Year 8 unit overview — Australian Curriculum: Mathematics

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Mathematics for Foundation–10*, <www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10>.

| School name | Unit title | Duration of unit |
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| Our School | Data investigation | 6 weeks |

| Unit outline |
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| Students develop their understanding of the basic concepts of probability and data representation. Students learn about collecting, analysing, and displaying representative data and assigning probabilities where appropriate. Students develop knowledge about ideas concerning type of data, appropriateness of display, calculated measures, analysis and the effect of outliers. Students also explore the logic that underpins scenarios involving chance. The big ideas of the unit include: * statistical analysis is a powerful tool that is used in real-world situations where data are able to be collected
* data can be displayed and represented in various ways
* data can be used to make predictions
* probability can be used to make predictions.

The focus questions that can lead inquiries in this unit are:* What data can we gather to make informed decisions?
* What do we need to do with this data to make informed decisions?
* How can we predict the outcomes of events?
* How do we assign values to different predictions?
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| Identify curriculum |
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| Content descriptions to be taught | General capabilities and cross‑curriculum priorities |
| Number and Algebra | Measurement and Geometry | Statistics and Probability |
| Number and place value* Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies [(ACMNA183)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA183)
 |  | Chance* Identify complementary events and use the sum of probabilities to solve problems [(ACMSP204)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP204)
* Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and' [(ACMSP205)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP205)
* Represent events in two-way tables and Venn diagrams and solve related problems [(ACMSP292)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP292)

Data representation an interpretation* Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes [(ACMSP206)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP206)
* Explore the variation of means and proportions in random samples drawn from the same population [(ACMSP293)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP293)
* Investigate the effect of individual  data values, including outliers, on the mean and median [(ACMSP207)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP207)
 | gc_literacy Literacy* Write reports
* Communicate using mathematical terminology

gc_numeracy Numeracy* Understand data in real-world applications

gc_ict **ICT capability*** Use spreadsheets and online survey tools

gc_critical Critical and creative thinking* Evaluate approaches to problem solving

gc_ethical Ethical behaviour* Understand that making decisions and drawing conclusions based on data may differ from those based on preferences and beliefs

cc_sust Sustainability* Represent non-rule-based data, e.g. water consumption over a month
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| Achievement standard |
| By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities. |
| Proficiencies |
| Opportunities to develop proficiencies include:Understanding * explaining the purpose of statistical measures

Fluency * recognising equivalence of common decimals and fractions including recurring decimals
* calculating the mean and median of small sets of data
 | Problem Solving * using two-way tables and Venn diagrams to calculate probabilities

Reasoning * justifying the result of a calculation or estimation as reasonable
* deriving a probability from its complement
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| Relevant prior curriculum | Curriculum working towards |
| **In the Australian Curriculum: Mathematics at Year 7**Statistics and ProbabilityThis unit builds upon students’ understanding of the basic concepts of probability and data representation:Chance* sample space
* assigning probabilities to simple events.

Data representation and interpretation* mean, median and mode
* the relationship between the mean and median
* types of data
* types of data displays.
 | **In the Australian Curriculum: Mathematics at Year 9**Statistics and ProbabilityChance* assigning probabilities and relative frequencies to compound events
* investigating the use of statistics in surveys and reports.

Data representation and interpretation* evaluating types and methods of data collection and displays.
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| Bridging content |
| The Essential Learnings by the end of Year 7 provide a good foundation to this unit. However, the type of language in the Australian Curriculum to describe events in the sub-strand Chance is more specific. In addition, the use of Venn diagrams will be new to the students. |
| Links to other learning areas |
| **Australian Curriculum: Science at Year 8:** **Scientific Inquiry Skills** Processing and analysing data and information* Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate.
* Summarise data, from students’ own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions.

Evaluating* Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method.

Communicating* Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate.
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| Assessment | Make judgments |
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| Describe the assessment | Assessment date | Teachers gather evidence to make judgements about the following characteristics of student work:Understanding* selection and application of mathematical concepts and information to solve problems
* description of choices made, strategies used and conclusions reached, and checks of the reasonableness of solutions
* mathematical modelling and representation

Skills* application of problem-solving strategies to investigate situations
* description of the results of mathematical investigations
* use of mathematical procedures and calculations to find solutions
* communication of explanations, solutions and calculations, using mathematical language, conventions and symbols

