Food and fibre

Introduction

The Australian Curriculum addresses learning about food and fibre production in two ways:

- in content descriptions as in F–6/7 HASS/Geography, Science and Technologies, noting that in Technologies there will be a stronger inclusion than in the other two areas
- where it is identified in content elaborations in other learning areas, such as Mathematics.

The scope of learning in food and fibre reflects relevant content from across the Australian Curriculum.

The Australian Curriculum Connection: Food and fibre provides a framework for all young Australians to understand and value primary industries both across learning areas and specifically within the Technologies learning area as a technologies context in core learning across Foundation to Year 8 and as additional learning opportunities offered by states and territories in Years 9–10

The food and fibre connection has been presented in bands of schooling. In Foundation – Year 6, the connection is described as learning about producing food and fibre. In Years 7–10, it is described as food and fibre production.

Relationship of learning about producing food and fibre to the learning areas of the Australian Curriculum

The following table identifies how the scope of food and fibre production is evident in content descriptions from across the Australian Curriculum. From this information, teachers could develop a sequential program for food and fibre production.

Year 9

Learning area/subject	Strand/sub-strand	Year 9 content descriptions	Year 9 content elaborations
Design and Technologies (Years 9 and 10) (elective)	Design and technologies knowledge and understanding	Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040)	• recognising the impact of past designed solutions and possible future decisions in relation to creating preferred futures, for example the design of public transport systems that use renewable energy and the design of rural communities to reduce fire risk
		Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041)	• predicting the impact of emerging technologies for preferred futures • constructing scenarios of how the future may unfold (forecasting) and what impacts there may be for society and particular groups, and back casting from preferred futures
		Investigate and make judgments on the ethical and sustainable production and marketing of food and fibre (ACTDEK044)	• examining emerging production technologies and methods in terms of productivity, profitability and sustainability, for example vertical farming, recirculation technologies in aquaculture • investigating how digital technologies could be used to enhance food production systems, for example global positioning system (GPS) for managing animals, crop sensors or automated animal feeding or milking • comparing the environmental impacts of intensive and extensive production systems and their contribution to food and fibre production

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			• investigating the interdependence of plants and animals in food and fibre production • examining the marketing chain of a range of agricultural products and outlining the effect of product processing and advertising on demand and price • taking account of animal welfare considerations in food and fibre production enterprises
	Design and technologies processes and production skills	Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas (ACTDEP048)	• critiquing a range of design and technologies ideas, for example assessing those that draw on the intellectual property of others, exploring how well the ideas respond to international and Australian standards
		Develop, modify and communicate design ideas by applying design thinking, creativity, innovation and enterprise skills of increasing sophistication (ACTDEP049)	• using techniques including combining and modifying ideas and exploring functionality to generate solution concepts • undertaking functional, structural and aesthetic analyses of benefits and constraints of design ideas, for example to different communities and environments including those from the countries of Asia • re-imagining designs to feature emerging technologies
		Work flexibly to effectively and **safely test, select, justify and use appropriate technologies and processes to make designed solutions** (ACTDEP050)	• modifying production processes to respond to unforeseen challenges or opportunities, for example when producing bulk quantities of recipes, lower than average rainfall and impacts on growth, materials with unexpected faults

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		Evaluate design ideas, processes and solutions against comprehensive criteria for success recognising the need for sustainability (ACTDEP051)	• evaluating and justifying the use and best combination of traditional, contemporary and emerging technologies during project development, including consideration of sustainability, for example farming methods in South-East Asia • evaluating choices made at various stages of a design process and modifying plans when needed with consideration of criteria for success
		Develop project plans using digital technologies to plan and manage projects individually and collaboratively, taking into consideration time, cost, risk and production processes (ACTDEP052)	• creating production flow charts using digital technologies to ensure efficient, safe and sustainable sequences
Science	Science understanding *Biological sciences*	Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)	• exploring interactions between organisms such as predator/prey, parasites, competitors, pollinators and disease • examining factors that affect population sizes such as seasonal changes, destruction of habitats, introduced species • investigating how ecosystems change as a result of events such as bushfires, drought and flooding
	Science as a human endeavour *Use and influence of science*	People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions and advances in science can affect people's lives including generating new career opportunities (ACSHE160)	• considering the impacts of human activity on an ecosystem from a range of different perspectives

