Australian CURRICULUM Review

TECHNOLOGIES

CONSULTATION CURRICULUM

All elements F–10

AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

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F–10 AUSTRALIAN CURRICULUM: TECHNOLOGIES

ABOUT THE LEARNING AREA

Introduction

The Australian Curriculum: Technologies Foundation to Year 10 comprises two subjects:

- Design and Technologies, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities
- Digital Technologies, in which students use computational thinking and information systems to define, design and implement digital solutions for authentic problems.

The Australian Curriculum: Technologies is written on the basis that all students will study the two subjects from Foundation to the end of Year 8.

In Years 9 and 10, student access to Technologies subjects will be determined by state and territory authorities or individual schools. Subjects may continue with Design and Technologies and Digital Technologies, as outlined in the Australian Curriculum: Technologies, or subjects relating to specific aspects of the curriculum such as technologies contexts or digital specialisations.

The curriculum for each of Design and Technologies and Digital Technologies describes the distinct knowledge, understanding and skills of the subject. Students will have the opportunity to develop a comprehensive understanding of traditional, contemporary and emerging technologies. There is flexibility for schools to develop teaching programs that integrate both Technologies subjects and other learning areas. This may be particularly important for primary school programs.

Rationale

Technologies enrich and impact on the lives of people and societies globally. They can play an important role in transforming, restoring and sustaining societies and natural, managed and constructed environments. Australia needs enterprising individuals who can make discerning decisions about the development and use of technologies, and who can independently and collaboratively develop solutions to complex challenges and contribute to sustainable patterns of living.

The Australian Curriculum: Technologies ensures that all students benefit from learning about and working with traditional, contemporary and emerging technologies that shape the world in which we live. By applying their knowledge and practical skills and processes when using

technologies and other resources students will create innovative solutions. They will work independently and collaboratively to develop knowledge, understanding and skills to respond creatively to current and future needs and opportunities.

The practical nature of the Technologies learning area engages students in critical and creative thinking, including understanding interrelationships in systems when solving complex problems. A systematic approach to experimentation, problem-solving, prototyping and evaluation instils in students the value of planning and reviewing processes to realise ideas.

All young Australians should develop capacity for action and a critical appreciation of the processes through which technologies are developed and how technologies can contribute to societies. Students need opportunities to consider the use and impact of technological solutions on equity, ethics, and personal and social values. In creating solutions, as well as responding to the designed world, students consider desirable sustainable patterns of living, and contribute to preferred futures for themselves and others.

Aims

The Australian Curriculum: Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- investigate, design, plan, manage, create and evaluate solutions
- are creative, innovative and enterprising when using traditional, contemporary and emerging technologies, and understand how technologies have developed over time
- make informed and ethical decisions about the role, impact and use of technologies in their own lives, the economy, environment and society for a sustainable future
- engage confidently with and responsibly select and manipulate appropriate technologies − materials, data, systems, components, tools and equipment − when designing and creating solutions
- analyse and evaluate needs, opportunities or problems to identify and create solutions.

Organisation of the learning area

Content structure

The Australian Curriculum: Technologies is presented in two-year band levels from Year 1 to Year 10, with Foundation being presented as a single year.

Band level descriptions

Band level descriptions provide an overview of the learning that students should experience at each level. They highlight the important interrelationships of the content strands and of the content strands to the core concepts for each band level.

Achievement standards

Achievement standards describe the expected quality of learning that students should typically demonstrate by the end of each band. To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Content descriptions

Content descriptions specify the essential knowledge, understanding and skills that young people are expected to learn, and that teachers are expected to teach, in each band. The content descriptions are organised into strands and sub-strands.

Content elaborations

Content elaborations provide teachers with suggestions and illustrations of ways to teach the content descriptions. They are optional material only; they are not a set of complete or comprehensive content points that all students need to be taught. They illustrate and exemplify content descriptions with a diverse range of examples.

Strands and sub-strands

Content in Design and Technologies and Digital Technologies is organised under two related strands:

- Knowledge and understanding
- Processes and production skills.

Under each strand, curriculum content is further organised into sub-strands.

Table 1 shows the strand and sub-strand structure for the two subjects in the Technologies learning area.

Students apply skills from the processes and production skills strand to the content from the knowledge and understanding strand. The similar strand structure supports an integrated approach to teaching Technologies.

Table 1: Design and Technologies and Digital Technologies content structure

Technologies		
	Design and Technologies	**Digital Technologies**
Strand	**Knowledge and understanding**	
Sub-strands	Technologies and society	
	Technologies contexts:	Digital systems
	Engineering principles and systems	
	Materials and technologies specialisations	
	Food and fibre production	
	Food specialisations	
		Data representation
Strand	**Processes and production skills**	
Sub-strands		Acquiring, managing and analysing data
	Creating designed solutions by:	*Creating digital solutions by:*
	Investigating and defining	Investigating and defining
	Generating and designing	Generating and designing
	Producing and implementing	Producing and implementing
	Evaluating	Evaluating
	Collaborating and managing	Collaborating and managing
		Considering privacy and security

Core concepts

Core concepts are the big ideas, understandings, skills or processes that are central to the Technologies curriculum. They give clarity and direction about what content matters most in the learning area. In the curriculum development process, core concepts help identify the essential content students should learn to develop a deep and increasingly sophisticated understanding of Technologies across the years of schooling. They ensure content is connected within and across the strands, building in sophistication across the year/band levels.

The word 'technology' comes from the ancient Greek word *techne*, meaning to make or to do. Technologies involves the practical application of knowledge, understanding and skills to respond to needs, opportunities or problems. Learning in Technologies is about: creating solutions for preferred futures using systems and data; design thinking, systems thinking and computational thinking; and technologies processes and production skills, project management skills, and enterprise skills and innovation; taking into account interactions impact.

All content descriptions in the Technologies curriculum help develop at least one core concept, and in most cases multiple core concepts. The core concepts for Technologies flow through into subject-specific core concepts as shown in Figure 1.

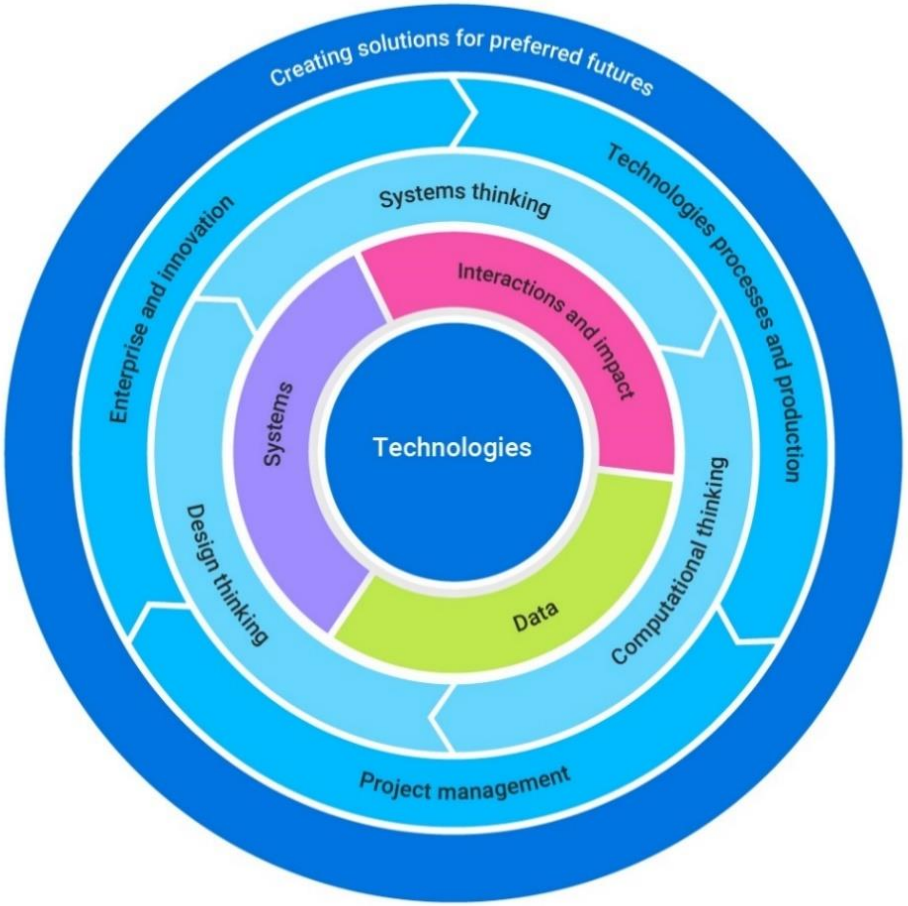

Figure 1: Overview of Technologies core concepts

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Descriptions for the learning area core concepts are provided below. Descriptions for the subject core concepts are provided in the introductory sections of each subject.

- **Creating solutions for preferred futures** is the overarching core concept and involves identifying compelling visions of the future and making considered design decisions taking into account ethics and economic, environmental and social sustainability factors. This is developed through the following core concepts.
- **Systems** comprise the structure, properties, behaviour and interactivity of people and components (inputs, processes and outputs) within and between natural, managed, constructed and digital environments.
- **Data** can be collected, interpreted and represented to help inform decision-making and can be manipulated, stored and communicated by digital systems.
- **Interactions and impact** need to be considered when creating solutions; this involves examining the relationships between components of systems and the effect of design decisions.
- **Systems thinking** helps people to think holistically about the interactions and interconnections that shape the behaviour of systems.
- **Computational thinking** helps people to organise data logically by breaking down problems into parts; defining abstract concepts; and designing and using algorithms, patterns and models.
- **Design thinking** helps people to empathise and understand needs, opportunities and problems; generate, iterate and represent innovative, user-centred ideas; and analyse and evaluate those ideas.
- **Technologies processes and production skills** help people to safely create solutions for a range of purposes and involve investigating and defining, generating and designing, producing and implementing, evaluating, and collaborating and managing.
- **Project management skills** help people to successfully and efficiently plan, manage and complete projects to meet identified criteria for success.
- **Enterprise skills and innovation** help people to identify opportunities to take action and create change; follow through on initiatives; and generate new ideas, processes and solutions.

Key connections

General capabilities

In the Australian Curriculum, general capabilities equip young Australians with the knowledge, skills, behaviours and dispositions to live and work successfully. General capabilities are developed through learning area content; they are not separate learning areas, subjects or isolated skills.

Opportunities to develop general capabilities in learning area content vary. The general capabilities of most relevance and application to Technologies are Digital Literacy, Critical and Creative Thinking, Personal and Social capability and Ethical Understanding.

Literacy and numeracy are fundamental to all learning. While literacy and numeracy development are core to the curriculum in English and Mathematics, literacy and numeracy skills are required and applied in all learning areas, including Technologies.

General capabilities are identified in content descriptions when they are developed or applied through learning area content. They are also identified in content elaborations when they offer opportunities to add depth and richness to student learning.

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Literacy

Learning in Technologies requires students to apply literacy knowledge and skills to listen to, interpret, evaluate, respond to and create a range of increasingly challenging procedural, explanatory and persuasive texts, including design tasks, manuals and instructions, patterns and recipes and specifications.

In Technologies students integrate and evaluate content presented in diverse media and formats, interpret, analyse, and assess descriptions, reports and data and navigate texts to locate information and assess complex visual text. Students recognise and appropriately use technical symbols, icons and key terms which may have generic uses as well as context-specific uses in technical topics.

Students create clear and coherent informative, explanatory and persuasive texts using precise vocabulary and terminology, appropriate structures and formats and a range of visual and diagrammatic elements. Their texts will be developed and organised using a format and style appropriate to particular tasks and audiences. They will produce and publish a range of texts where information and ideas are accurate, relevant to the context, supported by evidence and examples and cited, where needed, including annotated engineering or technical drawings, software instructions and programs, project outlines, briefs and management plans.

Digital Literacy

The Australian Curriculum: Digital Technologies explicitly supports the systematic development of Digital Literacy across the curriculum. Digital literacy is context dependent and involves students developing the knowledge and skills needed to learn effectively within the digital world. Effective development of digital literacy allows students to operate and manage digital systems and practise digital safety and wellbeing while investigating, creating and communicating. While specific elements of Digital Literacy are typically addressed in Digital Technologies learning programs, concepts and skills are consolidated and extended across all subjects.

Together, Digital Literacy and Digital Technologies provide the opportunity for students to become discerning users, productive creators, critical analysts and effective developers of digital solutions.

Critical and Creative Thinking

Students develop critical and creative thinking as they imagine, generate, iterate and critically evaluate ideas. They develop reasoning and the capacity for abstraction through challenging problems. Students analyse problems, refine concepts and reflect on the decision-making process by engaging in systems, design and computational thinking. They identify, explore and clarify technologies information and use that knowledge in a range of situations.

Students think critically and creatively about possible, probable and preferred futures. They consider how data, information, systems, materials, tools and equipment (past and present) impact on our lives, and how these elements might be better designed and managed. Experimenting, drawing, modelling, designing and working with equipment and software helps students to build their visual and spatial thinking and to create solutions, products, services and environments.

Personal and Social capability

Students develop personal and social capability as they engage in project management and design and production activities in a collaborative workspace. They direct their own learning, plan and carry out investigations, and become independent learners who can apply design thinking, and technologies understanding and skills when making decisions. Students develop social skills through working cooperatively in teams, sharing resources and processes, making group decisions, resolving conflict and showing leadership. Designing and innovation involve a degree of risk-taking, and as students work with the uncertainty of sharing new ideas, they develop resilience.

Students consider past and present impacts of decisions on people, communities and environments and develop social responsibility through understanding of, empathy with and respect for others. They develop an understanding of diversity by researching and identifying user needs.

Students reflect on the impact that digital tools and environments such as social media can have on their personal well-being and apply appropriate strategies in face-to-face and digital environments.

Numeracy

Students develop the capacity to interpret and use mathematical knowledge and skills in a range of real-life situations. They use number to calculate, measure and estimate; interpret and draw conclusions from statistics; measure and record throughout the process of generating and iterating ideas; develop, refine and test concepts; and cost and sequence when making products and managing projects. In using software, materials, tools and equipment, students work with the concepts of number, geometry, scale, proportion, measurement and volume. They use 3-dimensional models, create accurate technical drawings, work with digital models and use computational thinking in decision-making processes when designing and creating best-fit solutions.

Ethical Understanding

Students develop the capacity to understand and apply ethical and socially responsible principles when collaborating with others and creating, sharing and using technologies. Using an ethical lens, they investigate past, current and future local, national, regional and global technological priorities. When engaged in systems thinking, students evaluate their findings against criteria that include ethical issues. They explore complex issues associated with technologies and consider possibilities and ethical implications.

Students learn about safe and ethical procedures for investigating and working with people, animals, data and materials. They consider the rights of others and their responsibilities in using sustainable practices that protect the planet and its life forms. They learn to appreciate and value the part they play in the social and natural systems in which they live.

Students consider their own roles and responsibilities as discerning citizens and learn to detect bias and inaccuracies. Understanding the protection of data, intellectual property and individual privacy helps students to be respectful creators.

Cross-curriculum priorities

Cross-curriculum priorities support the Australian Curriculum to be a relevant, contemporary and engaging curriculum that reflects regional, national and global contexts. Cross-curriculum priorities are incorporated through learning area content; they are not separate learning areas or subjects. They provide opportunities to enrich the content of the learning areas where most appropriate and authentic, allowing students to engage with and better understand their world.

Opportunities to apply cross-curriculum priorities to learning area content vary. The cross-curriculum priorities of most relevance and meaning to the Technologies learning area are Sustainability and Aboriginal and Torres Strait Islander Histories and Cultures.

The cross-curriculum priority of Sustainability is embedded in content descriptions where it is core to the delivery of the content in Design and Technologies and Digital Technologies.

The Aboriginal and Torres Strait Islander Histories and Cultures cross-curriculum priority is identified in content elaborations in Design and Technologies and Digital Technologies where it offers opportunities to add depth and richness to student learning.

Read more

Sustainability

When students identify and analyse a problem, need or opportunity; generate ideas and concepts; and create solutions in Technologies, they give consideration to sustainability by anticipating and balancing economic, environmental and social impacts. The curriculum focuses on the knowledge, understanding and skills necessary to design for effective sustainability action, taking into account issues such as resource depletion and climate change. The learning area gives students opportunities to explore their own and competing viewpoints, values and interests. Understanding systems enables students to work with complexity, uncertainty and risk; make connections between disparate ideas and concepts; self-critique; and propose creative solutions that enhance sustainability. Students learn to appreciate local and global impact of design decisions. They reflect on past and current practices and assess new and emerging technologies from a sustainability perspective.

Aboriginal and Torres Strait Islander Histories and Cultures

In Design and Technologies students can explore the design and technologies of the oldest continuous living cultures in the world. Through varied and engaging contexts students learn how proven designed solutions from long ago endure today and can at times inspire contemporary solutions.

The engineering principles and systems employed by Aboriginal and Torres Strait Islander Peoples today, and in the past, provide culturally relevant and engaging contexts for all students to investigate how First Nations Australians have been successful at sustaining the world's oldest continuous living cultures. Students can investigate how Aboriginal and Torres Strait Islander Peoples' knowledges of natural materials have developed over millennia and have culminated in deep knowledge of their properties and performance. Likewise, students can explore successful systems that Aboriginal and Torres Strait Islander Peoples have developed to join materials for the design and production of a diverse range of essential, effort-reducing technologies. Students can investigate the diverse food and fibre production techniques developed by Aboriginal and Torres Strait Islander communities before colonisation and see how this capacity has sustained Aboriginal Australia for at

least 60,000 years and through numerous major climatic and environmental shifts. They can explore how First Nations Australians have long successfully developed complete diets that meet nutritional requirements and see how foods were and continue to be investigated for their nutritional and medicinal qualities. They can also investigate techniques used to improve palatability and remove toxins; and nutritional, environmental and economic benefits of developing traditional Aboriginal food and fibre sources.

Through Digital Technologies students can gain insights into how Aboriginal and Torres Strait Islander Peoples are often at the forefront of adopting digital systems, and also learn how they often endure the inequities of digital system performance and capabilities, especially when living on Country/Place far from the nation's city centres. Students can explore how many Aboriginal and Torres Strait Islander communities are embracing digital tools as a means to maintain, control, protect and further develop culture through the digitisation of cultural expressions. They can examine the complexities of data and the need for ethical protocols when using systems to acquire, manage and analyse data. Students can explore how Aboriginal and Torres Strait Islander ranger groups use computational thinking in their contributions to preferred futures such as restoring damaged environments and the monitoring and protection of endangered and vulnerable species. Through the context of material culture production techniques such as weaving, students can be introduced to designing algorithms and exploring how such practices can be converted into programmable automation.

Learning area connections

The Australian Curriculum: Technologies provides opportunities to integrate or connect content to other learning areas or subjects, in particular:

- Digital Technologies with Mathematics and Media Arts
- Design and Technologies with Science and Health and Physical Education.

Read more

Digital Technologies and Mathematics

Digital Technologies has a strong connection to the Mathematics learning area, in particular a shared focus on data. For example, data collection and interpretation across Foundation to Year 6, which include numeric data such as data counted in whole numbers and categorical data such as symbols and charts.

Data representation refers to the way data is symbolised, visually treated or provided in audio. The connections with Mathematics support students to gain the knowledge, understanding and skills that underpin patterns and data visualisation, while Digital Technologies focuses on how digital systems represent data.

Digital Technologies and Media Arts

Digital Technologies and Media Arts share a focus on user experience and user interface. Creating spoken, print, graphic or electronic communications for an audience is important in the design process for both subjects. These activities often involve numerous people in their construction and are usually shaped by digital systems used in their production. While there is no direct link between content descriptions, Media Arts provides an appropriate area for application of the knowledge and skills taught across Digital Technologies.

Design and Technologies and Science

Design and Technologies and Science share a focus through the Design and Technologies knowledge and understanding sub-strand: technologies contexts, and the Science understanding sub-strands. The relationships are:

- engineering principles and systems to physical sciences
- materials and technologies specialisations to chemical sciences
- food and fibre production to biological sciences
- food specialisations to chemical sciences.

Design and Technologies and Health and Physical Education

Aspects of food and nutrition are addressed in the Health and Physical Education focus area of food and nutrition. In the Design and Technologies sub-strand, technologies context: food specialisations, students learn about preparing food for healthy eating and the technologies associated with processing food for human consumption.

Key considerations

Safety

Identifying and managing risk in the Technologies learning area addresses the safe use of technologies as well as risks that can affect project timelines. It covers all necessary aspects of health, safety and injury prevention and, in any technologies context, the use of potentially dangerous materials, tools and equipment. It includes ergonomics, online safety, data security, and ethical and legal considerations when communicating and collaborating online.

Technologies learning experiences may involve the use of potentially hazardous substances and hazardous equipment. It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students and that school practices meet the requirements of the *Work Health and Safety Act 2011* and Work Health and Safety Regulation 2017, in addition to relevant state or territory health and safety guidelines.

In implementing projects with a focus on food, care also must be taken with regard to food safety and specific food allergies that may result in anaphylactic reactions. The Australasian Society of Clinical Immunology and Allergy has published guidelines for prevention of anaphylaxis in schools, preschools and childcare. Some states and territories have their own specific guidelines that should be followed.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include more specific advice on safety. For more information about relevant guidelines, contact your state or territory curriculum authority.

Privacy and security

Identifying and managing the implications of and concerns related to the collection and generation of data through automated and non-automated processes addresses the risks that can affect secure engagement with digital systems.

Privacy includes recognising the risks that are faced online and the mitigation strategies involved in managing them. In Australia, guidance on best practice for privacy is informed by the Australian Privacy Principles, the cornerstone of the privacy protection framework in the *Privacy Act 1988*. Thirteen principles govern standards, rights and obligations around:

- the collection, use and disclosure of personal information
- accountability
- integrity of personal information
- the right of individuals to access their personal information.

For more information visit: https://www.oaic.gov.au/privacy/australian-privacy-principles/

Security covers the development of appropriate technical, social, cognitive, communicative and decision-making skills to address online and network security risks. It includes data security, and ethical and legal considerations when working with and designing digital systems. When engaging with and designing digital systems, identifying and managing security threats and mitigation in a data-intensive world is paramount.

For more information about relevant guidelines, contact your state or territory curriculum authority.

