Government of **Western Australia**
School Curriculum and Standards Authority

Technologies: Digital Technologies

Teaching, learning and assessment exemplar

Year 8

Data Australis

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Background

This teaching, learning and assessment exemplar (the exemplar) has been developed by the School Curriculum and Standards Authority (the Authority) as part of the *School Education Act Employees (Teachers and Administrators) General Agreement 2017* (Clause 61.1–61.3).

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Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandated or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

This resource utilises electronic web-based resources, such as videos and image galleries. Teachers should be present while an electronic resource is in use and close links immediately after a resource, such as a video has played to prevent default 'auto play' of additional videos. Where resources are referred for home study, they should be uploaded through Connect, or an equivalent system, that filters advertising content

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The Western Australian Curriculum

The *Western Australian Curriculum and Assessment Outline* (the *Outline* – https://k10outline.scsa.wa.edu.au/) sets out the mandated curriculum, guiding principles for teaching, learning and assessment, and support for teachers in their assessment and reporting of student achievement. The *Outline* recognises that all students in Australian schools, or international schools implementing the Western Australian Curriculum, are entitled to be given access to the eight learning areas described in the *Alice Springs* (*Mparntwe*) *Education Declaration*, December 2019.

The Technologies curriculum

The mandated curriculum is presented in the year level syllabus documents.

The Technologies curriculum delivers a sequential and age-appropriate progression of learning with the following key elements:

- a year level description that provides an overview of the context for teaching and learning in the year
- a series of content descriptions, populated through strands and sub-strands, that sets out the knowledge, understanding and skills that teachers are expected to teach and students are expected to learn
- an achievement standard that describes an expected level that the majority of students are achieving by the end of a given year of schooling. An achievement standard describes the quality of learning (e.g. the depth of conceptual understanding and the sophistication of skills) that would indicate the student is well placed to commence the learning required in the next year.

This exemplar

This Technologies exemplar articulates the content in the *Outline* and approaches to teaching, learning and assessment reflective of the Principles of Teaching, Learning and Assessment. This exemplar demonstrates a sequence of teaching and learning, including suggested assessment points, for 16 lessons.

Catering for diversity

This exemplar provides a suggested approach for the delivery of the curriculum and reflects the rationale, aims and content structure of the learning area. When planning the learning experiences, consideration has been given to ensuring that they are inclusive and can be used in, or adapted for, individual circumstances. It is the classroom teacher who is best placed to consider and respond to (accommodate) the diversity of their students. Reflecting on the learning experiences offered in this exemplar will enable teachers to make appropriate adjustments (where applicable) to better cater for students' gender, personal interests, achievement levels, socio-economic, cultural and language backgrounds, experiences and local area contexts.

Using this exemplar

This teaching, learning and assessment exemplar provides suggestions to support the delivery of the mandated curriculum content. The exemplar provides:

- a teaching and learning sequence
- the mandated curriculum content to be taught at each point of the teaching and learning sequence, suggested resources, sample assessment tasks and marking keys
- the number of lessons to deliver the teaching and learning experiences
- learning intentions and support notes that may provide focus questions and additional information and/or examples to assist with the interpretation of curriculum content
- support notes to assist teachers to unpack the content and support teaching and learning experiences
- teaching and learning experiences that outline the structure of the lesson. These explicitly state each activity that the lesson will progress through and the key focus area for that activity.

Links to electronic resources

This sequence of lessons may utilise electronic web-based resources, such as videos and image galleries. Teachers should be present while an electronic resource is in use and close links immediately after a resource, such as a video, has played to prevent default ‘auto play’ of additional videos. Where resources are referred for home study, they should be uploaded through Connect, or an equivalent system, that filters advertising content.

Best practice

Teaching and learning

The teaching and learning opportunities offered in this exemplar are not exhaustive. Thus, teachers are encouraged to make professional decisions about which learning experiences, and the sequence in which they are delivered, are best suited to their classroom context, taking into account the availability of resources and student ability.

This sample may prove a useful starting point for amplifying creativity in the classroom, while presenting the embedded expectations of the Western Australian Curriculum: Technologies.

Teachers may find opportunities to incorporate the General Capabilities and the Cross-curriculum Priorities into the teaching and learning program.

Ways of teaching – teachers can locate additional information on the Ways of teaching from the School Curriculum and Standards Authority (the Authority) website https://k10outline.scsa.wa.edu.au/home/wa-curriculum/learning-areas/technologies/digital-technologies/p-10-digital-technologies-teaching/digital-technologies-ways-of-teaching.

Assessing

Assessment, both formative and summative, is an integral part of teaching and learning. Assessment should arise naturally out of the learning experiences provided to students. In addition, assessment should provide regular opportunities for teachers to reflect on student achievement and progress. As part of the support it provides for teachers, this exemplar includes suggested assessment points. It is the teacher's role to consider the contexts of their classroom and students, the range of assessments required, and the sampling of content descriptions selected to allow their students the opportunity to demonstrate achievement in relation to the year level achievement standard. Teachers are best placed to make decisions about whether the suggested assessment/s are used as formative or summative assessment and/or for moderation purposes.

Ways of assessing – a range of assessment strategies that can enable teachers to understand where students are in their learning is available on the Authority website https://k10outline.scsa.wa.edu.au/home/wa-curriculum/learning-areas/technologies/digital-technologies/p-10-digital-technologies-assessing/digital-technologies-ways-of-assessing.

Reflecting

Reflective practice involves a cyclic process during which teachers continually review the effects of their teaching and make appropriate adjustments to their planning. The cycle involves planning, teaching, observing, reflecting and replanning.

This exemplar supports reflective practice and provides flexibility for teachers in their planning. The exemplar shows how content can be combined and revisited throughout the year. Teachers will choose to expand or contract the amount of time spent on developing the required understandings and skills according to their reflective processes and professional judgements about their students' evolving learning needs.

Data Australis

The focus of this exemplar is to develop students' skills with acquiring, managing and analysing data. Using spreadsheets to manage and analyse data is essential because they offer a powerful, flexible and accessible way to organise information, identify patterns, and make informed decisions. With features like formulas, charts, pivot tables and conditional formatting, spreadsheets enable users to efficiently handle large amounts of data, perform calculations, and visualize trends without needing advanced technical skills. They are widely used across industries for budgeting, forecasting, project tracking, and performance analysis, making them a valuable tool for both individuals and organisations. By leveraging spreadsheets, users can increase productivity, reduce errors and gain clearer insights that drive smarter, data-based decisions.

Year level description

In the early adolescence phase of schooling, students align with their peer group and begin to question established conventions, practices and values. Learning and teaching programs assist students to develop a broader and more comprehensive understanding of the contexts of their lives and the world in which they live.

Digital Technologies further develops student understanding and skills in computational and design thinking, such as decomposing problems, and engages with a wider range of information systems as they broaden their experiences and involvement in local, regional, national and global activities.

In Year 8, students investigate the properties of networked systems and their suitability, based on performance specifications. They consider methods of data transmission and security in wired, wireless and mobile networks. They analyse and validate data using spreadsheets and make predictions by identifying trends. Students continue to investigate patterns, processes and phenomena, and explore forms of data representation and technology.

When defining problems, students identify the key elements of the problems and the factors and constraints at play. They design increasingly complex algorithms. Students develop an understanding of ethical issues regarding the collection and ownership of data.

Achievement standard

By the end of the year:

Students describe methods of data transmission and security in wired, wireless and mobile networks, identify specifications of hardware components and outline potential impact on particular tasks. They identify how digital systems represent image and audio data using binary. Students analyse and validate data, using spreadsheets to draw conclusions and make predictions based on identified trends. They design algorithms involving nested control structures and represented by flow charts and pseudocode in plain English. Students implement, modify and debug programs involving control structures in a general-purpose programming language. They trace algorithms to predict output for a given input and identify errors. Students identify ethical issues regarding the collection and ownership of data and evaluate the authenticity, accuracy and timeliness of acquired data. They describe cybersecurity threats, including phishing.

In Digital Technologies, students investigate a given need or opportunity for a specific purpose and develop a design brief. Students consider and select components and resources to develop solutions, identifying constraints. They use appropriate technical terms and technologies to design, develop, evaluate and communicate alternative digital solutions. Students use project management skills to plan, develop and communicate, while considering time, resources and costs to achieve solutions. They develop contextual criteria to evaluate design processes and solutions.

Lessons 1–16

Data Australis

Lesson 1: Big data

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

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Lesson outline

Learning intentions
Students will: • Understand the difference between data and information. • Be conscious of the amount of data produced and consumed on a daily basis. • Create an awareness of the potential uses of data collected in different contexts.

