Australian Curriculum - Technologies: Design and Technologies - Strands with Elaborations

PROGRESSION IN **'PROCESS AND PRODUCTION SKILLS'** IS HIGHLIGHTED IN THE FOLLOWING DOCUMENT VIA **BOLDED TEXT**.
NOTE: In Design and technologies, *Technologies contexts* are also denoted by **BOLDED TEXT**.

General Capabilities							Cross-curriculum priorities		
Literacy	Numeracy	ICT capability	Critical and creative thinking	Personal and social capability	Ethical understanding	Intercultural understanding	Aboriginal and Torres Strait Islander histories and cultures	Asia and Australia's engagement with Asia	Sustainability

Sourced from 'Key ideas in the Technologies curriculum'

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Overarching idea

(i) Creating preferred futures

The Technologies curriculum provides students with opportunities to consider how solutions that are created now will be used in the future. Students will identify the possible benefits and risks of creating solutions. They will use critical and creative thinking to weigh up possible short and long term impacts.

As students progress through the Technologies curriculum, they will begin to identify possible and probable futures, and their preferences for the future. They develop solutions to meet needs considering impacts on liveability, economic prosperity and environmental sustainability. Students will learn to recognise that views about the priority of the benefits and risks will vary and that preferred futures are contested.

(ii) Project management

Students will develop skills to manage projects to successful completion through planning, organising and monitoring timelines, activities and the use of resources. This includes considering resources and constraints to develop resource, finance, work and time plans; assessing and managing risks; making decisions; controlling quality; evaluating processes and collaborating and communicating with others at different stages of the process. Students are taught to plan for sustainable use of resources when managing projects and take into account ethical, health and safety considerations and personal and social beliefs and values.

Thinking in Technologies

(i) Systems thinking

A system is an organised group of related objects or components that form a whole. Systems thinking is a holistic approach to the identification and solving of problems where the focal points are treated as components of a system, and their interactions and interrelationships are analysed individually to see how they influence the functioning of the entire system.

In Design and Technologies the success of designed solutions includes the generation of ideas and decisions made throughout design processes. It requires students to understand systems and work with complexity, uncertainty and risk. Students recognise the connectedness of and interactions between people, places and events in local and wider world contexts and consider the impact their designs and actions have in a connected world.

Participating in and shaping the future of information and digital systems is an integral part of learning in Digital Technologies. Understanding the complexity of systems and the interdependence of components is necessary to create timely solutions to technical, economic and social problems. Implementation of digital solutions often has consequences for the people who use and engage with the system, and may introduce unintended costs or benefits that impact the present or future society.

(ii) Design thinking

Design thinking involves the use of strategies for understanding design needs and opportunities, visualising and generating creative and innovative ideas, planning, and analysing and evaluating those ideas that best meet the criteria for success.
Design thinking underpins learning in Design and Technologies. Design processes require students to identify and investigate a need or opportunity; generate, plan and realise designed solutions; and evaluate products and processes. Consideration of economic, environmental and social impacts that result from designed solutions are core to design thinking, design processes and Design and Technologies.

When developing solutions in Digital Technologies, students explore, analyse and develop ideas based on data, inputs and human interactions. When students design a solution to a problem they consider how users will be presented with data, the degree of interaction with that data and the various types of computational processing. For example, designing a maze; writing precise and accurate sequences of instructions to move a robot through the maze or testing the program and modifying the solution.

(iii) Computational thinking

Computational thinking is a problem-solving method that is applied to create solutions that can be implemented using digital technologies. It involves integrating strategies, such as organising data logically, breaking down problems into parts, interpreting patterns and models and designing and implementing algorithms.

Computational thinking is used when specifying and implementing algorithmic solutions to problems in Digital Technologies. For a computer to be able to process data through a series of logical and ordered steps, students must be able to take an abstract idea and break it down into defined, simple tasks that produce an outcome. This may include analysing trends in data, responding to user input under certain preconditions or predicting the outcome of a simulation.

This type of thinking is used in Design and Technologies during different phases of a design process when computation is needed to quantify data and solve problems. Examples include when calculating costs, testing materials and components, comparing performance, or modelling trends.

STRANDS

'The Australian Curriculum: Design and Technologies (F–10) comprises two related strands:
(i) Design and Technologies knowledge and understanding – the use, development and impact of technologies and design ideas across a range of technologies contexts
(ii) Design and Technologies processes and production skills – the skills needed to create designed solutions,...'

Relationship between the strands

'...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),...'

'...Teachers can select technologies-specific content from the ***Knowledge and understanding*** strand and students can apply skills from the ***Processes and production skills*** strand to that content. The common strand structure provides an opportunity to highlight similarities across the two subjects that will facilitate integrated approaches to teaching,...'

'...Teaching and learning programs will typically integrate content from each strand.
By the end of each band students will have had the opportunity to create different types of designed solutions that address the technologies contexts:
(i) **Engineering principles and systems**,
(ii) **Food and fibre production**,
(iii) **Food specialisations** and
(iv) **Materials and technologies specialisations**.
For breadth of study, the curriculum has been developed to enable students to complete at least one product, one service and one environment within each band.
The combination of technologies contexts and types of designed solutions is a school decision. Students will work on design projects that develop processes and production skills in investigating; generating; producing; evaluating; and collaborating and managing.'

Content descriptions for technologies contexts provide the stimulus for teachers to develop teaching and learning programs. Typically, a unit of learning in Design and Technologies would entail the integration of ***Design and Technologies knowledge and understanding*** content descriptions (Technologies and society and at least one Technologies context) and the ***Design and Technologies processes and production*** content descriptions. It may be possible to address multiple technologies contexts in a unit. The unit would be centred on a technologies context and may include **a design brief**.