Animal ethics and biosecurity

Any teaching activities that involve caring for, using or interacting with animals must comply with the Australian code of practice for the care and use of animals for scientific purposes 2013, the Australian Animal Welfare Standards and Guidelines, the National Livestock Identification System and other biosecurity measures, in addition to relevant state or territory guidelines. The Australian Government and state and territory governments may have extra legislation for animal ethics, protection of native animals and biosecurity that could affect how schools use animals.

When state and territory curriculum authorities integrate the Australian Curriculum into local courses, they will include more specific advice on the care and use of, or interaction with, animals. Schools must ensure they are aware of and comply with all state, territory and Commonwealth legislation or regulation about the use of animals in schools. For more information about relevant guidelines or to access your animal ethics committee, contact your state or territory curriculum authority.

Australian code of practice for the care and use of animals for scientific purposes,

www.nhmrc.gov.au/about-us/publications/australian-code-care-and-use-animals-scientific-purposes

Australian Animal Welfare Standards and Guidelines www.animalwelfarestandards.net.au

National Livestock Identification System www.nlis.com.au

Information correct as at 7 April 2021

DESIGN AND TECHNOLOGIES F–10

Rationale

In an increasingly technological and complex world, it is important to develop knowledge and confidence to analyse and creatively respond to design challenges. Knowledge, understanding and skills involved in the design, development and use of technologies are influenced by and can play a role in enriching and transforming societies and our natural, managed and constructed environments.

The Australian Curriculum: Design and Technologies enables students to become creative and responsive designers. When they consider ethical, legal, aesthetic and functional factors and the economic, environmental and social impacts of technological change, and how the choice and use of technologies contributes to a sustainable future, they are developing the knowledge, understanding and skills to become discerning decision-makers.

Design and Technologies actively engages students in creating quality designed solutions for identified needs and opportunities across a range of technologies contexts. Students manage projects independently and collaboratively from conception to realisation. They apply design and systems thinking and design processes to investigate, generate and refine ideas; and plan, produce and evaluate designed solutions. They develop a sense of pride, satisfaction and enjoyment from their ability to develop innovative designed products, services and environments.

Design and Technologies gives students authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. It motivates young people and engages them in a range of learning experiences that are transferable to family and home, constructive leisure activities, community contribution and the world of work.

Aims

The Australian Curriculum: Design and Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- develop confidence as critical users of technologies and designers and producers of designed solutions
- investigate, generate and analyse ethical and innovative designed solutions for sustainable futures
- use design and systems thinking to generate design ideas and communicate these to a range of audiences
- produce designed solutions suitable for a range of technologies contexts by selecting and manipulating a range of materials, systems, components, tools and equipment creatively, competently and safely; and managing processes

- evaluate processes and designed solutions and transfer knowledge and skills to new situations
- understand the roles and responsibilities of people in design and technologies occupations and how they contribute to society.

Organisation

Content structure

Content in the Australian Curriculum: Design and Technologies is organised under two related strands:

- Knowledge and understanding – the use, development and impact of technologies and design ideas across a range of technologies contexts
- Processes and production skills – the skills needed to create designed solutions.

Together, the two strands provide students with knowledge, understanding and skills through which they can safely and ethically design, plan, manage, produce and evaluate products, services and environments. Teaching and learning programs should balance and integrate both strands. Students learn about technologies and society through different technologies contexts (knowledge and understanding) as they create designed solutions (processes and production skills).

The knowledge and understanding strand comprises five sub-strands. One sub-strand focuses on technologies and society and the other four are technologies contexts. The band level descriptions show how many times each prescribed technologies context is addressed. Schools decide which technologies contexts are addressed in Years 9 and 10 (elective subject).

The processes and production skills strand comprises five sub-strands: investigating and defining, generating and designing, producing and implementing, evaluating, and collaborating and managing.

Table 2 shows the strand and sub-strand structure for Design and Technologies. Figure 2 illustrates the relationship between the Design and Technologies strands and the sub-strands.

Table 2: Design and Technologies content structure

Strand	**Knowledge and understanding**
Sub-strands	Technologies and society
	Technologies contexts:
	Engineering principles and systems
	Materials and technologies specialisations
	Food and fibre production
	Food specialisations
Strand	**Processes and production skills**
Sub-strands	*Creating designed solutions by:*
	Investigating and defining
	Generating and designing
	Producing and implementing
	Evaluating
	Collaborating and managing

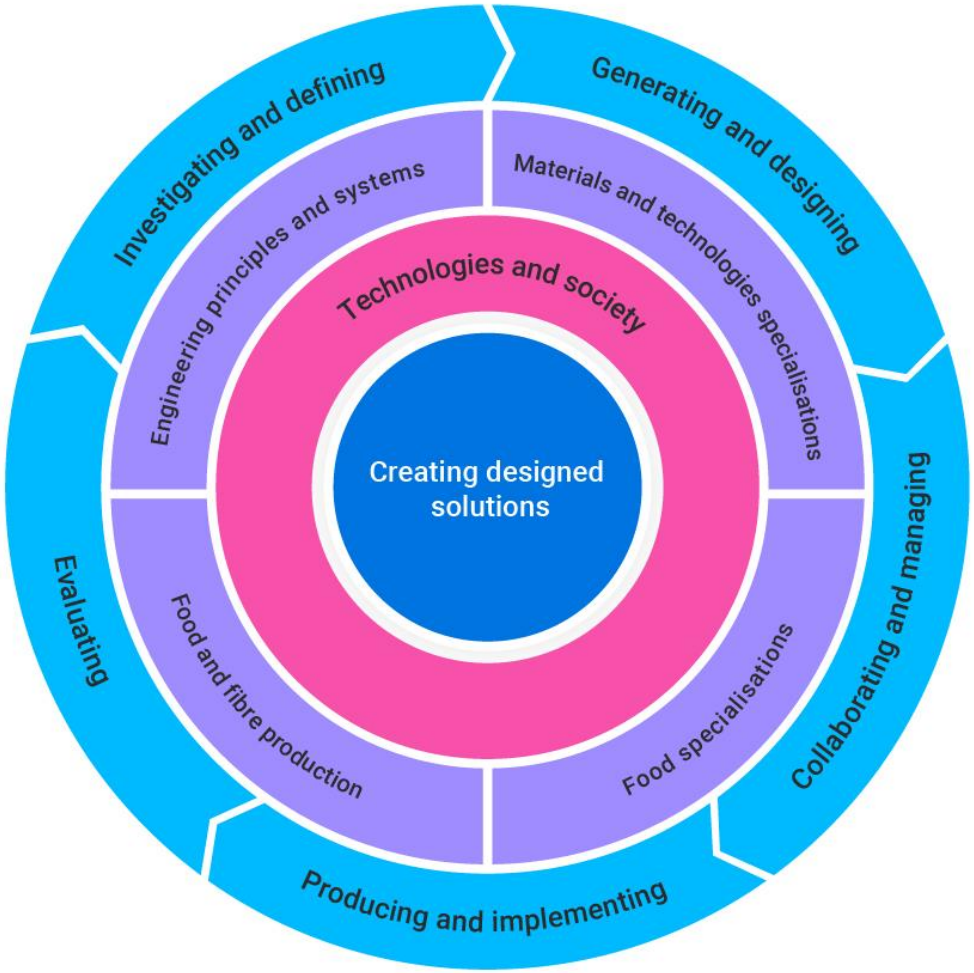

Figure 2: Relationship between the Design and Technologies strands and sub-strands

Technologies contexts and types of designed solutions

Students should have the opportunity to produce three types of designed solutions (products, services and environments). These different types of designed solutions have been specified to give students opportunities to engage with a broad range of design thinking and production skills. The combination of technologies contexts and types of designed solutions is a school decision.

In Foundation students will have the opportunity to produce at least one type of designed solution.

Across Years 1 to 4 students will have the opportunity to produce at least three types of designed solutions (products, services and environments) through the prescribed technologies contexts.

Across Years 5 to 8 students will have the opportunity to produce at least three types of designed solutions (products, services and environments) through the prescribed technologies contexts for each band.

Technologies contexts Foundation to Year 10

Foundation

In Foundation the technologies context is selected by the school. From Year 1 to Year 8 students will have the opportunity to create designed solutions at least once in each of the prescribed technologies contexts at least once in each band.

Years 1 and 2

By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Years 3 and 4

By the end of Year 4 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations

- Food and fibre production; Food specialisations.

Years 5 and 6

By the end of Year 6 students will have had the opportunity to create designed solutions at least once in each of these three technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Years 7 and 8

By the end of Year 8 students will have had the opportunity to create designed solutions at least once in each of the four technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production
- Food specialisations.

Years 9 and 10

By the end of Year 10 students will have had the opportunity to create designed solutions for one or more of the four technologies contexts.

Strands and sub-strands

Read more

Knowledge and understanding strand

This strand focuses on developing the underpinning knowledge and understanding of technologies (materials, systems, components, tools and equipment) across technologies contexts and the relationship between technologies and society.

Content is further organised into five sub-strands.

Sub-strand: Technologies and society

The technologies and society sub-strand focuses on how people use and develop technologies taking into account sustainability (social, economic, environmental), ethical, legal, aesthetic and functional factors and the impact of technologies on individuals; families; local, regional and global communities; the economy; and the environment – now and into the future.

Technologies contexts

Technologies contexts provide a framework within which students can gain knowledge and understanding about the characteristics and properties of technologies and systems and how they can be used to create innovative designed solutions.

The prescribed technologies contexts for Years 1 to 8 are described below.

Sub-strand: Engineering principles and systems

Engineering principles and systems is focused on how forces can be used to create light, sound, heat, movement, control or support in systems. Knowledge of these principles and systems enables the design and production of sustainable engineered solutions.

Students need to understand how sustainable engineered products, services and environments can be designed and produced as some resources diminish. They will progressively develop knowledge and understanding of how forces and the properties of materials affect the behaviour and performance of designed engineering solutions.

Sub-strand: **Materials and technologies specialisations**

Materials and technologies specialisations focus on a broad range of traditional, contemporary and emerging materials and specialist areas that typically involve extensive use of technologies. We live in and depend on the constructed environment for communication, housing, employment, healthcare, recreation and transport; however, we also face increasing concerns related to long-term sustainability.

Students need to develop the confidence to make decisions about processes and solutions that are ethical and sustainable. They can do this by learning about and working with materials and production processes. Students will progressively develop knowledge and understanding of the characteristics and properties of a range of materials, either when investigating particular materials or through producing designed solutions for a technologies specialisation; for example, architecture, electronics, fashion or graphics technologies.

Sub-strand: Food and fibre production

Food and fibre are the human-produced or harvested resources used to sustain life and are produced in managed environments such as farms, gardens and plantations or harvested from wild populations. Challenges for world food and fibre production include an increasing world population and an uncertain climate and competition for resources such as land and water.

Students need to engage in these challenges by understanding the processes of food and fibre production and by investigating innovative and sustainable ways of supplying agriculturally produced raw materials. They will progressively develop knowledge and understanding about the managed systems that produce food and fibre through creating designed solutions.

Sub-strand: Food specialisations

Food specialisations includes the application of nutrition principles (as described in Health and Physical Education) and knowledge about the characteristics and properties of food; food technologies; food selection and preparation; and contemporary technology-related food issues. There are increasing community concerns about food issues, including the nutritional quality of food and the environmental impact of food manufacturing processes.

Students need to understand the importance of a variety of foods, have sound understanding of nutrition principles and food safety, and develop skills in food preparation when making food decisions to help better prepare them for their future lives. They will progressively develop knowledge and understanding about food and food safety, and how to make informed and appropriate food preparation choices when experimenting with and preparing food sustainably.

Processes and production skills strand

The processes and production skills strand is based on design thinking, design processes and production processes and skills. This strand reflects a process of design and would typically be addressed through identifying needs or opportunities and may involve developing a design brief.

It focuses on creating designed solutions by:

- Investigating and defining
- Generating and designing
- Producing and implementing
- Evaluating
- Collaborating and managing.

These are the skills that students will use throughout a design project and they form the sub-strands for this strand. If students have been taught content from these sub-strands in one context, the students do not need to be taught the same content again using a different technologies context but rather they apply their skills to a different technologies context.

Sub-strand: Investigating and defining

Investigating and defining involves students analysing, exploring and investigating information, needs and opportunities. As creators and citizens they will critically reflect on the intention, purpose and operation of technologies and designed solutions. Analysing encourages students to examine values, and question and review processes and systems. Students reflect on how decisions they make may have implications for the individual, society and the local and global environment, now and in the future. Students explore and investigate technologies, systems, products, services and environments as they consider needs and opportunities. They progressively develop effective investigation strategies and consider the contribution of technologies to their lives and make judgements about them. Students develop criteria for success in response to needs and opportunities and may respond to or develop design briefs.

Sub-strand: Generating and designing

Generating and designing involves students in developing and communicating design ideas for a range of audiences. Students generate ideas, make choices, weigh up options, consider alternatives and document various design ideas and possibilities. They use critical and creative 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 solutions and identifying new design opportunities considering preferred futures. Generating and developing ideas involves identifying various competing factors that may influence and dictate the focus of the idea. Students evaluate, justify and synthesise what they learn and discover. They use graphical representation techniques when they draw, sketch, model, simulate and design ideas that focus on well- considered designed solutions.

Sub-strand: Producing and implementing

Producing and implementing involves students learning and applying a variety of skills and techniques to make designed solutions designed to meet specific purposes and user needs. They apply knowledge about components, materials and their characteristics and properties to ensure their suitability for use. They learn about the importance of adopting safe work practices. They develop accurate production skills to achieve quality designed solutions. Students develop the capacity to select and use appropriate materials, systems, components, tools and equipment; and use work practices that respect the need for sustainability. The use of modelling and prototyping to accurately develop simple and complex simulated or physical models supports the production of successful designed solutions.

Sub-strand: Evaluating

Evaluating involves students evaluating and making judgements throughout a design process and about the quality and effectiveness of their designed solutions and others' solutions. They identify criteria for success for needs or opportunities in the investigating and defining stage and then use these criteria to consider the implications and consequences of actions and decision-making. They determine effective ways to test and judge their ideas, concepts and, finally, their designed solutions. They reflect on processes and transfer their learning to other design needs or opportunities.

Sub-strand: Collaborating and managing

Collaborating and managing involves students learning to work collaboratively and to manage time and other resources to effectively create designed solutions. Progressively, students develop the ability to communicate and share ideas throughout the process, negotiate roles and responsibilities and make compromises to work effectively as a team. Students work individually and in groups to plan, organise and monitor timelines, activities and the use of resources. They progress from planning steps in a project through to more complex project management activities that consider various factors such as time, cost, risk assessment and management and quality control.

Core concepts

Core concepts are the big ideas, understandings, skills or processes that are central to the Design and Technologies curriculum. They give clarity and direction about what content matters most in Design and Technologies. In the curriculum development process, core concepts help identify the essential content students should learn to develop a deep, and increasingly sophisticated, understanding of Design and Technologies across the years of schooling.

Underpinning the Design and Technologies curriculum are the core concepts of the Technologies learning area. The core concepts that are specific to Design and Technologies make up the four sub-strands related to the four technologies contexts:

- **engineering principles and systems:** to design and create engineered solutions involves knowledge and understanding of forces, motion and energy and the properties and performance of materials.
- **materials and technologies specialisations:** to design and create solutions involves knowledge and understanding of characteristics and properties of a range of materials and production technologies.
- **food and fibre production:** to design and create food and fibre production solutions to support current and future access to food and fibre products involves knowledge and understanding of the sustainable management of the environments in which they are produced.
- **food specialisations:** to design and create solutions to maintain and enhance individual, community and planet health involves knowledge and understanding of food to make informed and healthy food selection and preparation choices.

Table 3 outlines the alignment between the Design and Technologies strands and sub-strands to the learning area and subject-specific core concepts.

Table 3: Relationships between Design and Technologies strands and sub-strands and core concepts (Denotes subject-specific core concepts)*

Content strands and sub-strands		Related core concepts
Strand	**Knowledge and understanding**	Creating solutions for preferred futures
Sub-strands	Technologies and society	Enterprise skills and innovation
	Technologies contexts:	Systems
	Engineering principles and systems	Engineering principles and systems*
	Materials and technologies specialisations	Materials and technologies specialisations*
	Food and fibre production	Food and fibre production*
	Food specialisations	Food specialisations*
Strand	**Processes and production skills**	Creating solutions for preferred futures
Sub-strands	*Creating designed solutions by:*	
	Investigating and defining	Technologies processes and production skills
	Generating and designing	Design thinking
	Producing and implementing	Systems thinking
	Evaluating	Computational thinking
	Collaborating and managing	Enterprise skills and innovation
		Interactions and impact
		Project management skills

DIGITAL TECHNOLOGIES F–10

Rationale

In a world that is increasingly digitised and automated, it is critical to the strength and sustainability of the economy, the environment and society that digital solutions are purposefully designed to include user empowerment, autonomy and accountability. With this, emerging technologies also present transformative opportunities to address the circular economy. This requires deep knowledge and understanding of digital systems (a component of an information system) and how to manage risks. Digital systems such as mobile and desktop devices and networks are transforming learning, recreational activities, home life and work. Digital systems support new ways of collaborating and communicating and require skills such as computational and systems thinking. These technologies are an essential problem-solving toolset in our knowledge-based society.

The Australian Curriculum: Digital Technologies empowers students to shape change by influencing how contemporary and emerging information systems and practices are applied to meet current and future needs. A deep knowledge and understanding of information systems enables students to be creative and discerning decision-makers when they select, use and manage data, information, processes and digital systems to meet needs and shape preferred futures.

Digital Technologies provides students with practical opportunities to use design thinking and to be innovative developers of digital solutions and knowledge. The subject helps students to become innovative creators of digital solutions, effective users of digital systems and critical consumers of information conveyed by digital systems.

Digital Technologies gives students authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. These are all necessary when using and developing information systems to make sense of complex ideas and relationships in all areas of learning. Digital Technologies helps students to be creative and innovative learners, who are active, ethical citizens capable of being informed members of the community.

Aims

Digital Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- design, create, manage and evaluate sustainable and innovative digital solutions to meet and redefine current and future needs
- use computational thinking (abstraction; data collection, representation and interpretation; specification; algorithms; and implementation) to create digital solutions

- confidently use digital systems to efficiently and effectively automate the transformation of data into information and to creatively communicate ideas in a range of settings
- apply protocols and legal practices that support safe, ethical and respectful communications and collaboration with known and unknown audiences
- apply systems thinking to monitor, analyse, predict and shape the interactions within and between information systems and the impact of these systems on individuals, societies, economies and environments.

Organisation

Content structure

Content in the Australian Curriculum: Digital Technologies is organised under two related strands:

- Knowledge and understanding – the information system components of data and digital systems (hardware, software and networks)
- Processes and production skills – the skills needed to create digital solutions.

Together, the two strands provide students with knowledge, understanding and skills through which they can safely and ethically use the capacity of information systems (people, data, processes, digital systems and their interactions) to systematically transform data into solutions that respond to the needs of individuals, society, the economy and the environment. Teaching and learning programs will typically integrate these two strands, as content in processes and production skills often draws on understanding of concepts in the knowledge and understanding strand.

Strands and sub-strands

Under each strand, curriculum content is further organised in sub-strands. The knowledge and understanding strand comprises two sub-strands. One sub-strand focuses on digital systems and the other on data representation.

The processes and production skills strand comprises seven sub-strands: acquiring, managing and analysing data; investigating and defining; generating and designing; producing and implementing; evaluating; collaborating and managing; and considering privacy and security.

Table 4 shows the strand and sub-strand structure for Digital Technologies. Figure 3 illustrates the relationship between the Digital Technologies strands.

Table 4: Digital Technologies content structure

Strand	**Knowledge and understanding**
Sub-strands	Digital systems
	Data representation
Strand	**Processes and production skills**
Sub-strands	Acquiring, managing and analysing data
	Creating digital solutions by:
	Investigating and defining
	Generating and designing
	Producing and implementing
	Evaluating
	Collaborating and managing
	Considering privacy and security

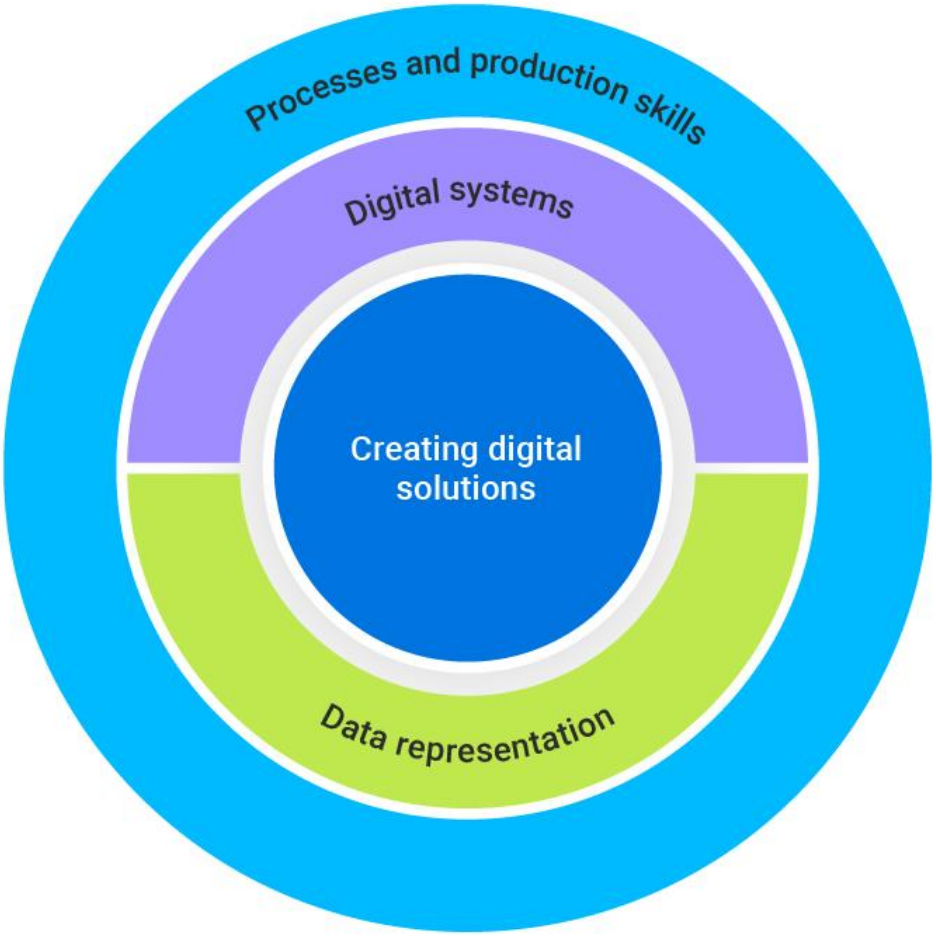

Figure 3: Relationship between the Digital Technologies strands and sub-strands

Read more

Knowledge and understanding strand

This strand focuses on developing the underpinning knowledge and understanding of information systems through the two sub-strands of digital systems and data representation.

