted in an unexpected outcome • **propose** how the solution could be improved • **compare** solution with existing products (including those developed by other students) identifying innovations**.**	**Evaluate existing and student solutions against the design criteria, user stories and possible future impact** • **develop** success criteria based on the design brief and constraints • **evaluate** the processes used to create the solution • **evaluate** the solution against the success criteria • **reflect** on the original analysis, problems encountered during production and how they were solved • **reflect** on initial reasoning or missing information that resulted in an unexpected outcome • **propose** how the solution could be improved • **compare** solution with existing products (including those developed by other students) identifying innovations**.**	**Evaluate existing and student solutions against the design criteria, user stories, possible future impact.** • **establish** explicit success criteria based on the design brief and constraints • **evaluate** the processes used to create the solution • **evaluate** the solution against the success criteria • **reflect** on the original analysis, problems encountered during production and how they were solved • **reflect** on initial reasoning or missing information that resulted in an unexpected outcome • **seek** and **document** feedback about the final solution from others using success criteria to inform reasoning • **propose** how the solution could be improved	**Evaluate existing and student solutions against the design criteria, user stories, possible future impact, and opportunities for enterprise** • **establish** explicit primary and secondary success criteria based on the design brief and constraints • **justify** the selection and use of processes during project development • **reflect** on the original success criteria, problems encountered during production and how they were solved • **appraise** the solution success against primary and secondary success criteria • **analyse** the impact of the solution or system on individuals, society and/or environment regarding preferred futures • **respond** to evaluation feedback from others in a meaningful way • **propose** how the solution could be improved

Sub-strands:	Year 7	Year 8	Year 9	Year 10
Students are encouraged to utilise multimodal options to demonstrate evidence of learning.				
Collaborating and managing Collaborating and managing involves students learning to work collaboratively and to manage time and other resources to effectively create digital solutions. Progressively, students develop the ability to communicate ideas and information and share ideas throughout the process, negotiate roles and responsibilities and independently and collaboratively manage agile projects to create interactive solutions. Students share information online by creating websites and interacting safely using appropriate information system protocols and agreed behaviours. They are progressively guided by trusted adults to account for risks when working individually and collaboratively. The project plan forms part of the design folio. Students are encouraged to utilise multimodal options to demonstrate evidence of learning.	**Select and use a range of digital tools effectively to create, locate and communicate content consistently applying common conventions** • **develop** criteria for selecting digital learning tools and resources to accomplish a defined task • **apply** their knowledge and skills from existing technologies and devices to successfully use new technologies • **use** features of code editing tools to produce and implement digital solutions to meet a specified design brief • **use** digital tools online or offline to: ○ **document** personal learning experiences ○ **create** a design solution portfolio to communicate their evidence of learning effectively ○ **collect** and analyse data and present information visually for a range of contexts. • **use** digital tools to gather data to help guide and assess information during the design process • **make** effective keyword choices when searching online to find their information • **analyse** and **present** data tables and charts to their peers • **use** online feedback/comments to evaluate practicality of prototypes • **comply** with copyright law when reusing content or resources from websites and correctly cite copyrighted	**Select and use a range of digital tools efficiently, including unfamiliar features, to create, locate and communicate content, consistently applying common conventions** • **develop** criteria for selecting digital learning tools and resources to accomplish a defined task • **apply** their knowledge and skills from existing technologies and devices to successfully use new technologies • **use** features (embedded, plugins or extensions) of code editing tools to produce and implement digital solutions to meet a specified design brief • **use** digital tools online or offline to: ○ **document** personal learning experiences and receive feedback from peers ○ **create** a design solution portfolio to communicate their evidence of learning effectively ○ **collect** and analyse data and present information visually for a range of contexts. • **use** interactive digital tools to gather data to help guide and assess information during the design process • **make** effective keyword choices when searching online and explain