Preparation for the lesson

- Prepare a Know, Want to know and Learned (KWL) chart for students on the topic of big data and share with each student.
- Find an infographic that visualises the amount of social media produced in a single day.
- Source a website that demonstrates the abundance of data collected every day, ideally in the local area, such as Smart Cities Perth or City of Melbourne – Open Data. These websites contain sets of data and visualisations of the data collected, for each city.
- Create a Microsoft® PowerPoint presentation and share with each student. The presentation should be separated into sections to allow each pair of students to enter the information found on the source website, when completing the class Jigsaw activity.

Support notes

- The term *data* reflects individual units of information that are raw and unstructured. The term *information* is data that has been processed to convey meaning.
- Big data can be defined as numerous, extremely large datasets characterised by volume, velocity and variety. With the universal nature of technology, data can be captured by a range of methods including sensors and social media. It is being perpetually generated and continues to grow exponentially in size.
- Big data can be analysed and visualised to identify trends, as well as predict likely outcomes, using historical data to provide evidence from which decisions can be made when planning. For example, transport companies can use historical data on passenger movements to plan how many buses should be run on a particular route on a particular morning.
- There are numerous online repositories of data that are accessible by the public and can be used for a variety of reasons, such as research collaboration, transparency and long-term preservation.

Teacher

- Ask students to complete the K and W sections of their KWL chart.
- Ask students to consider the amount of data that might be sent around the world in a single day. Students can put this question in a search engine to find a suggested number.
- Show students the infographic on the amount of social media produced in a single day. Ask them to Think-Pair-Share their social media usage in light of the infographic.
- Explain to students that the enormous amount of data produced on the internet each day can be used in a positive way and for a variety of purposes.

Students

Online jigsaw

- Students navigate to the source website that demonstrates an abundance of data collected every day. Break the website into sections and assign one section to a pair of students.
- Students work in their pairs and enter notes into their section of the shared presentation to describe the following:
  - type/s of data collected
  - how the data are collected
  - what the data are used for (goals or outcomes)
  - the visualisations (e.g. chart) in terms of how the data are used to achieve the goals stated on the website.

Lesson conclusion

- Students complete the L section of their KWL chart as a reflection of their learning.

Lesson 2: Privacy and security

The Western Australian Curriculum content addressed in this lesson is below.

Privacy and security

Ethical issues relating to the collection and ownership of data

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Lesson outline

Learning intentions
Students will: • Understand how a common method of acquiring personal data contributes to big data. • Consider the need for collecting and giving personal data in a discretionary manner. • Know that the collection and handling of personal information by third parties are protected by law.

Preparation for the lesson

- Select a common rewards program, such as those offered by major supermarket chains, to activate prior knowledge in the class discussion.
- Source a video that demonstrates the amount of personal data collected about an individual, on a daily basis, including use of algorithms as recommendation systems.

Support notes

- Loyalty cards are a way for businesses to attract and retain their customers, contributing to the phenomenon of big data. Customers can record their purchases on a loyalty card and receive rewards once they attain specific goals in their spending. Customer data is stored on third-party servers: this creates a risk that cyber criminals could gain access to credit and debit card details that are connected to loyalty cards.
- The handling of personal information by businesses is protected by law with the *Privacy Act 1988* and the *Australian Privacy Principles.*

Teacher

- Activate prior knowledge with a class discussion around a common loyalty program, as per preparation notes. Reinforce with sourced video that demonstrates the amount of personal data collected about an individual.

Students

- Research: Students create a list of loyalty programs that they might have heard of or they find through research. They choose one program to research in detail.
- From the information provided on the loyalty program provider's website, students:
  - identify the personal data that the company asks for when joining the loyalty program
  - classify the personal data as 'required' or 'optional'
  - explain if they would be comfortable providing those details to a company
  - describe the rewards that are offered for joining the program
  - state which options customers have for registering; for example, online or on paper.
- Students create their own loyalty program.

- Students create and design a loyalty card for an imaginary business, making it attractive to customers.
- Students consider the types of personal data that will be required to be collected from customers, checking that each data item is essential and will be used by the business and is for business purposes. If not essential, should the customer be asked for that information? This can be summarised in a table. See example below.

Personal data	Use for business	Is this necessary?
First name	Greetings, identification	Yes
Date of birth	Birthday reminder, rewards	Yes
Mother's maiden name	None	No

Table 1: Summary of personal data in a loyalty program

Lesson conclusion

- Students share their loyalty cards on an online platform. Other students comment and make suggestions, demonstrating good digital citizenship in the process.

Lesson 3: Introduction to spreadsheets

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

- Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

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Lesson outline

Learning intentions
Students will: • Review the format of spreadsheets, including cells, cell references, cell ranges, rows and columns, and basic tools. • Use a simple spreadsheet to predict requirements for a social event based on different scenarios.

Preparation for the lesson

- Research a small group of statistics, such as the medal count for the top five countries at the 2024 Paris Olympics. Present this information as a list and in a spreadsheet.

Medals Won at the 2024 Paris Olympics

USA: 10 Gold, 18 Silver, 14 Bronze
China: 40 Gold, 27 Silver, 24 Bronze
Japan: 20 Gold, 12 Silver, 13 Bronze
Australia: 18 Gold, 19 Silver, 16 Bronze
France: 16 Gold, 26 Silver, 22 Bronze

Medals Won at the 2024 Paris Olympics

Country	Gold	Silver	Bronze
USA	40	44	42
China	40	27	24
Japan	20	12	13
Australia	18	19	16
France	16	26	22

Figure 1: Medals won at 2024 Paris Olympics

- Source an infographic that shows the flags of the world. Select several flags that are composed of blocks of colour as opposed to flags that are composed of shapes.
- Create example of a spreadsheet with items listed to purchase for an event
  - Column headings show: Item, Servings per pack, Price per pack, Quantity, Number of servings, Cost
  - Column headings for final calculations are Total Cost, Budget and Balance (Budget minus Total cost)
  - Number of servings and cost are calculated using formulae (see Image 2: Party planning spreadsheet example below).
  - Use the fill handle tool to apply formulae to cells below. For example, column 'F' – Cost.

Support notes

- Data, based on its attributes, can be used to identify trends and to make predictions.
- Charts, graphs and data visualisation tools are visual elements that allow the viewer to easily see and understand patterns, trends and outliers in data.
- Spreadsheets are software applications that allow the storage and manipulation of data. They are formatted in a grid structure with horizontal rows and vertical columns. Rows are identified by a number whereas columns are identified with letters.

Activate prior knowledge

- Generate a discussion with students around a popular event (such as a sporting competition; for example, the 2024 Paris Olympics as prepared). Show students some statistics from the event in a list format. Ask students interpretive questions about the data, such as 'Which country won the least silver medals?'.
- Show students the same data in a spreadsheet format, and ask students the same questions.
- Prompt students to reflect on which format was easier to interpret when answering the questions and give reasons for their choice. Students can then do a Think-Pair-Share activity about their ideas. Reinforce the concept of spreadsheets as a tool that allows effective management and analysis of large amounts of data.

Teacher

- Introduce the topic of spreadsheets as a way of acquiring useful data and for creating information. Demonstrate how to find and open the spreadsheet application.

Students

- Review spreadsheet skills with a simple activity – Flags of the world
  - Give students step-by-step instructions to recreate several flags of the world that are composed of block colours only. For example, national flags of Hungary and Iceland.
  - Students recreate the flags in Microsoft® Excel and identify the country of origin.
  - Students choose one recreated flag in Excel and write down the steps needed to produce the flag, using correct cell references. Students save work to bring to the next lesson.

- Create a shopping list for an event, such as a birthday party or sporting club barbecue using a given scenario
  - Teacher to show an example of a spreadsheet with items listed to purchase for an event. Students to contribute ideas to the list.
  - Column headings show: Item, Servings per pack, Price per pack, Quantity, Number of servings, Cost.
  - Column headings for final calculations are Total Cost, Budget and Balance (Budget minus Total cost).
  - Students list items including unit price they found by online search.
  - Number of servings and cost are calculated using formulae (see Image 2: Party planning spreadsheet example below).
  - Use the fill handle tool to apply formulae to cells below. For example, column 'F' – Cost.
  - Students apply the AutoSum function to Total Cost.
  - When a change is made to the scenario (e.g. RSVPs show reduced attendance), the spreadsheet must reflect the change.
  - Students must change Quantity for each item, according to the number of people in attendance and number of servings required.
  - Below the shopping list, students add in a row showing the total cost of the shopping (using a formula to work out the cost).
- Additionally:
  - make a pie chart comparing how much money will be spent on the different items on the list
  - make a bar chart showing how many of each item will be purchased
- Extension:
  - Is there enough of each item so that everyone in the group can have at least one serving of everything?
  - Is there too much or too little of anything? Change the values in the 'Quantity to buy' column so that you end up with the right amounts?
  - Find how to format the total so that it includes a dollar sign.

