By curriculum area: secondary school example

By curriculum area: Mathematics

Rationale

Mathematics provides students with access to important mathematical ideas, knowledge and skills that they will draw on in their personal and work lives. The curriculum also provides students, as life-long learners, with the basis on which further study and research in mathematics and applications in many other fields are built. Mathematical ideas have evolved across societies and cultures over thousands of years, and are constantly developing. Digital technologies are facilitating this expansion of ideas and provide new tools for mathematical exploration and invention. While the usefulness of mathematics for modelling and problem solving is well known, mathematics also has a fundamental role in both enabling and sustaining cultural, social, economic and technological advances and empowering individuals to become critical citizens.

In this example, based on the Mathematics curriculum, a curriculum area plan has been developed for Year 7 – Year 10 and covers topics for all three Mathematic strands.

This plan could be used to assist teachers in planning with consideration of the:

* development and sequence of related topics across the years
* focus and time allocation for coverage of content (knowledge and skills)
* balance of topics across the strands to support learning progression based on the curriculum continuum and reduce the risk of repetition or gaps.

Further samples of Mathematics ‘strand-specific’ plans are available on the [VCAA website](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/mathematics/Pages/TeachingResources.aspx).

Achievement standards 7–10: Mathematics

|  |  |  |  |
| --- | --- | --- | --- |
| **Level 7** | **Level 8** | **Level 9** | **Level 10** |
| **Number and Algebra**  Students solve problems involving the order, addition and subtraction of integers. They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots. They solve problems involving all four operations with fractions, decimals, percentages and their equivalences, and express fractions in their simplest form. Students compare the cost of items to make financial decisions, with and without the use of digital technology. They make simple estimates to judge the reasonableness of results. Students use variables to represent arbitrary numbers and connect the laws and properties of number to algebra and substitute numbers into algebraic expressions. They assign ordered pairs to given points on the Cartesian plane and interpret and analyse graphs of relations from real data. Students develop simple linear models for situations, make predictions based on these models, solve related equations and check their solutions.  **Measurement and Geometry**  Students use formulas for the area and perimeter of rectangles. They classify triangles and quadrilaterals and represent transformations of these shapes on the Cartesian plane, with and without the use of digital technology. Students name the types of angles formed by transversals crossing parallel lines and solve simple numerical problems involving these lines and angles. They describe different views of three-dimensional objects, and use models, sketches and digital technology to represent these views. Students calculate volumes of rectangular prisms.  **Statistics and Probability**  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. | **Number and Algebra**  Students use efficient mental and written strategies to make estimates and carry out the four operations with integers, and apply the index laws to whole numbers. They identify and describe rational and irrational numbers in context. Students estimate answers and solve everyday problems involving profit and loss rates, ratios and percentages, with and without the use of digital technology. They simplify a variety of algebraic expressions and connect expansion and factorisation of linear expressions. Students solve linear equations and graph linear relationships on the Cartesian plane.  **Measurement and Geometry**  Students convert between units of measurement for area and for volume. They find the perimeter and area of parallelograms, rhombuses and kites. Students name the features of circles, calculate circumference and area, and solve problems relating to the volume of prisms. They make sense of time duration in real applications, including the use of 24-hour time. Students identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. They use tools, including digital technology, to construct congruent shapes.  **Statistics and Probability**  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. | **Number and Algebra**  Students apply the index laws using integer indices to variables and numbers, express numbers in scientific notation, solve problems involving very small and very large numbers, and check the order of magnitude of calculations. They solve problems involving simple interest. Students use the distributive law to expand algebraic expressions, including binomial expressions, and simplify a range of algebraic expressions. They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment using a range of strategies including the use of digital technology. Students sketch and draw linear and non-linear relations, solve simple related equations and explain the relationship between the graphical and symbolic forms, with and without the use of digital technology.  **Measurement and Geometry**  Students solve measurement problems involving perimeter and area of composite shapes, surface area and volume of rectangular prisms and cylinders, with and without the use of digital technology. They relate three-dimensional objects to two-dimensional representations. Students explain similarity of triangles, interpret ratios and scale factors in similar figures, and apply Pythagoras's theorem and trigonometry to solve problems involving angles and lengths in right-angled triangles.  **Statistics and Probability**  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. | **Number and Algebra**  Students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities, quadratic equations and pairs of simultaneous linear equations and related graphs, with and without the use of digital technology. Students substitute into formulas, find unknown values, manipulate linear algebraic expressions, expand binomial expressions and factorise monic and simple non-monic quadratic expressions, with and without the use of digital technology. They represent linear, quadratic and exponential functions numerically, graphically and algebraically, and use them to model situations and solve practical problems.  **Measurement and Geometry**  Students solve and explain surface area and volume problems relating to composite solids. They use parallel and perpendicular lines, angle and triangle properties, similarity, trigonometry and congruence to solve practical problems and develop proofs involving lengths, angles and areas in plane shapes. They use digital technology to construct and manipulate geometric shapes and objects, and explore symmetry and pattern in two dimensions.  **Statistics and Probability**  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. |