what terms they used to find their information • **analyse** and **present** data tables and charts to their peers, explaining the significance of each element	**Select and use emerging digital tools efficiently, including features to create, locate and communicate content for a diverse audience** • **develop** criteria for selecting digital learning tools and resources to accomplish a defined task • **apply** their knowledge and skills from existing technologies and devices to successfully use new technologies • **use** features (embedded, plugins or extensions) of code editing tools to produce and implement digital solutions to meet a specified design brief • **use** digital tools to: ○ **create** a digital design portfolio to demonstrate evidence of learning ○ **collect** and analyse data, and present information for a range of contexts ○ **create** design briefs and other digital artifacts to assist end users of a digital solution • **share** a collaborative online tool to gather data, information, or feedback in a variety of formats. For example, written or video (recorded or live). • **use** advanced search tools and strategies to locate and appropriately reference online images and other digital media and comply with copyright law**.** • **cite** electronic and print sources in appropriate format. For example, Harvard referencing	**Select and use emerging digital tools and advanced features to create and communicate interactive content for a diverse audience** • **develop** and **analyse** criteria for selecting digital learning tools and resources to accomplish a defined task • **apply** their knowledge and skills from existing technologies and devices to successfully use new technologies • **use** and **justify** features (embedded, plugins or extensions) of code editing tools to produce and implement digital solutions to meet a specified design brief • **use** digital tools to: ○ **create** a digital design portfolio that uses multimodal options to demonstrate evidence of learning ○ **collect** and analyse data, and present information for a range of contexts ○ **create** design briefs, user guides, help document, screencasts, and other digital artifacts to assist end users of a digital solution • **share** a collaborative online tool to gather data, information, or feedback in a variety of formats. For example, written or video (recorded or live). • **use** advanced search tools and strategies to locate and appropriately reference online images and other digital media and comply with copyright law**.**

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	works in their digital portfolios and online work • **understands** the importance of following common conventions. For example: ○ Files and folders – have names that make it mean something to everybody, are short, contains descriptive information (including dates if possible), avoids special characters, do not exceed 260 characters for total folder and file character count, use sequential numbering, use title casing, and use version number. ○ Documents – have clarity allow the readers to understand the meaning. Often evident in spelling, grammar, punctuation, capitalization, use of headings, and follow a style guide ○ Computer program – have comments, laid out using indentation, follows a naming convention for identifiers, and use the programming languages syntax correctly	• **use** online feedback/comments to evaluate feasibility and practicality of prototypes • **comply** with copyright law when reusing content or resources from websites and correctly cite copyrighted works in their digital portfolios and online work • **follows** common conventions. For example: ○ Files and folders – have names that make it mean something to everybody, are short, contains descriptive information (including dates if possible), avoids special characters, do not exceed 260 characters for total folder and file character count, use sequential numbering, use title casing, and use version number ○ Documents – have clarity allow the readers to understand the meaning. Often evident in spelling, grammar, punctuation, capitalization, use of headings, and follow a style guide ○ Computer program – have comments, laid out using indentation, follows a naming convention for identifiers, and use the programming languages syntax correctly	• **ensure** content is accessible by using built-in accessibility features • **demonstrates** common conventions. For example: ○ Files and folders – have names that make it mean something to everybody, are short, contains descriptive information (including dates if possible), avoids special characters, do not exceed 260 characters for total folder and file character count, use sequential numbering, use title casing, and use version number ○ Documents – have clarity allow the readers to understand the meaning. Often evident in spelling, grammar, punctuation, capitalization, use of headings, and follow a style guide ○ Websites – have a navigation system, contains markup language that makes it easier for web crawlers to scan a page, has a hierarchy, organised to arrange content and images, and allow for assess ability. ○ Computer program – have comments, laid out using indentation, follows a naming convention for identifiers, and use the programming languages syntax correctly	• **cite** electronic and print sources in appropriate format. For example, Harvard referencing • **ensure** content is accessible by using built-in accessibility