Sub-strand: 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.

Sub-strand: 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.

Processes and production skills strand

The Digital Technologies processes and production skills strand is based on computational thinking and design processes. This strand reflects skills that would typically be addressed as part of the user stories and design criteria for creating digital solutions.

Students create digital solutions that use data; require interactions with users and within systems; and have impacts on people, the economy and environments. Solutions may be developed using combinations of readily available and student-designed hardware and software applications. Examples of solutions are instructions for a robot, an adventure game, and products featuring interactive multimedia including digital stories, animations and websites.

The Digital Technologies processes and production skills strand entails:

- Acquiring, managing and analysing data

and creating digital solutions by:

- Investigating and defining
- Generating and designing

- Producing and implementing
- Evaluating
- Collaborating and managing
- Considering privacy and security.

These are the skills that students will use throughout a Digital Technologies project and they comprise the sub-strands for this strand.

Sub-strand: 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.

Sub-strand: Investigating and defining

Investigating and defining involves students creating solutions and defining problems clearly by identifying appropriate data and requirements. When designing, 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 of specification.

Sub-strand: Generating and designing

Generating and designing involves students developing computational thinking 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.

Sub-strand: Producing and implementing

Students apply their algorithms as a program through systems to make products or content which have been designed to meet specific user needs. They 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. They develop the capacity to select and use appropriate systems, components, tools and equipment; and use techniques and materials that respect the need for sustainability. They use modelling and prototyping to accurately develop simple and complex physical models that support the production of successful digital solutions.

Sub-strand: Evaluating

Students evaluate and make judgements throughout the design process and about the quality and effectiveness of their digital solution. They 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.

Sub-strand: Collaborating and managing

Students learn 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.

Sub-strand: Considering privacy and security

Considering privacy and security involves 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 investigate how online applications and networked systems curate their data and explore strategies to manage their digital footprint.

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.

Core concepts

Core concepts are the big ideas, understandings, skills or processes that are central to the Digital Technologies curriculum. They give clarity and direction about what content matters most in Digital Technologies. In the curriculum development process, core concepts help identify the essential content students should learn to develop a deep, and increasingly sophisticated, understanding of Digital Technologies across the years of schooling.

Underpinning the Digital Technologies curriculum are the core concepts of the Technologies learning area. The core concepts specific to Digital Technologies are:

- **digital systems**: processing data in binary, made up of hardware, controlled by software, and connected to form networks
- **data representation:** data being represented and structured symbolically for storage and communication, by people and in digital systems
- **data collection**: numerical, categorical or structured values acquired or calculated to create information
- **data interpretation:** extracting meaning from data
- **abstraction:** reducing complexity by hiding details so that the main idea, problem or solution can be defined and focus can be on a manageable number of aspects
- **specification:** defining a problem precisely and clearly, identifying the requirements, and breaking the problem into manageable pieces
- **algorithms:** the precise sequences of steps and decisions needed to solve a problem, often involving iterative (repeated) processes
- **implementation:** the automation of an algorithm, typically by writing a computer program or using appropriate software
- **privacy and security**: the protection of data when it is stored or transmitted through digital systems.

Table 5 outlines the alignment between the Digital Technologies strands and sub-strands to the learning area and subject-specific core concepts.

Table 5: Relationships between Digital Technologies strands and sub-strands and core concepts

Content strands and sub-strands		Related core concepts
Strand	**Knowledge and understanding**	
Sub-strands	Digital systems Data representation	Systems; Digital systems* Data; Data representation*
Strand	**Processes and production skills**	Creating solutions for preferred futures
Sub-strands	Acquiring, managing and analysing data	Data; Data collection*; Data interpretation*
	Creating designed solutions by:	Systems thinking; Design thinking; Computational thinking (Abstraction*; Specification*; Algorithms*; Implementation*); Technologies processes and production skills; Project management skills; Enterprise skills and innovation; Interactions and impact; Privacy and security*
	Investigating and defining	
	Generating and designing	
	Producing and implementing	
	Evaluating	
	Collaborating and managing	
	Considering privacy and security	

** Subject-specific core concepts*

Read more

Digital systems

Digital systems focuses on the components of digital systems: hardware and software (computer architecture and the operating system), and networks and the internet (wireless, mobile and wired networks and protocols). This concept is addressed in both strands. The broader definition of an information system that includes data, people, processes and digital systems relates to the interactions and impact concept.

Data collection, representation and interpretation

The concepts that are about data focus on the properties of data, identifying and describing patterns, and how it is interpreted in context to produce information. These concepts in Digital Technologies build on content in the statistics and probability strands in the Mathematics curriculum. The Digital Technologies curriculum provides a deeper understanding of data and its representation, and computational skills for interpreting data. The data concepts provide rich opportunities for authentic data exploration in other learning areas while developing data processing and visualisation skills.

Data collection describes the numerical, categorical and textual facts measured, acquired or calculated as the basis for creating information and its binary representation in digital systems. It is addressed in the processes and production skills strand. Data representation describes how data is represented and structured symbolically for storage and communication, by people and in digital systems, and is addressed in the knowledge and understanding strand.

Data interpretation describes the processes of extracting meaning from data and is addressed in the processes and production strand.

Abstraction

Abstraction involves hiding details of an idea, problem or solution that are not relevant, to focus on a manageable number of aspects. It is a natural part of communication: people rarely communicate every detail because many details are not relevant in a given context. The idea of abstraction can be acquired from an early age. For example, when students are asked how to make toast for breakfast, they do not mention all steps explicitly, assuming that the listener is an intelligent implementer of the abstract instructions.

Central to managing the complexity of information systems is the ability to ‘temporarily ignore’ the internal details of the subcomponents of larger specifications, algorithms, systems or interactions. In digital systems, everything must be broken down into simple instructions.

Specification, algorithms and implementation

The concepts specification, algorithms and implementation focus on the precise definition and communication of problems and their solutions. This process begins with the description of tasks and concludes in the accurate definition of computational problems and their algorithmic solutions. These concepts draw from logic, algebra and the language of mathematics, and can be related to the scientific method of recording experiments.

Specification describes the process of defining and communicating a problem precisely and clearly. For example, explaining the need to direct an object, human or robot to move in a particular way.

An algorithm is a precise description of the steps and decisions needed to solve a problem. Algorithms will need to be tested before the final solution can be implemented. Anyone who has followed or given instructions, or navigated using directions, has used an algorithm. These generic skills can be developed without programming. For example, students can follow the steps in a recipe or describe directions to locate items.

Implementation describes the automation of an algorithm, typically by using appropriate software or writing a computer program.

These three concepts are addressed in the processes and production skills strand.

Privacy and security

The privacy and security concept focuses on the implications of and concerns related to the collection and generation of data through automated and non-automated processes. It allows for the evaluation of the social and economic implications of privacy in the context of safety and ethics. This concept is applied in the processes and production skills strand; in particular, through the acquiring, managing and analysing data; evaluating; and collaborating and managing sub-strands.

F–10 DESIGN AND TECHNOLOGIES: CURRICULUM ELEMENTS

Foundation

Level description
Learning in Design and Technologies builds on the Early Years Learning Framework, revisiting, strengthening and extending skills as needed. By the end of Foundation students will have had the opportunity to explore technologies – materials and equipment – through play experiences and to make a solution using familiar technologies for a school-selected context. The context may be one of the Technologies contexts or one identified by the school. There are rich connections to other learning areas, including Science. In Foundation students explore and use technologies and develop an awareness of how people design familiar products, services and environments. They explore a school-selected context which might include working with materials such as cardboard, fabric and other common household items; exploring placement of plants in a school garden; using equipment such as scissors, glues, trowels and utensils; and learning techniques to safely make solutions for their needs.
Design and Technologies achievement standard
By the end of Foundation students explore familiar products, services and environments. They use materials and equipment to safely make a solution for a school-selected context.
Technologies learning area achievement standard*
By the end of Foundation students identify familiar products, services and environments and develop familiarity with and show confidence in using digital systems. They use materials and equipment to safely make a solution for a school-selected context and show how digital systems can be used to solve problems. Students use objects, pictures and symbols to represent data. They identify if data is personal and owned by them. * To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	explore how local products, services and environments are designed by people (AC9TDEFK01)	identifying how Aboriginal and Torres Strait Islander Peoples have long designed and produced domestic items including clothing, tools and shelter, for example hydration packs, similar to those used in endurance activities today, that are known as nil-pa as made by the Pitta Pitta Peoples (AC9TDEFK01_E1)
			exploring how local delivery services meet different needs of people, for example describing how gift packages can be sent to and from people who live in different locations and how online shopping items arrive at a person's home (AC9TDEFK01_E2)
			exploring how an environment such as a local playground may have shade structures to protect users (AC9TDEFK01_E3)
			describing how community gardens, public swimming pools and parks are designed to help people stay healthy (AC9TDEFK01_E4)
			asking questions about the design of products from the local store, for example why certain packaging materials might have been selected, and how people design the text and images on the packaging to attract people's attention (AC9TDEFK01_E5)
	Technologies contexts	By the end of Foundation students will have had the opportunity to design and make a solution for a school-selected context.	

Processes and production skills	Generating and designing	generate ideas and manipulate materials and equipment to safely make a solution for a purpose (AC9TDEFP01)	identifying a purpose for designing and making a solution, for example the sand keeps blowing out of the sandpit or the birds keep flying into the waste bin and taking food scraps (AC9TDEFP01_E1)
			exploring ideas by drawing or modelling, for example designs for bee hotels to attract native bees to the school garden (AC9TDEFP01_E2)
	Producing and implementing		exploring how everyday materials can be used or re-used in construction play, for example using blocks and rain gutters or cardboard to make a ramp to roll a ball or toy car down (AC9TDEFP01_E3)
			practising a range of technical skills safely using equipment, for example joining techniques when making a product from materials, such as a simple greenhouse to keep a seedling warm (AC9TDEFP01_E4)
			assembling components of systems and checking they function as planned, for example making and testing a simple bowling or stacking or obstacle game with discarded food containers or packaging (AC9TDEFP01_E5)
	Evaluating		evaluating what they have made using personal preferences, for example using a smiley face Likert scale (AC9TDEFP01_E6)

Years 1 and 2

Band level description

By the end of Year 2 students will have had the opportunity to create designed solutions at least once in these two technologies contexts:

- Engineering principles and systems; Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other learning areas, including Science and Health and Physical Education.

Students explore and investigate technologies – materials, systems, components, tools and equipment – including their purposes and how they meet personal and social needs within local settings. Students develop an understanding of how society and environmental sustainability factors influence design and technologies decisions. They evaluate designed solutions using questions such as: How does it work? What purpose does it meet? Who will use it? What do I like about it? How can it be improved? They begin to consider the impact of their decisions and of technologies on others and the environment. They reflect on their participation in a design process. This involves students developing new perspectives and engaging in different forms of evaluating and critiquing products, services and environments based on their personal preferences.

Using a range of technologies including a variety of graphical representation techniques to communicate, students draw, model and explain design ideas; label drawings; draw objects as two-dimensional images from different views; draw products and simple environments; and verbalise design ideas.

They plan simple steps and follow directions to complete their own or group design ideas and projects and manage their own role in team projects. Students are aware of others around them and the need to work safely and collaboratively when making designed solutions.

Design and Technologies achievement standard

By the end of Year 2 students identify the purpose of familiar products, services and environments. For each of the two prescribed technologies contexts they explore the features and uses of technologies and create designed solutions. Students evaluate their ideas based on their personal preferences. They communicate design ideas using models and simple drawings and follow sequenced steps to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 2 students describe the purpose of familiar products, services and environments and use basic computational thinking to create simple digital solutions to known problems or opportunities. For each of the two prescribed technologies contexts they identify the features and uses of technologies and create designed solutions. They evaluate their ideas, based on their personal preferences. Students communicate design ideas using models and simple drawings, describe and represent algorithms that involve repetition and decisions, and follow sequenced steps to safely produce designed solutions. They identify examples of personal data that may be stored online.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs (AC9TDE2K01)	exploring how Aboriginal and Torres Strait Islander Peoples have long understood their dependence on living systems to meet their local and community needs, for example exploring the material culture of the Ngarrindjeri Peoples who sustainably make woven items from a grass-like sedge (AC9TDE2K01_E1)
			exploring how particular services meet different needs of people in the community, for example describing why doctors provide medical care to people in many ways including by phone, video conference, plane, car or outdoor clinic (AC9TDE2K01_E2)
			asking questions about the design of a range of shelters provided for the public and how they meet the needs of people in the community, for example the structures of a school or local sportsground (AC9TDE2K01_E3)
			exploring how local products are designed, for example brainstorming the materials and processes needed to create a costume for a school or community event including using recycled clothing or components to minimise waste (AC9TDE2K01_E4)

	Technologies contexts	By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts.	
	Technologies context: Engineering principles and systems; Materials and technologies specialisations	explore how technologies including materials affect movement in products (AC9TDE2K02)	investigating Aboriginal and Torres Strait Islander Peoples' instructive toys and how such toys are designed and made to produce movement, for example propeller toys made from pandanus across northern Australia (AC9TDE2K02_E1)
			selecting materials to show how material properties are appropriate for particular designed solutions, for example materials that enable sliding or floating (AC9TDE2K02_E2)
			exploring how to manipulate materials using a range of tools, equipment and techniques to create movement, for example when constructing a toy boat that floats and moves (AC9TDE2K02_E3)
			exploring a system such as a marionette or Indonesian wayang kulit shadow puppet to see that by combining materials with forces movement can be created (AC9TDE2K02_E4)
	Technologies context: Food and fibre production; Food specialisations	explore how plants and animals are grown for food, clothing and shelter (AC9TDE2K03**)**	exploring how Aboriginal and Torres Strait Islander Peoples grow plants and animals for food, for example how land is transformed through the construction of terraces at Wagadagam on Mabuiag Island in the Torres Strait, or how the Kombumerri Peoples of South East Queensland developed an important aquaculture industry farming mangrove worms (AC9TDE2K03_E1)
			exploring which plants and animals can provide food or materials for clothing and shelter, for example comparing the farming techniques and volume of water needed to grow rice in countries across Asia with Australian rice production (AC9TDE2K03_E2)
			identifying products that can be designed and produced from plants and animals, for example food products, paper and wood products, fabrics and yarns, and fertilisers (AC9TDE2K03_E3)

			considering a range of tools and equipment needed to grow plants for a purpose and their suitability, for example describing tools needed to cultivate or mulch a home vegetable garden by hand or to produce a large non-food crop, such as cotton on a farm (AC9TDE2K03_E4)
		explore how food can be selected and prepared for healthy eating (AC9TDE2K04)	identifying a wide range of foods, categorising them into food groups and describing their nutritional value and the methods, tools and equipment needed to prepare them for healthy eating (AC9TDE2K04_E1)
			exploring how people including from countries across Asia design and produce food for healthy eating based on the available plants and animals in their region and their culture, beliefs and perspectives including any specific tools and equipment needed (AC9TDE2K04_E2)
Processes and production skills	Generating and designing	generate, develop and record design ideas through describing, drawing or modelling (AC9TDE2P01)	comparing and contrasting features of existing products to develop new ideas, for example designing and making a simple puppet with a movable part after experimenting with other toys with several movable parts (AC9TDE2P01_E1)
			communicating design ideas by modelling or producing and labelling 2-dimensional drawings using a range of technologies, for example designing a new environment such as a cubbyhouse or animal shelter and showing different views (top view and side view) with descriptions of materials and features (AC9TDE2P01_E2)
	Producing and implementing	use materials, components, tools, equipment and techniques to safely make designed solutions (AC9TDE2P02)	exploring how everyday materials can be used or re-used in construction play, for example using used wrapping paper and gift cards to design and make decorations or signage for the classroom or a school event to minimise waste (AC9TDE2P02_E1)
			practising a range of technical skills using tools and equipment safely, for example joining techniques when making products, watering and mulching gardens, preparing food (AC9TDE2P02_E2)
			assembling components and checking they function as planned, for example containers, contents and joining materials when making musical shakers (AC9TDE2P02_E3)

	Evaluating	evaluate the success of design ideas and solutions based on personal preferences and including care for the natural environment (AC9TDE2P03)	recording a judgement about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea or describing how design ideas meet the needs of those who will use the solution using audio-recording or video-recording software (AC9TDE2P03_E1)
			reflecting on the environmental impacts of the production of a solution and considering alternative approaches that would minimise future negative impacts, for example identifying the negative environmental impacts of different food packaging and how these could be minimised (AC9TDE2P03_E2)
			reflecting on the processes and challenges of designing and producing a solution and recording these reflections, for example when growing a food product, designing a structure to take a load or making a nutritious snack (AC9TDE2P03_E3)
			discussing design strengths and weaknesses, for example explaining how the equipment in a playground might be unsuitable for some children to use and suggesting areas for design improvement (AC9TDE2P03_E4)
	Collaborating and managing	sequence steps for making designed solutions (AC9TDE2P04)	using lists or storyboarding when planning and making, for example when creating an electronic planting calendar (AC9TDE2P04_E1)
			recording the procedure for making a product, for example the ordered steps for making a salad or instructions for making a container (AC9TDE2P04_E2)

Years 3 and 4

Band level description
By the end of Year 4 students will have had the opportunity to create designed solutions at least once in these two technologies contexts: • Engineering principles and systems; Materials and technologies specialisations • Food and fibre production; Food specialisations. Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other learning areas, including Science and Health and Physical Education. Students investigate technologies – materials, systems, components, tools and equipment – developing a sense of self and ownership of their ideas and thinking about their peers and communities and as consumers. They consider the purpose of technologies and how they meet needs. Students explore and learn to harness their creative, innovative and imaginative ideas and approaches to achieve designed products, services and environments. They do this through planning and awareness of the characteristics and properties of materials and the use of tools and equipment. They learn to reflect on their actions to refine their processes and develop their decision-making skills. Students examine social and environmental sustainability implications of existing products and processes to raise awareness of their place in the world. They compare their predicted implications with real-world case studies including those from the Asia region and recognise that designing and technologies can affect people and their environments. They become aware of the role of those working in design and technologies occupations and how these people think about the way a product might change in the future. Students clarify and present ideas, using a range of technologies and graphical representation techniques, for example drawing annotated diagrams and modelling objects as 3-dimensional images from different views by visualising rotating images and using materials. Students recognise techniques for documenting design and production ideas such as basic drawing symbols and use simple flow diagrams and charts. Students become aware of appropriate ways to manage their time and focus. They identify and list criteria for success including in relation to preferred futures. Students list the major steps needed to complete a design task. They show an understanding of the importance of planning when designing solutions, in particular when collaborating. Students identify safety issues and learn to follow simple safety rules when producing designed solutions.

