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| **SCOPE AND SEQUENCE** | | | Mathematics — Years 1 to 9 | | | | **CHANCE AND DATA** | | | **DRAFT** | | |
| **Scope and sequence** identifies what should be taught and what is important for students to have opportunities to learn. It describes the *knowledge* that students need for ongoing learning in Mathematics.  This knowledge is presented as *Concepts and facts* and *Procedur*es.  The scope and sequence:   * is provided for each year of schooling * should be used together with the *Essential Learnings* * provides additional detail in each Organiser * informs the focus of Mathematics in assessment * is a key document for school curriculum planning. | | | | | | | | | | | | |
| **Prep** | **Year 1** | **Year 2** | | **Year 3** | **Year 4** | **Year 5** | | **Year 6** | **Year 7** | | **Year 8** | **Year 9** |
| ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | | ***Concepts and facts*** | ***Concepts and facts*** | | ***Concepts and facts*** | ***Concepts and facts*** |
| * Chance experiences in familiar situations * Student-generated questions, issues to be resolved, e.g. who can tie their shoelaces? | * Randomness (a lack of predictable order and pattern in an event) * Observation to collect data to resolve question, issues of interest | * Uncertainty of occurrence of chance events * Refinement of questions for data collection * Data collection:   + how, when, how much and conditions * Sources of variation and error * Data displays | | * Predictions about chance events (a selected outcome or subset of all possible outcomes) * Data collection:   + surveys and observations responding to questions to be explored * Variation in data * Adequacy of data | * Experimental probability is the number of successful trials (one action in an experiment) divided by the total number of trials,  e.g. 5 tails in 20 flips of a coin,  5 divided by 20 * Data collection:   + experiments exploring chance events   + collection methods: tally marks, lists, tables * Effects of variation on conclusions and predictions * Adequacy of data | * Predictions of the range of possible outcomes (all possible results from a chance experiment) * Data collection:   + experiments and observations responding to questions about the likelihood of occurrence * Expected and unexpected variation in data sets * Additional data: reasons for, amount required, impact on statements related to data | | * Theoretical probability (the number of outcomes in an event divided by the total number of possible outcomes, e.g. ½ for obtaining a head when tossing a coin) * Probability using experimental data * Sample spaces, e.g. all possible outcomes within an activity or experiment * Frequency: the count of occurrences of an event occurring, e.g. rolling an even number on a die * Predictions based on experimental data * Discrete data:   + numerical   + categorical   + count | * Theoretical probability * Estimation of theoretical probability * Continuous data * Sample data drawn from given populations * Measures of location: mean, median, mode (for discrete data) * Variation * Bias | | * Estimation of probability with equally or unequally likely outcomes * Randomness (lack of predictable order and pattern in an event) * Law of large numbers (as the number of trials increases the experimental probability gets closer to the theoretical probability) * Ways to calculate probability:   + counting   + measuring   + symmetry * Sample space: tables, tree diagrams, organised lists * Single events: individual events measuring the likelihood of one thing occurring, e.g. rolling a 5 on a die * Effect of replacement and non‑replacement on probability * Data collection: population, sample * Data accuracy * Sources of variation and error   + explained and unexplained   + bias   + effects on mean of adding or deleting data | * Theoretical probability * Experimental probability is the proportion of the number of times an event occurs in an experiment * Inferences and generalisations * Data collection:   + samples, surveys, experiments, computer simulations, from published data and databases * Compound probability experiment: a chance procedure with more than one stage, e.g. in rolling two dice, the event of getting a four on one die and a six on the other * Simple measures of spread and centre, distribution of responses, outliers * Bins identify the intervals in which the continuous data are grouped (histograms) * Errors in data * Bias |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | ***Procedures*** | ***Procedures*** | | ***Procedures*** | ***Procedures*** | | ***Procedures*** | ***Procedures*** |
| * Classification of the likelihood of familiar events | * Classification of the likelihood of daily events | * Classification of the likelihood of daily events * Connections between collected data and interpretations | | * Connections between classifications of occurrence and predictions * Connections between collected data displayed data and interpretations | * Comparison of the likelihood of events * Classification of data for chance events * Connections between organised data, displayed data and interpretations * Comparison of different data collection methods | * Data collection check * Comparison of data sets | | * Comparison between:   + expected and observed numerical outcomes   + experimental data with theoretical probability, e.g. data gathered after rolling a die 50 times with the theoretical probability of it landing on a 6   + data sets for accuracy * Classification of discrete data for chance events: numbered or categories * Connections between questions with data needed to answer them | * Comparison of:   + how often an event occurs with the number of trials performed (relative frequency)   + experimental probability with theoretical probability   + experimental data and expected data * Summarisation of data | | * Links between experimental and theoretical probability * Comparison of probabilities | * Comparison of theoretical and experimental probability * Data analysis |
