Cricket Smart
Teacher Resource

CRICKET AUSTRALIA

Are numbers the real game?

Maths, we all use it to some degree, practically everyday, and possibly without realising. A great way of exploring its relevance is to analyse how mathematics is utilised in our favourite sports.

This mathematics unit draws on the teaching opportunities presented in playing the sport of cricket. Students will learn how mathematics plays a vital role in the game.

Students will be assigned tasks that require them to act as a selector whose job is to select a representative team.

They will unpack players' statistics, graph data and learn how to analyse it, and make justified decisions based on the data.

The successful outcomes of this unit will help to give relevance to the use of mathematics in our everyday lives.

Teacher Resource

Year Level 5
Learning Area Mathematics

Are numbers the real game?

Resource Descriptor

(2012 © Getty Images/ www.playcricket.com.au)

This mathematics unit draws on the teaching opportunities arising from the sport of cricket. Students will learn how mathematics plays a vital role in the sport.

They will be assigned tasks that require them to interpret data. They will unpack players' statistics, and will act as a selector, whose job it is to select a team.

During this unit, students will graph data, learn how to analyse the data they have found and argue points for and against using data to justify their decision-making.

View the supporting resources for this unit of work at **www.cricketsmart.cricket.com.au**.

Unit Objectives

In completing this unit, students will be expected to:

- Pose questions and collect numerical data
- Construct displays including column graphs and tables with and without the use of digital technologies
- Describe and interpret different data sets in context
- Identify the best methods of presenting data to illustrate the results of investigations and justify the choice of representations
- Use and compare data representations for different data sets to help decision making

Alignment to the Australian Curriculum

Australian Curriculum Content Descriptions

Statistics and Probability

ACMSP118: Pose questions and collect categorical or numerical data by observation or survey

ACMSP119: Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies

ACMSP120: Describe and interpret different data sets in context

The unit covers the mathematics proficiency strands of understanding, fluency, problem solving and reasoning across the content strand of statistics and probability. There are co-operative learning opportunities for a number of higher-order thinking strategies. The incorporation of NAPLAN style questions is demonstrated.

General capabilities

☑ Literacy

☑ Numeracy

☑ Information and communication technology (ICT) capability

☑ Critical and creative thinking

☐ Personal and social capability

☐ Ethical understanding

☐ Intercultural understanding

Cross-curriculum priorities

☐ Aboriginal and Torres Strait Islander histories and cultures

☐ Asia and Australia's engagement with Asia

☐ Sustainability

Teacher Resources

Suggested Teaching Sequence

The teaching sequence is flexible but a possible flow of ideas follows.

There are four student worksheets:

- Worksheets 1: (Batting) and 2 (Bowling) can be done at any time, either together or individually.

- Worksheet 3: Who is the best? relies on the completion of Worksheets 1 and 2 and asks the students (acting individually or in groups) to answer the question often posed by sports fans, 'which player was and or is the best?' Students justify their decisions using the process they employed whilst working through Worksheets 1 and 2.

- Worksheet 4: Your best XI. This is an extension activity where students form groups of four and act as a selection panel to select the Australian One-Day team based on the statistics and data from the Matador Cup – the Australian one-day domestic competition.

  Each selection panel will review their selections against those of other selectors to see how close they were to selecting the ideal team.

  The prior completion of Worksheets 1 through to 3 will give students the necessary skills to complete this task.

www.playcricket.com.au/what-is-cricket

Pre-teaching Ideas

- Introduce the concept of comparing player performances by recording what has happened in the past. Students can be asked to determine the criteria to be used. Teaching techniques include **Round Robins** and **P:C:R** (Publish:Circle:Refine) with **Extent Barometers**. Prompt questions could include:

(2012 © Getty Images/clubassist.cricket.com.au)

  o What data would you use to compare the best batters, bowlers and fielders?

  o Students may select players based on only one performance. Is this enough? What about three performances or an entire career?

  o How does the state of the game, the part of the match in which different players are involved, and the quality of the opposition affect selection decisions?

  o Is it equally easy to compare the three skills?

