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**Artificial intelligence (AI): years 7 and 8**

The following table identifies how the key aspects of understanding how AI works, types of AI, and responsible use and application of AI are evident in content descriptions from across the Australian Curriculum Version 9.0. From this information, teachers can develop a sequential program for learning about AI by connecting the key aspects of learning with learning area and subject-specific content descriptions.

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| Years 7 and 8 | | | |
| Key aspect 1: Understanding how AI works | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Digital Technologies** | **Knowledge and understanding**  Digital Systems | investigate how data is transmitted and secured in wired and wireless networks including the internet  AC9TDI8K02 | * describing physical networks and comparing their properties, for example the bandwidth, latency and reliability of wired versus wireless networks * explaining why cryptography is necessary for securing data, for example transmitting credit card details over the internet * exploring simple encryption and decryption algorithms, for example ROT13 and XOR * explaining how problems occur in network communication and how they can be solved, for example routers can drop packets and how Transmission Control Protocol (TCP) uses acknowledgements to confirm packets have been received |
| **Knowledge and understanding**  Data representation | investigate how digital systems represent text, image and audio data using integers  AC9TDI8K03 | * explaining how digital systems represent text as a sequence of individual characters numbered using the Unicode character set, for example upper-case and lower-case letters, punctuation and emoji * explaining how digital systems represent audio using whole numbers for the amplitude of the soundwave at a given sampling rate, for example -32,768 to 32,767 for 16-bit audio at 44,100 Hz * explaining how digital systems represent bitmap images (for example PNG and JPEG) as the colour of each pixel in separate red, green and blue (RGB) channels ranging from 0 to 255, and represent Scalable Vector graphics (SVG) using the geometry of lines and shapes * investigating how a digital system converts audio data to integers as it records, stores and outputs sound, for example using the Welcome to Country app to understand the local history and Traditional Owners of the lands which students learn on to inform the programming of an Acknowledgement of Country in a local First Nations Australian language |
| explain how and why digital systems represent integers in binary  AC9TDI8K04 | * explaining how whole numbers can be represented in binary, for example counting in binary from 0 to 31, and recognising that one byte = 8 bits, which can represent from 0 to 255 * explaining how digital systems represent data in binary, for example by converting a character to its Unicode value, then converting that value into binary * explaining how circuits can perform binary operations represented as on/off states, for example showing how circuits with 2 switches can represent AND or OR gates |
| **Processes and production skills**  Acquiring, managing and analysing data | acquire, store and validate data from a range of sources using software, including spreadsheets and databases  AC9TDI8P01 | * acquiring data to answer questions for their own investigations, for example answering "Does the canteen sell the right food?" by designing a survey to collect food preferences data and accessing canteen sales data * judging how meaningful data is to a question, its correctness and how up to date the data is, for example "Does age affect the chance of cyclist injury?", "Are self-reported accidents reliable?" and "Is the data before cycleways existed relevant?" * storing acquired data using specialised and general software appropriate for how it will be accessed and manipulated, for example a spreadsheet for visualisation or a pre-defined database for filtering and queries * acquiring, storing and validating data from a reputable source, such as the Australian Bureau of Statistics, to analyse the geographic distribution of First Nations Australians, with the aim to highlight past and emerging trends * ensuring that the data used to train an AI model minimises any potential biases in its output and is representative of the target audience; for example, training a model on data collected from a single demographic group may not produce correct outputs for a more diverse population |

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|  | **Processes and production skills**  Acquiring, managing and analysing data | analyse and visualise data using a range of software, including spreadsheets and databases, to draw conclusions and make predictions by identifying trends  AC9TDI8P02 | * summarising data based on its attributes to identify trends and make predictions, for example sorting crime data by type of offence, showing that burglaries have decreased over time to predict fewer burglaries will happen next year * visualising multidimensional data by choosing appropriate graphs, for example a scatter plot of food prices and sales, coloured by each food’s sugar content, or diagrams such as a social network diagram and maps of crime rates by location to reveal trends, outliers or other information * exploring machine learning, a form of artificial intelligence where an algorithm is trained using a data set, for example to classify images into categories * using an AI model with a natural language interface to generate queries to perform analysis; for example, describing a database schema and asking the model to generate an SQL query to find results that match a set of criteria * comparing the analysis performed by a trained predictive AI model with other analysis techniques; for example, comparing the output from a classification model against data tagged manually to verify its accuracy and effectiveness |