For further advice and guidelines on constructing guides to making judgments refer to the Learning area standard descriptors: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |
| Students are given opportunities to demonstrate their knowledge, skills and understanding through both formative and summative assessment. The assessment is collated in student folios and allows for ongoing feedback to students on their learning.Year 8 teachers make decisions about the length of time required to complete the tasks and the conditions under which the assessment is to be conducted.The teaching and learning experiences throughout the term provide opportunities for students to develop the understanding and skills required to complete these assessments. As students engage with these learning experiences the teacher can provide feedback on specific skills. | Weeks 5 and 6 |
| Modelling and problem-solving task (Written)Students complete a modified version of the *2007 Year 9 Mathematics QCAT*. In this task, students complete a data analysis of a report on bicycle usage (from the Australian Bureau of Statistics) in the form of a written report. The teacher reads, discusses and clarifies the report and survey.Students:* interpret data from a statistical report
* use survey data to create and analyse graphs, and make statements and predictions from those displays
* reflect on the decisions made relating to statistical information and displays
* revise and conduct their own survey
* peer review a student-designed survey
* analyse the results
* write a conclusion.

This QCAT is available from the Assessment Bank: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) |

| Teaching and learning | Supportive learning environment |
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| Teaching strategies and learning experiences | Adjustments for needs of learners | Resources |
| Data collection and analysis Students learn methods to collect, interpret and analyse data in preparation for their assessment — an analysis of a statistical report on bicycle usage from the Australian Bureau of Statistics.They use relevant questions from textbooks, worksheets and other stimulus, as appropriate. Students:* compile a glossary of terms, including: sample, fair, biased, frequency, mean, median, mode, score, tally, discrete, and continuous
* explore the practicalities and implications of obtaining representative data, e.g. “Is a class survey a sufficient sample for the whole school?”
* discuss examples of fair and biased survey questions and find real-world examples
* construct column graphs and histograms, with and without digital technology
* explore the variation of means and proportions in representative data, and the effect of outliers on the mean and median
* use the mean, median and mode to predict characteristics of a population.
* conduct the modified version of the *2007 Year 9 Mathematics QCAT* modelling and problem-solving task (data analysis).

Chance Students learn to solve problems involving complementary events and represent them using two-way tables and Venn diagrams. They use relevant questions from textbooks, worksheets and other stimulus, as appropriate, with a focus on describing events using appropriate mathematical language. Students:* compile a glossary of terms, including: possible, impossible, certain, more likely, less likely, equally likely, experimental probability, theoretical probability, trial, odds, outcome, favourable outcome, event, and complementary event
* discuss everyday events that have different likelihoods of occurring (likely, more likely, most unlikely, never) and how this likelihood influences individual decisions
* express probability as percentages, common fractions or decimal fractions between 0 and 1
* discuss the importance of appropriate sample sizes for chance experiments
* plan and conduct chance experiments involving complementary events, e.g. tossing a coin
* tabulate results of trials
* compile, organise and analyse data using spreadsheets
* construct Venn diagrams to illustrate different combinations of events
* compare results of trials to theoretical probabilities.
 | Section 6 of the *Disability Standards for Education* (The Standards for Curriculum Development, Accreditation and Delivery) states that education providers, including class teachers, must take reasonable steps to ensure a course/program is designed to allow any student to participate and experience success in learning. The *Disability Standards for Education 2005* (Cwlth) is available from: <www.ag.gov.au> select Human rights and anti-discrimination > Disability standards for education. | **ICT*** computer access required for data analysis (spreadsheet) and report writing (word-processing)
* interactive whiteboard with access to mathematics programs and websites/images (optional)

**Equipment*** relevant textbook
* worksheets
* QSA Assessment Bank: [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au)
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| Use feedback |
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| Ways to monitor learning and assessment | Teachers meet to collaboratively plan the teaching, learning and assessment to meet the needs of all learners in each unit.Teachers create opportunities for discussion about levels of achievement to develop shared understandings; co-mark or cross mark at key points to ensure consistency of judgments; and participate in moderating samples of student work at school or cluster level to reach consensus and consistency. |
| Feedback to students | Teachers strategically plan opportunities and ways to provide ongoing feedback (both written and informal) and encouragement to students on their strengths and areas for improvement.Students reflect on and discuss with their teachers or peers what they can do well and what they need to improve.Teachers reflect on and review learning opportunities to incorporate specific learning experiences and provide multiple opportunities for students to experience, practise and improve. |
| Reflection on the unit plan | Identify what worked well during and at the end of the unit, including:* activities that worked well and why
* activities that could be improved and how
* assessment that worked well and why
* assessment that could be improved and how
* common student misconceptions that need, or needed, to be clarified.
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