Design Briefs

A design brief is a concise statement clarifying the project task and defining the need or opportunity to be resolved after some analysis, investigation and research. It usually identifies the users, criteria for success, constraints, available resources, timeframe for the project and may include possible consequences and impacts. A design brief is a tool for clarifying a problem when self-generated, or a guideline for design when externally imposed. In earlier years of learning, design briefs may be fairly prescriptive and teacher directed. As design skills and design thinking develop, students should have greater input into the development of design briefs for specific identified needs or opportunities.

Factors influencing design decisions

In Design and Technologies students are encouraged to apply their knowledge and practical skills and processes when using technologies and other resources to create innovative solutions that meet current and future needs. In doing so, they consider economic, environmental and social sustainability. Students progress from considering environmental sustainability factors in the early years to then also considering social sustainability factors in primary years and extending the approach to include economic sustainability factors in later years. Students make ethical decisions about the use of design and technologies, considering health and sustainability implications. They consider aesthetic and functional requirements. They also consider the suitability of enterprise and marketing for the designed solution.

Enterprise and marketing in the early years of school focuses on local audiences and promotion through displays and presentations and sharing products and services from a personal perspective. In the later years enterprise and marketing becomes more oriented to the perspectives of others, with the use of more sophisticated mechanisms for sharing services and products. Students become more enterprising in developing and promoting designed solutions. Marketing increasingly draws on social and sustainability considerations, recognising wider societal acknowledgement of ethics and futures thinking. The Design and Technologies curriculum identifies work health and safety issues with increasing complexity in each band description to reflect students' developing knowledge, understanding and skills in the use of a range of technologies. See also Implications for teaching, assessment and reporting – Safety.

Progression of production skills

Students will spend a substantial amount of time engaged in developing processes and production skills. Through the practical application of technologies, students develop dexterity, fine motor skills and coordination through experiential activities. The quality of their solutions should improve as their production skills improve. Students produce designed solutions using production processes involving natural and fabricated materials, components and digital technologies. The types of technologies they use may become progressively more sophisticated. When students generate, develop and communicate their ideas to a range of audiences and for design tasks in a range of technologies contexts, they develop graphical representation skills. They also develop graphics skills when the focus of the design project is on producing a graphics product, service or environment. Students progress from basic drawing and modelling to using technical terms and techniques and using digital technologies to produce three-dimensional drawings and prototypes

Managing projects and collaboration

In Design and Technologies, in the early years, students are actively involved in projects. They plan (with teacher support) simple steps and follow directions to complete their own projects or manage their own role within team projects. As students progress through primary school they take more responsibility for specific roles within a project with increasing levels of collaboration and team work. In the early years of secondary school students begin to manage projects, with support from peers and teachers. In the later years students use their increasing skills to fully manage projects and teams. They use digital tools to support their project management. They coordinate teams and collaborate with others locally and globally.'