Design and Technologies achievement standard

By the end of Year 4 students describe how people design products, services and environments to meet the needs of people and consider sustainability. For each of the two prescribed technologies contexts they describe the features and uses of technologies and create designed solutions. Students evaluate ideas against criteria for success. They use models and drawings including annotations and symbols to plan, sequence and communicate steps in design and production. Students use technologies and techniques to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 4 students describe how people design products, services and environments to meet the needs of people, including sustainability, and use computational thinking to create scaffolded digital solutions. They recognise different types of data and identify how they are transmitted by digital systems. For each of the two prescribed technologies contexts they describe the features of technologies and create designed solutions. Students evaluate ideas against identified criteria for success. They define problems and identify opportunities, then design and implement solutions using algorithms and visual programming that involve decision-making, repetition and user input. Students use models and drawings including annotations and symbols to plan, sequence and communicate major steps in design and production. They use technologies and techniques to safely produce solutions. Students use passphrases and agreed behaviours to safely access and explore digital systems, tools and online or networked environments independently and with others.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	describe design and technologies occupations and explore factors including sustainability	exploring how in many Aboriginal and Torres Strait Islander communities people were and continue to be recognised for their specialist skills and abilities in designing and producing products made from local materials and providing related services, using sustainable practices to ensure future access to meet community needs, for example traditional adhesives and medicines (AC9TDE4K01_E1)

		that impact on the design of products, services and environments to meet community needs (AC9TDE4K01)	exploring how design and technologies occupations in the local area (suburban, rural or regional areas) meet community needs, for example farmers, seafood industry workers, mechanics, bakers, builders and radiographers (AC9TDE4K01_E2)
			examining the suitability of a service or everyday system and proposing improvements, for example a water-saving system for a bathroom at home or school, traffic management systems to reduce traffic jams, remote and regional services including medical services (AC9TDE4K01_E3)
			examining products and environments to discover the factors that may have influenced the design, choice of materials and technologies used, for example discussing energy-efficient cooking with a wok, or sustainable wood products for home use including furniture made from plantation timbers, bamboo toothbrushes or coconut shell bowls (AC9TDE4K01_E4)
	Technologies contexts	By the end of Year 4 students will have had the opportunity to create designed solutions at least once in each of the two combined technologies contexts.	
	Technologies context: Engineering principles and systems; Materials and technologies specialisations	describe how forces and the properties of materials affect function in a product or system (AC9TDE4K02)	investigating how Aboriginal and Torres Strait Islander Peoples consider buoyant forces as they select materials for watercraft, for example making bark or dugout canoes (AC9TDE4K02_E1)
			looking at models to identify how materials are used and movement is created, for example in the design of a toy with wheels or moving parts (AC9TDE4K02_E2)
			exploring through play how movement can be started by combining materials and using forces, for example releasing a wound rubber band to propel a model boat, how different materials may impact a marble roll speed, or how various surfaces from grass to bitumen might affect a robot's movement (AC9TDE4K02_E3)
			deconstructing a product or system to identify how motion and forces affect performance, for example in a puppet such as a Japanese *bunraku* puppet or a model windmill with moving sails (AC9TDE4K02_E4)

			identifying engineered systems and experimenting with available local materials, tools and equipment to solve problems, for example designing a container or parachute that will keep an egg intact when dropped from a height, a pop-up card, a tower or a vehicle (AC9TDE4K02_E5)
	Technologies context: Food and fibre production; Food specialisations	describe the ways of producing food and fibre (AC9TDE4K03)	investigating food and fibre production techniques and technologies developed by Aboriginal and Torres Strait Islander Peoples, such as burning, tilling, planting, transplanting, watering, irrigating, weeding, thinning, cropping, storing and trading food (AC9TDE4K03_E1)
			describing tools, equipment and procedures to improve plant and animal production, for example when growing vegetables in the school garden and producing environments such as a greenhouse or animal housing including safe bird shelters (AC9TDE4K03_E2)
			identifying production techniques and areas in Australia and Asia where major crops are grown or animals are bred, for example the wheat and sheep belt or beef industry areas, plantation and native forest areas or where sugar cane or rice are grown (AC9TDE4K03_E3)
		describe the ways food can be selected and prepared for healthy eating (AC9TDE4K04)	investigating how Aboriginal and Torres Strait Islander Peoples have long considered the nutrient content of seasonal foods as a means of maintaining a balanced diet (AC9TDE4K04_E1)
			recognising the benefits food technologies provide for health and food safety and ensuring that a wide variety of food is available and can be prepared for healthy eating, for example pasteurisation of milk for food safety and freezing of vegetables to retain nutrients (AC9TDE4K04_E2)
			discovering the differences between fresh food and processed food by investigating nutrient content of fresh food and examining food labels of processed foods for ingredients or nutritional value (AC9TDE4K04_E3)
			considering creative ways foods can be prepared for maximum taste and appeal, for example locating and discussing images online that show fun ways to present food that might encourage healthy eating (AC9TDE4K04_E4)
			describing foods using the senses, for example describing the colour, aroma, sound, texture and taste of the ingredients in a salad or stir fry and how our senses influence what we select to eat (AC9TDE4K04_E5)

Processes and production skills	Investigating and defining	explore needs or opportunities for designing, and test materials, components, tools, equipment and processes needed to create designed solutions (AC9TDE4P01)	exploring the designs and performance of models of Aboriginal and Torres Strait Islander Peoples' watercraft, and the opportunities for their designs to inform water sports equipment such as paddleboards (AC9TDE4P01_E1)
			examining the structure and production of everyday products, services and environments to enhance their own design ideas, for example discussing the processes and systems that might be used to distribute hot food to a large number of people at a community event (AC9TDE4P01_E2)
			selecting and making judgements about appropriate joining techniques for materials to produce designs, prototypes, structures or working models, for example joining fabric, paper or cardboard in various ways (AC9TDE4P01_E3)
			exploring and testing a range of materials under different conditions for suitability including sustainability considerations, for example the compostability of paper-based materials or the strength and durability of natural materials (AC9TDE4P01_E4)
			exploring the different uses of materials in a range of products, including those from countries across Asia, for example in shelters, boats, handmade tools, baskets, wooden items, musical instruments, clothing and fabric (AC9TDE4P01_E5)
	Generating and designing	generate, develop and communicate design ideas and decisions using technical terms and graphical representation techniques (AC9TDE4P02)	visualising innovative design ideas by producing thumbnail drawings, models and labelled drawings to explain features and modifications, for example drawing one or more designs for a machine to collect waste, and including labels and descriptions explaining materials used, their properties and the intended function of components or the whole system (AC9TDE4P02_E1)
			planning, sharing and documenting creative designs, ideas and processes using digital tools and appropriate terms and privacy considerations, for example a class blog or collaborative document that has been selectively shared with peers (AC9TDE4P02_E2)
			labelling diagrams with technical terms, for example labelling the chassis, axle, wheels and steering on a diagram for a pushcart (AC9TDE4P02_E3)

	Producing and implementing	select and use materials, components, tools, equipment and techniques to safely make designed solutions (AC9TDE4P03)	exploring ways of joining, connecting and assembling components that ensure success including the impact digital tools have on these processes, for example using virtual reality or simulations to experience the use of assembling materials or using tools (AC9TDE4P03_E1)
			using tools and equipment accurately when measuring, marking and cutting, for example when creating a template, measuring ingredients in a recipe or sowing seeds (AC9TDE4P03_E2)
			explaining the importance of safe, responsible and cooperative work practices when designing and making, for example when handling sharp equipment such as knives and scissors (AC9TDE4P03_E3)
			selecting and using materials, components, tools, equipment and processes with consideration of the environmental impact at each stage of the production process, for example considering how packaging and offcuts could be recycled or used for other purposes before choosing materials for a project (AC9TDE4P03_E4)
	Evaluating	develop criteria for success including care for the environment to evaluate design ideas and solutions (AC9TDE4P04)	comparing the amount of waste that would be produced from different design and development options and the potential for recycling waste, for example exploring the choice of materials to construct a simple toy and whether these materials are repairable or able to be recycled once the toy breaks or is no longer wanted (AC9TDE4P04_E1)
			reflecting on designed solutions to critique and assess suitability, sustainability and enterprise opportunities and determine how well they meet criteria for success, for example gathering relevant data to support a discussion and make judgements about a school or community fundraising event in relation to waste reduction, attendance and funds raised, and consider how these aspects could be handled in future events (AC9TDE4P04_E2)
	Collaborating and managing	sequence steps to individually and collaboratively make designed solutions (AC9TDE4P05)	determining planning processes as a class, for example recording when parts of a project need to be completed on a timeline, in a spreadsheet, calendar or list (AC9TDE4P05_E1)
			discussing the importance of managing time and resource allocation throughout production, for example discussing the roles different people might take in a team and identifying the tasks they will complete and the resources they will each need (AC9TDE4P05_E2)

	identifying the steps in a mass production process, for example drawing a flowchart or video recording a procedure for packing identical boxes of food for community members in need, where each student in a group has a separate task as part of the production process (AC9TDE4P05_E3)

Years 5 and 6

Band level description

By the end of Year 6 students will have had the opportunity to create designed solutions at least once in three technologies contexts:

- Engineering principles and systems
- Materials and technologies specialisations
- Food and fibre production; Food specialisations.

Students should have opportunities to experience designing and producing products, services and environments. There are rich connections to other subjects, including Science, Humanities and Social Sciences and Health and Physical Education.

Students critically examine technologies − materials, systems, components, tools and equipment − that are used in the home and in local, national, regional or global communities, with consideration of society, ethics and social and environmental sustainability factors. Students consider why and for whom technologies were developed. They engage with ideas beyond the familiar, exploring how design and technologies and the people working in technologies occupations contribute to society. They seek to explore innovation and establish their own design capabilities for designing products, services and environments. Students are given new opportunities for clarifying their thinking, creativity, analysis, problem-solving and decision-making. They explore trends and data to imagine what the future will be like and suggest design decisions that contribute positively to preferred futures.

Using a range of technologies including a variety of graphical representation techniques to communicate, students represent objects and ideas in a variety of forms such as thumbnail sketches, models, drawings, diagrams and storyboards to illustrate the development of designed solutions. They use a range of techniques such as labelling and annotating sequenced sketches and diagrams to illustrate how products function; and recognise and use a range of drawing symbols in context to give meaning and direction.

Students work individually and collaboratively to identify and sequence steps needed for a design task. They negotiate on, develop and follow plans to complete design tasks safely, adjusting when necessary. Students identify and maintain safety standards and practices when making designed solutions.

Design and Technologies achievement standard

By the end of Year 6 students explain how people design products, services and environments to meet the needs of communities, including sustainability. For each of the three prescribed technologies contexts they explain how the features of technologies impact on design decisions and they create designed solutions. Students evaluate ideas and solutions against criteria for success. They use technical terms and graphical representation techniques to communicate ideas to an audience. Students develop project plans including production processes and select appropriate technologies and techniques to safely produce designed solutions.

Technologies learning area achievement standard*

By the end of Year 6 students describe how people design products, services and environments to meet the needs and opportunities of communities, including sustainability. For each of the three prescribed technologies contexts students explain how the features of technologies impact on design decisions and they create designed solutions. They use computational thinking to design and create digital solutions by developing algorithms to address problems or opportunities and implement them as visual programs. They evaluate ideas and solutions against criteria for success. Students use technical terms and graphical representation techniques to communicate ideas to an audience. They record project plans, including production processes, and select appropriate technologies and techniques to safely produce designed solutions. Students understand and describe how data is transmitted, how behaviours and ethics help protect data and describe what effect supplied data can have on their digital footprint.

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Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	explain how people in design and technologies occupations consider competing factors including sustainability in the design of products, services and	investigating how Aboriginal and Torres Strait Islander Peoples have long considered competing factors especially those related to sustainability in the design of fish harvesting technologies, for example fish traps and fish poisons that allow for selective harvesting and release of bycatch, as compared with high-yield, non-selective harvesting practices such as trawling (AC9TDE6K01_E1)
			describing the impact and sustainability implications of designed products, services or environments on local, regional and global communities, including countries in the Asia region,

		environments for current and future use (AC9TDE6K01)	for example explaining the impact of sending redundant technologies to other countries for recycling or disposal (AC9TDE6K01_E2)
			explaining the importance of aesthetics, function and sustainability in product design, for example a textile product that gives UV protection and is appealing; a motor that moves a vehicle and uses a sustainable power source; a modification to a home to reduce environmental impact; restoring a natural environment and enabling low-impact access for the public such as boardwalks in fragile wet heath or swamp ecosystems (AC9TDE6K01_E3)
			identifying the components of a service that contribute to its success and assessing potential risk or failure, for example a community service announcement to communicate a message in the school or to a wide audience; a service that manages an aspect of the environment such as Clean Up Australia Day in different communities (AC9TDE6K01_E4)
	Technologies contexts	By the end of Year 6 students will have had the opportunity to create designed solutions at least once in each of these three technologies contexts.	
	Technologies context: Engineering principles and systems	explain how electrical energy can be transformed into movement, sound or light in a product or system (AC9TDE6K02)	investigating how much of the coastal regions of northern Australia are either owned or co-managed by Aboriginal and Torres Strait Islander Peoples, and where automated, labour-saving photovoltaic systems are expected to provide opportunities for First Nations Australians to expand their aquaculture industries (AC9TDE6K02_E1)
			explaining how sun tracking of solar panels assists renewable energy production in remote communities (AC9TDE6K02_E2)
			describing the process needed to carefully plan and select components for a system to perform a specific task, for example planning the arrangement of switches, light globes and a power source in a simple lighting design (AC9TDE6K02_E3)
			producing models using materials, tools and equipment to show how to control movement, sound or light, for example constructing a simple automaton or lifting system including a pulley to raise a bucket or toy (AC9TDE6K02_E4)

			deconstructing a product or system to discover how movement, sound or light can be controlled, for example taking apart a torch or buzzer, or exploring circuit design in a security system and investigating the properties of materials to solve problems including the amount of light reflected from different surfaces to control a sensor (AC9TDE6K02_E5)
	Technologies context: Materials and technologies specialisations	explain how characteristics and properties of materials, systems, components, tools and equipment affect their use when producing designed solutions (AC9TDE6K03)	investigating how Aboriginal and Torres Strait Islander Peoples have long used material science knowledge to identify materials and preparation techniques to meet performance needs, for example twining techniques of string and rope fibres to ensure suitability for use in wet, dry, freshwater and saltwater applications (AC9TDE6K03_E1)
			identifying and describing the properties of materials for the design and construction of a household product or system to improve household sustainability, for example a product for storing harvested water or reducing energy consumption (AC9TDE6K03_E2)
			describing the materials and systems used in public places and facilities that positively affect the way people live, for example a community exercise environment, arts facility, water treatment plant or garbage collection service (AC9TDE6K03_E3)
			comparing and describing the tools, equipment and techniques used to manufacture products in factories with those used by local and regional enterprises including cost and impacts, for example clothing made in factories compared with local handmade garments (AC9TDE6K03_E4)
			comparing the design and production of products, services or environments in Australia and a country in the Asia region, for example comparing the availability and properties of preferred materials and the design of public shelters and housing in Indonesia and Australia (AC9TDE6K03_E5)

	Technologies context: Food and fibre production/ Food specialisations	explain how and why food and fibre are produced in managed environments (AC9TDE6K04)	exploring how prior to colonisation, Aboriginal and Torres Strait Islander Peoples lived in discrete communities that cared for, protected and sustainably harvested food and fibre resources, some of which are now cultivated to meet domestic and international demand, for example bunya nuts, macadamia and finger limes (AC9TDE6K04_E1)
			investigating and experimenting with different tools, equipment and methods of preparing soil and the effect on soil quality and sustainability including conserving and recycling nutrients, for example when designing a sustainable school vegetable garden or cropping area (AC9TDE6K04_E2)
			describing the relationship between plant types and animal breeds and their environmental suitability when selecting suitable plants or animals for an environment (AC9TDE6K04_E3)
			sequencing the process of converting on-farm food or fibre products into a product suitable for retail sale, for example creating a digital flowchart to record a paddock-to-plate supply chain, or a procedure for making yarn or fabric from fibre (AC9TDE6K04_E4)
		explain how the characteristics of foods influence selection and preparation for healthy eating (AC9TDE6K05)	using current food guidelines and government-endorsed food policies to plan food choices, for example describing and planning a healthy meal or lunchbox for a particular individual with recommended serving sizes using the Australian Dietary Guidelines to inform choices and explaining the characteristics of selected foods (AC9TDE6K05_E1)
			experimenting with tools, equipment, ingredients and techniques to design and make food products or meals for selected groups for healthy eating taking into consideration environmental impacts and nutritional benefits, for example experimenting with preserving techniques including pickling, air drying or sun drying and presenting information on the benefits for an audience (AC9TDE6K05_E2)
			investigating how Aboriginal and Torres Strait Islander Peoples have long selected and prepared foods for healthy eating, for example based on their nutritional value, availability, spoilage, preparation and processing requirements (AC9TDE6K05_E3)

			exploring a variety of tastes and how they may influence the selection or preparation of food, for example the sour, salty, sweet, spicy and umami flavours of many foods from countries across Asia (AC9TDE6K05_E4)
Processes and production skills	Investigating and defining	analyse needs or opportunities for designing, and investigate the materials, components, tools, equipment and processes needed to create designed solutions (AC9TDE6P01)	investigating Aboriginal and Torres Strait Islander Peoples' traditional fibre sources as potential commercial solutions for biodegradable string or rope, and researching the materials, systems, components, tools and equipment required (AC9TDE6P01_E1)
			surveying people in the school community about their needs in order to design an appropriate product, service or environment that addresses the need, for example planning the requirements for a community meal, creating more shade in the school by determining where trees could be planted or designing a security system for the community garden (AC9TDE6P01_E2)
			investigating designed solutions from around the world to make suitable, quality decisions that meet needs or opportunities, for example locating information online about small-space gardening ideas from different countries and making a judgement about their suitability for the local environment (AC9TDE6P01_E3)
			identifying the importance of complementary parts of working, everyday systems by deconstructing the components, structure and purpose of products, services or environments, for example labelling a diagram of a robotic weeder or vacuum cleaner (AC9TDE6P01_E4)
			testing a range of materials, components, tools and equipment to determine the appropriate technologies needed to make products, services or environments, for example the materials for a product such as a rubber-band-powered vehicle or item of protective clothing (AC9TDE6P01_E5)
			investigating how to minimise material use and manage waste by critiquing the environmental and social impacts of materials, components, tools and equipment, for example deciding to repurpose an old item of clothing to create an apron or carry bag or using vegetable scraps to make a healthy soup (AC9TDE6P01_E6)

	Generating and designing	generate, develop and communicate design ideas, decisions and processes using technical terms and graphical representation techniques (AC9TDE6P02)	generating a range of design ideas for products, services or environments using prior knowledge, skills and research, for example a security system for a community garden, a product made from a repurposed item of clothing, a permaculture vegetable patch or a healthy meal for a family picnic (AC9TDE6P02_E1)
			analysing, modifying and developing design ideas to enhance and improve the sustainability of the product, service, environment or system, for example analysing eco-friendly alternatives to non-recyclable decorations for a community event or replacing paper-based newsletters with online formats (AC9TDE6P02_E2)
			representing and communicating design ideas using modelling and drawing standards including the use of digital tools, for example including scale, symbols and codes in plans and diagrams; using pictorial maps and aerial views; and using digital mapping applications or infographics to present research and ideas to others (AC9TDE6P02_E3)
			experimenting with materials, tools and equipment to refine design ideas, for example considering the selection of materials and joining techniques to suit the purpose of a product, such as a pop-up book, a fabric bag or an electric circuit (AC9TDE6P02_E4)
	Producing and implementing	select suitable materials, components, tools, equipment and techniques and use safe procedures to make designed solutions (AC9TDE6P03)	matching material and joining techniques to the design intention, for example accurately and safely cutting and sewing the fabric pieces to make a community banner or joining components to produce an electric circuit (AC9TDE6P03_E1)
			using appropriate personal protective equipment required for the use of some tools and equipment, for example protective eyewear and working safely, responsibly and cooperatively to ensure safe work areas, for example the safe use of equipment when making a water-resistant, floating craft (AC9TDE6P03_E2)
			choosing appropriate materials, tools, equipment and techniques for a specific purpose, for example when safely and hygienically preparing food, cultivating garden beds or constructing electronic products (AC9TDE6P03_E3)

			identifying work practices that show an understanding of nutrition, environmental considerations, hygiene and food safety when designing and making a food product, for example washing fruit and vegetables carefully to remove residues, safe disposal of cooking oils to avoid environmental damage, refrigerated storage of highly perishable foods (AC9TDE6P03_E4)
	Evaluating	develop criteria for success collaboratively that include sustainability to evaluate design ideas, processes and solutions (AC9TDE6P04)	identifying criteria for success, processes and planning of a designed solution collaboratively, for example using a visual representation such as a flowchart (AC9TDE6P04_E1)
			developing criteria for success with others to evaluate the suitability of materials, tools and equipment for specific purposes, for example considering the most suitable fabric, tools and equipment required to make beeswax wraps (AC9TDE6P04_E2)
			reflecting on how well their designed solution ensures safety and wellbeing of users and meets the needs of communities and different cultures, for example reviewing and discussing the choice of fabrics used to make re-usable bags and how they could be made more appealing to all cultural groups by considering modifications to style (AC9TDE6P04_E3)
			evaluating their designed solutions including considering the benefits and costs of production processes and the environmental impact, for example for the production of an animal shelter (AC9TDE6P04_E4)
			considering the social values and ethics of clients when designing an environment, for example interviewing users of a space or seeking permission to use designs or images created by others including respect of intellectual property (AC9TDE6P04_E5)

	Collaborating and managing	develop project plans that include consideration of resources to individually and collaboratively make designed solutions (AC9TDE6P05)	setting milestones for production processes and allocating roles to team members, for example using a cloud-based or server-based document or spreadsheet to list tasks, deadlines and roles for team members working on a project collaboratively, including setting document sharing permissions with selected people (AC9TDE6P05_E1)
			identifying the human resources, materials, tools and equipment that will be needed to make the designed solution as part of the project plan and specifying when these will be needed, for example access to a wildlife expert at the planning stage and scheduling access to shared tools when building a habitat for local animals (AC9TDE6P05_E2)
			outlining and reviewing the planning and production steps needed to produce a product, service or environment using digital tools, for example making a flowchart or using a digital planner to record the sequence of tasks and deadlines required to complete a project (AC9TDE6P05_E3)

Years 7 and 8

Band level description
By the end of Year 8 students will have had the opportunity to create designed solutions at least once in the following four technologies contexts: • Engineering principles and systems • Materials and technologies specialisations • Food and fibre production • Food specialisations. Students should have opportunities to design and produce products, services and environments. There are rich connections to other subjects, for example Science, Geography and Health and Physical Education. Students investigate and select from a range of technologies − materials, systems, components, tools and equipment. They consider how the characteristics and properties of technologies can be combined to design and produce sustainable designed solutions to problems for individuals and the community, considering ethical, economic, environmental and social sustainability factors. Students use creativity, innovation and enterprise skills with increasing independence and collaboration. They respond to feedback from others and evaluate design processes used and designed solutions for preferred futures. Students investigate design and technology professions and the contributions that each makes to society locally, regionally and globally through creativity, innovation and enterprise. They critique the advantages and disadvantages of design ideas and technologies. Using a range of technologies including a variety of graphical representation techniques to communicate, students generate and clarify ideas through sketching, modelling, perspective and orthogonal drawings. They use a range of symbols and technical terms in a variety of contexts to produce patterns, annotate concept sketches and drawings, using scale, pictorial and aerial views to draw environments. With greater autonomy, students identify the sequences and steps involved in design tasks. They develop plans to manage design tasks, including safe and responsible use of materials and tools, and apply their plans to successfully complete these tasks. Students establish safety procedures that minimise risk and manage a project with safety and efficiency in mind when making designed solutions.

Design and Technologies achievement standard

By the end of Year 8 students analyse how people design products, services and environments to meet present and future needs. For each of the four prescribed technologies contexts they analyse how the features of technologies influence and impact design decisions, and create designed solutions based on evaluation of needs or opportunities. Students develop criteria for success including sustainability and use these to evaluate the suitability of ideas, processes and designed solutions. They create, adapt, justify and iterate design ideas and communicate to audiences using suitable technologies, technical terms and graphical representation techniques. Students independently and collaboratively document and manage production processes to safely produce effective designed solutions for the intended purpose.

Technologies learning area achievement standard*

By the end of Year 8 students explain how people design products, services and environments to meet present and future needs. For each of the four prescribed technologies contexts students explain how the features of technologies influence and impact on design decisions, and they create designed solutions based on evaluation of needs or opportunities. They use computational thinking to independently and collaboratively design and create effective digital solutions to real-world problems and opportunities by creating a variety of algorithmic designs and implementing them using a general-purpose programming language. They use a range of tools to make predictions and draw conclusions based on acquired, stored and validated data. Students develop criteria for success including sustainability and use these to judge the suitability of ideas, processes and solutions. They create, adapt and iterate design ideas and communicate to audiences using suitable technologies, technical terms and graphical representation techniques. Students explain how digital systems represent, transmit and secure data. They independently and collaboratively plan to document and manage production processes and to safely produce effective designed solutions for the intended purpose. Students identify cyber security threats and risks and explain how to protect against threats and manage the risks of sharing and curating their digital footprint.

