Year 8 plan — Australian Curriculum: Mathematics

Implementation year: School name:

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| Identify curriculum | Year level description | The proficiency strands *Understanding*, *Fluency*, *Problem* *Solving* and *Reasoning* are an integral part of mathematics content across the three content strands: *Number and Algebra*, *Measurement* *and* *Geometry*, and *Statistics* *and* *Probability*. 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.At this year level:*Understanding* includes describing patterns involving indices and recurring decimals, identifying commonalities between operations with algebra and arithmetic, connecting rules for linear relations and their graphs, explaining the purpose of statistical measures, and explaining measurements of perimeter and area *Fluency* includes calculating accurately with simple decimals, indices and integers, recognising equivalence of common decimals and fractions including recurring decimals, factorising and simplifying basic algebraic expressions, and evaluating perimeters, areas of common shapes and their volumes and three dimensional objects *Problem* *Solving* includes formulating, and modelling practical situations involving ratios, profit and loss, and areas and perimeters of common shapes, using two-way tables and Venn diagrams to calculate probabilities *Reasoning* includes justifying the result of a calculation or estimation as reasonable, deriving a probability from its complement, using congruence to deduce properties of triangles, finding estimates of means and proportions of populations. |
| 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. |
| Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v3.0: Mathematics for Foundation–10*, <www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10>. |
| Teaching and learning | Term overview | Term 1 | Term 2 | Term 3 | Term 4 |
| Directed number, rules and patternsThis term builds upon students’ understanding of operations with integers and fractions, the connection between fractions, decimals and percentages, and index notation.The term focuses on developing students’ understanding of whole numbers, decimals and percentages. They plot in the four quadrants of the Cartesian plane and are introduced to straight line graphs. (10 weeks) | Mathematical design This term builds upon students’ understanding of the use of formulas to solve problems with perimeter and area, and the relationship between units of measurement. Students use a variety of mathematical techniques and approaches to produce optimal and efficient designs for various situations. This includes problems involving measurement, percentage, length, area and volume, rates and ratios, index notation, irrational numbers and square roots.(10 weeks) | Algebraic processes This unit builds upon students’ understanding of the concepts of variables and substitution, and the associative, commutative and distributive laws of algebra. Students complete a series of tasks involving simplifying and factorising algebraic expressions. (4 weeks) | Exemplar unit: Data investigationThis unit builds upon students’ understanding of the basic concepts of probability and data representation. Students learn about collecting, analysing and displaying representative data, and assigning probabilities where appropriate. This unit incorporates ideas concerning type of data, appropriateness of display, calculated measures, analysis and the effect of outliers. Work in this term also explores the logic that underpins scenarios involving chance. (6 weeks) |
| Geometric reasoningThis unit builds upon students’ understanding of straight-line geometry. Students investigate congruence and solve related numerical problems. They solve problems using mathematical reasoning.(3 weeks) |
| Planning a holidayThis unit builds upon students’ understanding of the application of rates, ratios and percentages. Students produce an itinerary and budget for a holiday. They consider costs, time taken for travel, and other criteria of their choosing. (3 weeks) | Linear relationsThis unit builds upon concepts developed in Terms 1 and 3. Students learn to solve linear equations using both algebraic and graphical techniques. They verify their solutions by substitution. (4 weeks) |

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| Teaching and learning | Aboriginal and Torres Strait Islander perspectives | Mathematics provides opportunities for students to strengthen their appreciation and understanding of Aboriginal peoples and Torres Strait Islander peoples and their living cultures. Specific content and skills within relevant sections of the curriculum can be drawn upon to encourage engagement with:* Aboriginal and Torres Strait Islander frameworks of knowing and ways of learning
* Social, historical and cultural contexts associated with different uses of mathematical concepts in Australian Indigenous societies
* Aboriginal peoples’ and Torres Strait Islander peoples’ contributions to Australian society and cultures.

