




## AusVELS Mathematics<sub>AC</sub> - Statistics and Probability (Strands and Sub-Strands with Elaborations)

PROGRESSION IS HIGHLIGHTED IN THE FOLLOWING DOCUMENT VIA **BOLDED TEXT**.

*Based on Australian Curriculum, Assessment and Reporting Authority (ACARA) materials*

### Cross-curriculum priorities

 Aboriginal and Torres Strait Islander histories and cultures	 Asia and Australia's engagement with Asia	 Sustainability
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Year Level Indicators	PROFICIENCY STRANDS <small>The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics.</small>	Sub-strands			
		Chance		Data representation and interpretation	
		Content Descriptor	Elaborations	Content Descriptor	Elaborations
Foundation	<b>Sourced from Level descriptions:</b> 'At this level:....,' '... <b>Problem Solving</b> includes....,' '...discussing the reasonableness of the answer'	N/A	N/A	Answer yes/no questions to collect information  (ACMSP011)	
Foundation Level Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	N/A	N/A	Students <b>sort familiar categorical data into sets and</b> use these to answer yes/no questions and <b>make simple true/false statements about the data</b>	
Level 1	<b>Sourced from Level descriptions:</b> 'At this level:....,' '... <b>Reasoning</b> includes....,' '... <b>justifying representations of data</b> ....'	<b>Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen'</b>  (ACMSP024)	* Justifying that some events are certain or impossible	<b>Choose</b> simple questions and <b>gather responses</b>  (ACMSP262)	* Determining which questions will gather appropriate responses for a simple investigation
Level 1 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	Students describe outcomes of familiar events using everyday language.		Students describe data displays.  They ask questions to collect data and <b>draw simple</b> data displays.	* Understanding one-to-one correspondence  * Describing displays by identifying categories with the greatest or least number of objects
Level 2	<b>Sourced from Level descriptions:</b> 'At this level:....,' '... <b>Fluency</b> includes....,' '...using the language of <b>chance to describe outcomes of familiar chance events</b> ....' '... <b>Reasoning</b> includes....,' '... <b>creating and interpreting simple</b> representations of data'	Identify <b>practical activities and everyday</b> events that involve chance.  Describe outcomes as <b>'likely' or 'unlikely'</b> and identify some events as <b>'certain' or 'impossible'</b>  (ACMSP047)	* Classifying a list of everyday events according to how likely they are to happen, using the language of chance, and explaining reasoning	<b>Identify a question of interest based on one categorical variable.</b>  Gather data relevant to the question  (ACMSP048)	* Determining the variety of birdlife in the playground and using a prepared table to record observations
Level 2 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	They describe outcomes for everyday events using everyday language.		Collect, <b>check and classify</b> data  (ACMSP049)	* Recognising the usefulness of tally marks  * Identifying categories of data and using them to sort data
				Create displays of data <b>using lists, table and picture graphs and interpret them</b>  (ACMSP050)	* Creating picture graphs to represent data using one-to-one correspondence  * Comparing the usefulness of different data displays
Level 2 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.			Students collect data from relevant questions to create lists, tables and picture graphs <b>with and without the use of digital technology.</b>  They interpret data <b>in context.</b>	

