



*These resources are proudly supported by Toyota Community Trust, Australian Mathematical Sciences Institute, Australian Centre for Career Education, Aurecon Group, and Champion Data.*

## How to Use These Resources

The following lesson plans are supported by additional resources including:

- Student activity sheet PDFs. These can be completed digitally or printed.
- Supporting PowerPoint presentation including relevant videos.
- [AMSI 2024 Teacher Professional Learning in Industry Day recordings](#). Hear from industry professionals and recent graduates and discover where mathematics can take you.

The lesson plans contain multiple activities that can be used to structure a class or series of classes. The activities can also be used separately to support your own lesson content, or assigned as homework.

### Year 9 Lesson Plans

#### Learning Intention:

- Represent the distribution of multiple data sets for numerical variables using comparative representations.
- Compare data distributions considering center, spread, shape, and the effect of outliers.
- Choose appropriate forms of display or visualisation for a given type of data.
- Justify selections and interpret displays in a given context.

#### Success Criteria:

- Students can identify and describe careers that use mathematical skills.
- Students can apply mathematical concepts to solve real-world problems related to specific careers.
- Students can display or create a visualisation for data.
- Students can effectively communicate their interpretation.

<p><b>Australian Curriculum Links:</b></p>	<p><b><u>AC9M9ST03</u></b>  Represent the distribution of multiple data sets for numerical variables using comparative representations; compare data distributions with consideration of centre, spread and shape, and the effect of outliers on these measures.</p> <p><b><u>AC9M9ST04:</u></b>  Choose appropriate forms of display or visualisation for a given type of data; justify selections and interpret displays for a given context.</p>
<p><b>Australian Blueprint for Career Development:</b></p>	<p><b><u>Phase: 3 – Starting Out</u></b>  <b>Learning Area B: Learning and Work Exploration.</b></p> <ul style="list-style-type: none"> <li>• Participate in lifelong learning supportive of career goals.</li> <li>• Locate and use career information effectively.</li> <li>• Understand the relationship between work, society and the economy.</li> <li>• Understand the changing nature of life and work roles.</li> </ul>
<p><b>Equipment/ Resources required:</b></p>	<ul style="list-style-type: none"> <li>• Whiteboard and markers.</li> <li>• Worksheets or handouts.</li> <li>• Access to internet and computers/tablets.</li> </ul>
<p><b>Useful Links:</b></p>	<ul style="list-style-type: none"> <li>• Myfuture - <a href="http://myfuture.edu.au">myfuture.edu.au</a></li> <li>• Your Career  Occupations - <a href="http://yourcareer.gov.au/occupations">yourcareer.gov.au/occupations</a>  Skills - <a href="http://yourcareer.gov.au/skillscourseseeker.edu.au">yourcareer.gov.au/skillscourseseeker.edu.au</a></li> <li>• AMSI career videos - <a href="http://careers.amsi.org.au/all-videos/">careers.amsi.org.au/all-videos/</a></li> </ul>
<p><b>Lesson Duration:</b></p>	<p>60 minutes.</p> <p><b><i>Note: These activities can be used individually as components of a lesson or can be used over multiple lessons.</i></b></p>

**Lesson  
Description:**

**Introduction (10-15 minutes):**

- Introduce the concept of careers that involve mathematics. Brainstorm different careers with the class.
- Highlight the fact that mathematics is a fundamental skill in various professions, such as engineering, finance, medicine, and technology.
- Visit [myfuture](#) and explore the Career Bullseye chart for Maths.
  - A Career Bullseye chart shows a selection of occupations that are related to mathematics.
  - The rings of the bullseye show the skill level required for those jobs, with level 1 usually requiring completion of year 10 or a certificate I or II, and level 4 usually requiring at least a bachelor's degree or higher.
- Have the students reflect:
  - What does the wide range of occupations and industries on the bullseye tell you about the importance of maths in the world of work?
  - Were there any occupations that you were surprised to see on that list? Why/why not?
  - Do you know anyone working in one of the occupations on the bullseye?

