**Where’s the mankarr? Recording and visualising data: Part 2**

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| Year levelStrand(s)Lesson lengthCD Code | * Year 4, Year 5
* Statistics
* 60 mins
* [AC9M4ST01](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST01&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)
* [AC9M4ST02](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST02&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)
* [AC9M4ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST03&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)
* [AC9M5ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY5&content-description-code=AC9M5ST03&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)
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| Lesson summary | In this second of two lessons, students view a video to record data about the bilby (mankarr). They visualise and interpret the data.In the previous lesson *Where’s the mankarr? Video observation data*, students investigate data from animal observations recorded by a video camera. This lesson was developed in collaboration with Caty Morris and Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA).ESA would like to acknowledge the Kanyirninpa Jukurrpa and Martu peoples as developers of the source material used in the creation of this lesson. |
| Learning intention | * We are learning how data is used to monitor and care for endangered species using a real-life context from the Western Desert.
* We are also learning language of First Nation’s traditional owners of the land – the Martu.
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| Success criteria | By the end of this lesson, students can: * record data from observations
* visualise their data using an appropriate format
* communicate findings from their observations and data interpretation
* use visualisations to communicate findings
* learn key terms in Martu, a First Nations Australian language.
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| Why are we learning about this? | Students can engage in a real-life mathematics experience about caring for Country through a First Nations Ranger group. This activity connects mathematics with culture. |
| Prerequisite student knowledge and language | Prior to this lesson, it is assumed that students have knowledge of:* recording data in a table
* tallying observations
* basic use of a spreadsheet.

Terminology definitions and explanations:* Column graph: a visual representation of data using vertical bars. Each bar represents a category or data point, and the height of the bar corresponds to the value it represents. Column graphs are used to compare and display data easily.
* Heat map: a visual representation of data in which colours are used to show the intensity or distribution of values across a grid. Darker colours typically represent higher values, while lighter colours represent lower values. Heat maps are useful for identifying patterns and trends in data.
* Spreadsheet: a computer program or document that organises data into rows and columns. It allows you to input, calculate, and manipulate data efficiently. Spreadsheets are commonly used for tasks like budgeting, data analysis and creating tables and charts.
* Table: a structured arrangement of data organised into rows and columns. Tables are used to present information in a clear and organised format. Each row typically represents a single record or data entry, while columns define different attributes or variables related to the data.
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| **Resources** | * Lesson plan (Word)
* Teacher’s slides: Ways to record data (PowerPoint)
* Access to the video [Wanja Mankaar? Where is the bilby](https://www.kj.org.au/media-films/wanyja-mankarr)?
* Example Excel spreadsheets: Column graph; and Column graph set up; Heat map
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Curriculum information

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| Achievement standard | By the end of Year 4, Students create many-to-one data displays, assess the suitability of displays for representing data and discuss the shape of distributions and variation in data. They use surveys and digital tools to generate categorical or discrete numerical data in statistical investigations and communicate their findings in context. They convert between units of time when solving problems involving duration. By the end of Year 5, students plan and conduct statistical investigations that collect nominal and ordinal categorical and discrete numerical data using digital tools. |
| Content description(s) | Students acquire data for categorical and discrete numerical variables to address a question of interest or purpose, using digital tools; represent data using many-to-one pictographs, column graphs and other displays or visualisations; interpret and discuss the information that has been created. [AC9M4ST01](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST01&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)Students analyse the effectiveness of different displays or visualisations in illustrating and comparing data distributions, then discuss the shape of distributions and the variation in the data. [AC9M4ST02](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST02&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)Students conduct statistical investigations, collecting data through survey responses and other methods; record and display data using digital tools; interpret the data and communicate the results. [AC9M4ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY4&content-description-code=AC9M4ST03&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)Students plan and conduct statistical investigations by posing questions or identifying a problem and collecting relevant data; choose appropriate displays and interpret the data; communicate findings within the context of the investigation. [AC9M5ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/foundation-year_year-4_year-5/content-description?subject-identifier=MATMATY5&content-description-code=AC9M5ST03&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick) |
| General capabilitiesCross-curriculum priority | General capabilities Numeracy* Interpreting and representing data [Level 4](https://v9.australiancurriculum.edu.au/f-10-curriculum.html/learning-areas/mathematics/year-4/general-capability-snapshot?subject-identifier=MATMATY4&content-description-code=AC9M4ST01&general-capability-code=N&element-code=NS&sub-element-index=0&sub-element-code=NSIRD&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)