| model and query the attributes of objects and events using structured data  AC9TDI8P03 | * modelling objects and events as structured data, that is, the attributes relevant to the task, for example products in the canteen and the sale of those products, with attributes such as the product name, price, quantity and nutritional value * using a spreadsheet table to model objects and events, including choosing appropriate formats for each column, and filtering and sorting rows to answer questions * interpreting and querying single-table databases using visual or simple SQL queries with SELECT, WHERE and ORDER BY clauses, for example answering queries in a database for a historical event |

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|  | **Processes and production skills**  Generating and designing | design algorithms involving nested control structures and represent them using flowcharts and pseudocode  AC9TDI8P05 | * designing an algorithm or modifying an existing algorithm to fix an error or change functionality, for example calculating the coins and notes needed for an amount of money and changing the algorithm to handle new denominations * describing algorithms precisely in pseudocode (structured English) or with flowcharts for each part of the problem, for example using separate flowcharts to describe the purchase of an item and the giving of change during the purchase * describing algorithms with nested control structures, including a nested if, for example IF it is raining THEN [IF parents are home THEN drive to school]; or an IF inside a loop, for example REPEAT [select the largest coin smaller than the remaining total, and subtract it] UNTIL the remainder is zero |
| trace algorithms to predict output for a given input and to identify errors  AC9TDI8P06 | * following an algorithm precisely to confirm it produces the expected output for the given input, for example desk check with a table of input, variables and output * specifying test cases and comparing the expected and actual output to determine the correctness of an algorithm, for example a test case of the change-calculating algorithm could have input $1.45 and expected output 1 x $1, 2 x 20c and 1 x 5c coins * following instructions for making woven baskets or nets by hand, as done by First Nations Australians, and making predictions of how the instructions would need to be modified to enable the item to be produced through automated manufacturing processes |
| **Processes and production skills**  Producing and implementing | implement, modify and debug programs involving control structures and functions in a general-purpose programming language  AC9TDI8P09 | * writing and editing programs to solve problems using branching, iteration, variables and functions in a general-purpose programming language, such as Python, JavaScript or C# * reading and interpreting an existing program and modifying the code to change functionality and fix errors, for example taking existing code for a weather forecasting app that includes temperatures and improving the output to include extra information such as rainfall, UV levels and air quality * writing a program that receives data from the environment to change the program behaviour, for example reading moisture level data from a soil sensor and switching on the watering system * writing a program that contains nested control structures to perform more complicated branching and decisions, for example using an IF statement inside a loop to count the warm days from an array containing temperature data only when the temperature for each day is more than 20 degrees Celsius * defining and using a function that produces different output based on the argument(s) it receives, for example a function that receives the name of an actor from user input, and searches a file or database to return a list of movies that actor appears in |
|  | **Processes and production skills**  Privacy and security | explain how multi-factor authentication protects an account when the password is compromised and identify phishing and other cyber security threats  AC9TDI8P13 | * explaining how multi-factor authentication prevents unauthorised access by prompting the account owner for a token or single-use password, for example demonstrating how a funds transfer from their bank account requires not only logging in, but provision of a one-time password received via SMS * identifying the common techniques used in phishing scams to identify and exploit susceptible users, for example using an email address from an unofficial domain when pretending to be an online retailer, or including grammatical errors to help filter out users who are more likely to detect the scam |
| investigate and manage the digital footprint existing systems and student solutions collect and assess if the data is essential to their purpose  AC9TDI8P14 | * investigating the ethical obligations of individuals and organisations regarding ownership and privacy of data and information by researching an online platform’s privacy policy for data collection, use and storage information and discussing impacts on digital footprint * investigating how recommendation algorithms used in media services rely on data that tracks user habits, for example how music streaming services generate playlists that contain songs from genres and artists that are similar to those you listen to regularly * explaining the risks associated with sharing personal data due to the ease with which generative AI models can create new content; for example, from short videos and audio recordings it is possible for convincing deep fake videos to be generated and distributed for malicious purposes |
| **Mathematics – Year 7** | **Algebra** | describe relationships between variables represented in graphs of functions from authentic data  AC9M7A04 | * exploring how functions are used in machine learning to model relationships; for example, in linear regression models, a linear function is used to predict outputs for particular inputs |