| * Concrete materials:   + computers   + manipulative materials * Verbal:   + everyday language: might, might not, never happen * Written:   + data display as classified objects and images * Visual:   + photographs   + pictorial of chance events | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + student-generated data recording sheets * Verbal:   + everyday language: always, sometimes, never, will, will not and might happen, maybe, fair, not fair, lucky, unlucky * Written:   + recorded observations as data   + lists   + simple data displays, e.g. object and people graph * Visual:   + photographs   + pictorial of chance events and data collection | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + student-generated data recording sheets * Verbal:   + personal opinions as predictions of chance events   + question development   + explanations of reasoning (data collection, data display, data variation)   + mathematical language: likely, unlikely, impossible, variation * Written:   + data collection records   + title and label for data display (manual or electronic) * Visual:   + lists   + tables   + picture and bar graphs | | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + student-generated data recording sheets * Verbal:   + personal opinions as predictions of chance events   + analytical descriptions of data and variations   + explanations of reasoning (data collection, data display, data variation)   + mathematical language: likely, unlikely, possible, impossible, variation * Written:   + lists   + tables   + picture and bar graphs   + conventions for data displays (manual or electronic) * Visual:   + other people’s lists, tables, picture graphs and bar graph | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + data record sheets * Verbal:   + explanation of judgments about likelihood   + descriptions of efficiencies in data collection methods   + descriptions of variations,   + justified conclusions from data   + mathematical language: likely, more likely, most likely, never * Written:   + simple designs for experiments   + lists   + tables   + picture graphs (one-to-many with scale)   + horizontal and vertical bar graphs   + conventions for data displays: titles, axes, scale * Visual:   + other people’s tables and graphs | * Concrete materials:   + computers and other electronic devices   + manipulative materials   + data sets * Verbal:   + statements and predictions based on collected data   + limitations of collected data   + comparative and quantitative language   + describing data displays   + mathematical language: more likely, less likely, equally likely, most likely, least likely, certain, multiple outcomes, sample space, randomness * Written:   + organised lists   + tables including two-way table line graphs * Visual:   + other people’s tables, pie charts and graphs | | * Concrete materials:   + computers and other electronic devices, e.g. random number generator for chance   + manipulative materials * Verbal:   + conclusions from data   + informal inferences developed, justified and critiqued   + mathematical language: impossible, certain, bias, more/less spread out, clumped, majority, “average” (colloquial use with visual estimate), maximum, minimum, frequency, relative frequency, theoretical probability, discrete data * Written:   + spreadsheets   + calculations of probability as key percentages between impossible 0%, 50%, and certain 100%   + plans and methods for data collection   + summarised and represented data   + design of data record templates according to question and type of data   + scatter graphs (dot plots) * Visual:   + other people’s tables and graphs | * Concrete materials:   + computers and other electronic devices, e.g. random number generator for chance   + manipulative materials * Verbal:   + subjective and numerical judgments   + probability expressed as  per cent, fraction, decimal   + description of continuous data as distributions of quantities   + conclusions from data, developed, justified and critiqued   + sources of bias   + mathematical language: equally/unequally likely, spread, range, extremes (maximum/minimum), frequency, relative frequency * Written:   + spreadsheets   + frequency table   + calculations of probability as key percentages between 0% and 100%, common fractions ½, ¼, ¾ and decimal fractions between 0 and 1, e.g. 50%, ½ , 0.5   + data representations (two-way table, pie chart, bar or line graph)   + plans and methods for data collection and recording   + displays to illustrate data features and variation * Visual:   + other people’s tables and graphs | | * Concrete materials:   + computers and other electronic devices, e.g. random number generator for chance   + manipulative materials   + published data   + databases * Verbal:   + random   + reasonableness of probability estimates   + comparisons and predictions with supporting data   + limitations of measures of central tendency   + spread, shape, e.g. asymmetry, unusual features   + conclusions from data developed, justified and critiqued   + mathematical language: key properties of numerical data (centre, spread, shape, extremes), compound events, multi-outcome events, sample data * Written:   + spreadsheets   + probability values from sample spaces   + histograms (numerical data)   + stem and leaf plots   + tree diagrams and tables   + organised lists * Visual:   + commercial and other people’s tables and graphs | * Concrete materials:   + computers and other electronic devices, e.g. random number generator for chance   + manipulative materials * Verbal:   + effect of bias   + biased judgments   + effects of anomalous data on measures of location   + limitations of findings and judgments   + responses to claims and questions   + mathematical language: fair, unfair, conditional probability, measures of location, categorical data, proportion, mode, census data * Written:   + spreadsheets   + two-way table   + tree diagrams   + histograms   + stem and leaf plots   + refined questions to guide study   + displays selected to highlight features * Visual:   + commercial and other people’s tables and graphs |