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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics: Statistics and Probability *toward* Level 7 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* investigate the robustness of mean, median, mode and range with respect to changes in some values of a data set
* analyse data (steps, heart-rate, sleep patterns) from a personal fitness device
* calculate mean, median and mode for a range of data sets and compare their location in terms of the shape of the distribution of the data
* work backwards from mean, range and shape of distribution to identifying source data sets, such as from summary weather data for world capital cities to identification of likely city
* use various experiments involving spinners, dice and other random devices to specify sample spaces for simple one-step experiments, and calculate corresponding probabilities as fractions, decimals and percentages, for cases involving equally likely outcomes and also some cases involving non-equally likely outcomes

.**Content Descriptions:**Construct sample spaces for single-step experiments with equally likely outcomes [(VCMSP266)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP266)Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data [(VCMSP270)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP270) |
| **Mathematics Level 6 Achievement Standard**  | **Example of Indicative Progress toward Level 7 Achievement Standard** | **Mathematics Level 7 Achievement Standard** |
| By the end of Level 6:* Students interpret and compare a variety of data displays, including displays for two categorical variables.
* They analyse and evaluate data from secondary sources.
* Students compare observed and expected frequencies of events, including those where outcomes of trials are generated with the use of digital technology.
* They specify, list and communicate probabilities of events using simple ratios, fractions, decimals and percentages.
 | In **Mathematics**, indicative progression towards the Level 7 achievement standard may be when students:* write down the sample space for simple one-step experiments such as spinning a spinner in a game with different coloured segments corresponding to outcomes
* calculate mean, median and mode of like distributions, and describe and compare these distributions, such as resting and exercise heart-rates for a given cohort of students
 | By the end of Level 7:* Students identify issues involving the collection of discrete and continuous data from primary and secondary sources.
* They construct stem-and-leaf plots and dot-plots.
* Students identify or calculate mean, mode, median and range for data sets, using digital technology for larger data sets.
* They describe the relationship between the median and mean in data displays.
* Students determine the sample space for simple experiments with equally likely outcomes, and assign probabilities outcomes.

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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics: Statistics and Probability *toward* Level 8 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* use Venn diagrams and two-way tables to represent the relationship between elements of a set and subsets of this set determined by two distinct properties, and solve related problems
* use technology to generate many simple random samples from a given population and plot and discuss the shape of the distribution of sample statistics such as proportions, mean, median and range.

**Content Descriptions:**Represent events in two-way tables and Venn diagrams and solve related problems (VPMSP296)Explore the variation of means and proportions of random samples drawn from the same population [(VCMSP299)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP299) |
| **Mathematics Level 7 Achievement Standard**  | **Example of Indicative Progress toward Level 8 Achievement Standard** | **Mathematics Level 8 Achievement Standard** |
| By the end of Level 7:* Students identify issues involving the collection of discrete and continuous data from primary and secondary sources.
* They construct stem-and-leaf plots and dot-plots. Students identify or calculate mean, mode, median and range for data sets, using digital technology for larger data sets.
* They describe the relationship between the median and mean in data displays.
* Students determine the sample space for simple experiments with equally likely outcomes, and assign
 | In **Mathematics**, indicative progression towards the Level 8 achievement standard may be when students:* represent information from a Venn diagram as a two-way table and vice-versa
* use technology to generate lots of samples from a population and plot the distribution of sample means
 | By the end of Level 8:* Students explain issues related to the collection of sample data and discuss the effect of outliers on means and medians of the data.
* They use various approaches, including the use of digital technology, to generate simple random samples from a population.
* Students model situations with Venn diagrams and two-way tables and explain the use of 'not', 'and' and 'or'.
* Students choose appropriate language to describe events and experiments.
* They determine complementary events and calculate the sum of probabilities.
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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics: Statistics and Probability *toward* Level 9 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* make two-step selections from a given set both with and without replacement, such as selecting coloured balls from a jar, with and without technology
* construct and interpret back-to-back stem-and-leaf plots for different sets of sample data in relation to two categories, such as house sale prices in two different suburbs/regions or hours worked in different occupations
* use technology to draw many random samples of the same size from a population and discuss variation in sample means