Bands of Year Levels Indicators	BAND DESCRIPTIONS	**Design and Technologies knowledge and understanding –** *The use, development and impact of technologies and design ideas across a range of technologies contexts*		**Design and Technologies processes and production skills –** *the skills needed to create designed solutions.*									
		‘…This strand focuses on developing the underpinning knowledge and understanding of technologies (materials, systems, components, tools and equipment) across technologies contexts and developing understanding of the relationship between technologies and society. Technologies and society How people use and develop technologies taking into account 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** The Technologies contexts content descriptions provide a framework within which students can gain knowledge and understanding about technologies and design across a range of technologies contexts. These content descriptions focus on the characteristics and properties of technologies and how they can be used to create innovative designed solutions,…’ ‘… They also reflect national priorities including workforce needs, food security and sustainable food and fibre production and health and wellbeing priorities. The prescribed technologies contexts for Foundation – Year 8 are described below. The band descriptions show how many times each technologies context is addressed in a band,…’ **(i) Engineering principles and systems** **(ii) Food and fibre production** **(iii) Food specialisations** **(iv) Materials and technologies specialisations** ‘,…**Across each band from Foundation – Year 8, students will have the opportunity to produce at least three types of designed solutions (product, service and environment) through the technologies contexts identified for a band.**’	The Design and Technologies processes and production skills strand is based on the major aspects of design thinking, design processes and production processes. The content descriptions in this strand reflect a design process and would typically be addressed through a design brief. The Design and Technologies processes and production skills strand focuses on creating designed solutions by: (i) investigating (ii) generating (iii) producing (iv) evaluating (v) collaborating and managing.’								
		Content Descriptor	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**
Foundation to Year 2	Learning in Design and Technologies builds on concepts, skills and processes developed in the Early Years Learning Framework, revisiting, strengthening and extending these as needed. By the end of Year 2 students will have had the opportunity to create designed solutions at least once in each of the following technologies contexts: **Engineering principles and systems**; **Food and fibre production** and **Food specialisations**; and **Materials and technologies specialisations**. Students should have opportunities to experience designing and producing products, services and environments. This may occur through integrated learning. In Foundation to Year 2 students explore and investigate technologies – materials, systems, components, tools and equipment – including their purpose 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. Students 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?’ or ‘How can it be improved?’ They begin to consider the impact of their decisions and of technologies on others and the environment including in relation to preferred futures. 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 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 (with teacher support) simple steps and follow directions to complete their own or group design ideas or projects, and manage their own role within team projects. Students are aware of others around them and the need to work safely and collaboratively when making designed solutions acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY	Identify how people design and produce familiar products, services and environments and consider sustainability to meet personal and local community needs (ACTDEK001)	* Exploring how local products, services and environments are designed by people for a purpose and meet social needs, for example the range of shelters provided for the public in a local community; graphical displays to market school and community events * Asking questions about natural and managed environments and impacts on them when selecting materials, tools and equipment when designing and making products, for example harvesting products from the school garden and using recycled clothing * Making design decisions based on personal and family needs, for example downloading and comparing recipes to suit available cooking facilities such as cooking in the bush compared to cooking in a kitchen * Exploring and critiquing products, services and environments for their impact on sustainability, for example the environmental risks and benefits of a system for organically or hydroponically growing a vegetable crop from seed or seedling to harvest	Explore needs or opportunities for designing, and the technologies needed to realise designed solutions (ACTDEP005)	* Identifying, gathering and playing with materials, components, tools and equipment to generate personal design ideas, for example designing a greeting card for a friend * Exploring opportunities around the school for designing solutions, for example how school play areas could be improved; how the school removes classroom waste and identifying opportunities to reduce, recycle and re-use materials; reviewing the school canteen menu to identify healthy food options and suggesting changes to promote future good health * Discussing possible designed solutions based on experience and some research, for example asking adults for advice * Considering the importance of sustainability in designed solutions, for example comparing the durability of materials for a selected solution * Exploring which tools, equipment and techniques to use with selected materials	Visualise, generate, develop and communicate design ideas through describing, drawing and modelling (ACTDEP006)	* Comparing and contrasting features of existing products to provide new ideas, for example exploring toys with several movable parts with the view to designing and making a simple puppet with one movable part * Communicating design ideas by modelling, and producing and labelling two-dimensional drawings using a range of technologies to show different views (top view and side view), for example a new environment such as a cubby house or animal shelter * Recording a judgment about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea * Identifying one common testing method, and recording results, for example taste-testing comparisons of a food product and recording results in a digital form * Describing how design ideas meet the needs of those who will use the solution	Use materials, components, tools, equipment and techniques to safely make designed solutions (ACTDEP007)	* Using and playing with everyday materials in new ways or re-using discarded materials, for example using discarded materials to design, make and model a constructed environment * Learning and safely practising a range of technical skills using tools and equipment, for example joining techniques when making products, watering and mulching gardens, preparing food, using software to design an environment * Assembling components of systems and checking they function as planned, for example when making a musical instrument	Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment (ACTDEP008)	* Developing criteria for success with teacher guidance including consideration of impact on environment * Recording a judgment about design ideas with teacher guidance, for example expressing own likes and dislikes about a design idea * Reflecting on the processes and challenges of designing and producing a solution and sharing these reflections using digital technologies, for example when growing a food product, designing a structure to take a load or making a nutritious snack * Suggesting areas for design improvement	Sequence steps for making designed solutions and working collaboratively (ACTDEP009)	* Checking that planned features have been included in design plans and drawings by referring to identified criteria for success including care for the environment * Using lists or storyboarding when planning and making, for example when planning an electronic planting calendar * Recording the procedure for making a product, for example a recipe or instructions for making a container * Identifying roles for each member of a group when working collaboratively
		Explore how **technologies** use forces to create movement in products (ACTDEK002)	* Exploring how the principles of push and pull are used in the design of toys, for example in a spinning toy such as an Aboriginal mammandur * Identifying, and playing and experimenting with, components such as wheels, balls, slides, springs and available local materials, tools and equipment to solve problems requiring movement * Selecting materials to demonstrate how material properties are appropriate for particular designed solutions, for example materials that enable sliding or floating * 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 * Combining materials and using forces in design, for example designing the door on a cage or a simple conveyor belt to move materials short distances * 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										
		Explore how **plants and animals are grown for food, clothing and shelter** and how **food is selected and prepared for healthy eating** (ACTDEK003)	* Exploring which plants and animals can provide food or materials for clothing and shelter and what basic needs those plants and animals have * 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 * Considering the suitability of a range of tools when cultivating gardens, mulching and building garden structures and preparing and cooking food from recipes * Identifying and categorising a wide range of foods, including Aboriginal bush foods, into food groups and describing tools and equipment needed to prepare these for healthy eating * Exploring how people from different cultures including those of Asia design and produce different cuisines based on the plants and animals in their region and available tools and equipment * Exploring the tools, equipment and techniques used to prepare food safely and hygienically for healthy eating										
		Explore the characteristics and properties of **materials** and components that are used to produce designed solutions (ACTDEK004)	* Exploring designed solutions to meet individual, family and community needs with a focus on materials, for example fabrics used for sports clothing, soft fall for play spaces * Developing new meanings for objects and action during play, for example exploring how household packaging can be used to represent other objects * Exploring systems used in the classroom or community for creatively dealing with problems and needs, for example storage systems for equipment, traffic system flow for drop and go zones, the use of hoists and ramps to facilitate access * Exploring facilities in local environments for accessibility and environmental impact, for example location of bike tracks and sporting fields using digital maps to view local area * Exploring materials, components, tools and equipment through play to discover potential uses when making products or modelling services and environments, for example when designing and making clothes, toys and shelters * Experimenting with techniques to combine or alter materials to satisfy a function										
Foundation to Year 2 Achievement Standard acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY	NOTE: The standards are not divided into Strands or Sub-strands in the Australian Curriculum documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right. Sourced from ‘*Achievement standards*’: ‘Achievement standards will be accompanied by portfolios of annotated student work samples that illustrate the expected learning and help teachers to make judgments about whether students have achieved the standard.’	By the end of Year 2, students describe the **purpose** of familiar products, services and environments and how they meet the needs of **users and affect others and environments**. They identify the **features** and **uses** of some technologies for each of the ***prescribed technologies contexts***.		They **describe given** needs or **opportunities**.		They communicate design ideas **for their designed products**, **services and environments** using modelling and simple drawings.		With guidance students **create** designed solutions for each of the ***prescribed technologies contexts***. **Following** sequenced steps students **demonstrate safe use of tools and equipment** when producing designed solutions.		Students create and evaluate **their** ideas and designed solutions **based on personal preferences**.		