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Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	analyse ways in which products, services and environments evolve locally, regionally and globally (AC9TDE8K01)	locating information and describing factors that influence the design of services, for example a natural disaster warning system for a community (AC9TDE8K01_E1)
			investigating traditional and contemporary design and technologies, including from countries across Asia, and predicting how they might change or be sustained in the future in response to technological, environmental or economic change, for example the production of contemporary textile designs using traditional batik techniques and modern dyes (AC9TDE8K01_E2)
			comparing the design and production of products, services and environments in Australia and a country in the Asia region and identifying needs and new opportunities for design and enterprise, for example design, promotion and marketing of a Western Australian wheat variety especially bred and grown for the making of udon noodles in Japan (AC9TDE8K01_E3)
			investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, control systems and biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products (AC9TDE8K01_E4)
		analyse how social, ethical and sustainability factors impact on the development of technologies and designed solutions for preferred futures (AC9TDE8K02)	analysing competing factors, including social and ethical factors, that influence the design of services for remote Aboriginal and Torres Strait Islander communities, for example a natural disaster warning system for the Koeybuway and Moegibuway Peoples of Saibai Island, who are vulnerable to flooding and rising sea levels (AC9TDE8K02_E1)
			considering the ethical and social requirements for designing solutions for cultural groups with their involvement and consultation, for example designing a solution with community members from other cultural backgrounds or those who usually communicate in a language other than English (AC9TDE8K02_E2)
			investigating how ethics and social, economic and environmental sustainability factors impact on design and technologies and design decisions, for example researching current information on

			animal welfare when designing an animal shelter or researching intellectual property or offshore manufacturing in countries across Asia when designing a 3D printed product (AC9TDE8K02_E3)
			considering the rights and responsibilities of those working in design and technologies occupations, for example taking into account Aboriginal and Torres Strait Islander protocols and Indigenous cultural and intellectual property rights (AC9TDE8K02_E4)
			investigating traditional and contemporary design and technologies, including from countries of Asia, and the need for more sustainable patterns of living, and predicting how they might change in the future in response to social, technological, environmental or economic change (AC9TDE8K02_E5)
	Technologies contexts	By the end of Year 8 students will have had the opportunity to create designed solutions at least once in each of the four technologies contexts.	
	Technologies context: Engineering principles and systems	analyse how force, motion and energy are used to manipulate and control simple, engineered systems (AC9TDE8K03)	analysing how wind generators harness the motion of propellers to create energy, and how this energy is used to power remote communities in the Torres Strait Islands of Queensland, Waiben (Thursday Island) (AC9TDE8K03_E1)
			investigating the technologies in a control system for an identified need or opportunity and user, for example the Corriong or Millow (Phillip Island) penguin weighbridge that enables collection of data about penguin weight and foraging duration (AC9TDE8K03_E2)
			experimenting to select the most appropriate principles and systems on which to base design ideas, for example structural components to be tested for strength (AC9TDE8K03_E3)
			testing functionality of an idea by producing prototypes and jigs, including the use of rapid prototyping tools such as 3D printers (AC9TDE8K03_E4)
			calculating an engineered system's outputs, for example speed, brightness of light, volume of sound to determine when the system might fail (AC9TDE8K03_E5)

			experimenting with control systems to understand motion, for example programming a microcontroller or a simple, object-based programming application to control a system such as a remote-controlled car or simple robotic arm (AC9TDE8K03_E6)
			investigating components, tools and equipment in terms of force, motion or energy, for example testing the durability of batteries or determining the effective range of wireless devices (AC9TDE8K03_E7)
	Technologies context: Materials and technologies specialisations	analyse how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions (AC9TDE8K04)	investigating the significance of hafting in Aboriginal and Torres Strait Islander Peoples' traditional toolkit, including how the characteristics and properties of materials are combined to create a designed solution, for example modern hatchets have seen little innovation since the hafted stone hatchet that combines the benefits of a lever and a wedge to create durable tools that reduce effort (AC9TDE8K04_E1)
			investigating aspects of technologies specialisations, for example in architecture, critiquing the design of an existing building to identify features of passive design or, in fashion, evaluating the sustainability of different fibres (AC9TDE8K04_E2)
			investigating a broad range of technologies − materials, systems, components, tools and equipment − when designing for a range of technologies contexts, for example analysing the benefits and disadvantages of building an animal shelter such as a dog kennel with wood, metal and synthetic fabric in terms of function, tools and equipment needed to produce it and expected durability (AC9TDE8K04_E3)
			considering the ways in which the characteristics and properties of technologies will impact on designed solutions, for example the choice of building materials and housing design in Australia and the countries of Asia; the properties of textile fibres and fabrics that determine end use (AC9TDE8K04_E4)

			explaining safe work practices for using specific equipment or materials, for example producing a safety information video that details risk management practices for using tools or equipment including considering how the properties of some materials suit certain designs and may cause harm if manipulated in an unsafe way in the classroom or within a community such as ventilation when sanding timber (AC9TDE8K04_E5)
			describing the use of various hand tools and equipment that could be used to produce simple furniture, for example a simple stool or smartphone stand that can be assembled from bending and interlocking cardboard pieces or from wood using a laser cutter or other digital tools (AC9TDE8K04_E6)
	Technologies context: Food and fibre production	analyse how food and fibre are produced in managed environments and how these can become sustainable (AC9TDE8K05)	analysing traditional Aboriginal and Torres Strait Islander Peoples' food and fibre sources for potential species that offer benefits in sustainability, such as reducing irrigation and processing (AC9TDE8K05_E1)
			comparing land and water management methods in contemporary Australian food and fibre production with countries of Asia, for example minimum-tillage cropping, water-efficient irrigation and smart farm monitoring and controlling systems for optimised farm operation and crop protection, and the impact of cash crops versus staples on social sustainability (AC9TDE8K05_E2)
			investigating the management of plant and animal growth through natural means or with the use of chemical products, for example comparing the use of herbicides or medicines when producing food and fibre products and recognising the need to increase food production using cost-efficient, ethical and sustainable production techniques (AC9TDE8K05_E3)
			describing physical and chemical characteristics of soil and their effects on plant growth when producing food and fibre products, for example comparing the effect on soil characteristics of traditional and regenerative farming practices (AC9TDE8K05_E4)
			investigating different animal-feeding strategies such as grazing and supplementary feeding, and their effects on quality when producing food and fibre products, for example meat tenderness, wool-fibre diameter (micron), milk fat and protein content (AC9TDE8K05_E5)

			recognising the importance of food and fibre production to Australia's food security and economy, including exports and imports to and from countries across Asia when critiquing and exploring food and fibre production, for example Tasmanian Candy Abalone (wild-caught dried abalone) (AC9TDE8K05_E6)
	Technologies context: Food specialisations	analyse how properties of foods determine preparation and presentation techniques when designing solutions for healthy eating (AC9TDE8K06)	analysing how Aboriginal and Torres Strait Islander Peoples prepare foods for healthy eating, for example using cooking methods that improve edibility, such as removing bitterness to make yams more palatable, roasting bunya nuts to improve texture and flavour, and on many occasions, carefully selecting wood for roasting and smoking to complement the flavour of foods (AC9TDE8K06_E1)
			explaining how food preparation techniques impact on the sensory properties, such as flavour, appearance, texture and aroma of food, for example the browning of cut fruit, the absorption of water when cooking rice, and the selection of timbers when smoking foods (AC9TDE8K06_E2)
			investigating the relationship between food preparation techniques and the impact on nutrient value including how a recipe can be modified to enhance health benefits, for example steaming vegetables, leaving skin on vegetables or removing skin from chicken (AC9TDE8K06_E3)
			analysing food preparation techniques used in different cultures including those from countries across Asia and the impact of these on nutrient retention, aesthetics, taste and palatability, for example stir-frying (AC9TDE8K06_E4)
Processes and production skills	Investigating and defining	analyse needs or opportunities for designing, and investigate and select materials, components, tools, equipment and processes to create designed solutions (AC9TDE8P01)	considering Aboriginal and Torres Strait Islander community needs when identifying opportunities for designing, for example considering the needs of local groups when designing remote community housing or energy supply solutions (AC9TDE8P01_E1)
			considering community needs when identifying opportunities for designing, for example gardens for a community centre, cost-effective food service for a sport club (AC9TDE8P01_E2)
			experimenting with traditional and contemporary technologies when developing designs, and discovering the advantages and disadvantages of each approach, for example comparing a hand-sewn product with one produced using a sewing machine (AC9TDE8P01_E3)

			investigating emerging technologies and their potential impact on design decisions, for example flame-retardant fabrics, self-healing materials, virtual reality or aquaponics (AC9TDE8P01_E4)
			examining, testing and evaluating a variety of suitable materials, components, tools and equipment for each design project, for example the durability differences between natural hardwood and plantation softwood timbers, which determine their suitability for interior or exterior use (AC9TDE8P01_E5)
			evaluating the viability of using different techniques and materials in remote, isolated areas or less developed countries and selecting appropriate materials to acknowledge sustainability needs by using life cycle thinking (AC9TDE8P01_E6)
	Generating and designing	generate, develop, test and communicate design ideas, plans and processes using technical terms and technologies including graphical representation techniques (AC9TDE8P02)	using a variety of strategies such as brainstorming, sketching, 3D modelling and experimenting to generate innovative design ideas to present to others (AC9TDE8P02_E1)
			considering which ideas to further explore and investigating the benefits and drawbacks of ideas including identifying factors that may hinder or enhance project development, for example using digital polling to capture the views of different groups in the community to inform the production of a solution designed with intercultural understanding (AC9TDE8P02_E2)
			developing models, prototypes or samples using a range of materials, tools and equipment to test the functionality of ideas (AC9TDE8P02_E3)
			producing annotated concept sketches and drawings, using: technical terms, scale, symbols, pictorial and aerial views to draw environments; production drawings, orthogonal drawings; patterns and templates to explain product design ideas (AC9TDE8P02_E4)
			documenting and communicating the generation and development of design ideas for an intended audience, for example developing a digital portfolio with images and text which clearly communicate each step of a design process (AC9TDE8P02_E5)

	Producing and implementing	select and justify choices of materials, components, tools, equipment and techniques and apply safe procedures to effectively make designed solutions (AC9TDE8P03)	developing innovative ways of manipulating technologies by comparing and choosing the most appropriate options to design a solution using traditional or contemporary materials, components, tools, equipment and techniques and considering alternatives including emerging technologies that could be substituted to reduce waste or time (AC9TDE8P03_E1)
			practising techniques to improve expertise, for example handling animals, cutting and joining materials (AC9TDE8P03_E2)
			developing technical production skills (techniques) and safe independent working practices to produce quality solutions designed for sustainability (AC9TDE8P03_E3)
			identifying and managing risks in the development of various projects, for example working safely, responsibly, cooperatively and ethically on design projects; assessing and responding to uncertainty and risk in relation to long-term health and environmental impacts, for example ensuring appropriate protective equipment is worn or ventilation is appropriate where solvents, glues or 3D printers are used (AC9TDE8P03_E4)
			considering how to improve technical expertise required to use tools or equipment needed to design a solution, for example using an online tutorial to learn to use software for design or production (AC9TDE8P03_E5)
	Evaluating	develop criteria for success independently that include sustainability to evaluate design ideas, processes and solutions (AC9TDE8P04)	developing criteria for success to evaluate designed solutions in terms of aesthetics, functionality and sustainability, for example recording design goals from people interviewed as prospective users of the finished product, service or environment or including life cycle assessment criteria (AC9TDE8P04_E1)
			evaluating designed solutions and processes and transferring new knowledge and skills to future design projects, for example considering project planning skills learned in producing an engineered product and using them in future projects (AC9TDE8P04_E2)

	Collaborating and managing	develop project plans to individually and collaboratively manage time, cost and production of designed solutions (AC9TDE8P05)	interpreting drawings to plan resources and production steps needed to produce products, services or environments for specific purposes, for example identifying resource requirements from specifications on a labelled drawing and collaboratively developing a detailed procedure (AC9TDE8P05_E1)
			identifying risks and how to avoid them, organising time, evaluating decisions and managing resources to ensure successful project completion, for example using digital tools to keep track of tasks, resources, expenses and deadlines (AC9TDE8P05_E2)
			investigating the time needed for each step of production, for example estimating time allocations on a planning template for the different stages of the design process needed to produce a clock, acoustic speaker or desk lamp using prior knowledge, research and testing (AC9TDE8P05_E3)

Years 9 and 10

Band level description

By the end of Year 10 students will have had the opportunity to design and produce at least four designed solutions focused on one or more of the four technologies contexts content descriptions. There is one optional content description for each of the following: Engineering principles and systems, Materials and technologies specialisations, Food and fibre production and Food specialisations. Students should have opportunities to experience creating designed solutions for products, services and environments.

Students use design and technologies knowledge and understanding, processes and production skills and design thinking to produce designed solutions for identified needs or opportunities of relevance to individuals and regional and global communities. Students work independently and collaboratively. Problem-solving activities acknowledge the complexities of contemporary life and make connections to related specialised occupations and further study. Increasingly, study has a global perspective, with opportunities to understand the complex interdependencies involved in the development of technologies and enterprises. Students specifically focus on preferred futures, taking into account ethics; legal issues; social values; and economic, environmental and social sustainability factors, and use strategies such as life cycle thinking. Students use critical thinking, creativity, innovation and enterprise skills with increasing confidence, independence and collaboration. They analyse data, critique design ideas and technologies, respond to feedback, and evaluate design processes used to inform designed solutions for preferred futures.

Using a range of technologies including a variety of graphical representation techniques to communicate, students generate and represent original ideas and production plans in 2-dimensional and 3-dimensional representations. These techniques will be specific to the technologies context and may include perspective, scale, orthogonal and production drawings with sectional and exploded views. Students produce rendered, illustrated views for marketing and use graphic visualisation software to produce dynamic views of virtual products.

Students identify the steps involved in planning the production of designed solutions. They develop detailed project management plans, incorporating elements such as sequenced time, cost and action plans, to manage a range of design tasks safely. They apply management plans, changing direction when necessary, to successfully complete design tasks. Students identify and establish safety procedures that minimise risk and manage projects with safety and efficiency in mind, maintaining safety standards and management procedures to ensure success.

Design and Technologies achievement standard

By the end of Year 10 students analyse how people working in design and technologies occupations consider factors that impact on design decisions and the technologies used to produce products, services and environments. They analyse the contribution of emerging technologies, innovation and enterprise skills to society. For one or more of the technologies contexts, students create designed solutions based on an evaluation of needs or opportunities and evaluate the features of technologies and their appropriateness for purpose. They identify the requirements for designed solutions to realise the preferred futures they have described. Students develop criteria for success, including sustainability, and use these to evaluate and refine their ideas, processes and designed solutions. They create, adapt and iterate design ideas and processes of increasing complexity and justify their decisions. They communicate and document projects for a range of audiences. Students independently and collaboratively develop and apply production and project management plans when producing designed solutions, adjusting processes when necessary. They select and use appropriate technologies skilfully and safely to produce quality designed solutions suitable for the intended purpose.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Technologies and society	analyse and make judgements about factors, including social, ethical, security and sustainability, that impact on designed solutions for global preferred futures and the complex design and production processes involved (AC9TDE10K01)	examining social and sustainability factors influencing the design and production of a solution developed by Aboriginal and Torres Strait Islander Peoples, such as the sustainable production of culturally significant pigments, for example in many places throughout Australia white and red pigments are not freely available and must be manufactured through a complex process of calcination by firing rocks or clays in a kiln. Calcining rock to produce iron oxide pigments continues to be used commercially throughout the world (AC9TDE10K01_E1)
			evaluating design and technology professions and their contributions to society locally, nationally, regionally and globally, for example engineers involved in social change causes (AC9TDE10K01_E2)
			recognising the impact of past designed solutions when creating solutions for preferred futures, for example the design of public transport systems that use renewable energy and the design of rural community environments to reduce fire risk (AC9TDE10K01_E3)

			considering the factors that influence design and professional designers and technologists, including time, access to skills, knowledge, finance, expertise, for example Australian designers working with rapid prototyping manufacturers in countries in the Asia region (AC9TDE10K01_E4)
			explaining how product life cycle thinking can influence decision-making related to design and technologies, for example rethinking products to provide for re-use, selecting a material for a product that has a lower carbon footprint (AC9TDE10K01_E5)
			critiquing mass production systems taking into account ethics and sustainability considerations, for example the mass production of food, clothing and shoes and why manufacturers produce different versions of the same product and support complete product life cycle strategies (AC9TDE10K01_E6)
		analyse and make judgements about how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (AC9TDE10K02)	investigating how the knowledges of Aboriginal and Torres Strait Islander Peoples have led to the discovery of potential innovative solutions, for example biodegradable polymers using spinifex grass to reduce landfill and strengthen latex, plastics and concrete (AC9TDE10K02_E1)
			exploring the ways commercial enterprises respond to the challenges and opportunities of technological change, for example e-commerce, and considering their carbon footprint (AC9TDE10K02_E2)
			explaining the consequences of social, ethical and sustainability decisions for products, services and environments, for example a managed public environment, the design of roads to include aerial bridges for wildlife and signage powered with solar technologies (AC9TDE10K02_E3)
			constructing scenarios of how the future may unfold and what opportunities and impacts there may be for society and particular groups in a preferred future, for example by using forecasting and backcasting techniques (AC9TDE10K02_E4)
			recognising real-world problems and understanding basic needs when considering designed solutions, for example Engineers Without Borders School Outreach program allows students to design solutions to problems occurring in a country in the Asia region; or artists from countries in South-East Asia creating posters for the world to take action in a pandemic (AC9TDE10K02_E5)

Technologies contexts	By the end of Year 10 students will have had the opportunity to create designed solutions for one or more of the four technologies contexts.	
Technologies context: Engineering principles and systems	analyse and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to control engineered systems (AC9TDE10K03)	investigating the engineering innovations of Aboriginal and Torres Strait Islander Peoples, such as spear throwers and bow and arrow, and how the characteristics and properties of materials are used, such as rigidity, flexibility and hardness (AC9TDE10K03_E1)
		explaining the way common machines or engineered systems interact and combine properties of materials, force, motion and energy efficiently, for example examining the structure and function of cranes on building sites or in a system, or examining the structure and function of car safety features such as seatbelts, airbags and crumple zones (AC9TDE10K03_E2)
		calculating forces, reactions and loads in structures and analysing the relationship between materials of properties, forces and safety in engineered systems such as bridges (AC9TDE10K03_E3)
		critiquing the effectiveness of the combinations of materials, forces, energy and motion in an engineered system such as a 3D printer (AC9TDE10K03_E4)
Technologies context: Materials and technologies specialisations	analyse and make judgements on how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions (AC9TDE10K04)	analysing how Aboriginal Peoples identified the superior thermal properties of possum fur in their development of products such as cloaks and blankets including making judgements on how these fibres are sourced and how these knowledges continue to be used today as seen in the emerging market of high-performance thermal clothing made from blended possum and wool fibre (AC9TDE10K04_E1)
		critiquing the design of an existing product to identify environmental consequences of material selection and investigating emerging materials and their impact on design decisions, for example examining the properties of common plastic bags and researching innovative materials that could be used as a sustainable alternative such as bioplastics or renewable materials such as seaweed (AC9TDE10K04_E2)

			justifying decisions when selecting from a broad range of technologies − materials, systems, components, tools and equipment, for example selecting low-emission paints and locally sourced materials (AC9TDE10K04_E3)
			analysing and explaining the ways in which the properties and characteristics of materials have been considered in the design of a product with specific requirements, such as minimising weight to reduce transport costs in rural Australia (AC9TDE10K04_E4)
			investigating emerging materials and their impact on design decisions, for example researching products such as sustainable bioplastic material made from discarded potato peels which can be used for a variety of applications including buttons and eyeglasses (AC9TDE10K04_E5)
	Technologies context: Food and fibre production	analyse and make judgements on the ethical, secure and sustainable production and marketing of food and fibre enterprises (AC9TDE10K05)	analysing Aboriginal grain sources, such as acacia, for their nutrient content, including energy, fat and protein and suitability as an ethical and sustainable food source in famine-prone, semi-arid, and tropical regions, as compared with cereal crops such as wheat and rice (AC9TDE10K05_E1)
			examining emerging production technologies and methods in terms of productivity, profitability and sustainability, for example taking account of animal welfare considerations in food and fibre production enterprises, vertical farming, recirculation technologies in aquaculture (AC9TDE10K05_E2)
			investigating how digital tools could be used to enhance food production systems, for example global positioning system for managing animals, crop sensors or automated animal-feeding or milking systems (AC9TDE10K05_E3)
			investigating the interdependence of plants and animals and comparing the environmental impacts of intensive and extensive production systems and their contribution to food and fibre production, for example the impact of pesticide use on bee populations (AC9TDE10K05_E4)
			considering the meaning of food and water security and how they may influence design decisions for creating preferred futures (AC9TDE10K05_E5)

			examining the marketing chain of a range of agricultural products and outlining the effect of product processing and advertising on demand and price including the impact of cash crops on communities (AC9TDE10K05_E6)
	Technologies context: Food specialisations	analyse and make judgements on how the principles of food preparation, preservation, safety, presentation and sensory and functional properties influence the creation of food solutions for healthy eating (AC9TDE10K06)	analysing how Aboriginal and Torres Strait Islander Peoples have long understood techniques to turn inedible plant products into food sources with high nutritional value, for example throughout much of northern Australia, cycad nuts have been detoxified to prepare them for safe consumption (AC9TDE10K06_E1)
			experimenting with food preservation methods such as freezing and dehydrating to determine changes to food structure and how these impact on designing healthy food solutions, for example dehydrating fruit for a lunchbox (AC9TDE10K06_E2)
			conducting sensory and nutritional assessment testing of a range of foods to determine how these characteristics might be used to enhance food solutions, for example taste testing a variety of milks, comparing freshly squeezed juice with commercial juices or locally grown fruit with imported fruit (AC9TDE10K06_E3)
			determining how the causes of food spoilage can be addressed when preparing, cooking, presenting and storing food items, for example developing a comprehensive checklist of considerations for safe and hygienic food storage and preparation including danger-zone temperatures for a food service (AC9TDE10K06_E4)
			considering factors that influence the preparation and presentation of foods using a range of techniques to ensure optimum nutrient content, flavour, texture and visual appeal, for example designing and producing a healthy snack for the canteen and using food photography and digital tools to promote the item in a healthy eating campaign (AC9TDE10K06_E5)