Mathematics curriculum area plan – Years 7 to 10 (sample only)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Week** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **Year 7** | **Semester 1** | **Surveys and displaying data 7.1.1** | | **Whole numbers, factors and multiples 7.1.2** | | | **Angles, lines and shapes - 7.1.3** | | | **Length and area - 7.1.4** | | | **Number puzzles and patterns - 7.1.5** | | **Integers, fractions and number lines - 7.1.6** | | **Probability and proportion - 7.1.7** | | |
| Sub-strand: Data representation and interpretation | | Sub-strand: Number and place value | | | Sub-strand: Geometric reasoning | | | Sub-strand: Using units of measurement | | | Sub-strand: Patterns and algebra | | Sub-strands: Real numbers; Number and place value | | Sub-strand: Chance | | |
| **Semester 2** | **Fractions - 7.2.1** | | **Patterns, rules and equations - 7.2.2** | | **Statistical data - 7.2.3** | | | **Decimals, percentages and simple ratios**  **7.2.4** | | | **Coordinates, graphs and transformations 7.2.5** | | | **Time and money - 7.2.6** | | **Solids, volume, capacity and mass - 7.2.7** | | |
| Sub-strand: Real numbers | | Sub-strand: Patterns and algebra | | Sub-strand: Data representation and interpretation | | | Sub-strand: Real numbers | | | Sub-strand: Patterns and algebra | | | Sub-strand: Using units of measurement | | Sub-strand: Using units of measurement; Shape | | |
| Sub-strand: Location and transformation | | | Sub-strand: Money and financial mathematics | |
| **Year 8** | **Semester 1** | **Positive and negative integers - 8.1.1** | | | **Maps, networks and coordinates - 8.1.2** | | **Properties of plane shapes - 8.1.3** | | | **Measurement: time and shapes - 8.1.4** | | | **Collecting and displaying data - 8.1.5** | | | **Money and Percentages 8.1.6** | | **Algebra Expressions - 8.1.7** | |
| Sub-strand: Number and place value | | | Sub-strand: Linear and non-linear relationships | | Sub-strand: Geometric | | | Sub-strand: Using units of measurement | | | Sub-strand: Data representation and interpretation | | | Sub-strand: Money and financial mathematics; Real numbers | | Sub-strand: Patterns and algebra | |
| **Semester 2** | **Linear functions and graphs - 8.2.1** | | | **Real numbers and indices** **- 8.2.2** | | | **Angles, polygons and solids - 8.2.3** | | **Linear equations - 8.2.4** | | **Volume and surface area**  **8.2.5** | | **Probability and simulation - 8.2.6** | | | **Ratios and rates - 8.2.7** | | |
| Sub-strand: Patterns and algebra; Linear and non-linear relationships | | | Sub-strand: Real numbers | | | Sub-strand: Geometric reasoning | | Sub-strand: Patterns and algebra | | Sub-strand: Using units of measurement | | Sub-strand: Chance | | | Sub-strand: Real numbers | | |
| **Year 9** | **Semester 1** | **Number and financial mathematics - 9.1.1** | | **Pythagoras’ theorem - 9.1.2** | | | **Algebra techniques - 9.1.3** | | **Linear relations and coordinate geometry - 9.1.4** | | | **Rate, ratio and proportion**  **9.1.5** | | **Probability - 9.1.6** | | | **Similarity and trigonometric ratios - 9.1.7** | | |
| Sub-strand: Real numbers; Money and financial mathematics | | Sub-strand: Pythagoras and trigonometry | | | Sub-strand: Patterns and algebra | | Sub-strand: Patterns and algebra | | | Sub-strand: Patterns and algebra | | Sub-strand: Chance | | | Sub-strand: Geometric reasoning; Pythagoras and trigonometry | | |
| **Semester 2** | **Applications of trigonometry - 9.2.1** | | | **Linear equations - 9.2.2** | | **Indices and scientific notation - 9.2.3** | | | **Shapes, prisms and cylinders - 9.2.4** | | | **Statistics - 9.2.5** | | | **Further algebra - 9.2.6** | | **Non-linear relations - 9.2.7** | |
| Sub-strand: Pythagoras and trigonometry | | | Sub-strand: Linear and non-linear relationships | | Sub-strand: Real numbers; Patterns and algebra | | | Sub-strand: Using units of measurement | | | Sub-strand: Data representation and interpretation | | | Sub-strand: Patterns and algebra | | Sub-strand: Patterns and algebra | |
| **Year 10** | **Semester 1** | **Measurement - 10.1.1** | | | **Linear relationships - 10.1.2** | | | **Statistics Univariate - 10.1.3** | | | **Number and financial applications - 10.1.4** | | | **Coordinates geometry and simultaneous equations 10.1.5** | | **Algebra techniques - 10.1.6** | | | |
| Sub-strand: Using units of measurement | | | Sub-strand: Linear and non-linear relationships | | | Sub-strand: Data representation and interpretation | | | Sub-strand: Real numbers; Money and financial mathematics; Patterns and algebra | | | Sub-strand: Patterns and algebra | | Sub-strand: Patterns and algebra | | | |
| **Semester 2** | **Quadratic functions - 10.2.1** | | | **Trigonometry - 10.2.2** | | | **Geometry - 10.2.3** | | | **Probability - 10.2.4** | | | **Statistics Bivariate - 10.2.5** | | **Relations and their graphs - 10.2.6** | | | |
| Sub-strand: Linear and non-linear relationships | | | Sub-strand: Pythagoras and trigonometry | | | Sub-strand: Geometric reasoning | | | Sub-strand: Chance | | | Sub-strand: Data representation and interpretation | | Sub-strand: Linear and non-linear relationships | | | |
|  | **Week** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |

\* Based on 3 hours teaching time per week

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Key** | **Number and Algebra Strand** |  | **Statistics and Probability Strand** |  | **Measurement and Geometry Strand** |  | **Topic, level, semester and sequence** |