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Year 3 and 4	Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed. By the end of Year 4 students will have had the opportunity to create designed solutions at least once in the following technologies contexts: **Engineering principles and systems**; **Food and fibre production** and **Food specialisations**; and **Materials and technologies specialisations**. Students should have opportunities to experience designing and producing products, services and environments. In Year 3 and 4 students develop **a sense of self and ownership of their ideas and thinking about their peers and communities and as consumers**. 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 working 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 designs and technologies can affect people and their environments**. They **become aware of the role of those working in design and technologies occupations and how they think about the way a product might change in the future**. Using a range of technologies including a variety of graphical representation techniques to communicate, students **clarify and present ideas**, for example by drawing **annotated diagrams**; **modelling** objects as **three**-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**. Students become aware of the appropriate ways to manage **their time and focus**. With teacher **guidance**, they **identify and list criteria for success including in relation to preferred futures and 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**. acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY	Recognise **the role of** people **in** design and technologies **occupations** and **explore factors**, including sustainability **that impact on the design of products, services and environments** to meet community needs (ACTDEK010)	* Exploring, playing with and testing materials for their appropriateness, for example materials for a new sun-shade product * Examining the suitability of a service or everyday system and proposing improvements, for example a water saving system for a bathroom at home * Investigating materials, components, tools and equipment, including by using digital technologies, to discover their characteristics and properties, how they can be used more sustainably and their impact in the future * Considering the impact of environments on users, for example a school vegetable garden, a protected outdoor play area * Exploring and testing factors that impact on design decisions, for example considering the demographics of an area or the impact of natural disasters on design of constructed environments such as the structural design of buildings in Japan to withstand earthquakes * Critiquing designed products, services and environments to establish the factors that influence the design and use of common technologies, for example the characteristics that contribute to energy-efficient cooking such as wok cooking; the suitability and sustainable use of particular timbers	**Critique** needs or opportunities for designing and explore **and test a variety of materials, components, tools and equipment** and the techniques needed to **produce** designed solutions (ACTDEP014)	* Exploring the different uses of materials in a range of products, including those from Aboriginal and Torres Strait Islander communities and countries of Asia * Critiquing and selecting appropriate joining techniques for materials to produce working models * Exploring and testing a range of materials under different conditions for suitability including sustainability considerations and identifying appropriate tools, equipment and techniques * Examining the structure and production of everyday products, services and environments to enhance their own design ideas * Exploring the properties of materials to determine suitability, for example the absorbency of different fabrics or the strength of different resistant materials	Generate, develop, and communicate design ideas and **decisions using appropriate technical terms and graphical representation techniques** (ACTDEP015)	* Exploring ways of joining, connecting and assembling components that ensure success * Generating a range of design ideas for intended products, services, environments * Identifying the properties of materials needed for the designed solution * Visualising and exploring innovative design ideas by producing thumbnail drawings, models and labelled drawings to explain features and modifications * Planning, sharing and documenting creative ideas and processes using digital tools such as a class blog or collaborative document	**Select** and use materials, components, tools and equipment **using safe work practices** to make designed solutions (ACTDEP016)	* Using appropriate technologies terms to confidently describe and share with others procedures and techniques for making, for example cutting and joining materials * Exploring ways of joining, connecting and assembling components that ensure success, and the impact digital technologies have had on these processes * Using tools and equipment accurately when measuring, marking and cutting; and explaining the importance of accuracy when designing and making, for example creating a template, measuring ingredients in a recipe, sowing seeds * Selecting and using materials, components, tools, equipment and processes with consideration of the environmental impact at each stage of the production process * Demonstrating safe, responsible and cooperative work practices when making designed solutions	Evaluate design ideas, processes and solutions **based on criteria** for success **developed with guidance** and including care for the environment (ACTDEP017)	* Negotiating criteria for success with class or group members * Evaluating, revising and selecting design ideas, based on criteria for success and including consideration of ethics, social values and sustainability * Evaluating the functional and aesthetic qualities of a designed solution * Reflecting on the sustainability implications of selected designed solutions * Comparing the amount of waste that would be produced from different design and development options and the potential for recycling waste * Reflecting on designed solutions to critique and assess suitability, sustainability and enterprise opportunities and determine how well they meet success criteria	**Plan** a sequence of **production** steps when making designed solutions **individually** and collaboratively (ACTDEP018)	* Determining planning processes as a class, for example recording a procedure or creating time plans * Managing time and resource allocation throughout production, for example materials, tools, equipment and people * Identifying the steps in a mass production process * Sequencing steps to collaboratively produce a designed solution
		Investigate how forces and **the properties of materials affect the behaviour of a product or system** (ACTDEK011)	* Examining models to identify how forces and materials are used in the design of a toy * Exploring through play how movement can be initiated by combining materials and using forces, for example releasing a wound rubber band to propel a model boat * Conducting investigations to understand the characteristics and properties of materials and forces that may affect the behaviour and performance of a product or system, for example woomera design deconstructing a product or system to identify how motion and forces affect behaviour, for example in a puppet such as a Japanese bunraku puppet or a model windmill with moving sails * Identifying and exploring properties and construction relationships of an engineered product or system, for example a structure that floats; a bridge to carry a load * Experimenting with available local materials, tools and equipment to solve problems requiring forces including identifying inputs (what goes in to the system), processes (what happens within the system) and outputs (what comes out of the system), for example designing and testing a container or parachute that will keep an egg intact when dropped from a height										
		Investigate **food and fibre production** and food **technologies used in modern and traditional societies** (ACTDEK012)	* Exploring tools, equipment and procedures to improve plant and animal production, for example when growing vegetables in the school garden and producing plant and animal environments such as a greenhouse, animal housing, safe bird shelters * Identifying the areas in Australia and Asia where major food or fibre plants and animals are grown or bred, for example the wheat and sheep belts, areas where sugar cane or rice are grown, northern Australia's beef industry, plantation and native forest areas * Describing ideal conditions for successful plant and animal production including how climate and soils affect production and availability of foods, for example Aboriginal seasons and food availability * 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 * Investigating the labels on food products to determine how the information provided contributes to healthy eating, for example ingredients and nutrition panels										
		Investigate the **suitability of materials, systems**, components, tools and equipment **for a range of purposes** (ACTDEK013)	* Conducting experiments and tests to understand the properties of materials, for example strength, durability, warmth, elasticity * Investigating the mass production of products to ensure standardisation, for example students setting up a production line to produce a product for a school fete * Investigating the suitability of technologies – materials, systems, components, tools and equipment – when designing and making a product, service or environment, for example a toy for a young child, a composting system for household waste management, raised garden beds for improved access, weaving nets, bags or baskets * Comparing how different components interrelate and complement each other in a finished designed solution, for example investigating and playing with joining processes for a variety of materials in the production of common products * Investigating local constructed environments to compare how buildings were constructed in the past and in the present and noting innovations * Analysing products, services and constructed environments from a range of technologies contexts with consideration of possible innovative solutions and impacts on the local community and the sustainability of its environment										
Year 3 and 4 Achievement Standard acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY	NOTE: The standards are not divided into Strands or Sub-strands in the Australian Curriculum documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right. Sourced from '*Achievement standards*': 'Achievement standards will be accompanied by portfolios of annotated student work samples that illustrate the expected learning and help teachers to make judgments about whether students have achieved the standard.'	By the end of Year 4 students explain how products, services and environments are designed to **best** meet needs of communities and their environments.				They develop and **expand** design ideas and communicate these using models and drawings **including annotations and symbols**.		They identify **appropriate technologies** and **techniques** and **demonstrate** safe work practices when producing designed solutions.				Students plan and sequence **major** steps in design and production.	
		They describe **contributions** of people in design and technologies occupations.						Students create designed solutions for each of the ***prescribed technologies contexts***.					
		Students **describe** how the features of technologies can be used to produce designed solutions for each of the ***prescribed technologies contexts***.		They **explain** needs or opportunities and evaluate ideas and designed solutions against identified criteria for success, including environmental sustainability considerations.									

