**AusVELS : Australian MATHEMATICS Curriculum, F-10:**

**Proficiency Strands: Understanding, Fluency, Problem Solving and Reasoning**

**Content Strands: Number & Algebra, Measurement & Geometry, Statistics & Probability**

**For Level 8 Maths Students:**

* **Understanding** includes describing patterns in uses of indices and repeating decimals, identifying commonalities between operations with algebra & arithmetic, connecting rules of relations & functions & their graphs, explaining the function of statistical measures, & contrasting measurements of perimeter & area
* **Fluency** includes calculating accurately with simple decimals, indices & integers, recognizing equivalence of common decimals & fractions including repeating decimals, factorizing & simplifying basic algebraic expressions, evaluating perimeters, areas & volumes of common shapes, & calculating the mean & median of small sets of data
* **Problem Solving** includes formulating & modeling, with comparisons of ratios, profit & loss, authentic situations involving areas & perimeters of common shapes & analyzing & interpreting data using two-way tables
* **Reasoning** includes justifying the result of a calculation or estimation as reasonable, explaining formal & intuitive use of ratios for comparing rates & prices, deriving one probability from its component, using congruence to deduce properties of triangles, & making inferences about data

\*This document intends to assist teachers in their understanding of the Australian curriculum through AusVELS – it combines description and elaboration statements. Teachers are advised to consult the online documentation to clarify further detail for themselves. ‘AusVELS’ is the official documentation for Victorian schools.

|  |  |  |
| --- | --- | --- |
| **Number & Algebra:** | **Measurement & Geometry:** | **Statistics & Probability:** |
| **Number & place value:** Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182)* evaluating numbers expressed as powers of positive integers

Carry out the four operations with integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)**Real numbers:** Investigate terminating and recurring decimals (ACMNA184)* recognising terminating, recurring and non­terminating decimals and choosing their appropriate representations

Investigate the concept of irrational numbers, including π (ACMNA186)* understanding that the real number system includes irrational numbers and that certain subsets of the real number system have particular properties

Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187)* using percentages to solve problems, including those involving mark­ups, discounts, profit and loss and GST

Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188) **ã*** understanding that rate and ratio problems can be solved using fractions or percentages and choosing the most efficient form to solve a particular problem
* calculating population growth rates in Australia and Asia and explaining their difference

**Money & Financial maths:**Solve problems involving profit and loss, with and without digital technologies (ACMNA189)* expressing profit and loss as a percentage of cost or selling price, comparing the difference
* investigating the methods used in retail stores to express discounts

**Patterns & algebra:**Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190)* applying the distributive law to the expansion of algebraic expressions using strategies such as the area model

Factorise algebraic expressions by identifying numerical factors (ACMNA191)* recognising that factorising is the opposite of expanding
* identifying the greatest common divisor (highest common factor) of numeric and algebraic expressions and using a range of strategies to factorise algebraic expressions

Simplify algebraic expressions involving the four operations (ACMNA192)* understanding that arithmetic laws are powerful ways of describing and simplifying calculations and that using these laws leads to the generality of algebra
* understanding that the laws that apply to number can be generalised using variables

**Linear & non-linear relationships:**Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193) * plotting points for tables of values from non­rule­based data, such as water consumption over a month

Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution (ACMNA194)* using variables to symbolise simple linear equations and using a variety of strategies to solve them
* solving equations using concrete materials, such as the balance model, and explain the need to do the same thing to each side of the equation
* using strategies, such as backtracking and guess, check and improve to solve equations
 | **Using units of measurement:**Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195)* choosing units for area including mm 2, cm 2, m 2, hectares, km 2, and units for volume including mm3, cm3, m3
* recognising that the conversion factors for area units are the squares of those for the corresponding linear units
* recognising that the conversion factors for volume units are the cubes of those for the corresponding linear units

Find perimeters and areas of parallelograms, rhombuses and kites (ACMMG196)* exploring the use of parallelograms, rhombuses and kites in art and architecture

Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area (ACMMG197)* investigating the circumference and area of circles with materials or by measuring, to establish an understanding of formulas
* investigating the area of circles using a square grid or by rearranging a circle divided into sectors

Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198)* investigating the relationship between volumes of rectangular and triangular prisms

Solve problems involving duration, including using 12­ and 24­hour time within a single time zone (ACMMG199) **ã*** identifying regions in Australia and countries in Asia that are in the same time zone

**Geometric reasoning:**Define congruence of plane shapes using transformations (ACMMG200)* understanding the properties that determine congruence of triangles and recognising which transformations create congruent figures
* establishing that two figures are congruent if one shape lies exactly on top of the other after one or more transformations (translation, reflection, rotation), and recognising the equivalence of corresponding sides and angles

Develop the conditions for congruence of triangles (ACMMG201)* solving problems using the properties of congruent figures, justifying reasoning and making generalisations
* constructing triangles using the conditions for congruence
* investigating the minimal conditions needed for the unique construction of triangles, leading to the establishment of the conditions for congruence (SSS, SAS, ASA and RHS), and demonstrating which conditions do not prescribe congruence (ASS, AAA)
* plotting the vertices of two­dimensional shapes on the Cartesian plane, translating, rotating or reflecting the shape and using coordinates to describe the transformation

Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202)* establishing the properties of squares, rectangles, parallelograms, rhombuses, trapeziums and kites
* identifying properties related to side lengths, parallelism, angles, diagonals and symmetry
 | **Chance:**Identify complementary events and use the sum of probabilities to solve problems (ACMSP204)* understanding that probabilities range between 0 to 1 and that calculating the probability of an event allows the probability of its complement to be identified
* identifying the complement of familiar events (for example the complement of getting a head on a coin is getting a tail, the complement of winning a game is not winning the game)

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)* posing ‘and’, ‘or’, ‘not’ and ‘given’ probability questions about objects or people

Represent such events in two­way tables and Venn diagrams and solve related problems (ACMSP292)* understanding that representing data in Venn diagrams or two­ way tables facilitates the calculation of probabilities
* using Venn diagrams and two­way tables to calculate probabilities for events, satisfying ‘and’, ‘or’, ‘given’ and ‘not’ conditions
* collecting data to answer the questions using Venn diagrams or two­way tables

**Data representation & interpretation:**Explore the practicalities and implications of obtaining representative data using a variety of investigative processes (ACMSP206)* understanding that making decisions and drawing conclusions based on data may differ from those based on preferences and beliefs
* investigating an international issue where media reporting and the use of data reflects different cultural or social emphases (for example whaling, football World Cup outcomes)

Explore the variation of means and proportions in representative data (ACMSP293)Investigate the effect of individual data values , including outliers, on the mean and median (ACMSP207)* using sample properties (for example mean, median, range, large gaps visible on a graph) to predict characteristics of the population (for example using mean height for a class to predict level­group mean height), acknowledging uncertainty
* using displays of data to explore and investigate effects
 |
| **Level 8 achievement standard**By the end of Level 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 two­way 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. |

Reference : <http://ausvels.vcaa.vic.edu.au/>

This grid is an adaption of the information from the VCAA site to create a visual representation to assist teachers.

Cross-curriculum priorities to be included in all learning areas: Aboriginal and Torres Strait Islander histories and cultures (); Asia and Australia’s engagement with Australia (ã ); Sustainability ()