| generate tables of values from visually growing patterns or the rule of a function; describe and plot these relationships on the Cartesian plane  AC9M7A05 | * using a simple general-purpose programming language to create and use algorithms that generate growing patterns and graphing the relationships on a Cartesian plane |
| manipulate formulas involving several variables using digital tools, and describe the effect of systematic variation in the values of the variables  AC9M7A06 | * exploring how deep learning models used for training artificial intelligence agents can involve the manipulation of mathematical functions with multiple variables; for example, conducting a sensitivity analysis to understand the artificial intelligence model's behaviour * understanding that the relationship between variables in an artificial intelligence model assists with explainability and interpretability; for example, manipulating and analysing formulas allows researchers to gain insights into how and why a model makes certain predictions |
| **Space** | design and create algorithms involving a sequence of steps and decisions that will sort and classify sets of shapes according to their attributes, and describe how the algorithms work  AC9M7SP04 | * creating a classification scheme for triangles based on sides and angles, using a flow chart using sequences and decisions * creating a flow chart or hierarchy for quadrilaterals that shows the relationships between trapeziums, parallelograms, rhombuses, rectangles, squares and kites * creating a classification scheme for regular, irregular, concave or convex polygons that are sorted according to the number of sides |
| **Statistics** | acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data  AC9M7ST01 |  |
| create different types of numerical data displays including stem-and-leaf plots using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode  AC9M7ST02 | * exploring how artificial intelligence systems can also use descriptive statistics to identify outliers or anomalies in data; for example, fraud detection and quality control |

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|  | **Probability** | identify the sample space for single-stage events; assign probabilities to the outcomes of these events and predict relative frequencies for related events  AC9M7P01 | * exploring how relative frequencies can be used to make predictions by estimating the probability of an event; for example, in natural language processing (NLP), predictive text algorithms use the relative frequency of words in a set of texts to predict the next word in a sentence |
| conduct repeated chance experiments and run simulations with a large number of trials using digital tools; compare predictions about outcomes with observed results, explaining the differences  AC9M7P02 | * developing an understanding of the law of large numbers through using experiments and simulations to conduct large numbers of trials for seemingly random events and discussing findings * conducting simulations using online simulation tools and comparing the combined results of a large number of trials to predicted results * exploring and observing First Nations Australian children’s instructive games; for example, Koara from the Jawi and Bardi Peoples of Sunday Island in Western Australia, to investigate probability, predicting outcomes for an event and comparing with increasingly larger numbers of trials, and between observed and expected results |
| **Mathematics – Year 8** | **Algebra** | use mathematical modelling to solve applied problems involving linear relations, including financial contexts; formulate problems with linear functions, choosing a representation; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model  AC9M8A03 | * modelling patterns on Country/Place and exploring their connections and meaning to linear equations, using the model as a predictive tool and critiquing results by connecting back to Country/Place |
| experiment with linear functions and relations using digital tools, making and testing conjectures and generalising emerging patterns  AC9M8A04 | * exploring how linear functions are used in linear regression models as a statistical technique in machine learning of artificial intelligence agents; for example, linear functions are used to model the relationship between input variables and a target variable, to predict stock or house prices in the financial and real-estate sectors |
| **Measurement** | use Pythagoras’ theorem to solve problems involving the side lengths of right-angled triangles  AC9M8M06 | * investigating how Pythagoras' theorem can be applied to determine the distance between two points in the plane, and how this can be used by predictive algorithms to navigate autonomous vehicles |
| **Space** | describe the position and location of objects in 3 dimensions in different ways, including using a three-dimensional coordinate system with the use of dynamic geometric software and other digital tools  AC9M8SP03 | * locating aircraft/drones using latitude, longitude and altitude as a three-dimensional coordinate system |

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|  |  | design, create and test algorithms involving a sequence of steps and decisions that identify congruency or similarity of shapes, and describe how the algorithm works  AC9M8SP04 | * listing the properties or criteria necessary to determine if shapes are similar or congruent * using the conditions for congruence of triangles and similarity of triangles to develop a sorting algorithm; for example, creating a flow chart * evaluating algorithms for accuracy in classifying and distinguishing between similar and congruent triangles |