**Activity 1 (20-30 minutes):**

- Divide students into pairs or small groups to research at least one occupation from each level of the Career Bullseye.
- By clicking on the occupation title students can view relevant labour market information.
- Have students record:
  - Skill level. e.g. Bachelor Degree or higher, VET.
  - Weekly pay.
  - Future growth. e.g. Strong projected employment growth.
  - Job titles.
  - Learning areas/subjects. e.g. Maths, Economics.
- Each group presents their findings on at least one occupation to the class.

**Lesson  
Description:**

***The following lesson plans incorporate Champion Data's work to provide real-world context and engage students in practical applications of statistical analysis.***

**Introduction to Comparative Representations and Data Distribution (60 minutes):**

**Equipment/Resources:**

- Whiteboard and markers.
- Graph paper.
- Computers/tablets with internet access.
- Data sets for student activities – [amsi.org.au/teacher\\_modules/pdfs/Data\\_Investigation\\_year\\_9.pdf](https://amsi.org.au/teacher_modules/pdfs/Data_Investigation_year_9.pdf)
- AFL Tables – [afltables.com/afl/afl\\_index.html](http://afltables.com/afl/afl_index.html)
- Video: Sports Statistician – [careers.amsi.org.au/sports-statistician](https://careers.amsi.org.au/sports-statistician)
- Video: How Champion data collects stats – [youtu.be/ZURJqa2WNdM?si=A\\_kCwv9k\\_u5JqCjr](https://youtu.be/ZURJqa2WNdM?si=A_kCwv9k_u5JqCjr)

***Note: These videos are included in the Year 9 PowerPoint presentation.***

**Introduction (10 minutes):**

- Begin with a brief introduction to data distribution and the importance of statistical analysis in real-world contexts.
- Show one or both of the videos to provide an overview of data collection and analysis in sports.
- Discuss how Champion Data uses statistical methods to analyse sports performance.

**Lesson  
Description:**

**Main Activity (40 minutes):**

**1. Exploring Data Sets (20 minutes):**

- Provide students with two data sets (*e.g.*, scores of two different sports teams over a season).  
[afltables.com/afl/afl\\_index.html](http://afltables.com/afl/afl_index.html)
  - Students may be able to find their own data sets that correspond to their own interests.
- Explain key terms: centre (mean, median), spread (range, interquartile range), and shape (symmetry, skewness).
- Discuss the effect of outliers on these measures.

**2. Comparative Representations (20 minutes):**

- Demonstrate how to create comparative representations (*e.g.*, side-by-side box plots, histograms).
- Students create comparative representations for the given data sets.
- Facilitate a discussion on the observations about the data distributions.

**Conclusion (10 minutes):**

- Recap the importance of comparative data representations.
- Possible homework: Find another data set from a different context (*e.g.*, test scores, weather data) and create a comparative representation.

**Effect of Outliers on Data Distribution (60 minutes):**

**Equipment/Resources:**

- Whiteboard and markers.
- Graph paper.
- Computers/tablets with internet access.
- Data sets with and without outliers.
- Statistical software or graphing tools.

**Lesson  
Description:**

**Introduction (10 minutes):**

- Review the previous lesson on comparative data representations.
- Introduce the concept of outliers and their potential impact on data analysis.

**Main Activity (40 minutes):**

**1. Identifying Outliers (20 minutes):**

- Provide students with a data set that includes outliers. [afltables.com/afl/afl\\_index.html](http://afltables.com/afl/afl_index.html)
- Teach methods for identifying outliers (e.g., using IQR and standard deviation).
- Students identify and highlight outliers in their data sets.

**2. Analysing Impact (20 minutes):**

- Compare data distributions with and without outliers.
- Students create visual representations (e.g., box plots, histograms) for both scenarios.
- Discuss how outliers affect measures of centre and spread.