To find out how more about the **Round Robin** and **P:C:R** (Publish:Circle:Refine), scan the QR Codes or use the URLs. See page six for the **Extent Barometer**.

Round Robin

www.itcpublications.com.au/qr/rrtau

P:C:R

www.itcpublications.com.au/qr/pcrtau

- Introduce data collection techniques and methods of recording results. You can use spreadsheets and take advantage of opportunities to use visual representations, such as column graphs.

- Introduce the concepts of consistency and variability through a visual inspection of graphs. For more capable students explore the links between consistency and the mean as well as variability and the range (highest score minus lowest score).

- The data on the bowlers includes their economy rate and their strike rate. These statistics can be determined using simple calculations.

$$\text{economy rate} = \frac{\text{runs scored off the bowler}}{\text{overs bowled by the bowler}} \qquad \text{strike rate} = \frac{\text{balls bowled by the bowler}}{\text{wickets taken by the bowler}}$$

- Refer to the glossary (p.8) for further information on economy rate and strike rate, or view the video on the Cricket Smart website at **www.cricketsmart.cricket.com.au**. Students can consider if the fall of wickets (strike rate) or economy (economy rate) are more important.

- Discuss the idea of a typical performance with your students – initially from a visual inspection of graphs. Introduce more capable students to the ideas of average performances (means) and the use of decimals in averages (how do we interpret a mean of 29.4 runs?).

- How is the Australia team selected? What information do the selectors use? Can we use similar ideas to select the First XI of the competition?

- Justification is an important concept in the unit. Justify is defined in the glossary (p.8). A graphic organiser for student use in justifying is on page nine.

- Link together learning areas, in particular English (language), Technology (spreadsheets) and Physical Education.

The worksheets

- Worksheet 1 includes some prepared data sets. They aim to develop the students' ability to analyse data and explain how this represents performances prior to the more difficult analysis of real data.

- Use the data sets in Worksheet 1 to model how to interpret the information. Students may work independently or with the teacher to answer the worksheet questions.

- Worksheet 1 also asks students to collect their own data on five batters/batsmen. Teachers can differentiate this activity for less able students by asking them to only find data on two or three players.

(2014© Gareth Copley/Getty Images)

- While completing Worksheet 1, Activity 6, students may find that some batters have a 'not out' score. Students need to be careful how they interpret this. You will need to explain that a not out score has implications for determining a players average (that is runs divided by times the batter was out).

- In Worksheet 1 students will have to graph data. Ensure that they carefully follow the example templates provided in the student workbook.

  Question 11 will ask students to rank each batter on the data they have collected. This ranking will be according to Runs Scored, Averages and Strike Rates as to determine which player has performed the best. Students will use a 1-5 scale, where 1 is the best and 5 the worst.

- Worksheet 4 asks students to select their Australian XI. Make sure all selections are based on fact (not emotion, such as who is their favourite player) and justified. Students need to refer to the data they have collected on both the batters and bowlers to justify their decisions. An **Extent Barometer** or an **Elimination Draw** will assist students with their decision-making.

To find out more about these tools, scan the QR Codes or use the URLs below.

Extent Barometer

www.itcpublications.com.au/qr/barsau

Elimination Draw

www.itcpublications.com.au/qr/edrsau

- The student worksheets have increasingly complex analysis opportunities. Justification is a critical thinking skill. Furthermore, questions 11 (Worksheet 1), 3b (Worksheet 2), the activity on Worksheet 3 and the later steps in Worksheet 4 provide opportunities for additional critical and/or creative thinking.

(2014 © Gareth Copley/Getty Images)

Examples of NAPLAN Style Questions (optional)

The worksheets can be supplemented by developing some NAPLAN-style test items. Some ideas include:

1. Identify the incorrectly spelled word in the following sentence and write the corrected word in the box provided.

   All cricket teams should be sellected on merit and statistics can help in the decisions.

   [   ]

   <div align="right">[SPELLING TEST]</div>

2. Identify and circle the word that best completes the sentence from the list provided

   The bowler ran _____ the wickets before delivering the ball.

       A) up   B) towards   C) between   D) from

   <div align="right">[GRAMMAR AND PUNCTUATION TEST]</div>

3. Write a narrative story about a player (real or imaginary) and their experiences in a cricket competition you have researched.