| **Statistics** | investigate techniques for data collection including census, sampling, experiment and observation, and explain the practicalities and implications of obtaining data through these techniques  AC9M8ST01 | * investigating how decisions concerning sampling relate to the training of artificial intelligence systems, recognising the need to mitigate any potential bias that may lead to the development of biased models |
| analyse and report on the distribution of data from primary and secondary sources using random and non-random sampling techniques to select and study samples  AC9M8ST02 | * investigating different methods of sampling used to collect data, considering the source and size of samples * comparing the sampling methods of simple random, systematic, stratified, quota, clustered or convenience, or judgement, and discussing the reliability of conclusions about the context that could be drawn * defining and distinguishing between probabilistic terms such as random, sample space, sample and sample distribution * investigating primary and secondary data sources relating to reconciliation between First Nations Australians and non-Indigenous Australians, analysing and reporting on findings |

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|  |  | compare variations in distributions and proportions obtained from random samples of the same size drawn from a population and recognise the effect of sample size on this variation  AC9M8ST03 | * using digital tools, including generative AI, to simulate repeated sampling of the same population, such as heights or arm spans of students, recording and comparing means, median and range of data between samples * using relative frequencies from historical data to predict proportions and the likely number of outcomes in situations such as weather forecasting or the countries of origin of visitors to tourist attractions * exploring how the comparison of variations in distributions and proportions from the same population applies to data-driven decision-making |
| **Probability** | recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts  AC9M8P01 | * investigating how various applications of artificial intelligence use the probability of complementary events when assessing the likelihood of favourable and unfavourable outcomes and making informed decisions based on these probabilities; for example, in binary classification problems where data is classified into one of two categories, such as spam or not spam, fraud or not fraud |
| conduct repeated chance experiments and simulations, using digital tools to determine probabilities for compound events, and describe results  AC9M8P03 | * using digital tools, including generative artificial intelligence, to conduct probability simulations involving compound events, comparing and discussing variability * using a random number generator and digital tools, including generative artificial intelligence, to simulate rolling 2 dice and calculating the difference between them, investigating what difference is likely to occur more often * using online simulation software to conduct probability simulations to determine in the long run if events are complementary |

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| Years 7 and 8 | | | |
| Key aspect 2: Types of AI | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Digital Technologies** | **Knowledge and understanding**  Digital systems | explain how hardware specifications affect performance and select appropriate hardware for particular tasks and workloads  AC9TDI8K01 | * explaining how hardware specifications affect what, and how quickly, a digital system can perform tasks, for example how different bandwidth networks affect download speed and lag or how much random access memory (RAM) is needed for multimedia authoring * selecting appropriate hardware for particular tasks, for example choosing a powerful graphics card for computer gaming or large external storage for video editing * considering how First Nations Australians communities in areas classified as remote often share access to smartphone and internet services, and how the hardware specifications of these devices affect performance, for example where immediate and extended families share and access data through a single smartphone or device * explaining how the specifications of components in a system impact the speed with which AI models can be trained; for example, GPUs are more efficient at performing the mathematical calculations necessary for training generative AI than CPUs |
| investigate how data is transmitted and secured in wired and wireless networks including the internet  AC9TDI8K02 | * describing physical networks and comparing their properties, for example the bandwidth, latency and reliability of wired versus wireless networks * explaining why cryptography is necessary for securing data, for example transmitting credit card details over the internet * exploring simple encryption and decryption algorithms, for example ROT13 and XOR * explaining how problems occur in network communication and how they can be solved, for example routers can drop packets and how Transmission Control Protocol (TCP) uses acknowledgements to confirm packets have been received |
|  | **Processes and production skills**  Evaluating | evaluate existing and student solutions against the design criteria, user stories and possible future impact  AC9TDI8P10 | * evaluating how an existing solution ensures users can control their safety and experience online as described in the Safety by Design Vision for Young People, for example ensuring privacy settings are comprehensive, easy to use and set to maximum protection by default * reviewing the requirements of a user story to ensure that their solution meets the user's needs, for example making sure that recommendations offered by their music application are of a similar genre to the rest of the user's library * judging existing solutions on the basis of their possible impact on the economy, environment or society, for example cloud computing services decrease data loss but require vast amounts of electricity to power the servers * discussing the risks and consequences of AI-generated content on social media platforms; for example, the potential for the spread of misinformation due to high volumes of automatically generated and intentionally misleading content being posted |