Bands of Year Levels Indicators	BAND DESCRIPTIONS	Design and Technologies knowledge and understanding – *The use, development and impact of technologies and design ideas across a range of technologies contexts*		Design and Technologies processes and production skills – *the skills needed to create designed solutions.*									
		Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations	Content Descriptor	Elaborations
Year 5 and 6	Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed. By the end of Year 6 students will have had the opportunity to create designed solutions at least once in four technologies contexts: **Engineering principles and systems**, **Food and fibre production**, **Food specialisations** and **Materials and technologies specialisations**. Students should have opportunities to experience designing and producing products, services and environments. In Year 5 and 6 students **critically examine technologies – materials**, **systems**, components, tools and equipment – that are used **regularly 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. Students engage with ideas **beyond** the familiar, exploring how design and technologies and the people **working in a range of *technologies contexts*** **contribute to** society. They **seek** to explore innovation and **establish their own** design capabilities. 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** and develop plans to complete design tasks, and follow plans to complete design tasks safely, **making adjustments to plans when necessary**. Students identify, **plan and maintain safety standards** and practices when making designed solutions. acara	Investigate **how** people in design and technologies occupations **address competing** considerations, including sustainability in the design of products, services and environments for **current and future use** (ACTDEK019)	* Reflecting on the features of designed solutions that ensure safety and wellbeing of users, for example smoke alarms * Evaluating the sustainability implications of materials, systems, components, tools and equipment, for example materials can be recycled or re-used to reduce waste; systems may benefit some, but disadvantage others * Considering the impact designed products, services or environments have in relation to sustainability and also on local, regional and global communities, including Aboriginal and Torres Strait Islander communities and countries in the Asia region * Reflecting on the importance of aesthetics, function and sustainability in product design, for example a textile product that gives protection and is appealing; a motor that moves a vehicle and uses a sustainable power source * Identifying the components of a service or system that contribute to its success and assessing potential risk or failure, for example, communication in the school or communication of a message to a wide audience; a system that manages an aspect of the environment; a campaign such as Clean Up Australia Day in different communities * Identifying the impact of the designed features of an environment , for example a modification to a home to reduce environmental impact; restoring a natural environment and retaining access for the public	Critique needs or opportunities for designing, and **investigate** materials, components, tools, equipment and processes to achieve **intended** designed solutions (ACTDEP024)	* Exploring the steps involved in the process to satisfy a design brief, need or opportunity * Investigating designed solutions from around the world to make suitable, quality decisions that meet the design brief, challenge or scenario * Identifying the importance of complementary parts of working, everyday systems by deconstructing the components, structure and purpose of products, services or environments * Testing a range of materials, components, tools and equipment to determine the appropriate technologies needed to make products, services or environments, for example a moving vehicle * Investigating how to minimise material use and manage waste by critiquing the environmental and social impacts of materials, components, tools and equipment	Generate, develop, communicate and **document** design ideas and **processes for audiences** using appropriate technical terms and graphical representation techniques (ACTDEP025)	* Generating a range of design ideas for products, services or environments using prior knowledge, skills and research * Developing alternative design ideas and considering implications for the future to broaden the appeal and acceptance of design ideas * Analysing and modifying design ideas to enhance and improve the sustainability of the product, service, environment or system * Representing and communicating design ideas using modelling and drawing standards including the use of digital technologies, for example scale; symbols and codes in diagrams; pictorial maps and aerial views using web mapping service applications * 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	**Apply** safe procedures when using a variety of materials, components, tools, equipment and techniques to make designed solutions (ACTDEP026)	* Matching material and joining techniques to the design intention, for example accurately cutting and sewing the fabric pieces to make a community banner or joining components to produce an electric circuit * Working safely, responsibly and cooperatively to ensure safe work areas, for example the safe use of equipment when making a water-resistant, floating craft or a model of an environmentally sensitive outdoor shelter * Using appropriate personal protective equipment required for the use of some tools and equipment, for example protective eyewear * Manipulating materials with appropriate tools, equipment and techniques, for example when preparing food, cultivating garden beds, constructing products	**Negotiate** criteria for success that include consideration of sustainability to evaluate design ideas, processes and solutions (ACTDEP027)	* Independently and collaboratively identifying criteria for success, processes and planning, for example using visual representations such as a flowchart * Evaluating the suitability of materials, tools and equipment for specific purposes * Reflecting on how well their designed solutions ensure safety and wellbeing of users and consumers and meet the needs of communities and different cultures * Considering the criteria for success in relation to the benefits and costs of production processes, the environmental impact, future use and application, and social values and ethics of clients * Evaluating products, services and environments from a range of technologies contexts with consideration of ethics and sustainability	Develop **project** plans that include consideration of resources when making designed solutions individually and collaboratively (ACTDEP028)	* Examining the essential features of existing processes to inform project planning including safe work practices that minimise risk * Setting milestones for production processes and allocating roles to team members * Identifying when materials, tools and equipment are required for making the solution * Outlining the planning and production steps needed to produce a product, service or environment using digital technologies * Reflecting on planned steps to see if improvements can be made