Processes and production skills	Investigating and defining	analyse needs or opportunities for designing and develop design briefs, and investigate, analyse and select materials, systems, components, tools and equipment to create designed solutions (AC9TDE10P01)	analysing Aboriginal and Torres Strait Islander Peoples' traditional grains for their potential for providing nutritional and commercial solutions and developing a design brief to highlight the materials, systems, components and tools or equipment needed (AC9TDE10P01_E1)
			analysing the design of new products to identify how well design ideas respond to sustainability issues, for example swimming pool covers, ultraviolet lights and lamps for disinfection, or disposable household products (AC9TDE10P01_E2)
			analysing a range of design and technologies ideas, for example assessing those that draw on the intellectual property of others, including Indigenous cultural and intellectual property rights (AC9TDE10P01_E3)
			considering the needs of community groups to identify rich design tasks, for example interviewing community members to develop the initial brief and then during specific phases of the design process to determine the best possible designed solution for the community (AC9TDE10P01_E4)
			examining tools, techniques, equipment and relationships of properties for complementary materials for product development, for example examining compressive and tensile strengths of materials (AC9TDE10P01_E5)
	Generating and designing	generate, develop, test and communicate design ideas, plans and processes by applying design thinking, creativity, innovation and enterprise skills (AC9TDE10P02)	using techniques including combining and modifying ideas and exploring functionality to generate solution concepts and reimagining designs to feature emerging technologies, for example designing wearable technology that could assist or provide independence to elderly people (AC9TDE10P02_E1)
			undertaking functional, structural and aesthetic analysis of benefits and constraints of design ideas, for example assessing how a design is suitable for different communities and environments including those in countries across Asia (AC9TDE10P02_E2)
			considering competing variables that may hinder or enhance project development, for example weight, strength and price of materials; laws; sustainability; social protocols, user needs and community consultation processes (AC9TDE10P02_E3)

			producing drawings, models and prototypes to explore design ideas, for example using technical drawing techniques, digital imaging programs, 3D printers or augmented reality modelling software; producing multiple prototypes that show an understanding of key aesthetic considerations in competing designs (AC9TDE10P02_E4)
			communicating using appropriate technical terms and recording the generation and development of design ideas for an intended audience including justification of decisions, for example developing a digital portfolio with images and text which clearly communicate each step of a design process (AC9TDE10P02_E5)
	Producing and implementing	work flexibly to effectively and safely test, select, justify and use appropriate technologies and processes to make designed solutions (AC9TDE10P03)	refining technical skills and using production skills with independence to produce quality designed solutions and reducing risks in production with appropriate, safe working practices required for a specific design project (AC9TDE10P03_E1)
			using materials, components, tools, equipment and techniques safely and considering alternatives to maximise sustainability, for example using timber because it stores carbon and offsets the demand for alternative products (AC9TDE10P03_E2)
			experimenting with innovative combinations and ways of manipulating traditional and contemporary materials, components, tools, equipment and techniques, and recording findings in a collaborative space to debate the merits of each with peers (AC9TDE10P03_E3)
			modifying production processes to respond to unforeseen challenges or opportunities, for example when producing bulk quantities of recipes, the impact of lower-than-average rainfalls on crop growth or using materials with unexpected faults (AC9TDE10P03_E4)

	Evaluating	develop criteria for success that include sustainability to iteratively evaluate design ideas, processes and solutions (AC9TDE10P04)	establishing specific criteria for success for evaluating designed solutions, for example determining necessary function of a product, service or environment such as an acceptable load for an engineered structure to carry and making a judgement about whether these have been met after stress testing or user testing (AC9TDE10P04_E1)
			evaluating and justifying the use and best combination of traditional, contemporary and emerging technologies during project development, including consideration of sustainability, for example considering farming methods that improve soil quality including those methods used in South-East Asia (AC9TDE10P04_E2)
			reflecting on learning including processes or choices made at various stages of a design process and modifying plans when needed with consideration of criteria for success (AC9TDE10P04_E3)
			evaluating design ideas for their long-term application, functionality and impact (AC9TDE10P04_E4)
	Collaborating and managing	develop project plans for intended purposes and audiences to individually and collaboratively manage projects, taking into consideration time, cost, risk, processes and production of designed solutions (AC9TDE10P05)	producing, explaining and interpreting drawings and planning production timelines using digital tools, for example establishing materials and equipment needs using spreadsheets, or creating production flowcharts to ensure efficient, safe and sustainable workflows (AC9TDE10P05_E1)
			collaborating to develop production plans for equitable distribution of work including discussing roles, tasks and deadlines and considering flexibility and contingencies (AC9TDE10P05_E2)
			investigating manufacturing processes to identify strategies to enhance production, for example identifying techniques to reduce use, cut costs, speed up processes or to form beneficial partnerships with others in production (AC9TDE10P05_E3)

F–10 DIGITAL TECHNOLOGIES: CURRICULUM ELEMENTS

Foundation

Level description
Learning in Digital Technologies builds on the Early Years Learning Framework, revisiting, strengthening and extending skills as needed. By the end of Foundation students will have had opportunities to explore digital systems, software, cameras and programmable devices in play experiences and projects. Students learn techniques to use digital systems to create information and represent their ideas. They focus on developing an awareness of digital systems and how we effectively use them to solve everyday problems or to cater to our needs. When exploring these problems and needs, students learn that objects, pictures and symbols can represent data. They learn what personal data should remain private and gain confidence in engaging in online learning and communication. There are rich connections to other learning areas, including Science.
Digital Technologies achievement standard
By the end of Foundation students develop familiarity with digital systems and display confidence when using digital systems. They show how digital systems can be used safely to solve problems. Students represent data using objects, pictures and symbols and identify examples of data that is owned by them.
Technologies learning area achievement standard*
By the end of Foundation students identify familiar products, services and environments and develop familiarity with and show confidence in using digital systems. They use materials and equipment to safely make a solution for a school-selected context and show how digital systems can be used to solve problems. Students use objects, pictures and symbols to represent data. They identify if data is personal and owned by them. * To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	recognise and explore digital systems (hardware and software) and how they can be used to solve simple problems (AC9TDIFK01)	exploring digital hardware such as cameras and microscopes to capture images of Aboriginal and Torres Strait Islander material culture, for example taking close-up photos of woven mats or baskets revealing intricate detail and projecting their images onto a screen for class sharing (AC9TDIFK01_E1)
			using audio-recording or video-recording devices to capture cultural stories of Aboriginal and Torres Strait Islander Peoples, for example interviewing a community member with the purpose of preserving stories of local significance (AC9TDIFK01_E2)
			playing with and using different digital systems for transferring and capturing data, for example carefully holding and using a device to take photographs or video with the front-facing and rear-facing cameras to import into a recount of a personal event or visual story (AC9TDIFK01_E3)
			constructing a model of a real or imaginary digital system for use in role-play scenarios and explaining the features of the device, for example making a model of a laptop computer or a robot out of recycled materials (AC9TDIFK01_E4)
			investigating a digital camera, tablet device or 360 camera to take photos of features of the school playground (AC9TDIFK01_E5)
			investigating how people use digital systems, for example discussing which workplaces and professions use digital systems and how those systems make the work safer or easier (AC9TDIFK01_E6)
			discussing how familiar digital systems solve simple problems, for example discussing the purpose of digital tools, smartphones, televisions or printers (AC9TDIFK01_E7)

	Data representation	represent data as objects, pictures and symbols (AC9TDIFK02)	exploring the iconic symbols of Aboriginal and Torres Strait Islander Peoples and how these symbols represent data (AC9TDIFK02_E1)
			sorting objects and events based on easily identified characteristics and using a range of methods to visually represent patterns in data, for example sorting and discussing reasons to group seedpods, leaves, litter or toys in different ways (AC9TDIFK02_E2)
			recognising different ways of representing patterns using materials, movements or pictures, for example by exploring repeating patterns and sequences in dance (AC9TDIFK02_E3)
Processes and production skills	Privacy and security	identify some data that are personal and owned by them (AC9TDIFP01)	letting others know that they do not want their photograph taken or shared or only sharing their full name or date of birth with people they know (AC9TDIFP01_E1)
			discussing the importance of asking permission from a parent or caregiver before entering personal details online such as address, phone number and date of birth (AC9TDIFP01_E2)
			making a list of examples for personal data and creating a T chart with types of data that are personal and of that data which can be public, for example a picture of a bird in the playground can be public but a picture of a child in school uniform should be private (AC9TDIFP01_E3)

Years 1 and 2

Band level description

By the end of Year 2 students will have had opportunities to create a range of digital solutions, such as using programmable devices to navigate a map. Students begin to learn about common digital systems and how they can be used for specific purposes. They focus on developing foundational skills in computational thinking and an awareness of personal experiences using digital systems.

Students organise, manipulate and present data, including numerical, categorical, text, image, audio and video data, in creative ways to create meaning. When defining problems, students use the concept of abstraction to identify the most important information, such as the significant steps involved in a procedure. They begin to develop their digital skills by conceptualising algorithms as a sequence of steps for carrying out instructions or controlling robotic devices.

They describe how information systems meet information, communication and recreational needs. Students learn to apply privacy and security practices to protect themselves and others as they interact online for learning and communicating.

Digital Technologies achievement standard

By the end of Year 2 students use basic computational thinking to create simple solutions to known problems or opportunities. They identify digital systems and their components, exploring their purpose. Students represent data using symbols, numbers and words. They identify examples of personal data that may be stored online. Students describe and represent algorithms that involve repetition and decisions.

Technologies learning area achievement standard*

By the end of Year 2 students describe the purpose of familiar products, services and environments and use basic computational thinking to create simple digital solutions to known problems or opportunities. For each of the two prescribed technologies contexts they identify the features and uses of technologies and create designed solutions. They evaluate their ideas, based on their personal preferences. Students communicate design ideas using models and simple drawings, describe and represent algorithms that involve repetition and decisions, and follow sequenced steps to safely produce designed solutions. They identify examples of personal data that may be stored online.

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Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	identify and explore digital systems and their components for a purpose (AC9TDI2K01)	exploring digital systems to better understand how they are used to provide remote Aboriginal and Torres Strait Islander communities with essential services, for example looking at the systems and components needed to allow families to watch their favourite television shows (AC9TDI2K01_E1)
			exploring and identifying software components of digital systems when creating ideas and information, for example experimenting with different ways of providing instructions to games software using a mouse, touchpad, touch screen, keyboard or stylus, and using different software to manipulate text, numbers, sound and images (AC9TDI2K01_E2)
			recognising and using hardware and software components of digital systems and experimenting with their functions, for example playing with interactive toys, robotic devices or interactive assistants (hardware and software) and discussing the way somebody would use it and how such a system might work as a simple process (AC9TDI2K01_E3)
			recognising and using software components of digital systems and experimenting with their functions, for example exploring mapping software such as Google Earth to find familiar places (AC9TDI2K01_E4)
			recognising that a digital system follows instructions or commands, for example instructing robotic toys to perform a function such as a dance movement or following a planned path as a group activity (AC9TDI2K01_E5)
			constructing and explaining a model of a real or imaginary digital system or device, for example making and explaining the functions of a prototype machine with sensors to detect washed hands that is made from re-used paper and cardboard (AC9TDI2K01_E6)

	Data representation	represent data as pictures, symbols, numbers and words (AC9TDI2K02)	recognising that pictures in Aboriginal and Torres Strait Islander seasonal calendars are used to represent and communicate data, such as how the appearance of a flower can signify an unconnected event or a resource availability, for example how the Gulumoerrgin people understand that the fruiting of freshwater mangrove signifies it is time to harvest magpie geese (AC9TDI2K02_E1)
			sorting objects and events based on easily identified characteristics and visually representing the data, for example sorting class data such as types of pets owned or birthdates and presenting the patterns using visual means such as charts, images or symbols with digital tools (AC9TDI2K02_E2)
			representing patterns in different ways using materials, sounds, movements or drawing, for example locating examples of repeating patterns in art and making their own with stamps, paints or digital tools (AC9TDI2K02_E3)
Processes and production skills	Investigating and defining	investigate simple problems for known users that can be solved with digital systems (AC9TDI2P01)	investigating internet-based translation tools and how similar technologies could promote the use of Aboriginal and Torres Strait Islander languages or assist communications, for example in aged care facilities for Aboriginal and Torres Strait Islander peoples (AC9TDI2P01_E1)
			exploring how digital systems help us, for example investigating how drones are used to inform surf lifesavers of beach and surf conditions or how fire rescue services might use them during natural disasters (AC9TDI2P01_E2)
			identifying how digital systems are used to solve problems at school, for example how teachers monitor student attendance, late arrival or borrowing and tracking library books (AC9TDI2P01_E3)
			comparing an analog and a digital solution, for example discussing the benefits or disadvantages of school notes sent home by email or on paper (AC9TDI2P01_E4)
			investigating how a digital system might solve problems for specific users, for example an artificial intelligence that responds to voice commands to turn lights on or off in a home (AC9TDI2P01_E5)

	Generating and designing	follow and describe algorithms involving a sequence of steps, branching (decisions) and iteration (repetition) (AC9TDI2P02)	identifying and describing sequences of instructions that are commonly experienced, for example creating a flowchart to decide what clothing to wear on any given day using yes or no questions (branching) and some choices leading back to a previously asked question (repetition) until a final description of what to wear is reached (AC9TDI2P02_E1)
			rearranging into correct order a series of mixed-up pictures that describe a procedure, for example how to complete a gross motor course; or rewriting a procedural text into a correct sequence, for example a recipe (AC9TDI2P02_E2)
			experimenting with simple, step-by-step procedures, for example giving weaving or string making instructions to fellow students, following traditional techniques of Aboriginal and Torres Strait Islander Peoples (AC9TDI2P02_E3)
			recognising the similarities of mathematical processes to algorithms in digital systems, for example discussing multiplication as repeated addition (AC9TDI2P02_E4)
			following a sequence of instructions, for example following instructions to build a series of digital slides or screens with sequenced or linked text and pictures with appropriate and available software (AC9TDI2P02_E5)
			experimenting with simple, step-by-step procedures, for example providing instructions to fellow students or robotic devices to move in an intended way, such as following a path around the local community highlighting key cultural places of interest on a map (AC9TDI2P02_E6)
	Evaluating	discuss how existing digital systems satisfy known user needs (AC9TDI2P03)	discussing how interactive versions of Aboriginal and Torres Strait Islander-authored and published stories preserve important cultural expressions (AC9TDI2P03_E1)
			discussing how known digital systems are used to solve problems for a user, for example discussing if a computer or tablet is meeting the learning needs of a student (AC9TDI2P03_E2)
			discussing how a range of information systems support personal needs, for example text-to-speech software for people with vision loss (AC9TDI2P03_E3)

	Collaborating and managing	create and locate content and communicate with others using common tools and their basic functionality (AC9TDI2P04)	respecting Aboriginal and Torres Strait Islander cultures through agreed behaviours regarding cultural protocols, including relevant permissions and attributions avoiding deficit discourse (AC9TDI2P04_E1)
			creating a greeting card using own photographs taken with a digital device or royalty-free images located online or on a network, and using digital systems to make, store or send the finished product (AC9TDI2P04_E2)
		share information with known people following agreed behaviours, supervised by trusted adults (AC9TDI2P05)	recognising and discussing the need for online safety when sharing information, for example recognising that personal information such as a photo can be used for unwanted purposes (AC9TDI2P05_E1)
			participating in safe and secure online or networked spaces to share information, for example creating a factual slide deck about a plant or animal and sharing it with the class teacher (AC9TDI2P05_E2)
	Privacy and security	access their school account with a recorded username and password to access their own information (AC9TDI2P06)	using a private prompt card to type their login details and password into a digital device (AC9TDI2P06_E1)
			practising finding the appropriate keys to use to type their username and password, for example using a laminated keyboard image to find the letters and numbers in their username and password (AC9TDI2P06_E2)
		discuss that some websites and apps store their personal data online (AC9TDI2P07)	sharing experiences of what might be viewed when exploring apps and websites, for example a pop-up ad asking you to enter a competition or an app that requires you to ‘sign up’ before using it (AC9TDI2P07_E1)
			discussing the importance of asking permission from a parent or caregiver before entering personal details online such as address, phone number and date of birth (AC9TDI2P07_E2)

Years 3 and 4

Band level description
By the end of Year 4 students will have had opportunities to create a range of digital solutions such as interactive adventures that involve user choice, models of simplified real-world systems and simple guessing games. In Years 3 and 4 students focus on further developing understanding and skills in computational thinking, such as categorising and outlining procedures; and developing an increasing awareness of how digital systems are used and could be used at home, in school and the local community. Students explore components of digital systems, and peripherals such as digital microscopes. They develop an understanding of the characteristics of data and its representation. Using the concept of abstraction, students define simple problems using techniques such as summarising facts to deduce conclusions. They record simple solutions to problems through text and diagrams and develop their designing skills from initially following prepared algorithms to later describing their own algorithms that support branching (choice of options), iteration (repetition) and user input. The student solutions are implemented using appropriate software including visual programming languages that use graphical elements rather than text instructions. Students explain, in general terms, how their solutions meet specific needs and consider how society may use digital systems to meet needs in environmentally sustainable ways. With teacher guidance, students identify and list the major steps needed to complete a task or project. When sharing ideas and communicating in online environments they develop an understanding of why it is important to consider the feelings of their audiences and apply safe and secure practices agreed by the class that demonstrate respectful behaviour.
Digital Technologies achievement standard
By the end of Year 4 students use computational thinking to create scaffolded digital solutions. They recognise different types of data and identify how they are transmitted by digital systems. They use passphrases and agreed behaviours to safely access and explore digital systems, tools and online or networked environments independently and with others. They define problems and identify opportunities, then design and implement solutions using algorithms and visual programming that involve decision-making, repetition and user input. Students evaluate their solutions against design criteria.
Technologies learning area achievement standard*
By the end of Year 4 students describe how people design products, services and environments to meet the needs of people, including sustainability, and use computational thinking to create scaffolded digital solutions. They recognise different types of data and identify how they are transmitted by digital systems. For each of the two prescribed technologies contexts they describe the features of technologies and create designed solutions. Students evaluate ideas against identified criteria for success. They define problems and identify opportunities, then design and implement solutions using algorithms and

visual programming that involve decision-making, repetition and user input. Students use models and drawings including annotations and symbols to plan, sequence and communicate major steps in design and production. They use technologies and techniques to safely produce solutions. Students use passphrases and agreed behaviours to safely access and explore digital systems, tools and online or networked environments independently and with others.