| **Processes and production skills**  Privacy and security | investigate and manage the digital footprint existing systems and student solutions collect and assess if the data is essential to their purpose  AC9TDI8P14 | * investigating the ethical obligations of individuals and organisations regarding ownership and privacy of data and information by researching an online platform’s privacy policy for data collection, use and storage information and discussing impacts on digital footprint * investigating how recommendation algorithms used in media services rely on data that tracks user habits, for example how music streaming services generate playlists that contain songs from genres and artists that are similar to those you listen to regularly |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * researching current information on animal welfare when designing an animal shelter or researching intellectual property or the significance of offshore manufacturing in a country in Asia when designing a 3D printed product * investigating traditional and contemporary design and technologies, including from countries across Asia, and predicting how they might change or be sustained in the future in response to technological, environmental or economic change, for example the production of contemporary textile designs using traditional batik techniques and modern dyes in Indonesia * comparing the design and production of products, services and environments in Australia and a country in Asia by identifying needs and new opportunities for design and enterprise, for example design, promotion and marketing of a Western Australian wheat variety especially bred and grown for the making of udon noodles in Japan * researching the rights and responsibilities of those working in design and technologies occupations, for example taking into account First Nations Australian protocols and Indigenous cultural and intellectual property rights * analysing the ethical and social requirements when designing solutions for cultural groups including their involvement and consultation, for example designing a solution with community members from other cultural backgrounds or those who usually communicate in a language other than English |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * analysing competing factors, including social and ethical factors, that influence the design of services for First Nations Australian communities in areas classified as remote, for example a natural disaster warning system for the Koeybuway and Moegibuway Peoples of Saibai Island, who are vulnerable to flooding and rising sea levels * investigating techniques used by land managers for managing and reducing bushfires in forests, for example techniques used by local First Nations Australians or smart technologies such as Internet of Things (IoT) sensors, artificial intelligence, cameras and drones * investigating traditional, contemporary and emerging design and technologies, including from a country in Asia, and the need for more sustainable patterns of living, and predicting how they might change in the future in response to social, technological, environmental or economic change, for example the diversity of house design or waste management practices * investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, accessibility guidelines, control systems or biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products * considering factors that impact on innovation, for example developing novel ideas, responding quickly to change, creating a point of differentiation, adding value for society, reducing costs and improving efficiency |
|  | **Knowledge and understanding**  Technologies context: Food and fibre production | analyse how food and fibre are produced in managed environments and how these can become sustainable  AC9TDE8K04 | * comparing land and water management methods in contemporary Australian food and fibre production with a country in Asia, for example comparing the use of robotics, drones, global positioning system (GPS) technologies, minimum-tillage cropping, water-efficient irrigation and smart farm monitoring and controlling systems for increasing efficiency of farm operations and crop protection, and the impact of cash crops versus staples on social sustainability |
| **Mathematics – Year 7** | **Statistics** | acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data  AC9M7ST01 |  |
| **Probability** | identify the sample space for single-stage events; assign probabilities to the outcomes of these events and predict relative frequencies for related events  AC9M7P01 | * exploring how relative frequencies can be used to make predictions by estimating the probability of an event; for example, in natural language processing (NLP), predictive text algorithms use the relative frequency of words in a set of texts to predict the next word in a sentence |
| **Mathematics – Year 8** | **Measurement** | use Pythagoras’ theorem to solve problems involving the side lengths of right-angled triangles  AC9M8M06 | * investigating how Pythagoras' theorem can be applied to determine the distance between two points in the plane, and how this can be used by predictive algorithms to navigate autonomous vehicles |
| **Space** | describe the position and location of objects in 3 dimensions in different ways, including using a three-dimensional coordinate system with the use of dynamic geometric software and other digital tools  AC9M8SP03 | * locating aircraft/drones using latitude, longitude and altitude as a three-dimensional coordinate system |