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Geography (elective)	Geographical knowledge and understanding *Biomes and food security*	Distribution and characteristics of biomes as regions with distinctive climates, soils, vegetation and productivity (ACHGK060)	• identifying and describing the major aquatic and terrestrial biomes of Australia and the world, and their spatial distribution • examining the influence of climate on biomass production (as measured by Net Primary Productivity) in different biomes
		The human alteration of biomes to produce food, industrial materials and fibres, and the use of systems thinking to analyse the environmental effects of these alterations (ACHGK061)	• identifying the biomes in Australia and overseas that produce some of the foods and plant material people consume • investigating ways that the production of food and fibre has altered some biomes (for example, through vegetation clearance, introduction of exotic species, drainage, terracing and irrigation) • identifying the differences between natural and agricultural ecosystems in flows of nutrients and water, and in biodiversity
		Environmental, economic, and technological factors that influence crop yields in Australia and across the world (ACHGK062)	• describing how environmental factors (for example, climate, soil, landform and water) can support higher crop yields and investigating the environmental constraints on agricultural production in Australia (for example, soil moisture, water resources and soils) • investigating how high crop yields (for example, from wheat, rice and maize) around the world are related to factors such as irrigation, accessibility, labour supply, landforms and agricultural technologies (for example, high-yielding varieties)
		Challenges to food production, including land and water degradation, shortage of fresh water, competing land uses and	• exploring environmental challenges to food production from land degradation (soil erosion, salinity,

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		climate change for Australia and other areas of the world (ACHGK063)	desertification), industrial pollution, water scarcity and climate change • identifying the impacts on food production from competing land uses (for example, sacred sites, urban and industrial uses, mining, production of food crops for biofuels, production of food crops for livestock, and recreation (such as golf courses)
		The capacity of the world's environments to sustainably feed the projected future global population (ACHGK064)	• examining the effects of anticipated future population growth on global food production and security, and its implications for agriculture and agricultural innovation • researching the potential of agricultural production in Northern Australia • identifying how poverty, food wastage, government policies or trade barriers could affect future food security
	Geographical inquiry and skills *Observing, questioning and planning*	Develop geographically significant questions and plan an inquiry that identifies and applies appropriate geographical methodologies and concepts (ACHGS063)	• developing questions of geographical significance about an area of focus in the geographical knowledge and understanding strand (for example, questions about the importance of food security or types of interconnections) • using a range of methods including digital technologies to plan and conduct an information search about human alteration to biomes in Australia and another country
	Collecting, recording, evaluating and representing	Evaluate sources for their reliability, bias and usefulness and select, collect, record and organise relevant geographical data and information, using ethical protocols, from a range of appropriate primary	• gathering relevant data from a range of primary sources (for example, from observation and annotated field sketches, conducting surveys and interviews and experiments, or taking photographs), about challenges

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		and secondary sources (ACHGS064)	to food production or the effects of people's travels, recreational, cultural or leisure choices on places
		Represent multi-variable data in a range of appropriate forms, for example, scatter plots, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies (ACHGS065)	• creating a diagram to illustrate the flows of nutrients and energy within a biome, and the alterations to these flows produced by agriculture • developing a table to show the types of challenges to food production in Australia compared to other areas of the world, or the ways that places and people are interconnected through trade
		Represent the spatial distribution of geographical phenomena by constructing special purpose maps that conform to cartographic conventions, using spatial technologies as appropriate (ACHGS066)	• creating a map to show the relationship between biomes and world food production, using a spatial technologies application
	Interpreting, analysing and concluding	Interpret and analyse multi-variable data and other geographical information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to make generalisations and inferences, propose explanations for patterns, trends, relationships and anomalies, and predict outcomes (ACHGS067)	• constructing a graph to show the relationship between growth in world population and world food production
	Reflecting and responding	Reflect on and evaluate findings of an inquiry to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic, political	• explaining how the application of geographical concepts and methods has contributed to deep understanding of the causes of and solutions to issues related to biomes, food production and security, interconnections or spatial change

