**Sleepy statistics: Part 1**

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| Year level  Strand(s)  Lesson length  CD Code | * 7 * Statistics * 60 minutes * [AC9M7ST02](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY7&content-description-code=AC9M7ST02&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick),[AC9M7ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick) |
| Lesson summary | In this first of two lessons, students acquire data as they conduct a sleep audit over two weeks to test hypotheses regarding improving sleep quality.  In a second lesson, Sleepy statistics: Part 2, students will represent the data using a back-to-back stem-and-leaf plot and draw conclusions based on statistical analysis. |
| Learning intention | * We will learn how to create and interpret a stem-and-leaf plot. * We will interpret and use data displays to compare datasets. * We will learn how different bedtime behaviours affect the quantity and quality of sleep, and understand the importance of statistical analysis in real-world data representation. |
| Success criteria | By the end of this lesson, students can:   * record and organise data in a table * create a stem-and-leaf plot by hand * calculate mean, median and range accurately from a stem-and-leaf plot. |
| Why are we learning about this? | We live in a data-driven world, where statistics are everywhere and graphs are a helpful way to summarise and visualise data. Understanding and interpreting graphs is an important skill that allows us to quickly interpret and analyse information in real-world situations. Understanding sleep patterns is crucial for health and wellbeing. By statistically analysing personal data, we can make informed decisions on daily habits, promoting healthier lifestyles. |
| Prerequisite student knowledge and language | It is assumed that students have:   * a basic understanding of data representation methods such as tables * an ability to calculate time differences, for example, finding the difference between 9.45pm and 6.50am and converting times in hours and minutes to minutes * can calculate mean, median and range for a dataset * an understanding of place and place value. |
| Resources | * Teacher’s slides (Part 1) * Sleep diary and instructions worksheet (Word) * Practising stem-and-leaf plots worksheet (Word) * Exit slip (Word) * Computers or tablets, Sticky notes |

Curriculum information

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| Achievement standard | [By the end of Year 7, students plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7?view=advanced&strand-selections=MATMAT-statistics_MATMAT-probability&hide-ccp=0&hide-gc=0&detailed-content-descriptions=0&side-by-side=1&strands-start-index=0&subjects-start-index=0). Students interpret data in terms summary statistics. |
| Content description(s) | Students create different types of numerical data displays including stem-and-leaf plots using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode. [AC9M7ST02](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY7&content-description-code=AC9M7ST02&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 involving data for discrete and continuous numerical variables; analyse and interpret distributions of data and report findings in terms of shape and summary statistics. [AC9M7ST03](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/content-description?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&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 capabilities  Cross-curriculum priority | **General capabilities**  Numeracy:   * Interpreting and representing data ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST02&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)) and ([PL6](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&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))   Digital Literacy:   * Interpret data ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST02&general-capability-code=DL&element-code=DLI&sub-element-index=0&sub-element-code=DLIC&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)) * Select and operate tools ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST02&general-capability-code=DL&element-code=DLMO&sub-element-index=0&sub-element-code=DLMOC&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))   Critical and Creative Thinking:   * Interpret concepts and problems ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&general-capability-code=CCT&element-code=CCTANA&sub-element-index=0&sub-element-code=CCTANAA&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)), * Draw conclusions and provide reasons ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&general-capability-code=CCT&element-code=CCTANA&sub-element-index=1&sub-element-code=CCTANAB&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)) * Develop questions ([PL5](https://v9.australiancurriculum.edu.au/f-10-curriculum/learning-areas/mathematics/year-7_year-8_year-9_year-10/general-capability-snapshot?subject-identifier=MATMATY7&content-description-code=AC9M7ST03&general-capability-code=CCT&element-code=CCTINQ&sub-element-index=0&sub-element-code=CCTINQA&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick))   **Related subject areas:**  Science ([AC9S7I02](https://v9.australiancurriculum.edu.au/f-10-curriculum.html/learning-areas/science/year-7/content-description?subject-identifier=SCISCIY7&content-description-code=AC9S7I02&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)), Health and Physical Education ([AC9HP8P10](https://v9.australiancurriculum.edu.au/f-10-curriculum.html/learning-areas/health-and-physical-education/year-7_year-8/content-description?subject-identifier=HPEHPEY78&content-description-code=AC9HP8P10&detailed-content-descriptions=0&hide-ccp=0&hide-gc=0&side-by-side=1&strands-start-index=0&subjects-start-index=0&view=quick)) |
| Areas of challenge | Some students may:   * think all forms of data representation can be used interchangeably * find keeping consistent data recording difficult * experience difficulty using digital spreadsheets.   The following interventions are suggested. Teachers can:   * highlight the purpose and effectiveness of different graphical representations – for instance, asking students what kind of data a stem-and-leaf plot could be effectively used for (categorical data, single/double-digit numerical data) and highlighting how other graphs, such as pie charts, might be a poor choice * check in with students each lesson to remind them to update their sleep diaries and consider emailing parents to remind them to support their children in completing the diary * model how to input data into software and generate graphs. Spreadsheets are pre-populated with inbuilt calculations in hidden tabs. |
| Strategies | [Mathematical investigation](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/mathematics-investigation/)  [Questioning](https://www.mathematicshub.edu.au/plan-teach-and-assess/teaching/teaching-strategies/questioning/) |

