# Sample Unit – Mathematics Standard – Year 11

***Sample for implementation for Year 11 from 2018***

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| **Unit title** | Classifying and Representing Data | **Duration** | 15 hours |
| **Topic** | Statistical Analysis | **Subtopic** | MS-S1: Data Analysis |
| **Subtopic focus**The principal focus of this subtopic is planning and management of data collection, classification and representation of data, calculation of summary statistics for single datasets and their use in the interpretation of data.Students develop awareness of the importance of statistical processes and inquiry in society.Within this subtopic, schools have the opportunity to identify areas of Stage 5 content which may need to be reviewed to meet the needs of students.This unit provides opportunities for the integrated delivery of the Mathematics Life Skills course. [Eligibility](http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/life-skills/eligibility) for Life Skills courses is determined through the school’s [collaborative curriculum planning process](http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/collaborative-curriculum-planning). Personalised adjustments have also been included to meet the needs of a student with disability. Read the student’s case study [here](http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/case-studies/kai). | **Resources**Access for teacher and student to spreadsheet technology.Access for teacher and student to the internet.Australia Bureau of Statistics (ABS): [www.abs.gov.au](http://www.abs.gov.au) CensusAtSchool Australia: <http://www.abs.gov.au/censusatschool>Numeracy in the News: <http://www.mercurynie.com.au/mathguys/mercury.htm>AAMT Top Drawer Teachers: <http://topdrawer.aamt.edu.au/Statistics/Good-teaching>Other [www.nss.gov.au](http://www.nss.gov.au), [www.statisticsworldwide.com](http://www.statisticsworldwide.com), [www.usa.gov/statistics](http://www.usa.gov/statistics)  |

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| **Outcomes** | **Assessment strategies** |
| A student:* represents information in symbolic, graphical and tabular form MS11-2
* develops and carries out simple statistical processes to answer questions posed MS11-7
* uses appropriate technology to investigate, organise and interpret information in a range of contexts MS11-9
* justifies a response to a given problem using appropriate mathematical terminology and/or calculations MS11-10

The following Life Skills outcomes have been integrated into this unit:* engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-2
* uses data in a range of contexts MALS6-9
* engages with mathematical skills and techniques, including technology, to investigate, explain and organise information MALS6-13
* communicates mathematical ideas and relationships using a variety of strategies MALS6-14
 | Informal assessment:* Students respond to prompts of keywords related to the unit to establish what prior knowledge they have, either orally as a class, as a class brainstorm, or in groups on paper. The ‘Chalk Talk’ Routine from ‘Visible Thinking’ is one method of doing this.
* Students read some questions on prior and early knowledge in the topic, and traffic light the questions as green (I understand), amber (I understand bits or I sort of understand) or red (I don’t understand). This can be done by showing a card of that colour, colouring in, or simply writing a G, A or R next to each question.
* Student responses to a class discussion can inform the teacher of the learning required.
* Students work either individually or in small groups, to draw a mind map, poster or summary of their prior learning in the topic.
* The teacher starts each lesson with a number of brief questions that review the key concepts of previous lessons and/or key skills that will be required in the lesson that will follow.
* As a plenary to a lesson ask students to summarise the core ideas they have learnt in their book, on a piece of paper to hand in, or orally.
* Run a ‘micro-lab’ where students bring a question they were unable to answer. Students work in groups of three to discuss the questions and share their ideas. Emphasise that a minute of silence to consider each question is important, to establish that thinking time is necessary in mathematics.