features • **demonstrates** common conventions. For example: ○ Files and folders – have names that make it mean something to everybody, are short, contains descriptive information (including dates if possible), avoids special characters, do not exceed 260 characters for total folder and file character count, use sequential numbering, use title casing, and use version number ○ Documents – have clarity allow the readers to understand the meaning. Often evident in spelling, grammar, punctuation, capitalization, use of headings, and follow a style guide ○ Websites – have a navigation system, contains markup language that makes it easier for web crawlers to scan a page, has a hierarchy, organised to arrange content and images, and allow for assess ability. ○ Computer program – have comments, laid out using indentation, follows a naming convention for identifiers, and use the programming languages syntax correctly
	Select and use a range of digital tools effectively and responsibly to share content online, plan tasks and collaborate appropriately on projects • **use** digital tools to support planning, implementing, and reflecting upon the design process and produced solution	**Select and use a range of digital tools efficiently and responsibly to share content online, and plan and manage individual and collaborative agile projects**	**Use simple project management tools to plan and manage individual and collaborative agile projects.** • **use** appropriate platforms to plan, decompose and manage a collaborative project with their peers	**Use simple project management tools to plan and manage individual and collaborative agile projects, accounting for risks and responsibilities** • **use** appropriate platforms to plan, decompose and manage a collaborative

Sub-strands:	Year 7	Year 8	Year 9	Year 10
	• **use** digital tools to brainstorm and develop collaborative and collective solutions to a design problem • **use** or create a design brief to respond to all design tasks • **document:** ○ active individual involvement ○ processes to be used to achieve the outcomes ○ timelines and deadlines for milestones ○ how decisions were determined ○ screenshot information or ideas communicated online • **explain** the process involved in producing the solution including choices made in production techniques • **record** feedback/discussions with individuals (teacher, students, or team members) that resulted in improvement of the solution • **demonstrate** agile project management skills and understanding, when working individually or as part of a team	• **use** digital tools to support planning, implementing, and reflecting upon the design process and produced solution • **use** digital tools to brainstorm and develop collaborative and collective solutions to a design problem • **use** or create a design brief to respond to all design tasks • **document:** ○ active individual involvement ○ processes to be used to achieve the outcomes ○ timelines and deadlines for milestones ○ how decisions were determined ○ screenshot information or ideas communicated online • **explain** the process involved in producing the solution including choices made in production techniques • **record** feedback/discussions with individuals (teacher, students, or team members) that resulted in improvement of the solution • **demonstrate** agile project management skills and understanding, when working individually or as part of a team	• **practice** techniques for sharing ideas and information online. • **use** a system development life cycle process to complete a project • **create** a design brief to address all design tasks • **use** a digital tool to document: ○ evidence of working independently and cooperatively to develop ideas and produce a solution ○ assigning roles to a group ○ use of a simple production flowchart to ensure efficient workflows are achieved ○ processes to be used to achieve the outcomes ○ timelines and deadlines for milestones ○ contingency plans ○ evidence of practical skills practice ○ track progress to ensure all work is completed by a specified deadline ○ screenshot information or ideas communicated online ○ document changes in design during the producing and implementation stage should include tester's feedback. • **apply** and **follow** relevant legislation and guidelines to their solutions by: ○ applying techniques that ensure data protection, ○ privacy ○ and copyright	project with their peers, could include using a version control process/tool • **practice** techniques for sharing ideas and information online. • **use** a system development life cycle process to complete a project • **create** a design brief to address all design tasks • **use** a digital tool to document: ○ evidence of working independently and cooperatively to develop ideas and produce a solution ○ assigning roles to a group ○ use of a simple production flowchart to ensure efficient workflows are achieved ○ processes to be used to achieve the outcomes ○ timelines and deadlines for milestones ○ contingency plans ○ evidence of practical skills practice ○ track progress to ensure all work is completed by a specified deadline ○ screenshot information or ideas communicated online ○ document changes in design during the producing and implementation stage should include tester's feedback. • **apply** and **follow** relevant legislation and guidelines to their solutions by: ○ applying techniques that ensure data protection, ○ privacy ○ and copyright