**Conclusion (10 minutes):**

- Summarise the impact of outliers on data interpretation.
- Possible homework: Research and bring examples of data sets where outliers significantly impact the analysis.

**Lesson  
Description:**

**Choosing Appropriate Visualisations (60 minutes):**

**Equipment/Resources:**

- Whiteboard and markers.
- Graph paper.
- Computers/tablets with internet access.
- Variety of data sets for practice.
- Example visualisations from Champion Data.

**Introduction (10 minutes):**

- Review the previous lessons on data representation and outliers.
- Discuss the importance of choosing appropriate visualisations for different types of data.

**Main Activity (40 minutes):**

**1. Types of Visualisations (20 minutes):**

- Introduce different types of visualisations. e.g. bar graphs, line graphs, scatter plots.
- Show examples from [Champion Data's website](#) and discuss why certain visualisations were chosen for specific data sets.

**2. Practice Selecting Visualisations (20 minutes):**

- Provide students with a variety of data sets.
- Instruct students to choose and create appropriate visualisations for each data set.
- Students present their visualisations and justify their choices.

**Conclusion (10 minutes):**

- Discuss the importance of context in choosing visualisations.
- Assign homework: Create a presentation on the visualisation techniques used by Champion Data and their effectiveness.

**Lesson  
Description:**

**Interpreting Data Displays (60 minutes):**

**Equipment/Resources:**

- Whiteboard and markers.
- Graph paper.
- Computers/tablets with internet access.
- Data sets for interpretation.
- Visualisations created by students in previous lessons.

**Introduction (10 minutes):**

- Review the importance of choosing appropriate visualisations.
- Introduce the skill of interpreting data displays accurately.

**Main Activity (40 minutes):**

**1. Interpreting Visualisations (20 minutes):**

- Provide students with visualisations created in previous lessons.
- Teach strategies for interpreting different types of data displays.
- Students practice interpreting the visualisations and drawing conclusions.

**2. Group Activity (20 minutes):**

- Divide students into small groups and give each group a new data set.
- Groups create visualisations and write a short report interpreting their findings.
- Groups present their visualisations and interpretations to the class.

**Conclusion (10 minutes):**

- Recap the key points of interpreting data displays.
- Encourage students to reflect on how they can use these skills in other subjects and real-life situations.



**Lesson  
Description:**

## **Application of Data Analysis in Sports (60 minutes):**

### **Equipment/Resources:**

- Whiteboard and markers
- Computers/tablets with internet access
- Data sets from sports (e.g., player statistics, game scores)
- Video: How Champion data collects stats - [youtu.be/ZURJqa2WNdM?si=A\\_kCwv9k\\_u5JqCjr](https://youtu.be/ZURJqa2WNdM?si=A_kCwv9k_u5JqCjr)
  - **Note: This video is included in the Year 9 PowerPoint presentation.**

### **Introduction (10 minutes):**

- Review the role of data analysis in sports as seen in the Champion Data video.
- Discuss the types of data collected and analysed in sports.

### **Main Activity (40 minutes):**

#### **1. Data Analysis in Sports (20 minutes):**

- Provide students with sports data sets.
- Students analyse the data to find patterns and trends.
- Discuss how these analyses can influence decisions in sports.

#### **2. Project-Based Learning (20 minutes):**

- Students work on a project to analyse sports data using the skills learned in previous lessons.
- Students create visualisations and write a report on their findings.
- Encourage creativity in presenting their data and conclusions.

### **Conclusion (10 minutes):**

- Showcase some of the student projects.
- Discuss how data analysis is used in various fields, emphasising the skills' transferability.

**Further  
Information:**

**At the end of EACH lesson:**

1. Reconvene as a whole class and have each group present their solutions and findings.
2. Facilitate a discussion on different careers and the mathematical skills required for each.
3. Encourage students to reflect on their interests and strengths in mathematics and potential career applications.
4. Provide additional information on educational pathways and opportunities for pursuing math-related careers. (Option: Design a poster/flyer.)