Formal assessment:An investigative task based on students using the knowledge, understanding and skills they have developed in this topic to analyse data from government websites, for example the Australian Bureau of Statistics, The Bureau of Meteorology or Graduate Careers Australia. Note: There is no requirement for formal assessment of Life Skills outcomes. |

| **Content** | **Teaching, learning and assessment strategies** | **Personalised adjustments****Case study: Kai** |
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| **S1.1: Classifying and representing data (grouped and ungrouped)**Students:* describe and use appropriate data-collection methods for samples and population ◊
	+ investigate whether a sample obtained from a population may or may not be representative of the population by considering different kinds of sampling methods: systematic sampling, self-selected sampling, simple random sampling and stratified sampling
	+ investigate the advantages and disadvantages of each type of sampling
	+ describe the potential faults in the design and practicalities of data- collection processes, eg surveys, experiments and observational studies, misunderstandings and misrepresentations, including examples from the media

**Life Skills*** recognise information in a variety of tables and graphs Critical and creative thinking icon
* recognise examples of data observable in their everyday life
* identify the purpose of collecting a set of data
* identify a range of ways that data can be collected to answer a given question https://lh5.googleusercontent.com/Rxtd35_bD9NYVAYTpCQ-l7NjzMfiyFajA_6a4YcahraxXOTfH4tnHYhUexf1uMPSXbOwgmNnpyg5qdPeM0mzCxt4kZSRo3k71lpcoUKMsqqj_fEDdSEoLDDRM41ErrQUfCaz07YL
 | The teacher conducts a class discussion about the ways in which surveys can be conducted and considers possible flaws in the methods of data collection. Questions to prompt discussion could include: What is the difference between a census and a sample? How can a sample be selected so that it most accurately reflects the entire population?Students conduct a census/sampling experiment where the entire class responds to a simple survey question and then explores the differences that arise when various samples are taken. Students explore the effect of different random samples on the understanding of the population. For example use a mini pack of coloured lollies to count the number of each colour, in order to predict the proportion of each colour that was intended in the factory settings.Students use a random sample generator to explore the differences that arise when different samples or different sizes of samples are taken. For example: <http://www.cas.abs.gov.au/cgi-local/cassampler.pl>Students consider when the selection of a stratified sample by age could be used. For example can the gender ratio in Year 11 across NSW be estimated from the number of boys and girls in a particular Year 11 class?Students design and construct a questionnaire. They consider the number of choices in a question, for example if only an even number of choices is given, this may force an inaccurate opinion from the respondents in relation to a particular question, while for some questions it may be appropriate to allow a neutral choice. Students also consider different ways of presenting questions in a survey, for example open questions, yes/no questions, tick boxes or response scales versus continuum scales.Students collect, display and discuss a variety of graphs sourced from the media and answer the following questions for each graph: Is the graph misleading? How was the data collected? Is the story that accompanies the graph based on fact? What other data could be collected to clarify the issue?The teacher conducts a class discussion which includes: * the importance of collecting data for decision-making by governments
* the reasonableness of drawing conclusions about populations from particular samples, for example whether it is appropriate to draw conclusions about the whole school from data based on a single class
* possible bias, such as how representative the sample chosen is, and other issues that may affect the interpretation of the results.

The teacher issues a formal investigative assessment task based on the analysis of data from various government websites. The teacher discusses the nature and scope of the task, the marking criteria and way in which the students can access feedback and support. **Life Skills**Class discussion: Discuss different ways individuals use tables and graphs in their everyday life. Explore a range of sample tables and graphs. Each student is to select a table and/or graph and identify the data being presented. Students are to discuss the purpose of the graph or table they chose, focusing on:* What type of data is presented?
* Why do you think they used a table/graph?
* Do you think the table/graph is an effective choice?
* Do you feel this data could be presented better? How?
* What was the purpose of collecting the data?

Questions to prompt discussion could include: Why do we collect data? What is the difference between a graph and a table? Why do we use graphs? Why do we use tables? What are some ways data can be collected? | Provide Kai with a graphic organiser, such as a Pros and Cons chart or Plus, Minus, Interesting table to record the advantages and disadvantages of conducting surveys. Kai to complete a vocabulary chart for terms associated with this topic, including *census* and *sample*. The vocabulary chart should include the following columns:* + definition
	+ example
	+ non-example
	+ connections (concepts the term is associated with)

Kai should be encouraged to add to the chart throughout the unit.Negotiate a topic for Kai’s survey that is familiar to him, for example to find out which sports the school should offer to students the following year. Provide Kai with a model of each of the different question types that can be included in a survey. Kai is to create at least one of each type of question in his survey. Provide Kai with a media article that is accessible to him and scaffolded questions, such as:* How was the data collected?
* How is the data represented?
* Is the visual representation of the data effective?
* Is the data accurately represented?