| **Science – Year 7** | **Science inquiry**  Planning and conducting | select and use equipment to generate and record data with precision, using digital tools as appropriate  AC9S7I03 | * examining how the use of digital tools such as stopwatches and digital scales can enable the generation of more precise data * using digital tools such as sensors to measure abiotic factors and apps that use image or call recognition to make field identifications |
| **Science as a human endeavour**  Use and influence of science | explore the role of science communication in informing individual viewpoints and community policies and regulations  AC9S7H04 | * examining how global reporting on high-impact weather events such as cyclones, tidal surges and heatwaves has led to the development of warning systems and evacuation policies |
| **Science – Year 8** | **Science inquiry**  Planning and conducting | select and use equipment to generate and record data with precision, using digital tools as appropriate  AC9S8I03 | * recording data with precision appropriate to the instrument such as rounding up or down with finer graduations or estimating an intermediate value with coarser graduations * using digital tools such as digital microscopes, simulations and video-recording devices when appropriate to observe, measure and record qualitative and quantitative data |
| **Science as a human endeavour**  Use and influence of science | explore the role of science communication in informing individual viewpoints and community policies and regulations  AC9S8H04 | * exploring how seismic data is collected and shared between governments across the Asia-Pacific region and how governments use this data including for tsunami alerts |

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| Years 7 and 8 | | | |
| Key aspect 3: Responsible use and application of AI | | | |
| Learning area/subject | Strand/sub-strand | Content descriptions | Content elaborations |
| **Digital Technologies** | **Processes and production skills**  Investigating and defining | define and decompose real-world problems with design criteria and by creating user stories  AC9TDI8P04 | * framing a problem in terms of what we know, why it is important and the outcome we want, for example matching the items in your fridge to possible recipes to reduce food waste * asking a series of questions and sub-questions to understand the problem and breaking it down into manageable parts, for example “How do we keep track of what items are in the pantry? Are there any dietary requirements that need to be considered?” * using a template such as "As a <type of user>, I want <some goal> so that <some reason>", for example "As a user with a visual impairment I want to be able to get the news on my smartphone so that I can keep up with my world" * making predictions about future population distribution of First Nations Australians based on identified trends, for example analysing and visualising data using spreadsheets and databases on their population growth in metropolitan areas |
| **Processes and production skills**  Generating and designing | design the user experience of a digital system  AC9TDI8P07 | * designing a user interface or experience to satisfy design criteria and user stories, using digital tools, for example sketch multiple pages of a website with wireframes, storyboards and simple branding guidelines for colours and styling * considering the factors of why a user might buy and use a product, in addition to its utility, for example how aligning the brand with the user’s values and identity contributes to its appeal * exploring the evolution of a user interface, for example comparing the design and branding of different search engines over time |
| generate, modify, communicate and evaluate alternative designs  AC9TDI8P08 | * reviewing and modifying a preferred design as part of the iterative development approach, for example making changes to overcome limitations of the design or better satisfy the user stories * using concept maps, wireframes or other diagrams to record and discuss the generated ideas, for example creating and discussing wireframes of a music streaming service, evaluating it against design criteria and user stories, such as the needs of diverse users * comparing multiple outputs from a generative model to determine the most suitable; for example, using AI tools to generate multiple prototypes of a user interface and selecting the design or features that best address users’ needs |
| **Processes and production skills**  Producing and implementing | implement, modify and debug programs involving control structures and functions in a general-purpose programming language  AC9TDI8P09 | * writing and editing programs to solve problems using branching, iteration, variables and functions in a general-purpose programming language, such as Python, JavaScript or C# * reading and interpreting an existing program and modifying the code to change functionality and fix errors, for example taking existing code for a weather forecasting app that includes temperatures and improving the output to include extra information such as rainfall, UV levels and air quality * writing a program that receives data from the environment to change the program behaviour, for example reading moisture level data from a soil sensor and switching on the watering system * writing a program that contains nested control structures to perform more complicated branching and decisions, for example using an IF statement inside a loop to count the warm days from an array containing temperature data only when the temperature for each day is more than 20 degrees Celsius * defining and using a function that produces different output based on the argument(s) it receives, for example a function that receives the name of an actor from user input, and searches a file or database to return a list of movies that actor appears in |
