

Student Learning Outline: Year 7 Mathematics

Year Level: 7 **Subject:** Mathematics **Investigation:** NRL Super Statistics Rugby League Team

Overview: Students will develop an understanding of events and the probability of outcomes. Students will construct a range of data displays including stem and leaf plots and various other data representations. Using a range of data collection techniques, students will investigate a variety of effects on data sets. Students will complete an investigation where they will be required to create a Rugby League team utilising data and statistics as the only tool for player selection.

Australian Curriculum

Achievement Standard:

By the end of Year 7,

- Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.
- They calculate mean, mode, median and range for data sets. They construct stem-and-leaf plots and dot-plots.

Statistics and Probability:

Data representation and interpretation – Year 7

- Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169)
- Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170)
- Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171)
- Describe and interpret data displays using median, mean and range (ACMSP172)



Driving Question:	Could selectors who utilise analytics, create the statistically strongest Rugby League team?
Real World Context:	<p>Analytics in sport is amongst the fastest growth areas within elite sporting organisations and teams right now. The ever-increasing collection of data on athletes is part of nearly every elite sporting teams' practices.</p> <p>Rugby League is amongst the leading sports in data collection of player's statistics. Data gathered by teams informs weekly team selections and most importantly, player acquisition. It has been said that mathematics is taking over the selection and recruitment of players in Rugby League teams.</p> <p>Using secondary statistical data, students will research and create their own 'Ultimate Rugby League Team' taking into account Rugby League positional requirements.</p>
Established Goals: <ul style="list-style-type: none"> What relevant goals (e.g. ACARA content descriptors, work program objectives, learning outcomes) will be addressed? 	Data representation and interpretation – Year 7 <ul style="list-style-type: none"> Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169) Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170) Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171) Describe and interpret data displays using median, mean and range (ACMSP172)
Understandings: <ul style="list-style-type: none"> What are the SIGNIFICANT concepts of this topic? 	Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays.
<ul style="list-style-type: none"> What knowledge is ESSENTIAL? 	<ul style="list-style-type: none"> Data display creation Mean, Median and Mode Data collection Outliers Frequency distribution Stem-and-leaf plots
<ul style="list-style-type: none"> What specific skills must be taught in this unit? 	Data collection techniques Constructing stem and leaf plots Constructing Dot Plots Frequency Distribution Table creation

21st Century skills	<p><i>Communication, Collaboration, Technology Skills, Citizenship</i></p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> • Creating new and worthwhile ideas and products <p>Critical Thinking and Problem Solving</p> <ul style="list-style-type: none"> • Critically evaluating information and arguments • Seeing patterns and connections • Seeking problems and developing solutions to real-world problems <p>Information, Media and Technology Skills</p> <ul style="list-style-type: none"> · Accessing information efficiently and effectively · Evaluating information critically and competently · Using and managing information accurately · Using technology as a tool to research, organize, evaluate, create and communicate information <p>Communication</p> <ul style="list-style-type: none"> • Communicating effectively with a variety of styles, modes and tools (including digital tools), tailored for a range of audiences <p>Collaboration</p> <ul style="list-style-type: none"> • Working effectively and respectfully with diverse teams • Making substantive decisions together • Learning from and contributing to the learning of others <p>Citizenship</p> <ul style="list-style-type: none"> · Developing a desire and ability to solve complex real-world problems <p>Character</p> <ul style="list-style-type: none"> · Developing self-directed learners with a passion for learning
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Differentiation	<div> <div>Content</div> <ul style="list-style-type: none"> ·Online Resources ·Real world relevance ·Using multiple media sources ·Scaffolding ·Links to the game of Rugby League </div> <div> <div>Process</div> <ul style="list-style-type: none"> ·Flexible Grouping Practices ·Tiered Inquiry based activities ·Cooperative Learning ·Teacher mentoring and pedagogy maintained ·Problem Based Learning ·Working in small groups </div>
Evidence of Student Learning	<p>Whilst the NRL's Inquiry based questions and investigation are not designed as assessment tasks, they have the scope to be modified to align with each school's individual assessment planning and practices.</p> <p>All attempts have been made to align activities and investigations to Australian and NSW Curriculum.</p>
Reflection	<p>Students will complete a Student Reflection sheet designed to gather insight into their own learning processes throughout the unit and to help identify successful practices for future learning.</p> <p>The reflective tool will also assist educators to make informed decisions about student centred learning in future tasks.</p>



Topic	Timeline	Skill	Student Worksheet	Additional Activities and Resources
Primary Vs Secondary data		<ul style="list-style-type: none"> Obtaining secondary Data Obtaining Primary Data Secondary data – making lists of statistical information available on the internet Establishing how primary and secondary information impacts on professional teams and real-world scenarios 	Worksheet- Primary and Secondary data	NRL website https://www.nrl.com/ Fox Sports website https://www.foxsports.com.au/nrl total footy stats website https://www.totalfootystats.com.au/ Newspapers
Data displays using dot plots		<ul style="list-style-type: none"> Reading dot plots to retrieve information Utilising secondary sources of information to create dot plots Linking the use of this data display to real world use 	Worksheet – Dot Plots	Using excel to create dot plots Online websites that show how clubs record their data
Data Displays using Bar Graphs		<ul style="list-style-type: none"> Reading bar graphs to retrieve information Utilising secondary sources of information to create dot plots Linking the use of this data display to real world use 	Worksheet – Bar Graphs	Using excel to create graphs Utilising online creators Real world Bar Graphs Online websites that show how clubs record their data