Refer to assessment activity for personalised adjustments for Kai. |
| * classify data relating to a single random variable ◊ **Paperclip icon**
	+ classify a categorical variable as either ordinal, eg income level (low, medium, high) or nominal, eg place of birth (Australia, overseas)
	+ classify a numerical variable as either discrete, for example the number of rooms in a house, or continuous, eg the temperature in degrees Celsius

**Life Skills*** identify a range of ways that data can be collected to answer a given question https://lh5.googleusercontent.com/Rxtd35_bD9NYVAYTpCQ-l7NjzMfiyFajA_6a4YcahraxXOTfH4tnHYhUexf1uMPSXbOwgmNnpyg5qdPeM0mzCxt4kZSRo3k71lpcoUKMsqqj_fEDdSEoLDDRM41ErrQUfCaz07YL
* order and sort data into groups, categories or ranges
 | Students explore the 2016 Census questions and classify the data collected: [http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2901.0Main%20Features802016/$FILE/2016%20Census%20Sample%20Household%20Form.pdf](http://www.abs.gov.au/ausstats/abs%40.nsf/Lookup/2901.0Main%20Features802016/%24FILE/2016%20Census%20Sample%20Household%20Form.pdf)Students explore the similarities and differences between different types of data. For example students use the CensusAtSchool Australia activities: [http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ+3A+WHAT'S+THE+DIFFERENCE+BETWEEN+NUMERICAL+AND+CATEGORICAL+DATA](http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ%2B3A%2BWHAT%27S%2BTHE%2BDIFFERENCE%2BBETWEEN%2BNUMERICAL%2BAND%2BCATEGORICAL%2BDATA)and[http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ+3B+NUMERICAL+DATA:+WHAT'S+THE+DIFFERENCE+BETWEEN+DISCRETE+AND+CONTINUOUS](http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ%2B3B%2BNUMERICAL%2BDATA%3A%2BWHAT%27S%2BTHE%2BDIFFERENCE%2BBETWEEN%2BDISCRETE%2BAND%2BCONTINUOUS)**Life Skills**Provide students with a range of items that students are required to either categorise or count, eg categorise drawing pins according to colour, count the number of drawing pins.Provide students with different survey topics and ask them to identify if the topics will produce categorical data or numerical data (the CensusAtSchool Australia activity will provide a basis for teachers to develop survey topics: [http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ+3A+WHAT%27S+THE+DIFFERENCE+BETWEEN+NUMERICAL+AND+CATEGORICAL+DATA](http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ%2B3A%2BWHAT%27S%2BTHE%2BDIFFERENCE%2BBETWEEN%2BNUMERICAL%2BAND%2BCATEGORICAL%2BDATA)). Questions from the last census might also be useful for this activity. | Provide Kai with a sample of questions from the 2016 Census that relate to familiar experiences and associated data. Ask Kai to classify the data as:* + categorical – values that can be sorted into groups
	+ numerical – values that can be measured.
 |
| * review how to organise and display data into appropriate tabular and/or graphical representations **AAM** ◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ display categorical data in tables and, as appropriate, in both bar charts or Pareto charts
	+ display numerical data as frequency distribution tables and histograms, cumulative frequency distribution tables and graphs, dot plots and stem and leaf plots (including back-to-back where comparing two datasets)
	+ construct and interpret tables and graphs related to real-world contexts, including but not limited to motor vehicle safety including driver behaviour, accident statistics, blood alcohol content over time, running costs of a motor vehicle, costs of purchase and insurance, vehicle depreciation, rainfall graphs, hourly temperature, household and personal water usage Sustainability icon Civics and citizenship icon
* interpret and compare data by considering it in tabular and/or graphical representations **AAM** ◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ choose appropriate tabular and/or graphical representations to enable comparisons
	+ compare the suitability of different methods of data presentation in real-world contexts, including their visual appeal, eg a heat map to illustrate climate change data or the median house prices across suburbs Sustainability icon Ethical understanding icon Difference and diversity icon