	A	B	C	D	E	F	G	H
1	PARTY PLANNING							
2	**Item**	**Servings per pack**	**Price per pack**	**Quantity**	**Number of servings**	**Cost**		
3	Soft drink	8	$3.90	3	24	$11.70	E3:"=B3*D3"	F3:"=C3*D3"
4	Burger buns	12	$7.80	5	60	$39.00	E4:"=B4*D4"	F4:"=C4*D4"
5								
6								
7								
8								
9								
10								
11								
12								
13								
14					***Total Cost:***	**$50.70**	"=SUM(F3:F13)"	
15					***Budget:***	*$50.00*		
16					***Balance:***	*-$0.70*	"=F15-F14"	

Figure 2: Party planning spreadsheet example

Lesson conclusion

- Play the Bingo game with the class
  - Students must add a ‘0’ to 5 cells in a new spreadsheet in the range of A1:J10
  - Teacher to call out cell references randomly, within the given range
  - Teacher to mark a spreadsheet (displayed on projector) with an ‘X’ to indicate a cell reference that has been called
  - First student with ‘0’ in all selected cell references marked by the teacher to call out ‘Bingo’.

Lesson 4: Spreadsheet calculations

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Lesson outline

Learning intentions
Students will: • Analyse a simple dataset. • Use the functions SUM, MAX, MIN, and COUNTA in a spreadsheet. • Create appropriate charts in a spreadsheet.

Preparation for the lesson

- Create a presentation to show how spreadsheets can be used as a 'super-calculator'. Introduce the concept of functions in spreadsheets, and demonstrate four functions: SUM, MAX, MIN, COUNTA. Refer to the use of the fill handle tool from Lesson 3 to increase efficiency of using functions.
- Create a spreadsheet showing data acquired from a survey. The spreadsheet should be unformatted and appear more as a flat file of data; for example, a Sports Day Fundraiser survey. Data types could include First name, Last name, Phone number, Email address, T-shirt size, Which game attending, Number of seats booked, Raffle donation, Mailing list (Y/N).
- Create a worksheet that walks through the activities for the survey activity and includes charts and functions. In the Sports Day Fundraiser example, pie chart and column/bar chart options could be:
  - Responses to newsletter question (yes/no)
  - T-shirt size required (S/M/L)
  - Selected sport (football/basketball/rugby).
- Meaning of data
  - Students open the example spreadsheet. In pairs, ask them to read the column headings and make assumptions about the meaning of data collected for each column (field). The students note their observations and conclusions in a table (column versus meaning).
- Functions
  - SUM – donation amount
  - MAX/MIN – donation amount, number of seats booked
  - COUNTA – number of people who provided their phone number.
- Prepare a short, online, multiple-choice quiz on spreadsheet functions.

Support notes

- Data based on its attributes can be used to identify trends and to make predictions.
- A Function is a pre-defined mathematical calculation built into the spreadsheet program, called upon via the use of keywords.
- Formula is any mathematical calculation initiated through the equals (=) symbol.
- Spreadsheets can be used for executing functions, such as MIN, MAX, COUNT, COUNTIF, MEAN, MODE, MEDIAN etc.
- Charts, graphs and data visualisation tools are visual elements that allow the viewer to easily see and interpret patterns, trends and outliers in data.
- Data that is acquired and presented in an unstructured way is called a flat file. A flat file is a single table of data with each row representing one record, and the columns representing fields or attributes for that record.

Teacher

- Open the *Party Plan* spreadsheet from Lesson 3 and display on projector. Click on the function in the Total Cost cell where the AutoSum tool has inserted the SUM function. Ask students to guess what the function means by reading through the function, including the cell range.
- Deliver the presentation on spreadsheet functions.

Students

- For review, students take out the written instructions they created for Lesson 3 – Homework (Flags of the world). They swap with a partner and test each other's work by following the instructions to create a flag of the world in a spreadsheet. Students compare the flag they created with the infographic displaying flags of the world to identify which flag the instructions represent. Students then give and receive feedback, making corrections as required.
- Students to open the prepared spreadsheet, *Spreadsheet survey – Sports day fundraiser*, and complete the tasks in the worksheet.

Lesson conclusion

- Students take a short multiple-choice quiz on functions.
- As available, show the analytics from the form responses, such as number of responses and average time for respondents to complete the form. Against each question, display the number of responses for each option and the chart showing the breakdown of responses.
- Teacher to Lead a brief discussion about how the information can be used by students and the teacher.

Lesson 5: Protecting dugongs – background

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Lesson outline

Learning intentions
Students will: • Understand the background and purpose of acquiring data on dugongs.

Preparation for the lesson

- Locate this web-based resource: Protecting dugongs classroom resource Protecting dugongs (digitaltechnologieshub.edu.au) then download the Dugongs Sightings Data spreadsheet.
- Source a video that introduces students to the dugong species, such as this video: 'The Dugongs' Ocean: Shark Bay, Western Australia'.
- Gather website resources for the research task.

Support notes

- Dugongs, also known as 'sea cows', are marine mammals that inhabit waters off the coast of Western Australia.
- The species has come under threat due to the impact of industry on their main food source, which is seagrass, as well as human interference from shark nets and boats.
- The reliance on the availability of seagrass to provide up to 40 kg of food for a dugong each day and preserving habitats free of human dangers is important to the survival of this species.
- Understanding dugongs is important for protecting dugongs, and the acquisition of data on this species provides information to support strategies for conserving numbers.
- Aboriginal and Torres Strait Islander peoples have managed the species through the use of traditional methods for centuries. The collaboration between scientists and Traditional Owners is an important part of ensuring conservation of this species.

Teacher

- Introduce the topic of protecting dugongs by asking students if they have heard of this type of animal. Can students list any facts about this species?
- Show the pre-selected video and ask students to note down three interesting facts about dugongs as the video is playing. For example, the dugong is also known as a 'sea cow', it can eat up to 40 kg of seagrass in a day, and it prefers warmer waters hence remains in shallow water nearer the coast.

Students

- Students complete a research task about the dugong using prepared website resources. Focus questions could include:
  - describe the ways in which Aboriginal and Torres Strait Islander peoples' ecological and zoological knowledge informed practices to ensure a sustainable population of the dugong
  - outline the main threats to dugongs
  - outline the main threats to dugongs' seagrass habitat
  - explain reasons why dugongs are listed as vulnerable
  - state the distance that dugongs can travel.

Lesson conclusion

- Students use the three-step interview learning strategy outlined below to assess each other's findings
  - In groups of three, one student is the interviewer, another student is the interviewee, and the third student is the reporter
  - The interviewer asks the focus questions to the interviewee, who responds, and the reporter makes notes
  - Each student swaps roles until all three have taken on each role.
  - Notes for the classroom can be compiled and shared online or as class presentation.

Lesson 6: Protecting dugongs – analysing data

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

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Lesson outline

Learning intentions
Students will: • Acquire a real-world dataset and understand the collection process. • Manage acquired data in an appropriate format and location. • Analyse data by sorting and filtering spreadsheet results to determine key questions and how they might be answered, using the data analysis process.

Preparation for the lesson

- Locate these web-based resources: *Protecting Dugongs classroom resource* Protecting dugongs (digitaltechnologieshub.edu.au) then download this career profile and the Dugongs Sightings Data spreadsheet.
- Prepare a presentation on how the Protecting Dugongs data was collected, using the Protecting dugongs (digitaltechnologieshub.edu.au) website and/or Support notes below.
- Prepare a 'cheat sheet' that explains how to sort and filter data in the spreadsheet application. Websites such as GCF Global are helpful and informative.
- Create a worksheet that students may follow to complete the Data analysis activity from the Protecting Dugongs website.

Support notes

- Methods of acquiring data pose significant challenges depending on the context. Scientists collect data about the dugong to manage its habitat and understand its numbers and movements.
- Aerial surveys are performed to acquire data from above the earth's surface using planes as well as drones and balloons. These types of surveys allow data to be collected over vast areas with little effort and cost.
- The dugong survey was conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in the Kimberley region of Western Australia. Four observers were seated in a plane with headsets and voice recorders. A global positioning system (GPS) was synced with the voice recorders to identify the precise location. For each sighting, the observer noted four points: what type of animal; how many; are they on or below the surface; and a measure of the turbidity of the water. The data acquired from the voice recordings was then manually entered into a database.

- The data analysis process can be guided by the following steps:
  - Ask questions: identify what you want to learn or understand
  - Acquire data: gather data from relevant and authentic sources
  - Clean/filter data: remove any incorrect or unnecessary (redundant) data
  - Visualise data: make sense of the data using visualisations, such as charts, graphs, and infographics
  - Create information: draw conclusions based on your findings to answer the original questions.

Teacher

- Give the presentation of the Dugong data collection methodology.