Mathematics provides opportunities to explore aspects of Australian Indigenous knowing in connection to, and with guidance from, the communities who own them. Using a respectful inquiry approach, students have the opportunity to explore mathematical concepts in Aboriginal and Torres Strait Islander lifestyles including knowledge of number, space, measurement and time. Through these experiences, students have opportunities to learn that Aboriginal peoples and Torres Strait Islander peoples have sophisticated applications of mathematical concepts which may be applied in other peoples’ ways of knowing.  |
| General capabilities and cross‑curriculum priorities | Opportunities to engage with:gc_literacygc_numeracygc_ictgc_criticalcc_sust | Opportunities to engage with:gc_literacygc_numeracygc_ictgc_criticalcc_asia | Opportunities to engage with:gc_literacygc_numeracygc_ictgc_criticalcc_asia | Opportunities to engage with:gc_literacygc_numeracygc_ictgc_criticalgc_ethicalcc_sust |
| Key to general capabilities and cross-curriculum priorities | gc_literacy Literacy  gc_numeracy Numeracy  gc_ict ICT capability  gc_critical Critical and creative thinking  gc_ethical Ethical behaviour  gc_personal_social Personal and social capability  gc_intercultural Intercultural understanding Aboriginal and Torres Strait Islander histories and cultures  cc_asia Asia and Australia’s engagement with Asia  cc_sust Sustainability |
| Develop assessment | AssessmentFor advice and guidelines on assessment, see [www.qsa.qld.edu.au](http://www.qsa.qld.edu.au) | A folio is a targeted selection of evidence of student learning and includes a range of responses to a variety of assessment techniques. A folio is used to make an overall on-balance judgment about student achievement and progress at appropriate points and informs the reporting process. |
| Term 1 | Term 2 | Term 3 | Term 4 |
| Week | Assessment instrument | Week | Assessment instrument | Week | Assessment instrument | Week | Assessment instrument |
| 3 | Supervised assessment: Short response (Written)Test students’ prior learning with a teacher-devised diagnostic test. | 6–8 | Modelling and problem-solving task (Written)Prepare a quote for a paving job using algebraic skills. | 7 | Supervised assessment: Short response (Written)Solve problems related to:* substitution
* associative, commutative and distributive laws
* geometric reasoning.
 | 5–6 | Mathematical investigation: Report (Written)Conduct a survey on bicycle usage and analyse the results.The assessment package *2007 Year 9 Mathematics QCAT (a* data analysis of a report on bicycle usage from the Australian Bureau of Statistics) in the QSA Assessment Bank could be used as assessment in this unit. |
| 9 | Supervised assessment: Short response (Written)Solve problems related to:* whole numbers, decimals and percentages
* straight-line graphing and calculations
* graphing on the Cartesian plane.
 | 9 | Supervised assessment: Short response (Written)Solve problems related to:* percentages, rates and ratios, index notation, irrational numbers and square roots
* length, area and volume.
 | 9 | Mathematical investigation: Report (Written)Plan a holiday by preparing an itinerary and budget. | 9 | Supervised assessment: Short response (Written)Solve problems related to linear equations. |
| Make judgments and use feedback | Moderation | Teachers develop tasks and plan units.Teachers mark student responses individually, then select samples representative of the A–E qualities for moderation.Teachers moderate samples to ensure consistency of judgments. | Teachers develop tasks and plan units.Students peer review the multimodal task.Before the multimodal task, teachers discuss task-specific descriptors of the quality of student performance. Teachers individually mark all student responses, applying the shared understanding achieved through this calibration process. | Teachers develop tasks and plan units.Teachers mark a small random sample of the report task, moderate the samples to ensure consistency of judgments, then mark their own class. | Teachers develop tasks and plan units.Teachers mark a small random sample of the report task, moderate the samples to ensure consistency of judgments, then mark their own class. |

Year 8 Mathematics: review for balance and coverage of content descriptions

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| Number and Algebra | 1 | 2 | 3 | 4 |
| Number and place value |
| Use index notation with numbers to establish the index laws with positive integral indices and the zero index [(ACMNA182)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA182) |  | ✓ |  |  |
| 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) | ✓ | ✓ | ✓ | ✓ |
| Real numbers |
| Investigate terminating and recurring decimals [(ACMNA184)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA184) | ✓ |  |  |  |
| Investigate the concept of irrational numbers, including π [(ACMNA186)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA186) |  | ✓ |  |  |
| Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies [(ACMNA187)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA187) | ✓ | ✓ |  |  |
| Solve a range of problems involving rates and ratios, with and without digital technologies  [(ACMNA188)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA188) | ✓ |  |  |  |
| Money and financial mathematics |
| Solve problems involving profit and loss, with and without digital technologies [(ACMNA189)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA189) |  | ✓ | ✓ |  |
| Patterns and algebra |
| Extend and apply the distributive law to the expansion of algebraic expressions  [(ACMNA190)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA190) |  |  | ✓ |  |
| Factorise algebraic expressions by identifying numerical factors [(ACMNA191)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA191) |  |  | ✓ |  |
| Simplify algebraic expressions involving the four operations [(ACMNA192)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA192) |  | ✓ | ✓ |  |
| Linear and non-linear relationships |
| Plot linear relationships on the Cartesian plane with and without the use of digital technologies [(ACMNA193)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA193) | ✓ |  |  | ✓ |
| Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution [(ACMNA194)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMNA194) |  |  |  | ✓ |

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| Measurement and Geometry | 1 | 2 | 3 | 4 |
| Using units of measurement |
| Choose appropriate units of measurement for area and volume and convert from one unit to another [(ACMMG195)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG195) |  | ✓ | ✓ |  |
| Find perimeters and areas of parallelograms, rhombuses and kites [(ACMMG196)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG196) |  | ✓ |  |  |
| Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area [(ACMMG197)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG197) |  | ✓ |  |  |
| Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume  [(ACMMG198)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG198) |  | ✓ | ✓ |  |
| Solve problems involving duration, including using 12- and 24-hour time within a single time zone [(ACMMG199)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG199) |  |  | ✓ |  |
| Geometric reasoning |
| Define congruence of plane shapes using transformations [(ACMMG200)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG200) |  |  | ✓ |  |
| Develop the conditions for congruence of triangles [(ACMMG201)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG201) |  |  | ✓ |  |
| Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning [(ACMMG202)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMMG202) |  |  | ✓ |  |

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| Statistics and Probability | 1 | 2 | 3 | 4 |
| 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 and interpretation |
| Investigate techniques for collecting data, including census and sampling [(ACMSP284)](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACMSP284) |  |  |  | ✓ |
| 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) |  |  |  | ✓ |

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