Lesson structure

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| Learning hook  15 mins | **Important note:** This lesson series can be structured over a two and a half week period to allow for the collection of data. The learning hook below takes about 15 minutes to deliver with the teacher’s slides. Deliver this a week before this lesson is scheduled, so students can collect Week 1 sleep data. At the end of this lesson, you will instruct students to collect Week 2 data, which will have a slight change of instruction.  **Iteration**: If time is short and to reduce cognitive load, combine lesson with students creating two different stem-and-leaf plots for the two weeks of data (rather than a back-to-back stem-and-leaf plot). Remove the two-column graph created using a spreadsheet.  **Learning hook**   * Hand out sticky notes (or squares of paper) and ask students to write down how long they think they slept last night in hours and minutes. * Ask the students to stand up with their papers or sticky notes and stand in a long line in increasing order. The teacher notes the highest and lowest values on the board and students return to their seats. * Ask students to think for 30 seconds about how much sleep they think they should get each night, and then tell their neighbour. * Bring up slide 2, which shows that ‘Adolescents are only getting between 6.5 and 7.5 hours of sleep on school nights’ and lead a discussion about how much sleep students should get, what affects our sleep, and why sleep is important for health. * Distribute the Sleep diary and instructions to students and use slides 3 and 4 to explain how to keep a sleep diary over the next week. Remind students about filling out the diary each lesson during the week. * If students ask why are they are keeping a sleep diary, show them the learning intentions on slide 5, and make connections with the task in your class discussion. |
| Explore  30 mins | **Stem-and-leaf plots**   * Hand out more sticky notes and ask each student to note their date of birth ignoring the month and year, for example, a student born on 17 May writes 17, a student born on 28 February writes 28. Explain that we are going to create a new type of graph showing their birthdates. * Ask students to stick their notes on the whiteboard in rows. Place the notes in groups – 0–9, 10–19, 20–29 and 30–31, but in no order. Ask how the data would be better shown and elicit the idea of ordering the data. Ask a couple of student volunteers to reorder the data. * Draw a stem-and-leaf template on the whiteboard with 0 to 3 on the stem and demonstrate, with student assistance, how to add the data to the stem-and-leaf plot. * Explain the use and construction of a stem-and-leaf plot, using slides 6–9 if desired. It is important that the students gain familiarity with a double-digit stem as this will be required for their sleep survey data. * Use questioning to scaffold the students trying to find the range, mean, median and mode from the stem-and-leaf plot created in the Introduction. * Observe students’ work and use questioning/feedback to correct any misunderstandings.   **Individual activities**   * Students complete the downloadable worksheet: Practising stem-and-leaf plots. * Students complete the online interactive[Interpreting stem and leaf plots](https://www.geogebra.org/m/djgpuuve) or any further related activities you would like to use. |
| Summary and reflection  15 mins | * Reserve 10 minutes to summarise the key features of a stem-and-leaf plot. Go through slides 10 to 12, which are about sleep and sleep hygiene. Slide 11 gives the sleep diary instructions for Week 2 where students make one change to their daily sleep practices. * Remind students to record their sleep data every night. |
| Assessment | The following is a mid-sequence opportunity for ongoing assessment for this lesson.  If time allows, students complete the mid-sequence Exit slip (slide 13 from the teacher’s slides) in the remainder or the lesson or as a homework task.  Note: Download, print and cut beforehand. There are three slips per page. |