Science* Explain the roles and interactions of consumers, producers and decomposers within a habitat and how food chains represent feeding relationships [AC9S4U01](https://v9.australiancurriculum.edu.au/f-10-curriculum.html/learning-areas/science/year-4/content-description?subject-identifier=SCISCIY4&content-description-code=AC9S4U01&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)

Cross-curriculum priority Aboriginal and Torres Strait Islander Histories and Cultures * First Nations communities of Australia maintain a deep connection to, and responsibility for, Country/Place and have holistic values and belief systems that are connected to the land, sea, sky and waterways. [A\_TSICP1](https://v9.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/aboriginal-and-torres-strait-islander-histories-and-cultures/slideout?code=A_TSICP1&organising-idea=0)
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| Areas of challenge | Some students may:* inaccurately record data of observations and misuse a tally system of recording data
* not use a scale on the axis to display frequencies and may have difficulty constructing a scale on the horizontal or vertical axis to effectively represent frequencies or measurements
* not realise that the relative lengths of the bars relate to quantities in the collected data
* not realise that measurement data can be grouped
* be unable to interpret the meaning between marked intervals on scales of frequencies or measures.
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| Strategies | * [Culturally responsive pedagogies](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/culturally-responsive-pedagogies/)
* [Concrete, Representational, Abstract (CRA)](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/concrete-representational-abstract-cra/)
* [Explicit teaching](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/explicit-teaching/)
* [Differentiated teaching](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/differentiated-teaching/)
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Lesson structure

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| Learning hook10 mins | * **Download and use the Teacher’s slides: Ways to record to accompany your teaching. You will find this in the ‘What you need’ section.**
* **Revise the previous lesson where students discussed suitable ways to record data from observations of the animals featured in the video *Wanja Mankaar? Where is the bilby?***
* **Refer back to their reflections about why it is important to collect data on the bilby. Ensure students are clear on why the data is being collected. Make explicit that the data helps scientists understand the species being monitored.**
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| Explore40 mins | **Recording data*** **Return to the groups established in the previous lesson. Set up a group data recording table to record their observations (either electronically or on paper). Discuss the use of tallying to record observations – grouping five observations together, then starting a new tally mark. Check each group’s approach before they watch the video. Use questioning and feedback to provide support so they are clear on what works well and what issues their approach might have.**
* **In their group students watch the video *Wanja Mankaar? Where is the bilby?* on a shared device. Encourage students to pause the video and record the data. In their pairs or groups of three they take on their designated roles of drawing, collecting, recording and checking.**

**Organising the data*** **Use slides 5–7 from the Teacher’s slides: Ways to record data. Revise the data that they can collect from viewing the video. and revisit ways to record the data in a table. Ask, ‘What is a logical way to organise the data?’ Discuss the use of months to show observations. How can you account for different animals? If we observed more than one animal in a month, how might we show that? (Answer: In a column graph we would need a column for each animal in that month.)**

**Visualising the data*** **Explain that a graph is one way to represent data. Ask, what other alternatives might be explored? Students might suggest a number of ways that might include:**
* Create a column graph with observations for each month. This will require students to show multiple columns for some months to represent more than one type of animal sighting.
* Data can be shown across a month to show the duration and sightings on particular days. Show an example page of a calendar month on a slide. Discuss this as an option, what is useful or not useful?
* Students familiar with Excel could create a table in a spreadsheet and use the table to create a chart of the data. Use the sample Excel spreadsheets: Column graph and Column graph set up as a teaching tool.
* Use Excel to create a heat map to show observations. Students can use conditional formatting with a colour scale to represent numbers of animals with a colour scale red to dark green indicating numbers 1–9. Use the example Excel Heat map as a teaching tool.

**Analyse and communicate*** **Record 3–5 statements about the data, for example: In March there were [number] bilbies seen. This is [less or more] than May where there were [number] sighted. [Month] had the most feral animals sighted.**
* **Students use their statements to write a brief report for the Martu rangers. They explain their findings using data and visualisations.**

**Differentiation** * **Support: To reduce cognitive load a student may focus on recording sightings of one animal type.**
* **Enabling: What patterns in the data are emerging?**
* **Extending: How can you use a spreadsheet with a drop-down menu to record and validate data allowing only whole-number values, and create a chart? How would you show the days when animals were sighted compared to days that had no sightings?**
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| Summary and reflection10 mins | * **How did you record and visualise the data? How well did your data display show what you wanted?**
* **How did you use the data to create your brief report?**
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| Assessment | * **Use observation and informal conversations to gauge students’ understanding of ways to acquire and record data.**
* **Use work samples such as final data displays, students’ brief report and their reflections to assess their proficiency in recording and visualising data.**
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