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Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	explore and describe a range of digital systems and their peripherals for a variety of purposes (AC9TDI4K01)	describing and comparing how terrestrial and satellite systems transmit television, including advantages and limitations of these systems, for example how television is transmitted to remote Aboriginal and Torres Strait Islander communities via satellite such as Milikapiti in the Tiwi Islands, and how heavy rain can interfere with signals when viewing television (AC9TDI4K01_E1)
			experimenting with different types of digital system components and peripherals to perform input, output and storage functions, for example a keyboard, stylus, touch screen, joystick, camera and microphone; a monitor, printer, 3D printer, digital microscope projector, tablet screen and speaker (AC9TDI4K01_E2)
			exploring how we use systems differently depending on the requirements of the task, recognising that many systems can perform multiple tasks, for example a student can use a tablet to take photos, record sound and find information to create a presentation (AC9TDI4K01_E3)
		explore transmitting different types of data between digital systems (AC9TDI4K02)	exploring how many remote Aboriginal and Torres Strait Islander communities rely on 3G network coverage for communications, and how the limitations of these systems do not allow for the exploitation of video conferencing capabilities that metropolitan areas benefit from (AC9TDI4K02_E1)
			exploring how data (video call) can be transmitted from a remote community to a city location (AC9TDI4K02_E2)

			showing that images and music can be transferred from a mobile device to a computer with cables or by utilising bluetooth to share between devices, for example using a cable to connect a camera and computer to upload images or sharing the images directly to the computer via bluetooth (AC9TDI4K02_E3)
			explaining that some file formats are more appropriate depending on purpose and software compatibility, for example a small-sized video may transfer faster than a large one, some software may not be compatible with certain file formats or devices (AC9TDI4K02_E4)
			using specific peripherals to capture different types of data, for example using a digital microscope or a 3D generator software to capture images of living and non-living things, using a micro sensor to measure classroom noise level or soil moisture levels in the school garden (AC9TDI4K02_E5)
	Data representation	recognise different types of data and explore how the same data can be represented differently depending on the purpose (AC9TDI4K03)	identifying petroglyphs and other cultural expressions to understand that images are used to encode and represent ethnobotanical knowledge, for example representation of plant use in the Kimberley rock art holds important data on medicinal and food plant classification and their usable parts (AC9TDI4K03_E1)
			explaining that the same information can be represented differently, for example the term ‘stop’ can also be represented with an octagon-shaped red sign and a hand icon; or explaining that the numeral ‘2’ or tally marks || or the word ‘two’ all represent the same data (AC9TDI4K03_E2)
			recognising that numbers, text, images, sounds, animations and videos are all forms of data when stored in or viewed using a digital system (AC9TDI4K03_E3)
Processes and production skills	Investigating and defining	define problems with given design criteria and by co-creating user stories (AC9TDI4P01)	exploring how Aboriginal and Torres Strait Islander rangers collect and manage information on native animals, for example how they conduct surveys using global positioning system solutions for monitoring local marine turtle populations (AC9TDI4P01_E1)
			defining the design criteria by summarising the problem so that some features of the problem can be outlined, for example what need is associated with the problem, who are the stakeholders and why do they have this problem? (AC9TDI4P01_E2)

			co-creating a user story using a template such as ‘A <type of user> has <some goal> so that <some reason>’, for example, ‘Our soccer team wants to access results on the web so that we can see our progress’ (AC9TDI4P01_E3)
	Generating and designing	follow and describe algorithms involving sequencing, comparison operators (branching), and iteration (AC9TDI4P02)	recognising that sequence of instructions or events can include comparison operators, for example if the temperature is greater than 25 degrees put the fan on and if the temperature is below 18 degrees turn the fan off (AC9TDI4P02_E1)
			designing and documenting a sequence of steps for responding to at-risk wildlife, such as considering how Aboriginal and Torres Strait Islander ranger groups monitor and protect sea turtles, for example the Bulgul rangers who work on the Cox Peninsula in the Northern Territory, responding to monitoring data on the vulnerable flatback turtle to protect them from visitor and predator interactions (AC9TDI4P02_E2)
			following algorithms in everyday activities, such as recognising that a set of rules in a game is an algorithm that controls decisions and actions including repeating actions, for example in Simon Says, with an IF structure: IF the instruction is preceded by the words ‘Simon says’, follow the instruction, ELSE don't; or when playing UNO®, deal each player a card until the number of cards is seven (REPEAT, deal cards until each has seven) (AC9TDI4P02_E3)
		generate, communicate and compare designs (AC9TDI4P03)	exploring information systems that suit particular home or personal needs, for example using speech recognition software that can help speakers whose language background is not English, or a system to monitor energy or water consumption in the home (AC9TDI4P03_E1)
	Producing and implementing	implement simple algorithms as visual programs involving control structures,	implementing a program that demonstrates the strict routines and techniques followed by Aboriginal and Torres Strait Islander ranger groups when providing care or handling specific native animals, for example using IF and THEN statements to create a training manual, such as: IF <insert animal name> is injured THEN the ranger will <insert action> (AC9TDI4P04_E1)

		variables and user input (AC9TDI4P04)	implementing a program that includes control structures, for example the use of branching dependent on a condition being met such as whether a button or key has been pressed, and iteration (repetition) such as how many attempts have been made in a guessing game (AC9TDI4P04_E2)
			programming for choices in a given algorithm, for example capturing a user's name to a variable, implementing a branching mechanism based on whether the user has given a correct answer and displaying or speaking: '<Name>, you are correct/incorrect' (AC9TDI4P04_E3)
	Evaluating	discuss how existing and student solutions satisfy the design criteria and user stories (AC9TDI4P05)	imagining and considering alternative uses and opportunities for digital tools used in the classroom, for example visiting a virtual museum and being able to experience artefacts (AC9TDI4P05_E1)
			evaluating whether a solution has met the design criteria and the requirements outlined in the user story (user story example: 'A <type of user> has <some goal> so that <some reason>', for example, 'Our soccer team wants to access results on the web so that we can see our progress') is the user able to access the progress of the soccer team on the web easily? (AC9TDI4P05_E2)
	Collaborating and managing	create, locate and edit content and communicate with others selecting and using common tools and their core functionality and following agreed conventions to name files (AC9TDI4P06)	building a collaborative word processor to document the progress and operation of a group digital project (AC9TDI4P06_E1)
			complying with agreed conventions, for example file naming (AC9TDI4P06_E2)
		share information and collaborate with others demonstrating agreed behaviours, guided by	respecting Aboriginal and Torres Strait Islander cultures through agreed behaviours regarding cultural protocols, including relevant permissions and attributions, along with addressing risks and responsibilities such as privacy, security, accuracy of data and avoiding deficit discourse (AC9TDI4P07_E1)

		trusted adults (AC9TDI4P07)	exploring digital tools that suit particular personal or group needs, for example the use of online mind maps to plan and create ideas, collaborative document systems to communicate, or language translation software that can help those who need translation (AC9TDI4P07_E2)
			investigating how digital tools are used in communities to meet needs, for example jointly creating an anonymous class survey to help plan an end-of-year party, where questions and answers conform to the agreed behavioural expectation (AC9TDI4P07_E3)
	Privacy and security	access their school account using a memorised password and explain why it should be easy to remember, but hard for others to guess (AC9TDI4P08)	investigating the current advice of password choice being long passphrases rather than a complex combination of text and symbols (AC9TDI4P08_E1)
			playing a guessing game with students using clues to see if they can guess simple passwords, for example, 20 questions, and discuss what could be done to make the passwords hard to guess but easy to remember for the user (AC9TDI4P08_E2)
			exploring strategies to assist with memorisation of password such as using the first letter of words in a nursery rhyme or song, a place and a favourite number, for example, 'Little Jack Horner sat in a corner' + ''in Brisbane' + 6' = LJHsiaciB6 (AC9TDI4P08_E3)
		identify what personal data is stored and shared in their online accounts and discuss any associated risks (AC9TDI4P09)	identifying types of personal data that can be stored or collected when creating an online account or posting online, for example posting a picture online may store the location where the image was taken (AC9TDI4P09_E1)
			looking at photographs of students (or fictional characters) and identifying which features might give away a person's location such as school uniform or recognisable landmark and comparing photos to rank them by degree of difficulty to determine location (AC9TDI4P09_E2)
			discussing the use of nicknames and why these are important when playing online games (AC9TDI4P09_E3)

Years 5 and 6

Band level description

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. Students focus on further developing understanding and skills in computational thinking such as identifying similarities in different problems and describing minor components of complex systems. They also focus on the sustainability of information systems for current and future uses.

Students develop an understanding of the role individual components of digital systems play in the processing and representation of data. They are introduced to the concept of data states in digital systems and how data is 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 digital solutions, students define problems clearly by identifying appropriate data and other 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 branching (decisions), 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 identify and list the major steps needed to complete a task or project. 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 security protocols such as devising file naming conventions that are meaningful and determining safe storage locations to protect data and information.

Digital Technologies achievement standard

By the end of Year 6 students use computational thinking to create digital solutions. They understand and describe how data is represented and transmitted. Students understand how behaviours and ethics help protect data and describe what effect supplied data can have on their digital footprint. They design digital solutions based on user stories by developing algorithms to address problems or opportunities and implement them as visual programs that involve decision-making, repetition and user input. Students evaluate ideas and solutions against design criteria, using their knowledge of digital systems to communicate ideas to an audience.

Technologies learning area achievement standard*

By the end of Year 6 students describe how people design products, services and environments to meet the needs and opportunities of communities, including sustainability. For each of the three prescribed technologies contexts students explain how the features of technologies impact on design decisions and they create designed solutions. They use computational thinking to design and create digital solutions by developing algorithms to address problems or opportunities and implement them as visual programs. They evaluate ideas and solutions against criteria for success. Students use technical terms and graphical representation techniques to communicate ideas to an audience. They record project plans including production processes and select appropriate technologies and techniques to safely produce designed solutions. Students understand and describe how data is transmitted, how behaviours and ethics help protect data and describe what effect supplied data can have on their digital footprint.

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Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	investigate the main internal components of common digital systems and their function (AC9TDI6K01)	investigating the main components in a video conferencing system and their function, for example a telehealth system used by Aboriginal and Torres Strait Islander communities to access ultrasound and other imagery services (AC9TDI6K01_E1)
			examining the use of 2-way radio communications or satellite phones to assist in communications when outside of a mobile phone service area (AC9TDI6K01_E2)
			describing the different functions of the internal components of digital systems, for example internal processing components including the central processing unit that may use artificial intelligence to process data such as facial or speech recognition (AC9TDI6K01_E3)
			investigating how specific digital systems work, for example using images of real-world objects and blending with computer-generated information to construct an augmented reality (AC9TDI6K01_E4)

		examine how digital systems form networks to transmit data (AC9TDI6K02)	investigating the use of satellite phones in remote and very remote Aboriginal and Torres Strait Islander homelands or outstations where mobile phone networks are either not available, accessible or reliable, for example many homeland communities of Arnhem Land, located in the north-eastern corner of the Northern Territory around 500 kilometres from the capital city, Darwin, have limited access to mainstream communication networks (AC9TDI6K02_E1)
			explaining how data may be transmitted between two digital systems in different ways, for example using wired networks to transfer data from one digital system to another, and radio waves to transmit data in wireless or mobile networks (AC9TDI6K02_E2)
			investigating how the internal and external components of digital systems are coordinated to handle data, for example how a keyboard, central processing unit and screen work together to accept, manipulate and present data and information (AC9TDI6K02_E3)
	Data representation	explain how digital systems represent all data using numbers (AC9TDI6K03)	recognising that digital systems rely on two states only: on and off (referring to electrical states) and that this requires every number to be converted to binary (AC9TDI6K03_E1)
		explore how data can be represented by off and on states (zeros and ones in binary) (AC9TDI6K04)	collaboratively making a long thread with beads representing binary for the letters that spell the country name in both English and local language, and could be hung as a 'binary banner' as an Acknowledgement of Country or Welcome to Country that we are on the traditional lands of the <insert name> Peoples (AC9TDI6K04_E1)
			recognising that the numbers 0, 1, 2 and 3 could be represented by the patterns of two binary digits: 00, 01, 10 and 11 (AC9TDI6K04_E2)
			investigating electrical circuits to see that a switch can only exist in one of two states: open or closed; and recognising that in the off state, a switch appears as a gap in the circuit (AC9TDI6K04_E3)

Processes and production skills	Investigating and defining	define problems using given or co-developed design criteria and by creating user stories (AC9TDI6P01)	investigating how Aboriginal land management corporations manage feral animals in Arnhem Land and Cape York Peninsula, for example how buffalo and cattle can be tracked and how this information is used to create economic development opportunities and reduce the impact on native flora and fauna (AC9TDI6P01_E1)
			identifying how the functions of one type of information system could be applied in a new way to meet a community or national need, for example documenting and recording cultural stories using animations (AC9TDI6P01_E2)
			defining the design criteria by summarising a problem so that aspects of the problem can be identified, for example what need is associated with the problem, who are the stakeholders, why do they have this problem (AC9TDI6P01_E3)
			checking existing solutions to identify designs that are transferable to new but similar digital solutions, for example sharing a visual program that takes an English word as input, speaks it, and translates it to another language and speaks the translated word (AC9TDI6P01_E4)
			co-creating a user story using a template such as ‘As a <type of user>, I want <some goal> so that <some reason>’, for example, ‘As a parent, I want to access my child’s progress so that I can help them with their learning’ (AC9TDI6P01_E5)
	Generating and designing	design algorithms involving multiple alternatives (branching) and iteration (AC9TDI6P02)	designing an algorithm including branching and iteration which responds to data, for example how Aboriginal and Torres Strait Islander rangers use structured procedures to respond to live tracking data that indicates feral buffalo are approaching an environmentally or culturally significant site (AC9TDI6P02_E1)
			experimenting with different ways of representing an instruction to make a choice, for example branches in a tree diagram with an ‘IF’ statement (a common statement used to branch) to indicate making a choice between different circumstances using a spreadsheet or a visual program (AC9TDI6P02_E2)
			experimenting with different ways of representing an instruction to make a repetition, for example loops in a flowchart diagram with a ‘REPEAT’ statement (AC9TDI6P02_E3)

		designing the instructions for a robot, for example a robot vacuum cleaner to clean a room considering when it will need alternatives and when it may need to repeat an action (AC9TDI6P02_E4)
	design a user interface for a digital system (AC9TDI6P03)	exploring different features of user interfaces that allow people from different cultures to access information irrespective of language background, for example the use of consistently placed, self-evident icons (AC9TDI6P03_E1)
		designing the user interface of a solution using different design tools, for example using a storyboard to outline the stages of a game or a mock-up to show the placement of icons (AC9TDI6P03_E2)
		investigating characteristics of a user interface that is common for particular types of problems, for example when using a touch screen many people respond more intuitively than when using a keyboard or stylus, and the consistent placement of symbols helps with performing actions that require speed, such as in games (AC9TDI6P03_E3)
		applying the principles and elements of design to a set of requirements to produce a user interface for a system that addresses an identified need, for example a user who is visually impaired might need larger text and customisable colour contrasts (AC9TDI6P03_E4)
	generate, modify, communicate and evaluate designs (AC9TDI6P04)	imagining how the functioning of one type of information system could be applied in a new way to meet a community or national need, for example considering how an electronic tracking system such as a global positioning system could be used to find people who are lost (AC9TDI6P04_E1)
		following, modifying and describing the design of a game involving simple algorithms represented diagrammatically or in English, for example creating a flowchart with software that uses symbols to show decisions, processes, and inputs and outputs (AC9TDI6P04_E2)

	Producing and implementing	implement algorithms as visual programs involving control structures, variables and user input (AC9TDI6P05)	programming digital systems to perform automated tasks, such as closing gates, for example simulating the work of Aboriginal and Torres Strait Islander rangers attempting to lure and capture feral animals (AC9TDI6P05_E1)
			implementing a program that includes control structures such as branching (dependent on multiple alternatives) and iteration (repeating until all questions have been asked or answered), and uses variables (to store the cumulative score), for example building a simple, interactive quiz that allocates points based on a set number of correct user responses where each point gained adds to a total score (AC9TDI6P05_E2)
			experimenting with different ways of instructing to make choices and repeat instructions, for example using IF statements to allow for making choices and iterations (repeat instructions) until a goal is achieved (AC9TDI6P05_E3)
	Evaluating	evaluate existing and student solutions against the design criteria and user stories and their broader community impact (AC9TDI6P06)	using the safety by design principles from the eSafety Commissioner, for example evaluating existing information systems and how these could benefit from newly designed solutions (AC9TDI6P06_E1)
			exploring and critiquing digital solutions actively used by peers, for example eSport across South-East Asia, identifying key influencers, stakeholders, success and economic factors (AC9TDI6P06_E2)
			evaluating digital solutions used by remote communities, for example online banking systems where internet bandwidth is poor or unreliable, or digital literacies or fluency in English are low (AC9TDI6P06_E3)
	Collaborating and managing	create, locate and edit content for, and communicate with, a specific audience, selecting appropriate tools fand using their advanced functionality	investigating the possible ethical and social outcomes of a given project, for example exploring the positive and negative impacts of a school's social media presence on all stakeholders (AC9TDI6P07_E1)
			creating content for a school celebration, for example designing a collaborative spreadsheet that can be used by a class to plan and cost their graduation party, together with a folder of tagged resources which support the planning (AC9TDI6P07_E2)

		and storage conventions (AC9TDI6P07)	recognising the need for and compliance with agreed conventions, for example file naming, storage location and formatting guidelines such as file extension (AC9TDI6P07_E3)
		share information, plan and collaborate with others demonstrating ethical and agreed behaviours, supported by trusted adults (AC9TDI6P08)	respecting Aboriginal and Torres Strait Islander cultures through agreed behaviours regarding cultural protocols, including relevant permissions and attributions, along with addressing risks and responsibilities such as privacy, security, accuracy of data and avoiding deficit discourse (AC9TDI6P08_E1)
			using a range of communication tools to share ideas and information, for example participating in collaborative online environments (AC9TDI6P08_E2)
			using digital systems to share web-based information taking into consideration referencing conventions, for example creating a blog, website or online learning space for sharing ideas (AC9TDI6P08_E3)
	Privacy and security	access multiple personal accounts using unique passphrases and explain the risks of password re-use (AC9TDI6P09)	discussing strategies to create a series of passphrases that can be remembered and used for different platforms, for example making words by mixing letters, numbers and characters such as 5ept3mber!, 0cto8er*, @N0v3mber, D3cember? (AC9TDI6P09_E1)
			discussing the outcome of a series of fictional scenarios if re-using passwords, for example if Child A re-used a password on many sites and child B discovered their password for one site, what could happen to Child A's personal information? (AC9TDI6P09_E2)
		explain the creation and permanence of their digital footprint and consider privacy when collecting user data (AC9TDI6P10)	creating communication strategies that promote positive actions and behaviour when engaging with others online, and using these strategies to show respect for self and others, for example seeking permission from others before posting photos online, responding respectfully to other people's opinions even if they are different from personal opinions (AC9TDI6P10_E1)
			using respectful language when online and recognising that many popular applications record all voice and text interactions, and these cannot be easily retracted (AC9TDI6P10_E2)

			explaining how our digital footprint is linked to our offline reputation, for example posting inappropriate content affects real people and might have lasting consequences on your own reputation (AC9TDI6P10_E3)

Years 7 and 8

Band level description
By the end of Year 8 students will have had opportunities to create a range of digital solutions, such as interactive web applications or programmable multimedia assets or simulations of relationships between objects in the real world. They develop further understanding and skills in computational thinking such as decomposing problems and prototyping; and engaging students with a wider range of information systems as they broaden their experiences and involvement in national, regional and global activities. Students analyse the properties of networked systems and their suitability and use for the transmission of data types. They acquire, analyse, validate and evaluate various types of data, and appreciate the complexities of storing and transmitting those data in digital systems. Students use structured data to model objects and events that shape the communities they actively engage with. They further develop their understanding of the vital role that data plays in their lives, and how the data and related systems define and are limited by technical, environmental, economic and social constraints. They further develop abstractions by identifying common elements while decomposing apparently different problems and systems to define requirements and recognise that abstractions hide irrelevant details for particular purposes. When defining problems, students identify the key elements of the problems and the factors and constraints at play. They design increasingly complex algorithms that allow data to be manipulated automatically and explore different ways of showing the relationship between data elements to help computation, such as using pivot tables, graphs and clearly defined markup or rules. They progress from designing the user interface to considering user experience factors such as user expertise, accessibility and usability requirements. They broaden their programming experiences to include general-purpose programming languages and incorporate subprograms into their solutions. They predict and evaluate their developed and existing solutions, considering time, tasks, data and the safe and sustainable use of information systems, and anticipate any risks associated with the use or adoption of such systems. Students plan and manage individual and team projects with some autonomy. They consider ways of managing the exchange of ideas, tasks and files and techniques for monitoring progress and feedback. When communicating and collaborating online, students develop an understanding of different social contexts, for example acknowledging cultural practices and meeting legal obligations.

Digital Technologies achievement standard

By the end of Year 8 students use computational thinking to independently and collaboratively create effective digital solutions measured against negotiated success criteria. They design solutions to real-world problems and opportunities by creating a variety of algorithmic designs and implement them using a general-purpose programming language. Students use a range of tools to make predictions and draw conclusions based on acquired, stored and validated data. They explain how digital systems represent, transmit and secure data. Students identify and explain how to protect against cyber security threats, manage the risks of sharing and curate their digital footprint.

Technologies learning area achievement standard*

By the end of Year 8 students explain how people design products, services and environments to meet present and future needs. For each of the four prescribed technologies contexts students explain how the features of technologies influence and impact on design decisions and they create designed solutions based on evaluation of needs or opportunities. They use computational thinking to independently and collaboratively design and create effective digital solutions to real-world problems and opportunities by creating a variety of algorithmic designs and implement them using a general-purpose programming language. They use a range of tools to make predictions and draw conclusions based on acquired, stored and validated data. Students develop criteria for success including sustainability and use these to judge the suitability of ideas, processes and solutions. They create, adapt and iterate design ideas and communicate to audiences using suitable technologies, technical terms and graphical representation techniques. Students explain how digital systems represent, transmit and secure data. They independently and collaboratively plan to document and manage production processes and to safely produce effective designed solutions for the intended purpose. Students identify cyber security threats and risks and explain how to protect against threats and manage the risks of sharing and curating their digital footprint.