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		and social considerations; and explain the predicted outcomes and consequences of their proposal (ACHGS071)	• examining the environmental, economic and social factors that need to be considered in an investigation of a contemporary geographical issue such as ways of increasing Australian or global food production or the effects of information and communications technologies on the location of manufacturing or services and debating alternative responses that consider environmental, economic and social factors
History	Historical knowledge and understanding *Making a better world?* Students investigate how life changed in the period in depth through the study of ONE of these major developments: the Industrial Revolution or Progressive ideas and movements or Movement of peoples. The study includes the causes and effects of the development, and the Australian experience.	The technological innovations that led to the Industrial Revolution, and other conditions that influenced the industrialisation of Britain (ACDSEH017) OR Changes in the way of life of a group(s) of people who moved to Australia in this period, such as free settlers on the frontier in Australia (ACDSEH084) The short and long-term impacts of the movement of peoples during this period (ACDSEH085)	• mapping the British Empire c.1800 AD (CE) and the raw materials it obtained from colonies (for example, sugar from Jamaica, wool from Australia and cotton from India) OR • investigating the experiences of a specific group of arrivals to Australia (for example, convicts in Sydney, Hobart, Brisbane; or free settlers in Melbourne, Adelaide, Perth or Darwin) • describing the impact of this group on the Aboriginal and Torres Strait Islander Peoples of the region • evaluating the effects of the movement of peoples on the indigenous and immigrant populations
Mathematics	Statistics and probability *Data representation and interpretation*	Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources (ACMSP228)	• comparing the annual rainfall in various parts of Australia, Pakistan, New Guinea and Malaysia

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		Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including ‘skewed’, ‘symmetric’ and ‘bi-modal’ (ACMSP282)	• using stem-and-leaf plots to compare two like sets of data such as the heights of girls and the heights of boys in a class • describing the shape of the distribution of data using terms such as ‘positive skew’, ‘negative skew’ and 'symmetric' and 'bi-modal'
		Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread (ACMSP283)	• comparing means, medians and ranges of two sets of numerical data which have been displayed using histograms, dot plots, or stem-and-leaf plots
	Number and algebra *Real numbers*	Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208)	• identifying direct proportion in real-life contexts
Economics and Business	Economics and business knowledge and understanding	Australia as a trading nation and its place within the rising economies of Asia and broader global economy (ACHEK038)	• identifying participants in the Australian economy including household, business, finance, government and foreign sectors • explaining the objectives of the Australian economy to satisfy needs and wants through the production and distribution of goods and services • exploring Australia’s interdependence with other economies (for example by identifying Australia’s major trading partners in the Asia region and the items of trade)
		Why and how participants in the global economy are dependent on each other (ACHEK039)	• brainstorming the ways that consumers, producers, workers and governments interact with other economies

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			• mapping the global supply chain for a product to identify the participants in the chain
		The nature of innovation and how and why businesses seek to create and maintain a competitive advantage in the market, including the global market (ACHEK041)	• identifying the reasons businesses seek to build or create a competitive advantage (for example to meet the changing demands of a competitive global market and improve their profit margins) • investigating the different strategies businesses use to create competitive advantage (for example research and development, offering a lower-cost product, or by implementing efficient internal operations strategies)

Year 10

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Design and Technologies (Years 9 and 10) (elective)	Design and technologies knowledge and understanding	Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040)	• recognising the impact of past designed solutions and possible future decisions when creating preferred futures (for example the design of public transport systems that use renewable energy and the design of rural communities to reduce fire risk)
		Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041)	• predicting the impact of emerging technologies for preferred futures • constructing scenarios of how the future may unfold (forecasting) and what impacts there may be for society and particular groups, and back casting from preferred futures
		Investigate and make judgments on the ethical and sustainable production and marketing of food and fibre (ACTDEK044)	• examining emerging production technologies and methods in terms of productivity, profitability and sustainability, for example vertical farming, recirculation technologies in aquaculture • investigating how digital technologies could be used to enhance food production systems, for example global positioning system (GPS) for managing animals, crop sensors or automated animal feeding or milking • comparing the environmental impacts of intensive and extensive production systems and their contribution to food and fibre production • investigating the interdependence of plants and animals in food and fibre production