**Content Descriptions:**List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events [(VCMSP321)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP321)Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including ‘skewed’, ‘symmetric’ and ‘bi modal’ [(VCMSP325)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP325)Apply set structures to solve real-world problems [(VCMNA307)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA307) |
| **Mathematics Level 8 Achievement Standard**  | **Example of Indicative Progress toward Level 9 Achievement Standard** | **Mathematics Level 9 Achievement Standard** |
| By the end of Level 8:* Students explain issues related to the collection of sample data and discuss the effect of outliers on means and medians of the data.
* They use various approaches, including the use of digital technology, to generate simple random samples from a population.
* Students model situations with Venn diagrams and two-way tables and explain the use of 'not', 'and' and 'or'.
* Students choose appropriate language to describe events and experiments.
* They determine complementary events and calculate the sum of probabilities.
 | In **Mathematics**, indicative progression towards the Level 9 achievement standard may be when students:* apply tree diagrams to solve problems involving two-step selections with and without replacement
* use back-to-back stem-and-leaf plots to compare the distributions of two sets of like numerical data for different categories, such as height of students in a class with respect to gender
* draw random samples from a population and calculate sample means
 | By the end of Level 9:* Students compare techniques for collecting data from primary and secondary sources, and identify questions and issues involving different data types.
* They construct histograms and back-to-back stem-and-leaf plots with and without the use of digital technology.
* Students identify mean and median in skewed, symmetric and bi-modal displays and use these to describe and interpret the distribution of the data.
* They calculate relative frequencies to estimate probabilities. Students list outcomes for two-step experiments and assign probabilities for those outcomes and related events.
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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics: Statistics and Probability *toward* Level 10 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* construct scatterplot for two numerical variables using real life data and discuss association in terms of strength, direction and linearity
* investigate association between two numerical variable with respect to possible causal or non-causal reasons
* carry out simulations or experiments involving selections with or without replacements and investigate the corresponding probabilities for compound events
* investigate and discuss counter-intuitive situations involving conditional probability, such as the Monty Hall problem, the boy or girl paradox, or the Sleeping Beauty problem

**Content Descriptions:**Use the language of ‘if ....then, ‘given’, ‘of’, ‘knowing that’ to investigate conditional statements and identify common mistakes in interpreting such language [(VCMSP348)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP348)Use scatter plots to investigate and comment on relationships between two numerical variables [(VCMSP352)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMSP352) |
| **Mathematics Level 9 Achievement Standard**  | **Example of Indicative Progress toward Level 10 Achievement Standard** | **Mathematics Level 10 Achievement Standard** |
| By the end of Level 9:* Students compare techniques for collecting data from primary and secondary sources, and identify questions and issues involving different data types.
* They construct histograms and back-to-back stem-and-leaf plots with and without the use of digital technology.
* Students identify mean and median in skewed, symmetric and bi-modal displays and use these to describe and interpret the distribution of the data.
* They calculate relative frequencies to estimate probabilities.
* Students list outcomes for two-step experiments and assign probabilities for those outcomes and related events.
 | In **Mathematics**, indicative progression towards the Level 10 achievement standard may be when students:* relate simple random selection with or without replacement to independent or dependent events
* describe association between two numerical variables in terms of strength, direction and linearity
 | By the end of Level 10:* Students compare univariate data sets by referring to summary statistics and the shape of their displays.
* They describe bivariate data where the independent variable is time and use scatter-plots generated by digital technology to investigate relationships between two continuous variables.
* Students evaluate the use of statistics in the media.
* They list outcomes for multi-step chance experiments involving independent and dependent events, and assign probabilities for these experiments.
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