**Life Skills*** identify common features of graphs, including heading, scale, key, axes and labels, and locate these on graphs
* choose the most appropriate display for a dataset
* construct a line, picture or column graph with increasing accuracy, for example:
	+ use correct graphing techniques eg equal (measured) spacing, ruling of lines
	+ include all relevant, commonly accepted features of graphs
	+ plot points or measure columns accurately as required
	+ use graph paper to assist with creating graphs
	+ use digital technologies to create a range of graphs https://lh6.googleusercontent.com/WSefKq_SVlkCAk8JjIg-pKyEHoJ9mbq8vmhjNlaSXq0PM2NXsYXw6HhprbvvU0SC_O7S7pZxOTygyLn98r1oPNm-O5E79mQsI6M1JEU8xlv8c6iKp1oIe6_2wgLfuojrK4cfjYe5
 | The teacher reviews Stage 5 methods of organising and displaying data. Students discuss the suitability of various types of graphical display to the data. For example why is it inappropriate to use a line graph to display categorical data?; why is it inappropriate to use a pie chart to explore trends in numerical data? Students use spreadsheets to organise and display the data they have collected through a self-designed survey. They evaluate the merits and failings of different graphical displays. Students gather data associated with the real-world context of driving. They display the data in a variety of appropriate graphical forms. Students interpret, compare and contrast the graphs and tables as they respond to guided questions. For example: A lobby group is proposing that NSW introduces ‘triple demerit’ days. What evidence supports their proposition? What days should be declared ‘triple demerit’ days? Students prepare a report that includes graphs with visual impact. ‘We are an environmentally friendly school.’ Students design a survey, collect data and display the data in a variety of appropriate and visually appealing forms in order to provide the school principal with evidence to support or refute this claim. **Life Skills**Discuss common features of graphs. Offer a range of graphs as examples for students to refer to. Ask students to identify the common features and why they are important (heading, scale, key, axes, labels). Students consider the question, ‘Why do we use different methods to display data?’ Provide students with three different datasets and ask students to select a line graph, column graph or pie chart to display the data. Students justify their choices. Students construct the graphical display, ensuring they are displaying the data accurately, for example: * look at the data and decide on a scale
* label the axis and mark the scale
* plot points on a graph/mark columns/indicate pictures
* join the points/construct the column or add the picture
* create the key
* add the heading.

Students engage in the activity to design a survey, collect and display data in order to support or refute the statement, ‘We are an environmentally friendly school’. | Kai to complete the following table to illustrate the most appropriate types of data for a range of graphical displays:

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| Graphical display | Type of data |
|  |  |

Provide Kai with four sets of data in a spreadsheet, relating to a topic of interest or a familiar experience. He is to visually represent the data and explain his choice of graphical display.Provide scaffolded questions for Kai in relation to the data on driving. The questions should move from literal to inferential to applied (with more questions at the literal level). Discuss with Kai the sorts of data that should be collected to support or refute the claim, ‘We are an environmentally friendly school’. Allow him to develop a survey based on this discussion, using the models of different types of survey questions previously provided. After Kai has collected the data, he can use an online scaffold such as canva.com to create an infographic to represent his data.<https://www.canva.com/create/infographics/>  |
| **S1.2: Summary statistics**Students:* describe the distinguishing features of a population and sample ◊
	+ define notations associated with population values (parameters) and sample-based estimates (statistics), including population mean $μ$, population standard deviation $σ$, sample mean $\overbar{x}$ and sample standard deviation $s$