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			• examining the marketing chain of a range of agricultural products and outlining the effect of product processing and advertising on demand and price • taking account of animal welfare considerations in food and fibre production enterprises
	Design and technologies processes and production skills	Critique needs or opportunities to develop design briefs and investigate and select an increasingly sophisticated range of materials, systems, components, tools and equipment to develop design ideas (ACTDEP048)	• critiquing a range of design and technologies ideas, for example assessing those that draw on the intellectual property of others, exploring how well the ideas respond to international and Australian standards
		Develop, modify and communicate design ideas by applying design thinking, creativity, innovation and enterprise skills of increasing sophistication (ACTDEP049)	• using techniques including combining and modifying ideas and exploring functionality to generate solution concepts • undertaking functional, structural and aesthetic analyses of benefits and constraints of design ideas, for example to different communities and environments including those from the countries of Asia • re-imagining designs to feature emerging technologies
		Work flexibly to effectively and **safely test, select, justify and use appropriate technologies and processes to make designed solutions** (ACTDEP050)	• modifying production processes to respond to unforeseen challenges or opportunities, for example when producing bulk quantities of recipes, lower than average rainfall and impacts on growth, materials with unexpected faults
		Evaluate design ideas, processes and solutions against comprehensive criteria for success	• evaluating and justifying the use and best combination of traditional, contemporary and emerging technologies during project development, including

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		recognising the need for sustainability (ACTDEP051)	consideration of sustainability, for example farming methods in South-East Asia • evaluating choices made at various stages of a design process and modifying plans when needed with consideration of criteria for success
		Develop project plans using digital technologies to plan and manage projects individually and collaboratively, taking into consideration time, cost, risk and production processes (ACTDEP052)	• creating production flow charts using digital technologies to ensure efficient, safe and sustainable sequences
Science	Science knowledge and understanding *Biological sciences*	The transmission of heritable characteristics from one generation to the next involves DNA and genes (ACSSU184)	• describing the role of DNA as the blueprint for controlling the characteristics of organisms • recognising that genetic information passed on to offspring is from both parents by meiosis and fertilisation • describing mutations as changes in DNA or chromosomes and outlining the factors that contribute to causing mutations
		The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence (ACSSU185)	• outlining processes involved in natural selection including variation, isolation and selection • investigating changes caused by natural selection in a particular population as a result of a specified selection pressure such as artificial selection in breeding for desired characteristics
	Science knowledge and understanding *Earth and space sciences*	Global systems, including the carbon cycle, rely on interactions involving the biosphere,	• investigating how human activity affects global systems

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		lithosphere, hydrosphere and atmosphere (ACSSU189)	• modelling a cycle, such as the water, carbon, nitrogen or phosphorous cycle within the biosphere • examining the factors that drive the deep ocean currents, their role in regulating global climate, and their effects on marine life
	Science as a human endeavour *Nature and development of science*	Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community (ACSHE191)	• considering the role of science in identifying and explaining the causes of climate change
		Advances in scientific understanding often rely on technological advances and are often linked to scientific discoveries (ASHE192)	• considering how computer modelling has improved knowledge and predictability of phenomena such as climate change and atmospheric pollution
	Use and influence of science	People can use scientific knowledge to evaluate whether they accept claims, explanations or predictions and advances in science can affect people's lives including generating new career opportunities (ACSHE194)	• considering the scientific knowledge used in discussions relating to climate change • investigating the applications of gene technologies such as gene therapy, genetic engineering
		The values and needs of contemporary society can influence the focus of scientific research (ACSHE230)	• considering the use of genetic testing for decisions such as genetic counselling, embryo selection, identification of carriers of genetic mutations and the use of this information for personal use or by organisation such as insurance companies or medical facilities

