# Year 9 Plan — Australian Curriculum: Mathematics

**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. The achievement standards reflect the content and encompass the proficiencies.

- **understanding** includes describing the relationship between graphs and equations, simplifying a range of algebraic expressions and explaining the use of relative frequencies to estimate probabilities and of the trigonometric ratios for right-angle triangles
- **fluency** includes applying the index laws to expressions with integer indices, expressing numbers in scientific notation, listing outcomes for experiments, developing familiarity with calculations involving the Cartesian plane and calculating areas of shapes and surface areas of prisms
- **problem-solving** includes formulating and modelling practical situations involving surface areas and volumes of right prisms, applying ratio and scale factors to similar figures, solving problems involving right-angle trigonometry and collecting data from secondary sources to investigate an issue
- **reasoning** includes following mathematical arguments, evaluating media reports and using statistical knowledge to clarify situations, developing strategies in investigating similarity and sketching linear graphs.

At IPC, relevant learning is experienced that encourages boys succeed in Maths and provides a foundation of understanding for the later years of education. The boys will undertake 8 X 50 minute lessons per fortnight.

**Achievement standard**

By the end of Year 9, students solve problems involving simple interest. They interpret ratio and scale factors in similar figures. Students explain similarity of triangles. They recognise the connections between similarity and the trigonometric ratios. Students compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data.

Students apply the index laws to numbers and express numbers in scientific notation. They expand binomial expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment. They sketch linear and non-linear relations. Students calculate areas of shapes and the volume and surface area of right prisms and cylinders. They use Pythagoras' Theorem and trigonometry to find unknown sides of right-angled triangles. Students calculate relative frequencies to estimate probabilities, list outcomes for two-step experiments and assign probabilities for those outcomes. They construct histograms and back-to-back stem-and-leaf plots.

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum v8.2: Mathematics for Foundation–10*, <www.australiancurriculum.edu.au/Mathematics/Curriculum/F-10>.
Text: 9 Essential Mathematics for the Australian Curriculum (Second Edition)

**Teaching and learning**

**Term overview**

| Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|
| Ch 1 – Reviewing Number & Financial Mathematics<br>Ch 2 – Linear & Simultaneous Equations<br>Ch 4 – Linear Relations | Ch 3 – Pythagoras & Trigonometry<br>Ch 6 – Indices & Surds | Ch 5 – Measurement<br>Ch 7 – Geometry<br>Ch 8 – Algebra | Ch 8 – Algebra<br>Ch 9 – Probability & Statistics<br>Ch 10 – Quadratics (Extension) |
| • Consolidation Connect fractions, decimals and percentages and carry out simple conversions (ACMNA157)<br>• Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208)<br>• Solve problems involving simple interest (ACMNA211)<br>• Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate (ACMNA213)<br>• (Sketch linear graphs using the coordinates of two points and) solve linear equations (ACMNA215)<br>• Extending Solve linear simultaneous equations, using algebraic and graphical techniques, including using digital technology (ACMNA237)<br>• Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software (ACMNA214)<br>• Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294) | • Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222)<br>• Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given anglein right-angled triangles (ACMMG223)<br>• Apply trigonometry to solve right-angled triangle problems (ACMMG224)<br>• Apply index laws to numerical expressions with integer indices (ACMNA209)<br>• Express numbers in scientific notation (ACMNA210)<br>• Extend and apply the index laws to variables, using positive integer indices and the zero index (ACMNA212)<br>• | • Calculate areas of composite shapes (ACMMG216)<br>• Calculate the surface area and volume of cylinders and solve related problems (ACMMG217)<br>• Solve problems involving the surface area and volume of right prisms (ACMMG218)<br>• Investigate very small and very large time scales and intervals (ACMMG219)<br>• Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar (ACMMG220)<br>• Solve problems using ratio and scale factors in similar figures (ACMMG221) | • 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 (ACMSP225)<br>• Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or' (ACMSP226)<br>• Investigate reports of surveys in digital media and elsewhere for information on how datawere obtained to estimate population means and medians (ACMSP227)<br>• Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources (ACMSP228)<br>• Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' (ACMSP282)<br>• Compare data displays using mean, median and range to describe and interpret numerical datasets in terms of location (centre) and spread (ACMSP283) |

| | | | | | |
|---|---|---|---|---|---|
| | | • Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215)<br>• | | | • Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate (ACMNA213)<br>• Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations (ACMNA296)<br>Extension<br>• Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)<br>• Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)<br>• Solve simple quadratic equations using a range of strategies (ACMNA241) |