   OR

   For those who have completed Worksheet 4: Write a persuasive essay on your view of the following statement.

   Statement:
   "Argue whether the best players to choose for a cricket team should be based purely on numbers."

   <div align="right">[WRITING TEST]</div>

   To help develop test familiarisation, a simple stimulus sheet could be developed for the persuasive task using images (optional, since the 2014 NAPLAN writing test stimulus did not include images) and the same prompts that have been used on past NAPLAN writing test papers.

4. Provide a graph or table and pose a multiple choice numeracy question that requires students to interpret the graph or table.

   <div align="right">[NUMERACY TEST]</div>

Glossary

Term	Meaning
average	In the context of cricket, the average is the mean. For example, a batting average is the total number of runs scored divided by the number of times the batter is out. Mathematically, an average is a measure of central tendency, that is a mean, median or mode.
batter	A cricketer whose prime responsibility in the team is the scoring of runs. An opening batter is one of the two batters to start the innings.
batting order	The order in which it is planned that the batsmen or batters will bat during an innings.
best score	The highest score achieved by a batter.
bowler	A cricketer whose prime responsibility in the team is bowling the ball to the opposition's batters. They can be classified according to the way they bowl, for example spin bowler and pace bowler. Each ball bowled is called a delivery.
bowling average	The number of runs conceded per wicket taken. Mathematically, it is the total number of runs scored off a particular bowler divided by the number of wickets taken by that bowler.
consistent	A performance that does not change very much over time. Graphically, consistency is represented by a column graph where the columns are all similar in height. It can be applied to batting, bowling and fielding.
economy rate	The number of runs scored off a bowler per over. Mathematically, it is the total runs scored off the bowler divided by the number of overs bowled by that bowler.
extras	Runs that are credited to the batting team that have not been scored by the batsmen or batters.
fielder	The ten players who are not bowling serve as fielders.
inconsistent	A performance that changes over time, i.e. it includes some high results and some low results. Graphically, inconsistency is represented by a column graph where the columns have different heights. It can be applied to batting, bowling and fielding.
innings	In a cricket match each team takes its turn to bat and attempts to score runs, while the other team fields. Each turn is known as an innings.
justify	To show or prove that a decision, action or idea about something is reasonable or necessary by giving sound, plausible and logical reasons for it.
mean	Commonly known as the average. Mathematically it is the total of the scores divided by the number of scores.
out	A batter is out when he/she loses his/her right to bat. They may be caught, bowled or out from a leg before wicket (LBW). A cricket team is out when ten of the batsmen/batters have been given out, the captain decides that the team has scored enough runs or completed the maximum number of overs allowed.
over	An over is a set of six deliveries, usually made by the same bowler.
range	A measure of variability. Mathematically, it is the highest score minus the lowest score.
state of the game	In cricket it is an indication of which team may be ahead at a particular time or how far the game has advanced.
strike rate	For a bowler it is the number of balls bowled by that bowler per wicket. Mathematically, it is the total number of balls delivered by the bowler divided by the number of wickets taken by that bowler. For a batter, it is a measure of how quickly they score their runs, measured by the number of runs scored per 100 deliveries.
stumps	Three vertical posts, which together form a wicket at either end of a cricket pitch. Each stump is 71.1cm high and approximately 3.5cm in diameter.
variable	A performance that changes a lot over time. It is a synonym for inconsistency.
wicket	This word has several meanings. It can be the cricket pitch used for batting. The fall of a wicket is a term to describe when a batter is out. Finally it can be one of the three stumps, with a set of three stumps referred to as the wickets.
world XI	The best team selected from players competing in an international competition. XI is '11' in Roman numerals. This is a common way of describing a cricket team (e.g. First XI).

While the glossary is provided mainly for teacher information, some of the words in this list could be introduced as spelling and/or vocabulary activities for students.

JUSTIFICATION FLOW CHART

DECISION:

Justification:

because

because

because

The **Milo T20 Blast School Cup** is a fast, fun T20 competition that captures all the excitement of the KFC T20 Big Bash League and is perfect activity to get the students involved in.

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