**Life Skills*** recognise the terms ‘mean’ and ‘average’ describe the same concept in everyday use https://lh5.googleusercontent.com/BaJe4_V7hOW-x1HTRBokL9dorYjTQQgjMCbVGhKlu6CWHO5webOqzPU3bIjnWKgc3mzujAsVntcPnKGg-HNd2P-f3MAD774pepFCOCtzf75c-reGcSd0KVsUdipv0YdLCTfxlVKX
* use statistical calculations to investigate data in work or other everyday situations
 | Students are provided with a pack of cards that include at least five groups comprising a table or graphical display of a dataset; the population mean; the population standard deviation; the sample mean; and the sample standard deviation. Students sort the cards into matching ‘sets’ of the same dataset. Students then design a version of this game themselves, working in small groups to analyse a single dataset before duplicating each set to form the set of cards.**Life Skills**Discuss the term ‘average’. Demonstrate how an average is calculated. Students identify when averages are used in their everyday life, eg sport. Students to calculate a range of real-life sample averages, eg average cricket score, average weekly repayment for a car loan.Explain that the term ‘mean’ is the mathematical term for ‘average’.Students to complete a range of mathematical calculations involving mean. | Provide Kai with a pack of cards that include three groups comprised of: a table, the population mean, a graph. Kai is to sort the cards into a matching ‘set’. |
| * summarise and interpret grouped and ungrouped data through appropriate graphs and summary statistics **AAM** ◊ **Paperclip icon**
	+ discuss the mode and determine where possible
	+ calculate measures of central tendency, including the arithmetic mean and the median (ACMEM050)
	+ investigate the suitability of measures of central tendency in real-world contexts and use them to compare datasets Critical and creative thinking icon Civics and citizenship icon
	+ calculate measures of spread including the range, quantiles (including but not limited to quartiles, deciles and percentiles), interquartile range (IQR) and standard deviation (calculations for standard deviation only required using technology)  Information and communication technology capability icon

**Life Skills*** calculate the range for a simple dataset and discuss its meaning
* calculate the mean, median and mode for a simple dataset and discuss each concept
* use statistical calculations to investigate data in work or other everyday situations
 | Students measure the lengths of their lower and upper legs. The teacher coordinates the collection and analysis of data from all students in the class. Students use their knowledge about measures of central tendency to decide on the best measurements for a chair specifically designed for young people in their age group.Students solve problems involving measures of central tendency. For example:1. If the class were to calculate the mean and variance of their ages now and in 10 years’ time how would they have changed?
2. A sample of size 20 has a mean of 2.2. Another two values are added to the sample, both being 3.3. What is the new mean?
	1. If the word ‘mean’ was replaced by the word ‘median’, what can be said about the new median?
	2. If the word ‘mean’ was replaced by the word ‘mode’, what can be said about the new mode?

**Life Skills**Introduce the term ‘range’. Explain the range is the difference between the highest score and the lowest score in a dataset. Give students a range of different datasets and ask them to calculate the range.Introduce the terms ‘median’ and ‘mode’. Explain each term and why they are important when analysing data.Using the same datasets, students calculate the median and mode.Case study – Sydney trainsLooking at data of Sydney trains, students are to identify:* Which train line is the most popular (mode)?
* What is the average number of people (mean) who travel on that train line daily or monthly?
* What is the average cost of a ticket on that line?
* What is the range in time of the trains on that line?

The following website might provide useful data:<https://public.tableau.com/profile/bureau.of.transport.statistics#!/vizhome/PTVisualisation-Train-2_7_3-Nov16/Welcome> | Provide Kai with a copy of the data collected from all students in the class. Kai can work with a partner to calculate the mean, mode, range and median for the data. With his partner or in a group, he can decide on the best measurements for a chair specifically designed for young people in their age group.  |
| * investigate and describe the effect of outliers on summary statistics ◊ **Paperclip icon**
	+ use different approaches for identifying outliers, including consideration of the distance from the mean or median, or the use of $Q1-1.5×IQR$ and $Q3+1.5×IQR$ criteria, recognising and justifying when each approach is appropriate
	+ investigate and recognise the effect of outliers on the mean and median