Students

- Students download the *Dugongs Sightings* spreadsheet and make a copy and label one 'original' and the other 'working copy'. Students to address the question 'Why do we need two copies?'.
- Students complete a data investigation by answering the following questions in the prepared worksheet, collecting evidence as they go by taking screenshots of the relevant areas of their spreadsheet.
  - What do the columns mean?
  - How many rows of data are there?
  - How reliable is the data? [Hint: scroll to see the column 'Reliability' (blank=confident, probable=sighting, guess=disregarded)]. Students to consider the following questions:
    - How can you find out the total number of dugong sightings labelled as 'guess'? Does this make a difference to the overall data?
    - Ask students to come up with at least three different ways to answer the questions, using functions or features of the spreadsheet.
- Students consider whether some columns of data are relevant or not; i.e. do some redundant columns need to be deleted? For example, the 'Observer' column is not needed when gathering information about the plight of dugongs. This will simplify and clean up the data.
- Students sort and filter the data to provide evidence that answers these questions. Students may also consider some questions of their own
  - What animal types were sighted and how many?
  - Which animal type is most frequently sighted?
  - Are there more sightings on a day of less turbidity (water is less murky/clearer)?
- Note: when navigating a spreadsheet with a considerable amount of data, the following keyboard shortcuts are helpful:
  - Freeze the top row so that headers are always visible
  - Use CTRL/CMD > Home to go to the start of the spreadsheet and CTRL/CMD > End to go to the end of the spreadsheet.

Lesson conclusion

- Through an informal debate, students form opinions about the validity of the data in the *Protecting dugongs* spreadsheet. Students to use the evidence collected during the data analysis activity to support their argument. The teacher to facilitate a discussion where students state their opinion and one piece of supporting evidence.

Lesson 7: Protecting dugongs – visualising data

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Lesson outline

Learning intentions
Students will: • Sort, filter and visualise the Protecting dugong data using an online mapping tool. • Compare and contrast the process of visualising data from spreadsheets versus a more intuitive, visual application like the online mapping tool.

Preparation for the lesson

- Locate an appropriate online mapping tool for your school context.
- Prepare an activity worksheet, using a procedure similar to the one below for Google Maps: My maps:
  - Login to Google Maps: My Maps.
  - Create a new map by selecting the plus sign in the bottom right corner.
  - On the menu on the left, under Untitled layer, select Import and import the Dugongs Sightings spreadsheet. Select the latitude and longitude columns and identify them as latitude or longitude when prompted, then select datatype for the placemarks.
  - Importing the file may involve a brief wait time, but you should eventually get a map with pins for all sightings.
  - All the labels are initially the same colour. To separate out (sort) the different species, select Uniform style, group places by datatype, and wait for the map to reload the data.
  - Add icons to represent each data type to enhance the visualisation of the data. Select a data type (e.g. dolphin) then click on the paint bucket icon at the right. Click More Icons then enter the data type in the Filter field and select an icon that is representative of the data type. If an icon does not exist, then select Custom icons and upload a PNG image of the data type. Take Screenshot 1 and save.
  - Delete the other data types, leaving only the dugongs, to filter out unnecessary data. Take Screenshot 2 and save.
- Create a Report template for students to analyse their maps, using the following prompts:
  - Introduction: students to provide background on the purpose of the data analysis.
  - Examine Screenshot 1. Study the pattern of icons in locations where they were observed from the plane. What conclusions can be drawn about the dugongs from this image? Answers might include the relative proportions of species of sea life.
  - Examine Screenshot 2. Note the distribution and density of the dugong sightings. Look for any trends. What conclusions can now be drawn about the dugongs and their habits? How might these habits affect the dugong population and its survival? Answers might include the

preference of dugongs to reside near the coast (due to warmer waters, location of food) and therefore increased chance of contact with humans.
    - Conclusion: students summarise the findings from the data analysis and what insights the findings give into the plight of the dugongs.

Support notes

- Online mapping tools, such as Google Maps: My maps, are web apps that allow users to import geospatial data to create and share interactive maps with ease.
- The visual and spatial nature of the maps are easy to interpret for personal use as well as a wide range of business and industry purposes.

Teacher

- Give a demonstration of the use of the selected online mapping tool. This can be done with the students, broken down into a series of steps, as appropriate.

Students

- Students follow the prepared activity worksheet to analyse and visualise the Protecting dugongs data.

Lesson conclusion

- Students present their findings by completing the prepared report template.

Lessons 8–9: Protecting dugongs – infographic

The Western Australian Curriculum content addressed in these lessons is below.

Design thinking skills

Investigating and defining
Investigate a problem for a given need or opportunity

Designing
Design processes and solutions considering a range of technologies and techniques, using appropriate technical terms

Producing
Implement agreed protocols, a range of technologies, techniques, components and processes to produce designed solutions

Evaluating
Use student-developed contextual criteria to evaluate design processes and solutions

Lesson outline

Learning intentions
Students will: • Learn the purpose and structure of an infographic. • Understand the impact that design concepts can have when producing an effective infographic. • Understand the impact that content can have when producing an effective infographic. • Produce an infographic based on the Protecting dugongs case study. This can be used as a formative assessment (Appendix B).

Preparation for the lesson

- Set up a values line in the classroom. Choose a wall that is not obstructed, placing ‘Yes’ and ‘No’ signs at opposite ends with ‘Maybe’ in the middle.
- Create a presentation based on the Support notes below.
- Gather a few examples of simple infographics that demonstrate the following: structured content, qualitative versus quantitative information, use of icons, use of data visualisations, and a clear message or purpose.
- Create an Infographic outline worksheet that helps to scaffolds a brief analysis of the content of one of the sourced infographics. There is a sample Infographic outline in Appendix B.
- Find a video that explains the basic design concepts such as Fundamentals of Design.
- Create a Design analysis worksheet that scaffolds a brief analysis of design concepts used in one of the sourced infographics
- Become familiar with the Canva web app (or similar platform for making infographics), its templates and design features.

Support notes

- Infographics are a visual medium that can efficiently communicate information to a broad audience: they contain images, icons, data visualisations and minimal text in an engaging format. The result is an attention-grabbing experience that not only informs, but leaves a lasting impression.
- Steps to creating an infographic can include: researching the topic, deciding what is/are the message/s to be sent to the target audience, organising information into an Infographic outline (e.g. title, introduction, sectioned main content, conclusion and/or links to further information), translating the outline into visuals (e.g. icons, images, charts) and small amounts of text (e.g. title, introduction, small amount of body text within sections, conclusion/links), and fine-tuning the final product (e.g. step back and take another look, peer feedback).
- Design concepts enable the designer by giving them the 'tools' and 'rules' to attract their target audience. Tools can include colour, shape, space and line. Rules can include balance and emphasis.

Teacher

- Review – values line: Ask the class the question: 'Using apps, such as Google Maps: My maps is too easy and we don't really understand the data – are spreadsheets are a better option?'. Ask students to place themselves along the values line where they feel their opinion matches. Choose some students to explain their choice.
- Give the prepared presentation on infographics.
- Show prepared video that explains basic design concepts.
- Demonstrate chosen software to create an infographic.

Students

- Content Analysis: Students complete the prepared Infographic outline worksheet.
- Design Analysis: Students complete the prepared Design analysis worksheet.
- Formative Assessment: Infographic (Appendix B).
- For the evaluation, ask students to Think-Pair-Share what makes an effective infographic. Create a list from the answers then seek consensus in ranking the criteria in importance. Choose the top five criteria and allow students to evaluate three Infographics of other students, based on the five most important criteria. Ensure that all students receive three evaluations each.

Lesson conclusion

- Infographic gallery: infographics can be exhibited either online or printed at full size, in colour, for full effect.

Lesson 10: Data reliability

The Western Australian Curriculum content addressed in this lesson is below.

Privacy and security

Ethical issues relating to the collection and ownership of data

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Lesson outline

Learning intentions
Students will: • To understand the importance of timeliness, accuracy and authenticity as a measure of data reliability.

Preparation for the lesson

- Become familiar with tools in the search engine of choice, particularly the date range search tools.
- Prepare two examples of phishing emails and one email that is from a legitimate source, such as a bank.

Support notes

- Accuracy is a measure of the degree to which data or information represents the real-world entities that it captures.
- Timeliness is accuracy of data at a given point in time. Out-of-date data can cause problems and issues with analysis and data predictions. It is integral to use up-to-date data especially in real-time actioning of information.
- Authenticity is the idea that data or information has originated from the given source. Authentic data is not corrupted during movement or transmission.
- Phishing emails are a type of scam where emails pretend to originate from a reliable source with the purpose of stealing personal information or other malicious intent.

Teacher

- Data timeliness activity
  - Write a simple mathematical problem on the board; for example, multiplying the age of four people.
  - When students believe they have the correct answer, change one of the numbers on the board, showing that students' answers are now incorrect based on the number update.
  - Then ask for an updated answer, and change one more number, indicating that students are now incorrect again.
  - Complete five iterations of this process until students understand that data timeliness can affect outcomes of information.
  - Discuss with students the importance of having up-to-date and timely data, and how that can affect data.
  - Demonstrate the use of a custom date range in a search engine. Use this data range to search a sporting ladder from the previous month. Compare this to the same month in the

previous year. Keep the results next to each other and explain which is more accurate due to timeliness.