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Geography (elective)	Geographical knowledge and understanding *Environmental change and management*	Human-induced environmental changes that challenge sustainability (ACHGK070)	• discussing the concept of sustainability in relation to environmental functions • identifying human-induced environmental changes (for example, water and atmospheric pollution; loss of biodiversity; degradation of land, inland and coastal aquatic environments) and discussing the challenges they pose for sustainability • evaluating the concept of ecosystem services and the importance of these services for sustainability and biodiversity
	• Select ONE of the following types of environment as the context for their study: land (e.g. forests, deserts, grassland, farmland), inland water, coast, marine or urban. • A comparative study of examples selected from Australia and at least one other country should be included.		
		The application of systems thinking to understanding the causes and likely consequences of the environmental change being investigated (ACHGK073)	• describing the nature of the environmental change and its effect on the sustainability of environmental functions
		The application of geographical concepts and methods to the management of the environmental change being investigated (ACHGK074)	• comparing strategies in Australia and another country to manage the environmental change being investigated
		The application of environmental, economic and social criteria, in evaluating management responses to the change (ACHGK075)	• discussing the extent to which achieving sustainability in one place should take account of the effects on the environmental conditions in other places in the context of the environmental change being investigated
History	Historical knowledge and understanding *The globalising world*	*The environment movement* The background to environmental awareness, including the	

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	Students investigate one major global influence that has shaped Australian society in depth, including the development of the global influence during the twentieth century. Students study ONE of these electives: Popular culture or The environment movement or Migration experiences.	nineteenth century National Parks movement in America and Australia (ACDSEH028) The intensification of environmental effects in the twentieth century as a result of population increase, urbanisation, increasing industrial production and trade (ACDSEH125) The growth and influence of the environment movement within Australia and overseas, and developments in ideas about the environment including the concept of 'sustainability' (ACDSEH126) Responses of governments including the Australian Government and international organisations to environmental threats since the 1960s, including deforestation and climate change (ACDSEH128)	• outlining the emergence of concerns about the preservation of natural areas for future generations (for example, as reflected in the establishment of national parks in the United States (Yellowstone National Park in 1872), Australia (Royal National Park in 1879), Canada (Rocky Mountains National Park in 1885) and New Zealand (Tongariro National Park in 1887)) • investigating the impact of early texts that warned about environmental change (for example *Silent Spring* by Rachel Carson, 1962; *Don't It Make You Want To Go Home* by Joe South, 1970; Mother Earth News magazine in 1970; *Mercy Mercy Me (The Ecology)* lyrics by Marvin Gaye, 1971) • recognising the historic impact of the pictures of Earth taken during the Apollo 8 mission and how they influenced people's view of the world • explaining the significance of ideas about the environment (for example Gaia – the interaction of Earth and its biosphere; limits of growth – that unlimited growth is unsustainable; sustainability – that biological systems need to remain diverse and productive over time; and rights of nature – recognition that humans and their natural environment are closely interrelated) • explaining the responses of governments and organisations to environmental threats (for example, New Zealand's anti-nuclear policy, the United States Comprehensive Environmental Response, Compensation and Liability Act 1980 (CERCLA), Australia's first Great Barrier Reef Outlook Report 2009)

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			• evaluating the effectiveness of international protocols and treaties such as Kyoto (1997), the United Nations Framework Convention on Climate Change (since 1992) and the Washington Declaration (2007)
Mathematics	Statistics and probability *Chance*	Use the language of 'if … then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)	• using two-way tables and Venn diagrams to understand conditional statements
	Data representation and interpretation	Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data (ACMSP253)	• investigating the use of statistics in reports regarding the growth of Australia's trade with other countries of the Asia region
	Data representation and interpretation	Use scatter plots to investigate and comment on relationships between two numerical variables (ACMSP251)	• using authentic data to construct scatter plots, make comparisons and draw conclusions
Economics and Business	Economics and business knowledge and understanding	Indicators of economic performance and how Australia's economy is performing (ACHEK050)	• investigating the performance of the Australian economy using key indicators and explaining fluctuation using phases of the business cycle
		The ways businesses respond to changing economic conditions and improve productivity through organisational management and workforce management (ACHEK054)	• describing ways in which businesses can improve productivity (for example, training, capital investment, investment in applications of technology, use of just-in-time inventory systems) • exploring ways businesses structure their working environment to provide flexible, efficient approaches (for example, horizontal (flat) or vertical (tall) organisational structures)

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			• exploring the use of technology and the extent to which it has driven and allowed innovative responses by business • investigating ways that businesses have responded to improving economic conditions (for example, increasing their research and development funding to create innovative products, adjusting marketing strategies to expand their market share, upskilling their workforce to improve productivity)