**Life Skills*** compare means and medians in a range of contexts, for example:
	+ compare and discuss why the mean house price in a suburb might be much higher than the median house price if there is an unusually expensive sale
* interpret information about a dataset and use it to draw conclusions
 | Students use a spreadsheet to explore the effect of outliers on the summary statistics and the shape of the display. Students solve simple problems involving the comparative size of the mean and median. For example add one score to a set of scores so that the median remains unchanged but the mean increases or decreases; the mean remains unchanged but the median increases or decreases. Students analyse the effect of outliers on a dataset by first identifying outliers in a set of data, then constructing a graphical display of the data with and without the outlier(s) and discussing the effect of removing the outlier on the five-figure summary, the mean, median and the shape of the display.**Life Skills**Ask students to research the area in which they live and find out the mean, median and range of 10 current houses for sale. Students share their information with the class. Students respond to the following questions:* Do you feel the mean price is accurate?
* Were there any houses in your area that were well above or below the average prices? What does this do to the data?
* Why do you think there is a difference in house price between areas?
* What does a higher mean tell us about the area?
* What does a lower mean tell us about the area?
* What does a large range tell us about the area?
 | Provide Kai with visual representations of outliers.Provide Kai with a dataset including two outliers – one high and one low. He uses this dataset to construct a graphical display of the data. Ask Kai to find the mean, mode, range and median for the dataset. Kai can complete the following exercises using his dataset:* Eliminate the high outlier and find the mean, mode, range and median. Explain the difference to your original findings.
* Eliminate the lower outlier and find the mean, mode, range and median. Explain the difference.
* Eliminate both outliers and find the mean, mode, range and median. Explain the difference.
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| * investigate real-world examples from the media illustrating appropriate and inappropriate use or misuse of measures of central tendency and spread (ACMEM056) **AAM Paperclip icon**

**Life Skills*** interpret graphs, tables and datasets from a variety of common sources, for example:
	+ newspapers
	+ television
	+ internet https://lh6.googleusercontent.com/WSefKq_SVlkCAk8JjIg-pKyEHoJ9mbq8vmhjNlaSXq0PM2NXsYXw6HhprbvvU0SC_O7S7pZxOTygyLn98r1oPNm-O5E79mQsI6M1JEU8xlv8c6iKp1oIe6_2wgLfuojrK4cfjYe5 https://lh5.googleusercontent.com/Rxtd35_bD9NYVAYTpCQ-l7NjzMfiyFajA_6a4YcahraxXOTfH4tnHYhUexf1uMPSXbOwgmNnpyg5qdPeM0mzCxt4kZSRo3k71lpcoUKMsqqj_fEDdSEoLDDRM41ErrQUfCaz07YL https://lh4.googleusercontent.com/1USu359LjcFWOcrFTTaaPyar5ziAbgBK4YgcvVNZjq9tNN_yY6N2dCKeDZ8TPElxnPrBaXtJRbmqUzMD5RBEY5vDcbB5AA5OIPpbjtXM7uwPL7K0r2r7nOvihVdzsVpZfI2I-BTl
 | The teacher sources a recent article from the media that has a number of different data displays accompanying the text. Students respond to the article through key questions such as: Which organisation collected the data? Is the data display a reasonable choice of graphic? Students write a paragraph of approximately 100 words comparing the data display with the text of the article – are the conclusions made in the article reasonable? Students create different graphical displays of the data in the article. If the article misrepresents or misuses the data, students correct the misrepresentation and rewrite the relevant sections of the article.**Life Skills**Source a recent article from the media that includes at least one data display to accompany the text. Students answer the following questions:* What does the data tell us?
* Do you believe the data is accurate? Why or why not?
* Does the graph appropriately represent the data?
 | Provide Kai with a media article that is on a topic that he is familiar with, and that is accessible to him, for example an article with one data display and accompanying text that has been ‘chunked’ into smaller sections. Provide a scaffold for Kai to complete the paragraph comparing the data display with the text.  |
| * describe, compare and interpret the distributions of graphical displays and/or numerical datasets and report findings in a systematic and concise manner **AAM** ◊ **Paperclip icon** Critical and creative thinking icon  Information and communication technology capability icon Literacy icon
	+ identify modality (unimodal, bimodal or multimodal)
	+ identify shape (symmetric or positively or negatively skewed)
	+ identify central tendency, spread and outliers, using and justifying appropriate criteria
	+ calculate measures of central tendency or measures of spread where appropriate