- Data authenticity – phishing emails
  - Split the class into pairs. Allocate each pair one of the examples of a phishing email
  - This activity can also be carried out through the Expert group instructional strategy.

Student

- Data timeliness – Sporting ladder activity
  - Students use the custom date range to find the top of the sporting ladder in the chosen month or round for the past five years and compare them. Students can enter their search results into a table.
  - Reinforce why data timeliness is important when searching the internet for data or information.
- Data authenticity – phishing emails
  - Students identify the numerous errors in the phishing emails. This can be carried out by circling the errors and annotating the email page to identify why it is an error in the document
  - Repeat the activity for the legitimate email. Students may think they find errors with this document. As a class, discuss why students were looking for errors in the legitimate email based on the previous activity
  - Students compete to find the greatest number of errors in the supplied documents
  - Two pairs then compare answers on the same document to gather all errors. Each member of the team is required to explain one of the errors found.

Lesson conclusion

- Data reliability checklist: Students create a Data reliability checklist that makes use of the strategies they employed in this lesson (or one of their own). Each student to provide at least one element in the checklist. Teacher to use students' ideas and refine the checklist for future classroom use.

Lesson 11: Introducing PivotTables (optional)

The Western Australian Curriculum content addressed in this lesson is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Privacy and security

Ethical issues relating to the collection and ownership of data

---

Lesson outline

Learning intentions
Students will: • Review the concept of data reliability from the previous lesson. • Understand the concept of PivotTables and PivotCharts, then examine some simple uses. • Reinforce the process of data analysis and report writing.

Preparation for the lesson

- Create a presentation to explain the concept of a PivotTable and show the steps involved in creating a simple PivotTable and PivotChart, using the Support notes as a guide.
- Acquire a simple dataset relevant to your context that will provide answers to questions inspired by the data. For example, a sample spreadsheet showing the study habits of five students over a week (columns: Student Name, Date, Start Time, Finish Time, Subject).
- Create a worksheet to scaffold the data analysis and visualisation process.
  - Explore the data: What do the columns mean? How many rows of data? How reliable is the data? Use the Data Reliability Checklist from the previous lesson to assist
  - Consider purpose/s and relevant questions
  - Clean data by deleting redundant data (if present)
  - Acquire evidence to support answers by creating PivotTables and PivotCharts.

Support notes

- PivotTables are a dynamic and versatile way of creating custom tables from datasets containing raw (unstructured) data. They allow us to answer specific questions by selecting the relevant data and processing it into information. The processes involved include summarising, sorting and filtering the data, and completing calculations, to provide the information needed to answer the questions. Different questions can be answered by pivoting or rearranging the same data.
- PivotCharts are a visual representation of the results of a PivotTable.
- To create a simple PivotTable; for example, Student television survey:
  - Select all data from A1 to D13 (Step 1)
  - Click on Insert > PivotTable
  - Click OK on PivotTable dialog box

- Drag and drop (or in this case, tick Name box then Hours box) in PivotChart Fields window into appropriate areas, as above (Step 2)
- A new worksheet will appear with the summary table above (Step 3), showing hours of television per person, in alphabetical order
- Label all worksheets appropriately by double-clicking on worksheet name at the bottom of the screen and change to a descriptive label.

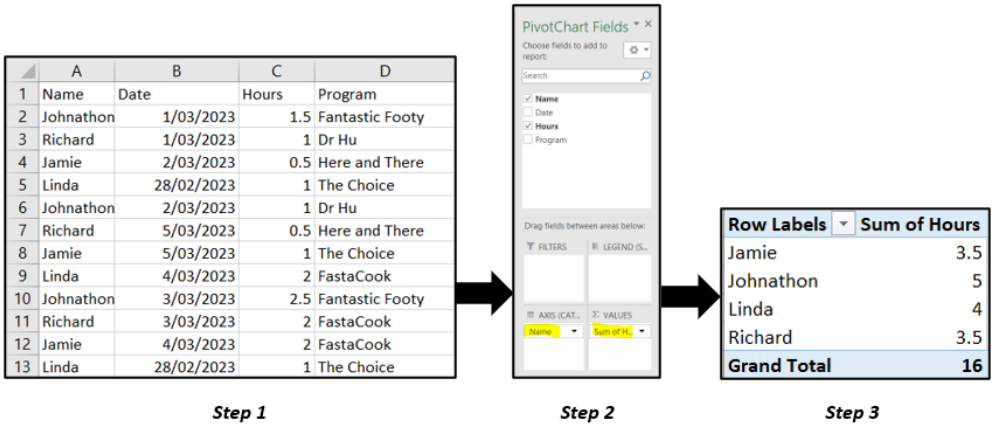


Figure 3: PivotTable process for Student television survey

- A PivotChart can be created to visualise the information provided by the PivotTable.
  - Click on any cell in the PivotTable
  - Click *Insert* > PivotChart
  - The Insert PivotChart dialog box will be displayed. Select appropriate chart type then *OK*. The chart will appear, as below.

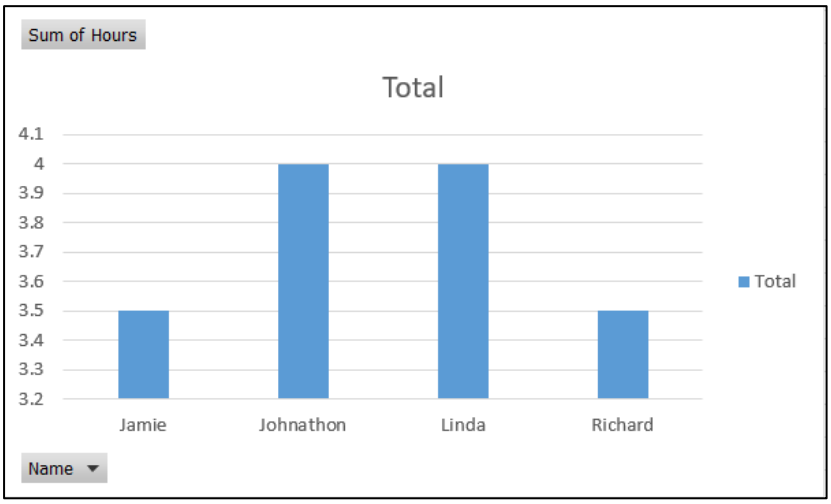


Figure 4: PivotChart of Student Television Survey

- Are there any other questions that can be answered using the same dataset? For example, 'What is the most watched television program?', or 'What category is most popular?' (add the column 'Category').

Teacher

- Deliver the prepared presentation to class, then provide a demonstration of the process using an appropriate software application.

Students

- Students use pre-selected data set and prepared worksheet to answer questions. Each question is to be answered by the students.

Lesson conclusion

- Students write a brief report that summarises the conclusions they have made from the PivotTable planning activity. Students make use of screenshots of the PivotCharts and any other supporting evidence that will validate their statements.

Lessons 12–13: Data reliability, data types and PivotTables (optional)

The Western Australian Curriculum content addressed in these lessons is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Privacy and security

Ethical issues relating to the collection and ownership of data

---

Lesson outline

Learning intentions
Students will: • Identify meaningful data within an acquired dataset and present data to an audience to convey a specific meaning.

Preparation for the lesson

- To activate prior learning, prepare a small number of pre-populated graphs for students to make inferences and assumptions about the data. For example, sporting statistics or the Big Mac Index.
- Create a presentation on the following topics:
  - Data types used in spreadsheets
  - Examples of incorrect data types (such as text in a cell that is expecting a number value)
  - Formatting spreadsheets including PivotCharts
  - Examples of PivotCharts to show trends that can be used to predict outcomes.
- Prepare demonstration:
  - Access a local climate dataset from the nearest weather station online through the Bureau of Meteorology (BOM). Download the dataset in a spreadsheet format, such as CSV.
  - Prepare a PivotTable Planning worksheet for distribution. Add questions that relate to data types and predictions.
  - The following example shows a BOM dataset of maximum temperatures. Points to note on this dataset:
    - Month is stored as an integer. Considering replacing with name of month
    - only Year, Month and Maximum Temperature columns required. All other columns are redundant and can be deleted.
  - Create PivotTable:
    - click anywhere in table of data then Insert > PivotTable (Step 1)
    - change settings in PivotTable Fields panel as per below (Step 2)
    - to remove Grand Totals: right-click on *Grand Totals* cell and choose '*Remove Grand Totals'*.