**Teaching and learning**

**Aboriginal and Torres Strait Islander perspectives**

Ignatius Park College has begun a two partnership with QUT to develop the Prime Futures program; teaching Yumi-Deadly Maths. It involves professional development, implementing practical resources and strategies that will engage indigenous students from 'their' perspective and reference of knowledge. This is an exciting and developing project, with the prospect of advantaging all students understanding and appreciation of Mathematics.
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**

Literacy Numeracy ICT capability Critical /creative thinking Ethical behaviour Personal/social capability Intercultural understanding

**Develop assessment**

**Assessment**
For advice and guidelines on assessment, see 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** |
| | | 1-5 | Naplan Preparation (Booklet) | 4 | Formative: PSMT | | |
| 9-10 | Supervised assessment: Short response Understanding and Fluency (Written) | 6<br><br><br>10 | Mathematical investigation: (Written)<br>Summative: Probolem solving and modelling Task (PSMT)<br>Formative: Topic Test | 8 | Supervised assessment:<br>Extended Exam<br>Short response with problem-solving and reaoning (Written) | 7/8 | Supervised Exam<br>Short response with problem-solving and reasoning (Written) |

**Make judgments & use feedback**

**Moderation**

| Term 1 | Term 2 | Term 3 | Term 4 |
|---|---|---|---|
| Teachers develop tasks and plan units.<br>Teachers co-mark tasks to ensure consistency of judgments. | Teachers develop tasks and plan units.<br>Teachers identify A–E samples before marking tasks, and moderate to ensure consistency of judgments.<br>Teachers co-mark tasks to ensure consistency of judgments.<br>Curriculum leaders randomly sample folios to check for consistency of judgments. | Teachers develop tasks and plan units.<br>Teachers co-mark tasks to ensure consistency of judgments. | Teachers develop tasks and plan units.<br>Teachers co-mark tasks to ensure consistency of judgments.<br>Curriculum leaders randomly sample folios to check for consistency of teacher judgments. |

## Year 9 Mathematics: review for balance and coverage of content descriptions

| Number and Algebra | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **Real Numbers** | | | | |
| Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208) | ✓ | | | |
| Apply index laws to numerical expressions with integer indices (ACMNA209) | | ✓ | | |
| Express numbers in scientific notation (ACMNA210) | | ✓ | | |
| **Money and financial mathematics** | | | | |
| Solve problems involving simple interest(ACMNA211) | ✓ | | | |
| Patterns and algebra | | | | |
| Extend and apply the index laws to variables, using positive integer indices and the zero index (ACMNA212) | | ✓ | | |
| Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate (ACMNA213) | ✓ | | | ✓ |
| Linear and non-linear relationships | | | | |
| Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software (ACMNA214) | ✓ | | | |
| Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294) | ✓ | | | |
| Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215) | ✓ | | | |
| Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations (ACMNA296) | | | | ✓ |

| Measurement and Geometry | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **Using units of measurement** | | | | |
| Calculate areas of composite shapes (ACMMG216) | | | ✓ | |
| Calculate the surface area and volume of cylinders and solve related problems (ACMMG217) | | | ✓ | |
| Solve problems involving the surface area and volume of right prisms (ACMMG218) | | | ✓ | |
| Investigate very small and very large time scales and intervals (ACMMG219) | | | ✓ | |
| **Geometric reasoning** | | | | |
| Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar (ACMMG220) | | | ✓ | |
| Solve problems using ratio and scale factors in similar figures (ACMMG221) | | | ✓ | |
| Pythagoras and trigonometry | | | | |
| Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222) | | ✓ | | |
| Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given anglein right-angled triangles (ACMMG223) | | ✓ | | |
| Apply trigonometry to solve right-angled triangle problems (ACMMG224) | | ✓ | | |

| Statistics and Probability | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Chance | | | | |
| 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 (ACMSP225) | | | | ✓ |
| Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or' (ACMSP226) | | | | ✓ |
| Investigate reports of surveys in digital media and elsewhere for information on how datawere obtained to estimate population means and medians (ACMSP227) | | | | ✓ |
| Data representation and interpretation | | | | |
| Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources (ACMSP228) | | | | ✓ |
| Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' (ACMSP282) | | | | ✓ |
| Compare data displays using mean, median and range to describe and interpret numerical datasets in terms of location (centre) and spread (ACMSP283) | | | | ✓ |