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Level 3	<p><b>Sourced from Level descriptions:</b></p> <p>'At this level:....'</p> <p>'...<b>Fluency</b> includes...,' '...<b>identifying</b> and describing outcomes of chance <b>experiments</b>...'</p> <p>'...<b>Problem Solving</b> includes formulating and <b>modelling</b> authentic situations <b>involving planning methods of data collection and representation</b>...'</p> <p>'...<b>Reasoning</b> includes...,' '...creating and interpreting <b>variations in the results of data collections and data displays</b>'</p>	<p><b>Conduct</b> chance experiments, identify and describe possible outcomes and <b>recognise variation in results</b></p> <p>(ACMSP067)</p>	<p>* Conducting repeated trials of chance experiments such as tossing a coin or drawing a ball from a bag and identifying the variations between trials</p>	<p>Identify questions <b>or issues</b> for categorical variables.</p> <p><b>Identify data sources and plan methods of data collection and recording</b></p> <p>(ACMSP068)</p>	<p>* Refining questions and planning investigations that involve collecting data, and carrying out the investigation (for example narrowing the focus of a question such as 'which is the most popular breakfast cereal?' to 'which is the most popular breakfast cereal among Level 3 students in our class?')</p>
				<p>Collect data, <b>organise into categories</b> and create displays using lists, tables, picture graphs and <b>simple column graphs, with and without the use of digital technologies</b></p> <p>(ACMSP069)</p>	<p>* Exploring meaningful and increasingly efficient ways to record data, and representing and reporting the results of investigations</p> <p>* Collecting data to investigate features in the natural environment</p>
				<p><b>Interpret and compare</b> data displays</p> <p>(ACMSP070)</p>	<p>* Comparing various student-generated data representations and describing their similarities and differences</p>
Level 3 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	Students conduct chance experiments and list possible outcomes and recognise variations in results.		They interpret and compare data displays.	
Level 4	<p><b>Sourced from Level descriptions:</b></p> <p>'At this level:....'</p> <p>'...<b>Fluency</b> includes...,' '...<b>collecting and recording data</b>...'</p> <p>'...<b>Reasoning</b> includes...,' '...communicating information using graphical displays and <b>evaluating the appropriateness of different displays</b>'</p>	<p>Describe <b>possible</b> everyday events and <b>order their chances of occurring</b></p> <p>(ACMSP092)</p>	<p>* Using lists of events familiar to students and ordering them from 'least likely' to 'most likely' to occur</p>	<p><b>Select and trial methods</b> for data collection, <b>including survey questions and recording sheets</b></p> <p>(ACMSP095)</p>	<p>* Comparing the effectiveness of different methods of collecting data</p> <p>* Choosing the most effective way to collect data for a given investigation</p>
		<p>Identify everyday events <b>where one cannot happen if the other happens</b></p> <p>(ACMSP093)</p>	<p>* Using examples such as weather, which cannot be dry and wet at the same time</p>	<p>Construct <b>suitable</b> data displays, <b>with and without the use of digital technologies, from given or collected data.</b></p> <p>Include tables, column graphs and picture graphs <b>where one picture can represent many data values</b></p> <p>(ACMSP096)</p>	<p>* Exploring ways of presenting data and showing the results of investigations</p> <p>* Investigating data displays using many-to-one correspondence</p>
		<p>Identify events where the chance of <b>one will not be affected by the occurrence of the other</b></p> <p>(ACMSP094)</p>	<p>* Explaining why the probability of a new baby being either a boy or a girl does not depend on the sex of the previous baby</p>	<p><b>Evaluate the effectiveness</b> of different displays <b>in illustrating data features including variability</b></p> <p>(ACMSP097)</p>	<p>* Interpreting data representations in the media and other forums in which symbols represent more than one data value</p> <p>* Suggesting questions that can be answered by a given data display and using the display to answer questions</p>
Level 4 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	Students <b>identify dependent and independent</b> events.		They <b>describe</b> different methods for data collection and representation, and evaluate their effectiveness.	
		Students list the probabilities of everyday events.		They construct data displays from given or collected data, with and without the use of digital technology.	