**Life Skills*** use statistical calculations to investigate data in work or other everyday situations
* interpret information about a dataset and use it to draw conclusions
 | Students explore the different shapes of the graphical display of data. For example complete the CensusAtSchool activity: [http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ+1D+NUMERICAL+DATA+USING+GRAPHS+TO+DESCRIBE+DISTRIBUTION](http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSQ%2B1D%2BNUMERICAL%2BDATA%2BUSING%2BGRAPHS%2BTO%2BDESCRIBE%2BDISTRIBUTION)or<https://www.geogebra.org/m/UhM6eEyq>**Life Skills**Students use the Job Outlook website to research five jobs they are interested in and compare the weekly earnings of each. Students create a graph displaying the data and determine the mean, mode, median and range. <http://joboutlook.gov.au/> Students describe their data display, providing possible reasons for the differences in weekly earnings between the jobs they have selected (eg experience, qualifications). | Provide Kai with a copy of graphical displays that demonstrate a:* + positive skew
	+ negative skew
	+ symmetric skew.

Assist Kai to write definitions of these into his vocabulary chart before completing the online activities.  |
| * construct and compare parallel box-plots **AAM Paperclip icon**  Information and communication technology capability icon
	+ complete a five-number summary for different datasets (ACMEM058)
	+ compare groups in terms of central tendency (median), spread (IQR and range) and outliers (using appropriate criteria)
	+ interpret and communicate the differences observed between parallel box-plots in the context of the data

**Life Skills*** recognise and describe trends in data
* use information to extrapolate or make predictions from data
* present findings of a statistical investigation using a range of formats and techniques
 | The teacher enables students to link taking samples with creating box-plots: <http://www.scootle.edu.au/ec/viewing/L2342/index.html>Students compare parallel box-plots to ‘Fix the Matchbox Machine’: <http://www.scootle.edu.au/ec/viewing/L2336/index.html>Students use graphing technologies to construct and compare box-plots. They make changes to the data and observe the subsequent changes in the box-plot. Students comment on the effect of the change in data to the shape of the display.The teacher prepares a set of cards that includes a box-plot, the five-number summary and the simple dataset for about five different datasets. Students work in small groups with a mixed set of cards to determine the matching datasets. The teacher may provide in-class time for students to finalise their response to the formal assessment task and assist with the submission of any digital files.**Life Skills**What effects does a continued increase in population have on a country? What effect would a decrease in population have on a country? Do the leaders of a country need to be concerned about population growth?Case study – population growthStudents examine the population growth in Australia over the past 50 years compared to China’s population growth. What differences can be identified?Students predict the population of both China and Australia for the next year, for five years and ten years (using data). Students share their predictions, giving reasons. Students graph their predictions. Students can also create a digital presentation of their findings and predictions.  | Kai can work with a partner to construct and compare box-plots.  |

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| **Prior knowledge** | **Questions and prompts for Working Mathematically** | **Summary of technology opportunities** |
| Some experience in reading graphs and interpreting visual displays will be beneficial. | What would happen if …?What is the same and different about …?Explain why …How can we be sure that …?Of what is this a special case …?Give me an example of …What information has been lost?What else can be concluded? | Use spreadsheets to collate, analyse and display data efficiently.Use online survey forms and data-collection tools, such as Google Forms or Survey Monkey, to assist in the process of data collection and management. Generate random numbers using calculators or online to select random samples or datasets. Use graphing technologies such as *GeoGebra* or *Desmos* to construct parallel box-plots and compare datasets.Use the internet to research media articles, find data displays or find data sourced from real-world situations. |

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| Reflection on learning and evaluation – to be completed by teacher during or after teaching the unit. |