| **Processes and production skills**  Evaluating | evaluate existing and student solutions against the design criteria, user stories and possible future impact  AC9TDI8P10 | * evaluating how an existing solution ensures users can control their safety and experience online as described in the Safety by Design Vision for Young People, for example ensuring privacy settings are comprehensive, easy to use and set to maximum protection by default * reviewing the requirements of a user story to ensure that their solution meets the user's needs, for example making sure that recommendations offered by their music application are of a similar genre to the rest of the user's library * judging existing solutions on the basis of their possible impact on the economy, environment or society, for example cloud computing services decrease data loss but require vast amounts of electricity to power the servers * discussing the risks and consequences of AI-generated content on social media platforms; for example, the potential for the spread of misinformation due to high volumes of automatically generated and intentionally misleading content being posted |
| **Processes and production skills**  Collaborating and managing | select and use a range of digital tools efficiently, including unfamiliar features, to create, locate and communicate content, consistently applying common conventions  AC9TDI8P11 | * locating relevant content from multiple sources, exploring advanced search functions and targeted criteria, for example using specific filters such as date range, image size, file type and usage licence * selecting and using appropriate digital tools, for example when participating in online lessons or planning sessions using a common video conferencing tool * using effective prompts with generative AI models to create output that is better suited to the problem being solved; for example, specifying the voice, tone and brevity for a persuasive news article with a restrictive word limit * using a progressive series of prompts with generative models to refine output to improve its correctness; for example, performing translation from one language to another and instructing the model to correct errors in translation |
| **Processes and production skills**  Collaborating and managing | select and use a range of digital tools efficiently and responsibly to share content online, and plan and manage individual and collaborative agile projects  AC9TDI8P12 | * displaying empathy for diverse cultural expectations when participating in teams and in online communities, for example showing sensitivity around images or names of deceased people, and valuing the intellectual property and perspectives of others * demonstrating agile project management skills and understanding, for example when collaborating with First Nations Australians’ community groups to develop digital solutions to projects: following cultural protocols, including relevant permissions and attributions; acknowledging diversity, capability and strength; and addressing risks and responsibilities such as privacy, security and accuracy of data * using AI tools to decompose high-level instructions into more detailed steps to assist with completing a task; for example, asking an AI model to break down the steps involved in building a website from scratch |
| **Digital Technologies** | **Processes and production skills**  Privacy and security | investigate and manage the digital footprint existing systems and student solutions collect and assess if the data is essential to their purpose  AC9TDI8P14 | * investigating the ethical obligations of individuals and organisations regarding ownership and privacy of data and information by researching an online platform’s privacy policy for data collection, use and storage information and discussing impacts on digital footprint * investigating how recommendation algorithms used in media services rely on data that tracks user habits, for example how music streaming services generate playlists that contain songs from genres and artists that are similar to those you listen to regularly * explaining the risks associated with sharing personal data due to the ease with which generative AI models can create new content; for example, from short videos and audio recordings it is possible for convincing deep fake videos to be generated and distributed for malicious purposes |
| **Design and Technologies** | **Knowledge and understanding**  Technologies and society | analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments  AC9TDE8K01 | * researching current information on animal welfare when designing an animal shelter or researching intellectual property or the significance of offshore manufacturing in a country in Asia when designing a 3D printed product * investigating traditional and contemporary design and technologies, including from countries across Asia, and predicting how they might change or be sustained in the future in response to technological, environmental or economic change, for example the production of contemporary textile designs using traditional batik techniques and modern dyes in Indonesia * comparing the design and production of products, services and environments in Australia and a country in Asia by identifying needs and new opportunities for design and enterprise, for example design, promotion and marketing of a Western Australian wheat variety especially bred and grown for the making of udon noodles in Japan * researching the rights and responsibilities of those working in design and technologies occupations, for example taking into account First Nations Australian protocols and Indigenous cultural and intellectual property rights * analysing the ethical and social requirements when designing solutions for cultural groups including their involvement and consultation, for example designing a solution with community members from other cultural backgrounds or those who usually communicate in a language other than English |