		Investigate how forces **or electrical energy can control movement**, **sound or light in** a designed product or system (ACTDEK020)	* Deconstructing a product or system to discover how movement, sound or light can be controlled, for example deconstructing a torch or buzzer and exploring circuit design * Investigating the properties of materials to solve problems requiring the control of movement, sound or light, for example directing light through a maze using mirrors * Investigating how biomimicry can be used by engineers and designers, for example the ways plant and animal adaptations can be copied to solve human challenges, for example the Japanese building Sendai Mediatheque based on seaweed-like tubes * Recognising the need to carefully plan and select components for a system to perform a specific task * Producing models using materials, tools and equipment to show how to control movement, sound or light in structures, for example the design of a house with passive solar; the use of optical fibre in directing sunlight; acoustics of recording studios * Investigating the technologies in a control system for an identified need or opportunity and user, for example a system that allows safe passage at pedestrian crossings										
		Investigate how and why **food and fibre are produced in managed environments** (ACTDEK021)	* Investigating and experimenting with different tools, equipment and methods of preparing soil and the effect on soil quality and sustainability, for example when designing a garden for a community group * Identifying ways of applying, conserving and recycling nutrients in food and fibre production when designing a sustainable school vegetable garden or cropping area, for example composting and other forms of organic fertilisers * Considering how low-input sustainable agriculture (LISA) is used in a range of environments including Australia and the countries of Asia * Describing the relationship between plant types and animal breeds and their environmental suitability when selecting suitable plants or animals for an environment * Sequencing the process of converting 'on-farm' food or fibre products into a product suitable for retail sale, that is, the 'paddock to plate' supply chain, or when making yarn or fabric from fibre * Investigating the use of technologies including digital technologies in the production of food and fibre * Exploring and comparing the efficiency of different irrigation methods in plant production systems including the use of digital technologies to improve the effectiveness, for example when designing a sustainable irrigation system to be used in a garden										
		Investigate the role of **food preparation in maintaining good health and the importance of food safety and hygiene** (ACTDEK022)	* Using current food guides and government-endorsed food policies to plan food choices * Describing and using safety guidelines for food storage and preparation at home and school, for example use and care of chopping boards; methods of preparing and storing fruits and vegetables to ensure optimum quality and nutrient content * Experimenting with tools, equipment, combining 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 * Considering traditional and contemporary methods of food preparation used in a variety of cultures, including Aboriginal and Torres Strait Islander methods * 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										
		Investigate **characteristics and properties of a range of** materials, systems, components, tools and equipment and **evaluate the impact of their** use (ACTDEK023)	* Identifying the properties of materials for the design and construction of a sustainable household item, for example a product for storing harvested water * Evaluating the functional properties of a specific-purpose household system, for example a security system * Examining the materials and systems used in a public use system that affect the way people live, for example a community exercise environment or arts facility, water treatment, garbage collection * Comparing tools, equipment and techniques to select those most appropriate for a given purpose * Evaluating the use of computer-aided manufacturing in terms of cost and impacts on local and regional designers, producers and enterprises * Comparing the design and production of products, services and environments in Australia and a country in the Asia region										
Year 5 and 6 Achievement Standard acara	NOTE: The standards are not divided into Strands or Sub-strands in the Australian Curriculum documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right. Sourced from '*Achievement standards*': 'Achievement standards will be accompanied by portfolios of annotated student work samples that illustrate the expected learning and help teachers to make judgments about whether students have achieved the standard.'	By the end of Year 6 students **describe some** competing considerations in the design of products, services and environments taking into account sustainability. They describe how design and technologies **contribute to meeting** present and future needs. Students **explain** how the features of technologies impact on designed solutions for each of the ***prescribed technologies contexts***.		Students create designed solutions for each of the ***prescribed technologies contexts*** **suitable for** identified needs or opportunities. They **combine** design ideas and communicate these to audiences using graphical representation techniques and technical terms. They **select** and use appropriate technologies and techniques **correctly** and safely to produce designed solutions.					They **suggest** criteria for success, including sustainability considerations and use these to evaluate their ideas and designed solutions.		Students **record** project plans including production **processes**.	