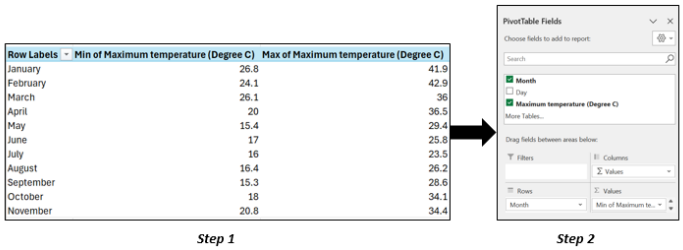


Figure 5: PivotTable fields for monthly maximum temperatures

- Create and style PivotChart:
  - click anywhere in PivotTable then select Insert > Recommended Chart (Step 1)
  - add Chart Title by clicking on PivotChart then Design tab > Add Chart Element > Chart Title. To style, right-click on Chart Title then select Format Chart Title to choose colour scheme etc
  - right-click on any grey field button on PivotChart then select Hide All Field Buttons on Chart (Step 2).

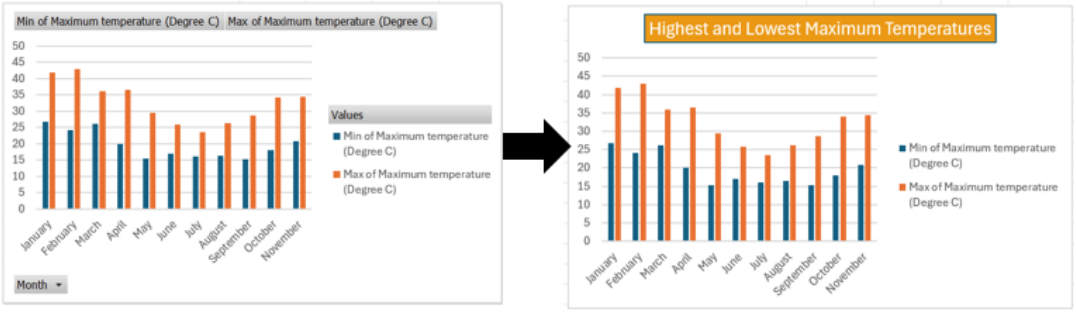


Figure 6: PivotChart styling for monthly maximum temperature

Support notes

- Data type: the type of information held within a spreadsheet cell, such as number, text, date and time, and currency.
- Prediction: assumption based on historical data by identifying trends and forecasting future outcomes.

Teacher

- To activate prior learning ensure students have a basic understanding of using spreadsheet software and can create and manipulate data, format a spreadsheet and manipulate data with simple functions and formulas.
- Engage students by showing prepared data visualisations and ask them to make inferences and assumptions from the graphs in small groups.
- Deliver prepared presentation to the class.
- Demonstrate the acquiring of the prepared dataset as per lesson preparation notes.

Students

- Students complete PivotTable Planning worksheet using the acquired dataset.
- Students create PivotTable and PivotChart, either working alongside teacher demonstration or after the demonstration (teacher decision based on context).
- Students finalise PivotTable Planning worksheet, including predictions based on historical data.

Lesson conclusion

- Reiterate with students the importance and accuracy of data and how it becomes information.
- Select some of the student submissions to showcase to the class. Ask students to signal with a thumbs up or down if they agree with the prediction/s.

Lessons 14–16: Data Australis report

The Western Australian Curriculum content addressed in these lessons is below.

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Design thinking skills

Project management
Plan, develop and communicate, using project management processes, considering time, resources and costs to achieve solutions

Investigating and defining
Investigate a problem for a given need or opportunity

Designing
Design processes and solutions considering a range of technologies and techniques, using appropriate technical terms

Producing and implementing
Implement agreed protocols, a range of technologies, techniques, components and processes to produce designed solutions

Evaluating
Use student-developed contextual criteria to evaluate design processes and solutions

---

Preparation for the lesson

- Students require a copy of the Data Australis report summative assessment (Appendix C).
- Concept Map: gather examples of well-formatted reports that demonstrate Charts or PivotCharts.

Support notes

- The assessment task can be broken into parts and edited to suit the school context. Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their levels of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.

Activate prior knowledge

- Students have previously created, acquired, managed and analysed an online dataset. Facilitate a class discussion focusing on the tasks involved in each of these processes before the assessment.

Teacher

- Concept Map: Break the class into groups of four or five students. Hand out copies of the prepared examples of formatted reports that incorporate Charts or PivotCharts, one per group. Each group will assess the characteristics of a report format using a concept map.

Students

- Students complete the Data Australis report summative assessment (Appendix C).

Lesson conclusion

- Conclude by selecting students to share their report findings with the class.

Appendix A

Formative assessment task

Resources

Resources

Lessons	Resource	Link/information
1	Smart Cities Perth	City of Perth. *Smart Cities Perth*. Smart Cities Perth
	City of Melbourne – Open Data	City of Melbourne. *City of Melbourne – Open Data*. Home Page — CoM Open Data Portal
2	Classroom Ideas: Years 7–8 (Privacy and security)	Australian Curriculum. *Classroom Ideas: Years 7–8 (Privacy and security)*. https://curriculumstagingbos.azurewebsites.net/media/7494/years_7-8_classroom_ideas-privacy_and_security.pdf
3	Paris 2024 Medal Tally	The Australian Olympic Committee. *Paris 2024 Medal Tally* [Table]. https://www.olympics.com.au/games/paris-2024/medal-table/
3–4	Modelling Data Using Spreadsheets	National Centre for Computing Education. *Modelling data using spreadsheets*. https://teachcomputing.org/curriculum/key-stage-3/modelling-data-spreadsheets
5	The Dugongs' Ocean: Shark Bay, Western Australia	UNESCO. *The Dugongs' Ocean: Shark Bay, Western Australia [Video file]*. https://youtu.be/1Z8o2xh_kR4
5–7	Protecting Dugongs	Digital Technologies Hub. *Protecting Dugongs*. Protecting dugongs (digitaltechnologieshub.edu.au)
6	GCF Global	*GCF Global*. https://edu.gcfglobal.org/
	code.org	*code.org*. *CSP Data Analysis [Video file]*. https://youtu.be/uzESOw7tmzw?si=P5Y4AbYY5cYSAu4I
7	Google Maps: My Maps	*Google Maps: My Maps.* My Maps – About – Google Maps
8–9	Canva for Education	*Canva for Education*. https://www.canva.com/education/
	Fundamentals of Design	*Fundamentals of Design*. https://youtu.be/YqQx75OPRa0?si=giQBwMgd6xIRq7WR
12–13	BOM Climate Data Online	Bureau of Meteorology. *Climate Data Online*. http://www.bom.gov.au/climate/data/index.shtml
Appendix C	Tasmanian Convicts (1803–1893)	Australian Government. *Tasmanian Convicts (1803–1893)*. https://data.gov.au/data/dataset/tasmanian-convicts-1803-1893

Appendix B

Formative assessment task

Infographic

Task details

Title	Protecting dugongs – Infographic
Description	Students work individually to research, design, produce and evaluate an Infographic based on the Protecting dugongs activities.
Type of assessment	Formative
Ways of assessing	Evidence submissions, observation
Evidence to be collected	Infographic outline Design sketch Infographic Evaluation checklist
Suggested time	Two to four hours of class sessions
Differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment task.

Content descriptions

Design thinking skills

Investigating and defining

- Investigate a problem for a given need or opportunity

Designing

- Design processes and solutions considering a range of technologies and techniques, using appropriate technical terms

Producing and implementing

- Implement agreed protocols, a range of technologies, techniques, components and processes to produce designed solutions

Evaluating

- Use student-developed contextual criteria to evaluate design processes and solutions

Resources

- Access to design software to produce infographic
- Infographic outline
- Design sketch
- Evaluation checklist
- Marking key

Instructions for teachers

- Students work individually on this task.
- Give students scaffolded worksheets to assist in the completion of each stage of this task.
- Allow students sufficient time to complete the planning worksheets for the Infographic outline and Design sketch. Individual teachers will make a judgement on this based on their class ability and need for support or extension.
- Use oral questioning techniques to give feedback on student progress.

Teacher reflection

Teachers may use the feedback gained from the ongoing formative assessment to:

- review the skill development of students
- inform teaching and learning
- respond to individual student work and identify possible approaches for improvement
- reteach/reinforce student understanding
- inform future teaching and learning
- respond to individual student understanding and identify possible approaches for improvement.

Instructions to students

- Work individually to manage your time, two to four lessons as decided by your teacher, and resources to complete all sections of this assessment.
- This task involves researching, designing, producing and evaluating an Infographic based on the Protecting Dugongs activities. Itemise the most interesting information on your infographic.
- Familiarise yourself with the marking key.
- Work in collaboration with your peers, seeking ongoing feedback, to get the best possible outcome.

Task sheet for students

Task Description: Protecting dugongs infographic

Name _____

1. Infographic outline (5 marks)

Using the *Protecting dugongs report*, turn the information into an Infographic outline that will show how you will structure the content in your Infographic. Use the Infographic outline template below:

Overview	
Target audience characteristics	1. 2. 3.
Key message	

2. Design sketch (storyboard) (20 marks)

Sketch and label design (storyboard) for your Infographic that visually represents the Infographic outline on the previous page. Make sure you describe both Content features and Design features in your sketch.