Topic	Timeline	Skill	Student Worksheet	Additional Activities and Resources
Data Displays using Stem and Leaf plots		<ul style="list-style-type: none"> Reading Stem and Leaf plots to retrieve information Utilising secondary sources of information to create stem and leaf plots Linking the use of this data display to real world use 	Worksheet – Stem and Leaf plots	Using excel to create graphs Utilising online creators Stem and Leaf plots of data Online websites that show how clubs record their data
Mean, Median and Mode		<ul style="list-style-type: none"> Calculating Mean Calculating Mode Calculating Median Investigating how the NRL uses Mean, Median and Mode in their statistics 	Mean, Median and Mode overview sheet Mean specific sheet Mode specific sheet Median specific sheet	NRL website https://www.nrl.com/ Fox Sports website https://www.foxsports.com.au/nrl total footy stats website https://www.totalfootystats.com.au/
Topic	Timeline	• Skill	Student Worksheet	Additional Activities and Resources
Data Displays using Stem and Leaf plots		<ul style="list-style-type: none"> Reading frequency distribution table Utilising secondary sources of information to frequency distribution tables Linking the use of this frequency distribution tables to real world use 	Worksheet –Frequency Distribution table	Using excel to frequency distribution tables Utilising online creators Online websites that show how clubs record their data



Australian Curriculum:

Mathematics / Year 7 / Statistics and Probability / Data representation and interpretation / ACMSP170

Content Description

Construct and compare a range of data displays including stem-and-leaf plots and dot plots

Elaborations

- understanding that some data representations are more appropriate than others for particular data sets, and answering questions about those data sets
- using ordered stem-and-leaf plots to record and display numerical data collected in a class investigation, such as constructing a class plot of height in centimetres on a shared stem-and-leaf plot for which the stems 12, 13, 14, 15, 16 and 17 have been produced

Mathematics / Year 7 / Statistics and Probability / Data representation and interpretation / ACMSP169

Content Description

Identify and investigate issues involving numerical data collected from primary and secondary sources

Elaborations

- obtaining secondary data from newspapers, the Internet and the Australian Bureau of Statistics
- investigating secondary data relating to the distribution and use of non-renewable resources around the world

Mathematics / Year 7 / Statistics and Probability / Data representation and interpretation / ACMSP171

Content Description

Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data

Elaborations

- understanding that summarising data by calculating measures of centre and spread can help make sense of the data

Mathematics / Year 7 / Statistics and Probability / Data representation and interpretation / ACMSP172

Content Description

Describe and interpret data displays using median, mean and range

Elaborations

- using mean and median to compare data sets and explaining how outliers may affect the comparison
- locating mean, median and range on graphs and connecting them to real life



New South Wales Curriculum:

Mathematics / Statistics and Probability

DATA: Data Collection and Representation

A student:

Stage 4: MA4-19SP collects, represents and interprets single sets of data, using appropriate statistical displays

DATA: Single Variable Data Analysis

A student:

Stage 4: MA4-20SP analyses single sets of data using measures of location, and range

Stage 5.1: MA5.1-12SP uses statistical displays to compare sets of data, and evaluates statistical claims made in the media

Stage 5.2: MA5.2-15SP uses quartiles and box plots to compare sets of data, and evaluates sources of data

Stage 5.3: MA5.3-18SP uses standard deviation to analyse data

Bivariate Data Analysis:

Stage 5.2: MA5.2-16SP investigates relationships between two statistical variables, including their relationship over time

Stage 5.3: MA5.3-19SP investigates the relationship between numerical variables using lines of best fit, and explores how data is used to inform decision-making processes



Relevant NSW Stage Statements:

Stage 4:

By the end of Stage 4, students use mathematical terminology, algebraic notation, diagrams, text and tables to communicate mathematical ideas, and link concepts and processes within and between mathematical contexts. They apply their mathematical knowledge, skills and understanding in analysing real-life situations and in systematically exploring and solving problems using technology where appropriate. In solving particular problems, they compare the strengths and weaknesses of different strategies and solutions.

Students construct, interpret and compare data displays, including dot plots, stem-and-leaf plots, sector graphs, divided bar graphs, and frequency tables and histograms. In analysing data, they consider both categorical and numerical (discrete and continuous) variables, sampling versus census, and possible misrepresentation of data, and calculate the mean, mode, median and range.

Stage 5.1:

By the end of Stage 5.1, students explain and verify mathematical relationships, select and use appropriate strategies to solve problems, and link mathematical ideas to existing knowledge and understanding. They use mathematical language and notation to explain mathematical ideas, and interpret tables, diagrams and text in mathematical situations.

Students' statistical skills are extended to include considering shape and skewness of distributions, comparing data and data displays, and evaluating the reliability of statistical claims.

Stage 5.2:

By the end of Stage 5.2, students use mathematical arguments to reach and justify conclusions. When communicating mathematical ideas, they use appropriate mathematical language and algebraic, statistical and other notations and conventions in written, oral or graphical form. Students use suitable problem-solving strategies, which include selecting and organising key information, and they extend their inquiries by identifying and working on related problems.

Statistical skills are extended to include the construction of box-and-whisker plots and the calculation of interquartile range to analyse and compare data sets in appropriate data displays. Students investigate bivariate data sets and use scatter plots to describe relationships between variables. They evaluate the sources of data in statistical reports.

Stage 5.3:

By the end of Stage 5.3, students use deductive reasoning in problem solving and in presenting arguments and formal proofs. They interpret and apply formal definitions and generalisations and connect and apply mathematical ideas within and across substrands. They demonstrate fluency in selecting, combining and applying relevant knowledge, skills and understanding in the solution of familiar and unfamiliar problems.

Students use standard deviation to analyse data, and interpolate and extrapolate from bivariate data using lines of best fit. They investigate statistical reports and explore how data is used to inform decision-making processes.