* To provide flexibility for schools an achievement standard has been written for the Technologies learning area, Foundation to Year 8, as well as for each subject. Some schools may wish to report holistically on Technologies learning in Foundation to Year 8, while others may prefer to report on each subject.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	explain how hardware specifications affect performance and select appropriate hardware for particular tasks and workloads (AC9TDI8K01)	considering how remote Aboriginal and Torres Strait Islander communities frequently share access to mobile phone and internet services, and how the hardware specifications of these devices affect performance, for example where immediate and extended families share and access data through a single mobile phone or device (AC9TDI8K01_E1)
			building and justifying a component list for a computer that is fit for purpose, for example for everyday email and web browsing or for high-end gaming considering the impact of resources used (AC9TDI8K01_E2)
		investigate how data is transmitted and secured in wired and wireless networks including the internet (AC9TDI8K02)	explaining how cellular radio towers and mobile phones work together to create mobile networks and comparing the reliability and speed of data flows through wi-fi, wired and mobile networks (AC9TDI8K02_E1)
			exploring data transmission methods, for example binary voltage changes, changes to a radio wave, or varying the intensity or colour of light in an optical fibre (AC9TDI8K02_E2)
	Data representation	investigate how digital systems represent text, image and audio data using integers (AC9TDI8K03)	investigating how a humanoid robot or similar digital system converts audio data to integers as it records, stores and outputs sound, for example the programming of an Acknowledgement of Country in a local Aboriginal or Torres Strait Islander language (AC9TDI8K03_E1)
			investigating how the colours in images and videos are represented in digital systems, for example manipulating red, green and blue colours in an image editor (AC9TDI8K03_E2)
			exploring the function of analog to digital and digital to analog converters, noting how sample sizes and times influence the quality of the representation, for example a low sample rate will make an audio file smaller but sound quality will be very poor as a result (AC9TDI8K03_E3)
			investigating the different representation of bitmap and vector graphics and its consequences, for example pixilation in magnified bitmap and vector images, considering impact of file size (AC9TDI8K03_E4)

		explain how and why digital systems represent integers in binary (AC9TDI8K04)	recognising that computers can only work with a language that uses ones and zeros, therefore we need a way of translating from the computer alphabet to our own and vice versa, for example using an ASCII table to translate an English word or phrase as a binary number sequence (AC9TDI8K04_E1)
			exploring secure transmission of data by restricting encryption to numerical values of letters of the alphabet and control characters, and investigating how Unicode overcomes the ASCII problem of dealing with languages that require more than 128 characters (AC9TDI8K04_E2)
			representing whole numbers in binary, for example counting in binary from zero to 15, or writing a friend's age in binary (AC9TDI8K04_E3)
Processes and production skills	Acquiring, managing and analysing data	acquire, store and validate data from a range of sources using software, including spreadsheets and databases (AC9TDI8P01)	acquiring, storing and validating data, from a reputable source, such as the Australian Bureau of Statistics, to analyse Aboriginal and Torres Strait Islander people's geographic distribution, with the aim to highlight past and emerging trends (AC9TDI8P01_E1)
			acquiring relevant data to draw conclusions, for example assessing the liveability of a city, town or village using a combination of data from valid sources and from a student-designed survey (AC9TDI8P01_E2)
			validating the role of structured data, for example using the attributes of different mammals to build a dichotomous key which can identify a specific type of plant or animal (AC9TDI8P01_E3)
		analyse and visualise data using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends (AC9TDI8P02)	acting ethically and respecting intellectual property when acquiring and displaying data belonging to others (AC9TDI8P02_E1)
			visualising data to create information, for example identify trends and outlier data from spreadsheets using plots, or display geocoded data on a map (AC9TDI8P02_E2)

		model and query the attributes of objects and events using structured data (AC9TDI8P03)	identifying and incorporating data attributes for a purpose, for example creating a data dictionary for a flat file database such as membership details for a sporting club and creating the database including filters or other methods to produce reports (AC9TDI8P03_E1)
	Investigating and defining	define and decompose real-world problems with design criteria and by creating user stories (AC9TDI8P04)	making predictions about future population distribution of Aboriginal and Torres Strait Islander Peoples based on identified trends, for example analysing and visualising data using spreadsheets and databases on their population growth in metropolitan areas (AC9TDI8P04_E1)
			examining factors influencing the design of a global positioning system–based application to assist in the identification of Traditional Owners, for example investigating the potential of an application that could assist Australians to identify and contact the traditional Aboriginal and Torres Strait Islander owners of the land they are on (AC9TDI8P04_E2)
			investigating a local or global issue in need of a solution and producing design criteria to effectively meet the needs and opportunities for sustainable living, including collecting data about direct stakeholders, consequences of design choices, budgets and others who may be impacted by a solution, for example locating or acquiring data on electricity use in homes in a local area, analysing the data and publishing findings including recommendations for designed and digital solutions that could be produced, their estimated cost and community impacts (AC9TDI8P04_E3)
			identifying that designed solutions can be decomposed into sub-elements to plan and produce them effectively, for example identifying the elements of game design such as characters, movements, collisions and scoring and their relationships, and considering who will play the game (user) and how they might interact with the game (user story) (AC9TDI8P04_E4)
			using a template such as ‘As a <type of user>, I want <some goal> so that <some reason>’, for example, ‘As a user with a visual impairment I want to be able to get the news on my phone so that I can keep up with my world’ (AC9TDI8P04_E5)
			building a set of rules for a game or system including depicting the system as a sequence of processes and data flows, for example documenting a troubleshooting system which uses artificial intelligence (AC9TDI8P04_E6)

	Generating and designing	design algorithms involving nested control structures and represent them using flowcharts and pseudocode (AC9TDI8P05)	designing the menu structure for an augmented reality experience that utilises user input data, for example how an interpretive tour of Aboriginal and Torres Strait Islander Peoples' uses of local resources including food, fibre or medicinal plants can be tailored to the user's preferences for items such as language and content (AC9TDI8P05_E1)
			using diagrams to describe key decisions, for example creating flowcharts using digital tools to describe a set of computational instructions including branching and iteration to determine the steps taken in an algorithm (AC9TDI8P05_E2)
			using structured English to express algorithmic instructions, for example using conventional statements such as REPEAT and UNTIL in a loop when describing interactive instruction (AC9TDI8P05_E3)
		trace algorithms to predict output for a given input and to identify errors (AC9TDI8P06)	following instructions for making woven baskets or nets by hand, as done by Aboriginal and Torres Strait Islander Peoples, and making predictions of how the instructions would need to be modified to enable the item to be produced through mechanisation as a labour-saving strategy (AC9TDI8P06_E1)
			manually checking the accuracy of an algorithm before it is implemented, for example reading and reviewing (desk checking) the algorithm using test data to see if the instructions produce the expected results (AC9TDI8P06_E2)
		design the user experience of a digital system (AC9TDI8P07)	investigating a range of existing digital solutions for logic, connections and user behaviour; that is, user experience (UX) and visual design of the solution, including branding and user interface (UI), for example discussing observations of UX and UI using popular apps and games as stimulus (AC9TDI8P07_E1)
			applying the principles and elements of design to a series of solutions to evaluate the success of each solution to hold the viewer's attention, for example identifying which colour combinations or framing of visual elements keep different audiences engaged with on-screen activity (AC9TDI8P07_E2)
			comparing the history of graphical user interfaces, for example comparing the iconography of digital systems over time, looking at guidelines for such interfaces, their evolution and whether adherence to such guidelines is common (AC9TDI8P07_E3)

		generate, modify, communicate and evaluate alternative designs (AC9TDI8P08)	producing a website, animation or other interactive experience to help Australians identify and contact the Aboriginal and Torres Strait Islander Traditional Owners of user-provided locations (AC9TDI8P08_E1)
			designing the user interface of a solution using a range of design tools, for example using wireframes or mock-ups to describe the appearance of a solution or mocking up a mobile solution in a slide deck where buttons link to slides showing their effect (AC9TDI8P08_E2)
			evaluating the direct and indirect effects of digital systems, for example privacy, social media bubbles, hacking, cyberware, automation and job reassignment due to increased use of artificial intelligence (AI), effects of bias in AI-driven systems (AC9TDI8P08_E3)
	Producing and implementing	implement algorithms and modify and debug programs involving control structures and functions in a general-purpose programming language (AC9TDI8P09)	using a general-purpose programming language to program a device to recognise particular objects and to complete an action, for example considering the choice of objects and programming needed to create interaction in a simple computer game including the use of colour or a decision to move ahead or reverse direction depending on the proximity of a wall (AC9TDI8P09_E1)
			creating digital solutions that provide user navigation and prompts with controlled repetitions, for example an information kiosk that has layers of buttons and prompts the user three times before returning to the beginning (AC9TDI8P09_E2)
	Evaluating	evaluate existing and student solutions against the design criteria, user stories and possible future impact (AC9TDI8P10)	reviewing student projects, past and present, and comparing various aspects of the design and production of the solutions including revisiting user stories, design criteria and impact (AC9TDI8P10_E1)
			questioning the impact of being wholly dependent on digital tools, for example do digital solutions in low service areas create inequities? (AC9TDI8P10_E2)
			investigating solutions and evaluating alternative designs, for example whether the mobile and laptop versions of a webpage provide users with a similar experience (AC9TDI8P10_E3)

			exploring the history of emerging technologies and their positive and negative impacts on society and the environment, for example researching the development of new versions of hardware and software, plug-ins and apps; and considering the redundancy of physical packing, disks and related materials that do not include e-waste (AC9TDI8P10_E4)
	Collaborating and managing	create, locate and edit content for, and communicate with, a specific audience, selecting from a range of tools and using their advanced functionality and storage conventions (AC9TDI8P11)	communicating with a specific person or group to research a user story, determine design criteria and create a customised digital solution considering future needs and emerging technologies, for example building a database that manages a sporting club in a growing community (AC9TDI8P11_E1)
			collaborating with communities and organisations to explore how their diverse narratives might be incorporated in the design of a game or app (AC9TDI8P11_E2)
		share information publicly online and plan, manage and collaborate on simple agile projects, demonstrating agreed behaviours (AC9TDI8P12)	respecting Aboriginal and Torres Strait Islander cultures through agreed behaviours regarding cultural protocols, including relevant permissions and attributions, along with addressing risks and responsibilities such as privacy, security, accuracy of data and avoiding deficit discourse (AC9TDI8P12_E1)
			itemising the requirements of a planned collaborative online system that is fit for purpose, for example researching and recording device and network specifications, and accessibility, security and privacy provisions needed to set up a simple network such as closed-circuit television AC9TDI8P12_E2)
			exploring the differences between virtual and face-to-face communications, for example equity of access, the contribution of body language to communication, and the ability and ethics of tracking individual contribution afforded by virtual communications (AC9TDI8P12_E3)

	Privacy and security	explain how multi-factor authentication protects an account when the password is compromised and identify phishing and malware threats (AC9TDI8P13)	investigating systems and processes that protect personal privacy and data considering emerging technologies, for example researching methods for identifying and protecting against spyware and malware and systems for ensuring strong passwords and authentication processes (AC9TDI8P13_E1)
			exploring multi-factor authentication in action followed by common set-up procedures, for example multi-factor authentication could be demonstrated in class where students have to physically ask for verification to get into a school site using a unique password (AC9TDI8P13_E2)
			identifying common scams such as the fake parcel delivery scam through tell-tale signs, for example misspellings, inappropriate grammar or the purported site not matching the actual link in URL (AC9TDI8P13_E3)
		investigate and manage the data that existing systems and student solutions collect that contributes to a digital footprint and assess if the data is essential to their purpose (AC9TDI8P14)	investigating the ethical obligations of individuals and organisations regarding ownership and privacy of data and information by researching an online platform and discussing the impact of the data it collects and stores on digital footprint and what it does with that data and information (AC9TDI8P14_E1)
			critiquing their own digital solutions to examine what sort of personal data is collected and whether that collection is warranted and secured (AC9TDI8P14_E2)
			investigating how data collections impact media production and consumption and their impact on our understanding of ourselves, for example media streaming services predicting what television shows or music tracks we might be interested in (AC9TDI8P14_E3)

Years 9 and 10

Band level description
By the end of Year 10 students will have had opportunities to analyse problems and design, implement and evaluate a range of digital solutions, such as database-driven websites and artificial intelligence engines and simulations. They develop further understanding and skills in computational thinking such as precisely and accurately describing problems and the use of modular approaches to solutions. Students also engage with specialised learning in preparation for vocational training or learning in the senior secondary years. Students consider how human interaction with networked systems introduces complexities surrounding access to, and the privacy and security of, data of various types. They interrogate security practices and techniques used to compress data, and learn about the importance of separating content, presentation and structural elements for data integrity and maintenance purposes. Students explore how bias can affect the results and value of data collection methods and they use structured data to analyse, visualise, model and evaluate objects and events. They learn how to develop multilevel abstractions, identify standard elements such as searching and sorting in algorithms, and explore the trade-offs between the simplicity of a model and the faithfulness of its representation. When defining problems students consider the functional and non-functional requirements of a solution through interacting with clients and regularly reviewing processes. They consolidate their algorithmic design skills to incorporate testing and review, and further develop their understanding of the user experience to incorporate a wider variety of user needs. Students develop modular solutions to complex problems, using an object-oriented programming language where appropriate, and evaluate their solutions and existing information systems based on a broad set of criteria including connections to existing policies and their enterprise potential. They consider the privacy and security implications of how data is used and controlled and suggest how policies and practices can be improved to ensure the sustainability and safety of information systems. Students progressively become more skilled at identifying the steps involved in planning solutions and developing detailed plans that are mindful of risks and sustainability requirements. When creating solutions, individually and collaboratively, students comply with legal obligations, particularly for the ownership of information, and when creating interactive solutions for sharing in online environments.

Digital Technologies achievement standard

By the end of Year 10 students use computational thinking to create innovative digital solutions measured against stakeholder user stories. They plan and manage agile projects, being aware of risks, responsibilities and the effects of curated data on the digital footprint. Students design complex solutions to draw conclusions and make predictions by creating and validating algorithms and modular programs. They model entities and their relationships using structured data. They critically evaluate ideas and solutions against design criteria and user stories. Students design and create online documents using the component parts of text, markup and styling. Students explain how data can be stored; secured; managed; and controlled by hardware, software and encryption. They evaluate cyber security threats and mitigations.

Strand	Sub-strand	Content description *Students learn to:*	Content elaboration *This may involve students:*
Knowledge and understanding	Digital systems	investigate how hardware and software manage, control and secure access to data in networked digital systems (AC9TDI10K01)	explaining the role of hardware and software components in giving Aboriginal and Torres Strait Islander Peoples improved access to financial or healthcare services, for example how telehealth services accelerate diagnosis, reduce travel-related trauma and provide security of confidential health data (AC9TDI10K01_E1)
			exploring how an operating system manages the relationship between hardware, applications and secure access to data considering energy for processes (AC9TDI10K01_E2)
			examining the role of hardware and software components in allowing people to interact with digital systems, for example using a mouse or touchpad or touch screen, speech and accelerometer, acknowledging language barriers, for example in health for people in remote communities (AC9TDI10K01_E3)
			investigating the role of a system clock in the flow of data and in security protection such as mitigating man-in-the-middle attacks (AC9TDI10K01_E4)
			exploring the role of network interfaces, switches, routers and devices such as domain name servers and dynamic host configuration servers to explain how hardware and software work together with agreed protocols to provide secure and reliable data transmission across networks (AC9TDI10K01_E5)

			investigating the ways in which artificial intelligence is a part of the range of solutions used to interpret data, for example using facial recognition in public security systems or identifying and organising photographs of individuals in a smartphone (AC9TDI10K01_E6)
	Data representation	represent documents online as content (text), structure (markup) and presentation (styling) and explain why such representations are important (AC9TDI10K02)	building a simple webpage showing how a markup language can change the styling of text, then investigating ways of further changing the styling using differing Cascading Style Sheets which change based on the viewing device or the user requirements (AC9TDI10K02_E1)
			generating several different reports or analyses from the same database or Python library, each for different audience needs (AC9TDI10K02_E2)
		investigate simple data compression techniques (AC9TDI10K03)	investigating the data compression techniques required in Aboriginal and Torres Strait Islander communities as a way of managing internet access, for example how images must be reduced in size or quality to manage bandwidth and data limits (AC9TDI10K03_E1)
			examining an image with a large proportion of blue sky and discussing whether the image quality would be compromised if all the blue pixels of the sky in one row were to be replaced by one token and the number of pixels it represents (AC9TDI10K03_E2)
			explaining the difference between lossy and lossless compression and the consequences of each, for example the difference between JPEG and PNG images and exploring codecs for audio-visual compression such as MP3, MP4 and WAV formats considering energy requirements of file sizes (AC9TDI10K03_E3)
			investigating artificial intelligence used to improve the perceived quality of compressed images to force the compression algorithm to put emphasis on details that humans consider important (AC9TDI10K03_E4)

Processes and production skills	Acquiring, managing and analysing data	develop techniques to acquire, store and validate data from a range of sources using software, including spreadsheets and databases (AC9TDI10P01)	sourcing and storing secondary data from the Australian Bureau of Statistics in a format that is useful for analysis, for example acquiring data on the population growth or age structure of the Aboriginal and Torres Strait Islander population (AC9TDI10P01_E1)
			identifying strengths and weaknesses of collecting data using different methods, for example online surveys, face-to-face interviews, phone interviews, observation, comments in response to a social media posting, phone logs, browser history and online webcam systems (AC9TDI10P01_E2)
			examining intellectual property and applying appropriate protocols when acquiring and displaying data including validating the source and accuracy (AC9TDI10P01_E3)
			developing strategies and techniques for capturing accurate and balanced datasets and creating visualisations that can be used to help in decision-making (AC9TDI10P01_E4)
		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 (AC9TDI10P02)	using software to visualise and compare data to identify patterns, relationships and trends in data, for example investigating emerging trends such as the rapid population growth and the marked differences in the age structure of the Aboriginal and Torres Strait Islander population (AC9TDI10P02_E1)
			exploring artificial intelligence data analysis where an algorithm is trained by a structured dataset, for example, engaging with online machine learning examples (AC9TDI10P02_E2)
			exploring the impacts of artificial intelligence systems, for example investigating probability-based machine learning and identifying possible unintended outcomes such as those caused by biases in training data and algorithms (AC9TDI10P02_E3)
		model and query entities and their relationships using structured data (AC9TDI10P03)	building an entity relationship diagram for a relational database, for example one that is used for websites such as online stores, natural disaster records or consumer reviews (AC9TDI10P03_E1)
			using structured data to help in decision-making, for example creating a data schema for a relational database and building the database, incorporating query and reporting functionality to solve a problem of student choice (AC9TDI10P03_E2)

	Investigating and defining	define and decompose real-world problems with design criteria and by interviewing stakeholders to create user stories (AC9TDI10P04)	exploring how Aboriginal and Torres Strait Islander Peoples' cultural stories and languages are being preserved with digital systems, for example how communities could record, animate and maintain their connections with culture and language in a contemporary format that resonates with young people to help ensure that vital practices continue (AC9TDI10P04_E1)
			building design criteria that incorporate innovative ideas for sustainability by decomposing a real-world problem to identify immediate and future needs, data flows, stakeholders, timeline and budgetary constraints and considering user experience and user interface (AC9TDI10P04_E2)
			investigating different design criteria to produce effective designed solutions, for example hardware capability, network speed, compatibility with other systems and considering how the requirements of reliability, user experience and robustness could affect the way people use solutions (AC9TDI10P04_E3)
			identifying the range of stakeholders who might use or be indirectly affected by a designed solution, for example using the design thinking process or techniques such as interviewing and reinterviewing to clarify needs, and creating user stories (AC9TDI10P04_E4)
	Generating and designing	design algorithms involving logical operators and represent them as flowcharts and pseudocode (AC9TDI10P05)	producing and testing algorithms considering efficiency, for example creating an algorithm using pseudocode or by manually reviewing an algorithm to test structure and identify errors (AC9TDI10P05_E1)
			considering embedded program debugging, for example breakpoints, stubs and flags (AC9TDI10P05_E2)
			considering event logging, for example writing data about progress of a program to a text file for later examination (AC9TDI10P05_E3)
		validate algorithms and programs by comparing their output against a range of test cases (AC9TDI10P06)	using techniques such as boundary-value analysis, for example to test comparisons, division by zero possibilities (AC9TDI10P06_E1)
			using in-built debugging tools in programming software to identify and correct errors, for example 'trace' in Python or 'console.trace' in JavaScript (AC9TDI10P06_E2)

		design and prototype the user experience of a digital system (AC9TDI10P07)	evaluating aspects of the total user experience; that is, all aspects of the system as perceived by the users, for example a user's initial experience of setting up and using a system, or a user's emotional or cultural response to using a digital system (AC9TDI10P07_E1)
			writing specific, testable acceptance criteria for a designed solution, for example documenting the steps needed to demonstrate success at each interaction when an online banking user wants to recover the password to their account if the password is forgotten (AC9TDI10P07_E2)
			designing documentation, branding and marketing for a digital solution, for example a product demonstration screencast or 'getting started' user guide (AC9TDI10P07_E3)
		generate, modify, communicate and critically evaluate alternative designs (AC9TDI10P08)	reviewing peer projects, past and present, for example reviewing a past student's exemplar, discussing whether it met the design criteria, and predicting how future changes in digital technologies may affect its sustainability (AC9TDI10P08_E1)
	Producing and implementing	implement, modify and debug modular programs, applying selected algorithms and data structures, including in an object-oriented programming language (AC9TDI10P09)	implementing separate modules that perform discrete functions but contribute to meeting the needs of the solution (AC9TDI10P09_E1)
			creating programs which allow users to stay connected to community (AC9TDI10P09_E2)
			defining classes that represent the attributes and behaviour of objects in a program (AC9TDI10P09_E3)
			building a hierarchy of instances based on a class, for example defining the behaviour of a mammal and creating an instance for a particular type of mammal (AC9TDI10P09_E4)
			selecting different types of data structures such as an array, record and object to model structured data (AC9TDI10P09_E5)
			considering different algorithms and selecting the most appropriate based on the problem, for example choosing appropriate data structures and methods considering impact on resources (AC9TDI10P09_E6)

	Evaluating	evaluate existing and student solutions against the design criteria, user stories, possible future impact and opportunities for enterprise (AC9TDI10P10)	building a case study of a solution's impact, for example exploring entrepreneurial opportunities that arise from mobile computing combined with the provision of high-speed internet (AC9TDI10P10_E1)
			using design criteria to review the key qualities of an existing program, for example, exploring the efficiency of execution of the program and its usability (AC9TDI10P10_E2)
			using a series of test cases to verify that a program performs according to the user stories (AC9TDI10P10_E3)
	Collaborating and managing	create, locate and edit interactive content for a diverse audience (AC9TDI10P11)	identifying accessibility issues and exploring how these impact the design of interactive content, for example building an online chatbot that responds to differing languages or understands speech (AC9TDI10P11_E1)
			investigating techniques used by people and organisations to shape how information systems are used to create content appropriate for the audience, for example locating content to support reluctant adopters, editing policies on how the use of social media can advocate or influence behaviours, or creating equipment update policies (AC9TDI10P11_E2)
		plan, manage and document individual and collaborative agile projects accounting for risks and responsibilities (AC9TDI10P12)	respecting Aboriginal and Torres Strait Islander cultures through agreed behaviours regarding cultural protocols, including relevant permissions and attributions, along with addressing risks and responsibilities such as privacy, security, accuracy of data and avoiding deficit discourse (AC9TDI10P12_E1)
			using digital tools for project management including collaborative Gantt charts, timelines and version control repositories to plan and monitor project progress including seeking and responding to feedback to help in consolidating strengths, addressing weaknesses and fulfilling a project's goals while considering security and data privacy (AC9TDI10P12_E2)
			applying techniques to make ethical decisions when faced with dilemmas about security and ownership of data, for example selecting an action that results in the greatest benefit for the greatest number of people (AC9TDI10P12_E3)

	Privacy and security	describe cyber security threats and mitigation, including using multi-factor authentication and password managers (AC9TDI10P13)	explaining cyber security solutions, for example penetration testing and non-malicious hacking (ethical hacking) and other effective methods of data protection that can be used in a home and business setting (AC9TDI10P13_E1)
			exploring the features of a password manager app and create an instructional video for a chosen audience explaining set-up and usage (AC9TDI10P13_E2)
			exploring cyber security concepts such as confidentiality, availability and integrity and identifying risks such as identity theft, disclosure of passwords and passphrases, and fraud (AC9TDI10P13_E3)
		apply the Australian Privacy Principles to critique and manage the data that existing systems and student solutions collect that contribute to a digital footprint (AC9TDI10P14)	exploring the impact on themselves, family and community when sharing images and texts without consent (AC9TDI10P14_E1)
			applying relevant principles from the Australian Privacy Principles documentation to solutions students have created, outlining how their solution will deal with specific principles such as APP10, APP11 and APP13 (AC9TDI10P14_E2)
			examining the Australian Privacy Principles and creating a public campaign poster to highlight the importance of respecting others' privacy (AC9TDI10P14_E3)