Complete your sketch in the box below.

3. Evaluation checklist (3 marks)

Complete three evaluations of Infographics created by other students, as guided by your teacher.

Use the Evaluation checklist template below.

Criterion	Infographic 1	Infographic 2	Infographic 3
1.			
2.			
3.			
4.			
5.			
General feedback:			

Marking key – Protecting dugongs infographic

Description	Marks
Investigating and defining (target audience)	
Lists three (3) characteristics of target audience – one mark for each	3
Subtotal	**/3**
Investigating and defining (key message)	
States key message clearly and briefly, relating to the target audience	2
States key message as a general statement	1
Subtotal	**/2**
Designing (design sketch/storyboard)	
Develops a comprehensive storyboard design with detailed and accurate annotations incorporated	5
Develops a storyboard design with a range of detailed and accurate annotations	4
Develops a storyboard design with labels	3
Presents a basic storyboard design with limited labelling	2
Presents an incomplete storyboard	1
Subtotal	**/5**
Producing and implementing (infographic content)	
Creates and refines an effective digital solution that displays all selected data aesthetically	5
Creates an effective digital solution that displays all selected data	4
Creates a digital solution that displays some data effectively with limited aesthetic considerations	3
Creates digital solution that display minimal consideration for the user experience	2
Creates a digital solution that is incomplete or includes an inappropriate product	1
Subtotal	**/5**

Description	Marks
Producing and implementing (infographic images/style)	
Uses a range of techniques, software and hardware safely to create an infographic that demonstrates all selected data clearly and aesthetically	9–10
Uses a range of techniques, software and hardware safely to create an infographic that mostly demonstrates the selected data clearly and aesthetically	7–8
Uses some techniques, software and hardware safely to create an infographic that demonstrates some data effectively with limited aesthetic considerations	5–6
Uses some techniques, software and hardware to create part of an infographic that demonstrates some of the select data with limited aesthetic considerations	3–4
Uses limited techniques, software and hardware to create an infographic with minimal consideration for the user experience and an incomplete or inappropriate product	1–2
Subtotal	**/10**
Evaluation	
Applies contextual criteria to comprehensively examine design processes and solutions, providing a detailed evaluation	3
Assesses design processes and solutions	2
Completes minimal evaluation	1
Subtotal	**/3**
Total	**/28**

Appendix C

Summative assessment task

Data Australis report

Task details

Title	Data Australis report
Description	Students acquire, manage and analyse data from a dataset in order to answer questions and make predictions
Type of assessment	Summative
Ways of assessing	Electronic or hardcopy report
Evidence to be collected	Written answers Storyboard design Report Evaluations
Suggested time	Four one-hour lessons
Differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment task.

Content descriptions

Acquiring, managing and analysing data

Analyse and validate data using spreadsheets to draw conclusions and make predictions by identifying trends

Design thinking skills

Project management

- Plan, develop and communicate, using project management processes, considering time, resources and costs to achieve solutions

Investigating and defining

- Investigate a problem for a given need or opportunity

Designing

- Design processes and solutions considering a range of technologies and techniques, using appropriate technical terms

Producing and implementing

- Implement agreed protocols, a range of technologies, techniques, components and processes to produce designed solutions

Evaluating

- Use student-developed contextual criteria to evaluate design processes and solutions

Resources

- Student task sheet with questions, predictions, storyboard design and evaluation
- Teacher-provided dataset. Note: this example uses the *Tasmanian Convicts dataset* from data.gov.au (Australian Government). Using a different dataset would require different questions and predictions with subsequent changes made to the student task sheet
- Access to word processing and spreadsheet software

Instructions for teachers

Distribute prepared dataset to students. Edit the documentation to suit the dataset as required.

Teacher reflection

Teachers may use the feedback gained from the ongoing formative assessment to:

- review the skill development of students
- inform teaching and learning
- respond to individual student work and identify possible approaches for improvement
- reteach/reinforce student understanding
- inform future teaching and learning
- respond to individual student understanding and identify possible approaches for improvement.

Part 1

In pairs, students format a spreadsheet and analyse data to answer given questions.

After completing their responses to the questions, students choose five interesting facts from the dataset to be displayed as a Chart or PivotChart in a report format.

Part 2

Students individually complete a storyboard, report and evaluation. Students should:

- use detailed annotations in the space provided on their storyboard rather than simple labels
- become familiar with chosen word processing software before commencing the task
- create evaluation questions before carrying out a self-and peer-evaluation of the completed report.

Instructions to students

Part 1 (in pairs)

- Working with your partner, format a spreadsheet. Make sure your formatting makes the data easier to read and use. Be careful to check that the data is accurate before starting the analysis.
- Answer questions 1–13.
- Choose five data points from the selected dataset that would be interesting when compared or displayed for an intended audience.

Part 2 (individually)

- Annotate your storyboard with as much detail as you can.
- Use a variety of tools when creating your report.
- Make your report visually interesting and clear for the viewer to read.
- When creating your evaluation questions, think of five open ended questions that will give you the most feedback.

Task sheet for students

Part 1 (in pairs)
Task description: Data Australis report

Name _____

I am working with _____

Use the dataset provided to answer the following questions.

Question 1 (6 marks)

Format your dataset to make it visually appealing and easier to read.

In the space below, place a screen shot of your spreadsheet.

Question 2 (2 mark)

Voyage number 170 departed from which port?

_____

State the steps taken to finding this answer.

_____

Question 3 (3 marks)

What are the two departure dates for the Anna Maria ship?

_____

State the steps taken to finding this answer.

_____

Question 4 (2 marks)

How many people who travelled were named on the Ship Shamrock?

_____

State the steps taken to finding this answer.

_____

Question 5 (2 marks)

How many different ships have departed from Queenstown port?

_____

State the steps taken to finding this answer.

_____

Question 6 (1 mark)

Identify why two dates are listed in some rows of the Year column.

_____

Question 7 (2 marks)

Give a reason why some of the data is missing from Ship_Native_Place.

_____

_____

_____

_____

_____

_____

Question 8 (4 marks)

State two factors that could affect the accuracy of data in this dataset.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 9 (3 marks)

Explain how to check the authenticity of this dataset.

Question 10 (3 marks)

How up to date is this dataset? Explain why timeliness of data is important.

Question 11 (6 marks)

Create two Charts or PivotCharts showing interesting data from the dataset.

Place the screenshots in the spaces below.

Question 12 (4 marks)

Describe what these graphs show and explain why you created them using that graph type.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 13 (4 marks)

Based on the dataset provided, predict how many ships would have departed in 1848 if convict shipping continued. Justify why you have chosen this number.

_____

_____

_____

_____

_____

_____

_____

_____

_____

In your pair, list five facts from the dataset that would be interesting when displayed in a report.

1. _____
2. _____
3. _____
4. _____
5. _____

Worksheet/booklet for students

Part 2 (Individually)

Task description: Data Australis report (29 marks)

Use the five interesting facts chosen from your dataset to design and create a report. Create evaluation questions to self-evaluate your report and conduct peer-evaluation for future improvements.

Step 1

- Complete a storyboard of your report with annotations using the template on the next page.

Step 2

- Create your report in the software chosen by your teacher.

Step 3

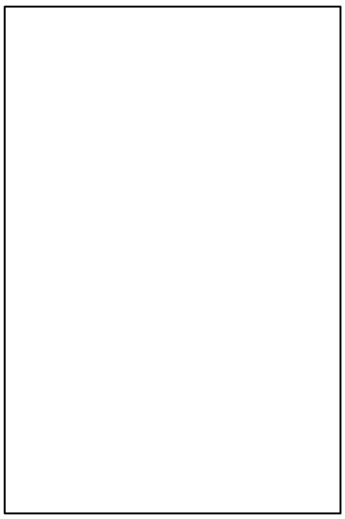
- Write five evaluation questions to help improve your designs and reports in the future.

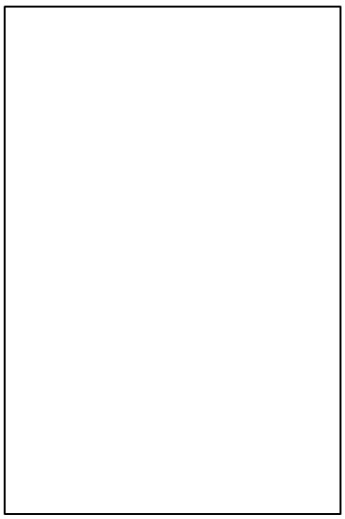
Step 4

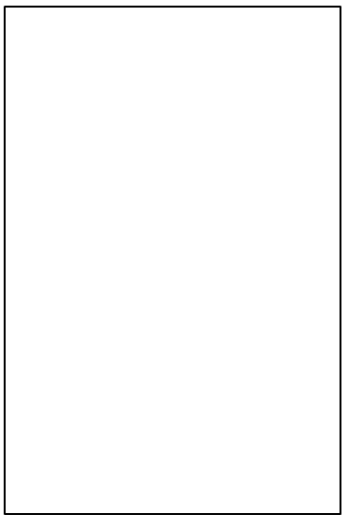
- Self-evaluate your report with the evaluation questions you have created.