Bands of Year Levels Indicators	BAND DESCRIPTIONS	**Design and Technologies knowledge and understanding –** *The use, development and impact of technologies and design ideas across a range of technologies contexts*		**Design and Technologies processes and production skills –** *the skills needed to create designed solutions.*									
		Content Descriptor	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**	**Content Descriptor**	**Elaborations**
Year 7 and 8	Learning in Design and Technologies builds on concepts, skills and processes developed in earlier years, and teachers will revisit, strengthen and extend these as needed. 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**, **Food and fibre production**, **Food specialisations** and **Materials and technologies specialisations**. Students should have opportunities to design and produce products, services and environments. In Year 7 and 8 students **investigate and select from a range of technologies – materials**, **systems**, components, tools and equipment. They consider the ways characteristics and properties of technologies can be **combined** to design and produce sustainable designed solutions to problems for individuals and the community, considering society and ethics, and **economic**, environmental and social sustainability factors. Students use creativity, innovation and **enterprise** skills with **increasing independence** and collaboration. Students **respond to feedback from others** and evaluate design processes used and designed solutions for preferred futures. They investigate design and technology professions and the contributions **that each makes** to society locally, regionally and globally through creativity, innovation and **enterprise**. Students evaluate 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 range of contexts** to produce **patterns**, annotated **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 management plans to successfully complete design tasks. Students establish safety procedures that minimise risk and manage a project with safety and efficiency in mind when making designed solutions. acara	Examine and **prioritise** competing **factors** including social, ethical and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures (ACTDEK029)	* Considering factors that influence the selection of appropriate materials, components, tools and equipment, for example Aboriginal and Torres Strait Islander Peoples' sustainable practices, custodianship and connection to Country * Investigating how ethics, social values, profitability and sustainability considerations impact on design and technologies, for example animal welfare, intellectual property, off-shore manufacturing in Asia * Analysing an environment to decide if it meets personal or community needs, for example consulting with family members when designing an enhancement to an indoor or outdoor home environment * Critiquing competing factors that influence the design of services, for example a natural disaster warning system for a community * Investigating the ethics of using surveillance systems while balancing privacy, security and safety concerns	Critique needs or opportunities for designing and investigate, **analyse and select from a range of** materials, components, tools, equipment and processes to develop design ideas (ACTDEP035)	* Considering community needs when identifying opportunities for designing, for example gardens for a community centre, cost effective food service for a sport club * Experimenting with traditional and contemporary technologies when developing designs, and discovering the advantages and disadvantages of each approach * Investigating emerging technologies and their potential impact on design decisions, for example flame retardant fabrics or smart materials such as self-healing materials, digital technologies and agriculture * Examining, testing and evaluating a variety of suitable materials, components, tools and equipment for each design project, for example the differences between natural hardwood and plantation softwood timbers, which determine their suitability for particular uses related to durability, for example interior or exterior use * Evaluating the viability of using different techniques and materials in remote, isolated areas, or less developed countries * Selecting appropriate materials to acknowledge sustainability requirements by using life cycle thinking	Generate, develop, test and communicate design ideas, plans and processes for **various** audiences using appropriate technical terms and technologies including graphical representation techniques (ACTDEP036)	* Using a variety of critical and creative thinking strategies such as brainstorming, sketching, 3-D modelling and experimenting to generate innovative design ideas * Considering which ideas to further explore and investigating the benefits and drawbacks of ideas, for example using digital polling to capture the views of different groups in the community * Identifying factors that may hinder or enhance project development, for example intercultural understanding * Developing models, prototypes or samples using a range of materials, tools and equipment to test the functionality of ideas * 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 design ideas * 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 communicates each step of a design process	**Effectively** and safely use a **broad** range of materials, components, tools, equipment and techniques to make designed solutions (ACTDEP037)	* Developing technical production skills and safe working practices with independence to produce quality solutions designed for sustainability * Practising techniques to improve expertise, for example handling animals, cutting and joining materials * Identifying and managing risks in the development of various projects, for example working safely, responsibly, cooperatively and ethically on design projects, assessing uncertainty and risk in relation to long-term health and environmental impacts * Developing innovative ways of manipulating technologies using traditional and contemporary materials, components, tools, equipment and techniques and considering alternatives including emerging technologies that could be substituted to reduce waste or time	**Independently** develop criteria for success to **assess** design ideas, processes and solutions and their sustainability (ACTDEP038)	* Developing criteria for success to assess the success of designed solutions in terms of aesthetics, functionality and sustainability * Considering how to improve technical expertise * Evaluating designed solutions and processes and transferring new knowledge and skills to future design projects	Use project **management** processes when working individually and collaboratively **to coordinate** production of designed solutions (ACTDEP039)	* Explaining and interpreting drawings, planning and production steps needed to produce products, services or environments for specific purposes * Organising time, evaluating decisions and managing resources to ensure successful project completion and protection of the work space and local environment * Identifying risks and how to avoid them when planning production * Investigating the time needed for each step of production