| analyse the impact of innovation and the development of technologies on designed solutions for global preferred futures  AC9TDE8K02 | * analysing competing factors, including social and ethical factors, that influence the design of services for First Nations Australian communities in areas classified as remote, for example a natural disaster warning system for the Koeybuway and Moegibuway Peoples of Saibai Island, who are vulnerable to flooding and rising sea levels * investigating techniques used by land managers for managing and reducing bushfires in forests, for example techniques used by local First Nations Australians or smart technologies such as Internet of Things (IoT) sensors, artificial intelligence, cameras and drones * investigating traditional, contemporary and emerging design and technologies, including from a country in Asia, and the need for more sustainable patterns of living, and predicting how they might change in the future in response to social, technological, environmental or economic change, for example the diversity of house design or waste management practices * investigating influences impacting on manufactured products and processes such as historical developments, societal change, new materials, accessibility guidelines, control systems or biomimicry, for example researching the development of Velcro, which was inspired by burrs, or researching contemporary designers who use new materials to design and produce innovative products * considering factors that impact on innovation, for example developing novel ideas, responding quickly to change, creating a point of differentiation, adding value for society, reducing costs and improving efficiency |
| **Mathematics – Year 7** | **Statistics** | acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data  AC9M7ST01 |  |
| create different types of numerical data displays including stem-and-leaf plots using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode  AC9M7ST02 | * exploring how artificial intelligence systems can also use descriptive statistics to identify outliers or anomalies in data; for example, fraud detection and quality control |
| **Mathematics – Year 8** | **Statistics** | investigate techniques for data collection including census, sampling, experiment and observation, and explain the practicalities and implications of obtaining data through these techniques  AC9M8ST01 | * investigating how decisions concerning sampling relate to the training of artificial intelligence systems, recognising the need to mitigate any potential bias that may lead to the development of biased models |
| analyse and report on the distribution of data from primary and secondary sources using random and non-random sampling techniques to select and study samples  AC9M8ST02 | * investigating different methods of sampling used to collect data, considering the source and size of samples * comparing the sampling methods of simple random, systematic, stratified, quota, clustered or convenience, or judgement, and discussing the reliability of conclusions about the context that could be drawn * defining and distinguishing between probabilistic terms such as random, sample space, sample and sample distribution * investigating primary and secondary data sources relating to reconciliation between First Nations Australians and non-Indigenous Australians, analysing and reporting on findings |
| compare variations in distributions and proportions obtained from random samples of the same size drawn from a population and recognise the effect of sample size on this variation  AC9M8ST03 | * using digital tools, including generative AI, to simulate repeated sampling of the same population, such as heights or arm spans of students, recording and comparing means, median and range of data between samples * exploring how the comparison of variations in distributions and proportions from the same population applies to data-driven decision-making |
| **Probability** | recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts  AC9M8P01 | * investigating how various applications of artificial intelligence use the probability of complementary events when assessing the likelihood of favourable and unfavourable outcomes and making informed decisions based on these probabilities; for example, in binary classification problems where data is classified into one of two categories, such as spam or not spam, fraud or not fraud |
| **Science – Year 7** | **Science inquiry**  Planning and conducting | select and use equipment to generate and record data with precision, using digital tools as appropriate  AC9S7I03 | * examining how the use of digital tools such as stopwatches and digital scales can enable the generation of more precise data * using digital tools such as sensors to measure abiotic factors and apps that use image or call recognition to make field identifications |
| **Science as a human endeavour**  Use and influence of science | explore the role of science communication in informing individual viewpoints and community policies and regulations  AC9S7H04 | * examining how global reporting on high-impact weather events such as cyclones, tidal surges and heatwaves has led to the development of warning systems and evacuation policies |
| **Science – Year 8** | **Science inquiry**  Planning and conducting | select and use equipment to generate and record data with precision, using digital tools as appropriate  AC9S8I03 | * recording data with precision appropriate to the instrument such as rounding up or down with finer graduations or estimating an intermediate value with coarser graduations * using digital tools such as digital microscopes, simulations and video-recording devices when appropriate to observe, measure and record qualitative and quantitative data |
| **Science as a human endeavour**  Use and influence of science | explore the role of science communication in informing individual viewpoints and community policies and regulations  AC9S8H04 | * exploring how seismic data is collected and shared between governments across the Asia-Pacific region and how governments use this data including for tsunami alerts |