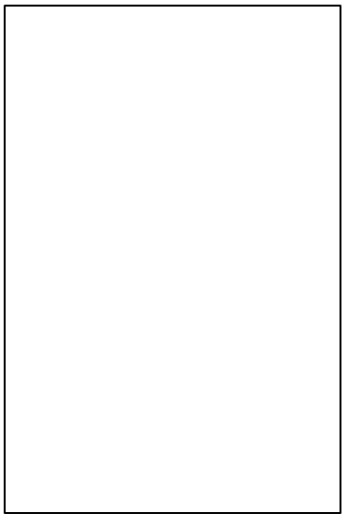
Step 5

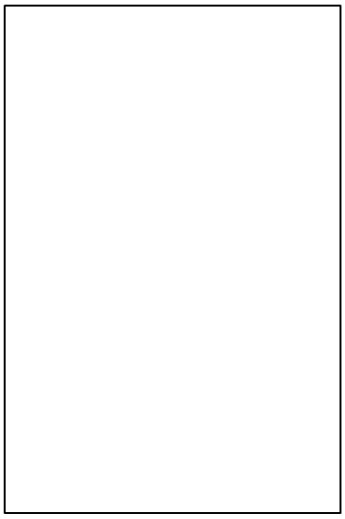
- Complete a peer-evaluation of your report using the evaluation questions you have created

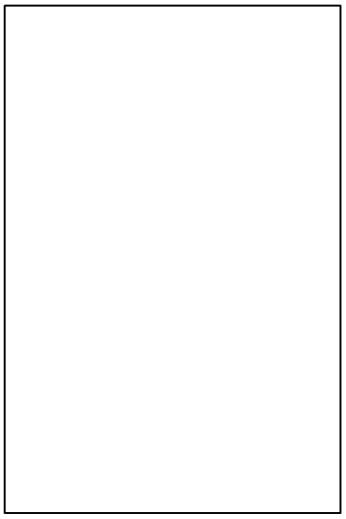












Marking key (Part 1)

Description	Marks
Q1. Spreadsheet design	
Produces a spreadsheet that is visually appealing, easy to read, includes filter functions and considers usability	3
Produces a spreadsheet that is easy to read, includes filter functions and considers usability with the removal of unnecessary columns	2
Attempts to produce a spreadsheet with formatting	1
Subtotal	**/3**
Q1. Spreadsheet content	
Produces a spreadsheet with reliable data by considering data timeliness, authenticity and accuracy	3
Produces a spreadsheet with some reliable data by giving consideration to data timeliness, authenticity and accuracy	2
Produces a spreadsheet with limited attention to reliability of data	1
Subtotal	**/3**
Q2. Voyage number 170 departed from which port?	
One mark for the correct answer (London) *sample answer may vary with data set*	1
Q 2. Process	
States a logical and accurate process to identify answer	1
Subtotal	**/2**
Q3. What are the two departure dates for the Anna Maria ship?	
One mark for each of the correct dates (7 October 1851, 13 March 1848) *sample answer may vary with dataset*	1–2
Q 3. Process	
States a logical and accurate process to identify answer	1
Subtotal	**/3**
Q4. How many people who travelled were named on the ship Shamrock?	
One mark for the correct answer (15) Note: sample answer may vary with data set	1
Q 4. Process	
States a logical and accurate process to identify answer	1
Subtotal	**/2**

Description	Marks
Q5. How many different ships have departed from Queenstown port?	
One mark correct answer (2) Note: sample answer may vary with data set	1
Q 5. Process	
States a logical and accurate process to identify answer	1
Subtotal	**/2**
Q6. Identify why two dates are listed in some rows of the Year column	
Accurately identifies an assumption for having two dates listed in some of the rows of the Year column	1
Subtotal	**/1**
Q7. Give a reason why some data is missing from Ship_Native_Place	
Gives a comprehensive/accurate reason why some data is missing from the dataset	2
Gives a basic/simple reason why some data is missing from the dataset	1
Subtotal	**/2**
Q8. State two factors that could affect the accuracy of data in this dataset	
For each factor	
States comprehensively how it could affect the accuracy of the data in this dataset	2
Identifies how it could affect the accuracy of the data in this dataset	1
Subtotal	**/4**
Q9. Explain how to check the authenticity of this dataset	
Explains how to check the authenticity of this dataset	3
Describes how to check the authenticity of this dataset	2
Identifies how to check the authenticity of this dataset	1
Subtotal	**/3**
Q10. How up to date is this dataset?	
Identifies how up to date the dataset is	1
Q 10. Explain why timeliness of data is important	
Explains why timeliness of data is important	2
Identifies why timeliness of data is important	1
Subtotal	**/3**

Description	Marks
Q11. Create two Charts or PivotCharts showing interesting data from the dataset For each Chart:	
For each Chart	
Effectively represents data in a visually appealing and accurate way	3
Represents data in a visually appealing and accurate way	2
Selects and graphs irrelevant data	1
Subtotal	**/6**
Q12. Describe what these graphs show	
Describes what each graph shows	2
Identifies what each graph shows	1
Q 12. Explain why you chose that graph type	
Provides an explanation for the selection of graph types	2
Attempts to provide an attempted explanation for the selection of graph types	1
Subtotal	**/4**
Q13. Based on the dataset provided, predict how many ships would have departed in 1848 if convict shipping continued. Justify why you have chosen this number.	
Predicts and accurately justifies number with reference to the data provided	4
Predicts and justifies number	3
Predicts and attempts to justify number	2
Provides limited justification	1
Subtotal	**/4**
Part 1 total	**/42**

Marking key (Part 2)

Description	Marks
Designing (storyboard)	
Develops a comprehensive storyboard design with detailed and accurate annotations incorporated	5
Develops a storyboard design with a range of detailed and accurate annotations	4
Develops a storyboard design with annotations	3
Presents a basic storyboard design with limited labelling	2
Presents an incomplete storyboard	1
Subtotal	**/5**
Producing and implementing (content)	
Creates and refines an effective digital solution that displays all selected data aesthetically	5
Creates an effective digital solution that displays all selected data	4
Creates a digital solution that displays some data effectively with limited aesthetic considerations	3
Creates a digital solution that display minimal consideration for the user experience	2
Creates a digital solution that is incomplete or includes an inappropriate product	1
Subtotal	**/5**
Producing and implementing (images/style)	
Uses a range of techniques, software and hardware safely to create an infographic that demonstrates all selected data clearly and aesthetically	9–10
Uses a range of techniques, software and hardware safely to create an infographic that mostly demonstrates the selected data clearly and aesthetically	7–8
Uses some techniques, software and hardware safely to create an infographic that demonstrates some data effectively with limited aesthetic considerations	5–6
Uses some techniques, software and hardware to create part of an infographic that demonstrates some of the select data with limited aesthetic considerations	3–4
Uses limited techniques, software and hardware to create an infographic with minimal consideration for the user experience and an incomplete or inappropriate product	1–2
Subtotal	**/10**

Description	Marks
Evaluation	
Independently develops and applies contextual criteria to comprehensively examine design processes and solutions, providing a detailed evaluation	5
Independently develops and applies contextual criteria to comprehensively examine design processes and solutions	4
Independently develops contextual criteria to assess design processes and solutions	3
Limited development of contextual criteria and minimal details are provided in the self-evaluation	2
Lists unclear contextual criteria, with minimal self-evaluation completed	1
Subtotal	**/5**
Project management	
Consistently plans, develops and communicates, using project management processes, to achieve effective solutions	4
Plans, develops and communicates, using project management processes, to achieve solutions	3
Plans, develops and communicates, using project management processes, to achieve solutions	2
Occasionally plans, develops and communicates, using project management processes, to achieve incomplete solutions	1
Subtotal	**/4**
Part 2 total	**/29**
Total	**/71**

Acknowledgements

Lesson 3

Data from: The Australian Olympic Committee. (2024). Paris 2024 Medal Tally [Table].Retrieved June, 2025, from https://www.olympics.com.au/games/paris-2024/medal-table/

Lesson 5

'Supporting' dot points information from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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'Students' sub dot points 2–5 and 10 adapted from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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Lesson 6

'Supporting notes' dot point 1adapted from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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Lesson 6

'Students' sub dot points 2–5 and 10 from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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'Students' sub dot points 6–8 from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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Lesson 7

'Students' sub dot points 1–5 adapted from: Digital Technologies Hub. (n.d.). Protecting Dugongs. Retrieved June, 2025, from https://www.digitaltechnologieshub.edu.au/teach-and-assess/classroom-resources/lesson-ideas/protecting-dugongs/
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