		Investigate the ways in which products, services and environments **evolve** locally, regionally and globally through the creativity, innovation and **enterprise** of **individuals and groups** (ACTDEK030)	* Exploring how products and services have changed over time and predicting future developments, for example home entertainment, communications or food packaging * Considering the rights and responsibilities of those working in design and technologies occupations, for example consideration of Aboriginal and Torres Strait Islander protocols * Exploring the use and development of systems for navigating unfamiliar environments, for example a service to help tourists engage with a heritage area * Investigating traditional and contemporary design and technologies, including from Asia, and predicting how they might change in the future in response to factors such as social change and the need for more sustainable patterns of living * Identifying needs and new opportunities for design and enterprise, for example promotion and marketing of designed solutions * Investigating how developments in materials, tools and equipment influence designed solutions										
		Analyse how **motion**, force and energy are used to **manipulate** and control **electromechanical systems** when designing simple, **engineered** solutions (ACTDEK031)	* Investigating influences impacting on manufactured products and processes such as historical developments, society, new materials, control systems and biomimicry, for example the development of velcro * Experimenting to select the most appropriate principles and systems on which to base design ideas, for example structural components to be tested for strength * Calculating an engineered system's outputs, for example speed, brightness of light, volume of sound * Producing prototypes and jigs to test functionality, including the use of rapid prototyping tools such as 3D printers * Using code to control systems, for example code to program a microcontroller or a simple, object-based coding application to program a system such as a remote-controlled car or simple robotic arm										
		Analyse how **food and fibre are produced** when designing managed environments and how these can **become more** sustainable (ACTDEK032)	* Comparing land and water management methods in contemporary Australian food and fibre production with traditional Aboriginal systems and countries of Asia, for example minimum-tillage cropping, water- efficient irrigation * Investigating the management of plant and animal growth through natural means and with the use of chemical products like herbicides and medicines when producing food and fibre products * Recognising the need to increase food production using cost efficient, ethical and sustainable production techniques * Describing physical and chemical characteristics of soil and their effects on plant growth when producing food and fibre products * Investigating different animal feeding strategies such as grazing and supplementary feeding, and their effects on product quality, for example meat tenderness, wool fibre diameter (micron), milk fat and protein content when producing food and fibre products * Recognising the importance of food and fibre production to Australia's food security and economy including exports and imports to and from Asia when critiquing and exploring food and fibre production										
		Analyse how characteristics and properties of **food** **determine** preparation **techniques and presentation** when **designing solutions for** healthy eating (ACTDEK033)	* Planning and making quality, safe and nutritious food items, using a range of food preparation tools, equipment and techniques * Examining the relationship between food preparation techniques and the impact on nutrient value, for example steaming vegetables * Investigating how a recipe can be modified to enhance health benefits, and justifying decisions, for example by replacing full cream milk with skim milk * Analysing food preparation techniques used in different cultures including those from the Asia region and the impact of these on nutrient retention, aesthetics, taste and palatability, for example stir-frying * Explaining how food preparation techniques impact on the sensory properties (flavour, appearance, texture, aroma) of food, for example the browning of cut fruit, the absorption of water when cooking rice										
		Analyse ways to produce designed solutions through selecting and **combining** characteristics and properties of **materials**, **systems**, components, tools and equipment (ACTDEK034)	* 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 * Investigating and selecting from a broad range of technologies – materials, systems, components, tools and equipment – when designing for a range of technologies contexts * 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 determine end use * Considering safe work practices, for example producing a safety information video that details risk management practices for using a piece of equipment in the classroom or within a community * Evaluating products and services for the individual and the community considering ethics and social factors, for example a short video encouraging individuals to increase their use of public transport in the local area * Evaluating environments that have been designed in consultation with community groups, for example a bush tucker community garden developed in consultation with local Elders										
Year 7 and 8 Achievement Standard acara	NOTE: The standards are not divided into Strands or Sub-strands in the Australian Curriculum documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right. Sourced from '*Achievement standards*': 'Achievement standards will be accompanied by portfolios of annotated student work samples that illustrate the expected learning and help teachers to make judgments about whether students have achieved the standard.'	By the end of Year 8 students explain factors that **influence** the design of products, services and environments to meet present and future needs.											
		They explain the contribution of design and technology innovations and enterprise to society.				They create and adapt design ideas, make considered decisions and communicate to **different** audiences using appropriate technical terms and **a range of** technologies and graphical representation techniques.		They **independently** and safely produce effective designed solutions for the intended purpose.		They develop criteria for success, including sustainability considerations, and **use these to judge** the suitability of their ideas and designed solutions and processes.		Students **apply** project management skills to document and use project plans to **manage** production processes.	
		Students explain how the features of technologies impact on designed solutions and influence design decisions for each of the ***prescribed technologies contexts***.		Students create designed solutions for each of the ***prescribed technologies contexts*** **based on an evaluation of** needs or opportunities.									