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Level 5	<b>Sourced from Level descriptions:</b> 'At this level:....,' '...Reasoning includes...,' '...interpreting results of chance experiments, posing appropriate questions for data investigations and interpreting data sets'	List outcomes of chance experiments involving <b>equally likely</b> outcomes and <b>represent probabilities of those outcomes using fractions</b>  (ACMSP116)	* Commenting on the likelihood of winning simple games of chance by considering the number of possible outcomes and the consequent chance of winning in simple games of chance such as jankenpon (rock/paper/scissors)	Pose questions and collect <b>categorical or numerical</b> data by <b>observation</b> or survey  (ACMSP118)	* Posing questions about insect diversity in the playground, collecting data by taping a one-metre-square piece of paper to the playground and observing the type and number of insects on it over time
		Recognise that <b>probabilities range from 0 to 1</b>  (ACMSP117)	* Investigating the probabilities of all outcomes for a simple chance experiment and verifying that their sum equals 1	Construct displays, including column graphs, <b>dot plots</b> and tables, appropriate for data type, with and without the use of digital technologies  (ACMSP119)	* Identifying the best methods of presenting data to illustrate the results of investigations and justifying the choice of representations
				Describe and interpret different data <b>sets</b> in context  (ACMSP120)	* Using and comparing data representations for different data sets to help decision making
Level 5 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	Students list outcomes of chance experiments with equally likely outcomes and assign probabilities as a number from 0 and 1.		Students <b>compare</b> and interpret different data sets.  Students pose questions to gather data and construct various displays appropriate for the data, with and without the use of digital technology.	
Level 6	<b>Sourced from Level descriptions:</b> 'At this level:....,' '...Problem Solving includes...,' '...interpreting secondary data displays...,' '...Reasoning includes...,' '...explaining why the actual results of chance experiments may differ from expected results'	Describe probabilities <b>using fractions, decimals and percentages</b>  (ACMSP144)	* Investigating games of chance popular in different cultures and evaluating the relative benefits to the organisers and participants (for example Pachinko)	Interpret and compare <b>a range</b> of data displays, <b>including side-by-side column graphs for two categorical variables</b>  (ACMSP147)	* Comparing different student-generated diagrams, tables and graphs, describing their similarities and differences and commenting on the usefulness of each representation for interpreting the data  * Understanding that data can be represented in different ways, sometimes with one symbol representing more than one piece of data, and that it is important to read all information about a representation before making judgments
		Conduct chance experiments <b>with both small and large numbers of trials using appropriate digital technologies</b>  (ACMSP145)	* Conducting repeated trials of chance experiments, identifying the variation between trials and realising that the results tend to the prediction with larger numbers of trials	Interpret <b>secondary data presented in digital media and elsewhere</b>  (ACMSP148)	* Investigating data representations in the media and discussing what they illustrate and the messages the people who created them might want to convey  * Identifying potentially misleading data representations in the media, such as graphs with broken axes or non-linear scales, graphics not drawn to scale, data not related to the population about which the claims are made, and pie charts in which the whole pie does not represent the entire population about which the claims are made
		Compare <b>observed frequencies across experiments with expected frequencies</b>  (ACMSP146)	* Predicting likely outcomes from a run of chance events and distinguishing these from surprising results		
Level 6 Achievement Standard	NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.	Students compare observed and expected frequencies of events, <b>including those where outcomes of trials are generated with the use of digital technology.</b>  They specify, list and communicate probabilities of events using simple <b>ratios</b> , fractions, decimals and percentages.		They interpret and compare a variety of data displays, including displays for two categorical variables.  They analyse and evaluate data from secondary sources.	

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Level 7	<p><b>Sourced from Level descriptions:</b></p> <p>'At this level:....'</p> <p>'...<b>Problem Solving</b> includes....', '....interpreting sets of data collected through chance experiments</p> <p><b>Reasoning</b> includes....', '....interpreting data displays'</p>	<p>Construct <b>sample spaces for single step experiments</b> with equally likely outcomes</p> <p>(ACMSP167)</p>	<p>* Discussing the meaning of probability terminology (for example probability, sample space, favourable outcomes, trial, events and experiments)</p> <p>* Distinguishing between equally likely outcomes and outcomes that are not equally likely</p>	<p><b>Identify and investigate issues</b> involving numerical data collected from primary and secondary sources</p> <p>(ACMSP169)</p>	<p>* Obtaining secondary data from newspapers, the Internet and the Australian Bureau of Statistics</p> <p>* Investigating secondary data relating to the distribution and use of non-renewable resources around the world</p>
		<p><b>Assign</b> probabilities to the outcomes of events and <b>determine</b> probabilities for events</p> <p>(ACMSP168)</p>	<p>* Expressing probabilities as decimals, fractions and percentages</p>	<p>Construct and compare a range of data displays including <b>stem and leaf plots</b> and dot plots</p> <p>(ACMSP170)</p>	<p>* Understanding that some data representations are more appropriate than others for particular data sets, and answering questions about those data sets</p> <p>* 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</p>
				<p>Calculate <b>mean, median, mode and range</b> for sets of data.</p> <p>Interpret <b>these</b> statistics in the context of data</p> <p>(ACMSP171)</p>	<p>* Understanding that summarising data by calculating measures of centre and spread can help make sense of the data</p>
				<p><b>Describe and interpret</b> data displays using median, mean and range</p> <p>(ACMSP172)</p>	<p>* Using mean and median to compare data sets and explaining how outliers may affect the comparison</p> <p>* Locating mean, median and range on graphs and connecting them to real life</p>
Level 7 Achievement Standard	<p>NOTE: The standards are not divided into sub-strands in the AusVELS documents. However, logic would dictate that the standards could be put into sub-strands, as demonstrated to the right.</p>	<p>Students determine the sample space for simple experiments with equally likely outcomes, and assign probabilities outcomes.</p>		<p>Students identify issues involving the collection of <b>discrete</b> and continuous data from primary and secondary sources.</p> <p>Students identify or calculate mean, mode, median and range for data sets, using digital technology <b>for larger data sets.</b></p> <p>They describe <b>the relationship between</b> the median and mean in data displays.</p> <p>They construct stem-and-leaf plots and dot plots.</p>	