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

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

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

**For Level 7 Maths Students:**

* **Understanding** includes describing patterns in uses with indices with whole numbers, recognizing commonalities between fractions, decimals, percentages & ratios, plotting points on the Cartesian plane, identifying angles formed by a transversal crossing a pair of parallel lines, & connecting the laws & properties of numbers to algebraic terms & expressions
* **Fluency** includes calculating accurately with integers, representing fractions & decimals in various ways, investigating best buys, evaluating measures of central tendency & calculating areas of shapes & volumes of prisms
* **Problem Solving** includes formulating & solving authentic problems using numbers & measurements, creating transformations & identifying symmetry, calculating angles & interpreting sets of data collected through chance experiments
* **Reasoning** includes applying the number laws to calculations, applying known geometric facts to draw conclusions about shapes, applying an understanding of ratio & interpreting data displays

\*This document intends to assist teachers in their implementation 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.

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| **Number & Algebra:** | **Measurement & Geometry:** | **Statistics & Probability:** |
| **Number & place value:**Investigate index notation and represent whole numbers as products of powers of prime numbers (ACMNA149)* defining and comparing prime and composite numbers and explaining the difference between them
* applying knowledge of factors to strategies for expressing whole numbers as products of powers of prime factors, such as repeated division by prime factors or creating factor trees
* solving problems involving lowest common multiples and greatest common divisors (highest common factors) for pairs of whole numbers by comparing their prime factorization

Investigate and use square roots of perfect square numbers (ACMNA150)* lnvestigating square numbers such as 25 and 36 and developing square­ root notation
* investigating between which two whole numbers a square root lies

Apply the associative, commutative and distributive laws to aid mental and written computation (ACMNA151)* understanding that arithmetic laws are powerful ways of describing and simplifying calculations

Compare, order, add and subtract integers (ACMNA280)**Real numbers:**Compare fractions using equivalence. Locate and represent fractions and mixed numerals on a number line (ACMNA152)* exploring equivalence among families of fractions by using a fraction wall or a number line (for example by using a fraction wall to show that 2/3 is the same as 4/6 and 6/9)

Solve problems involving addition and subtraction of fractions, including those with unrelated denominators (ACMNA153)* exploring and developing efficient strategies to solve additive problems involving fractions (for example by using fraction walls or rectangular arrays with dimensions equal to the denominators)

Multiply and divide fractions and decimals using efficient written strategies and digital technologies (ACMNA154)* investigating multiplication of fractions and decimals, using strategies including patterning and multiplication as repeated addition, with both concrete materials and digital technologies, and identifying the processes for division as the inverse of multiplication

Express one quantity as a fraction of another, with and without the use of digital technologies (ACMNA155)* using authentic examples for the quantities to be expressed and understanding the reasons for the calculations

Round decimals to a specified number of decimal places (ACMNA156)* using rounding to estimate the results of calculations with whole numbers and decimals, and understanding the conventions for rounding

Connect fractions, decimals and percentages and carry out simple conversions (ACMNA157)* understanding that quantities can be represented by different number types and calculated using various operations, and that choices need to be made about each
* justifying choices of written, mental or calculator strategies for solving specific problems including those involving large numbers

Find percentages of quantities and express one quantity as a percentage of another, with and without digital technologies. (ACMNA158)* using authentic problems to express quantities as percentages of other amounts

Recognise and solve problems involving simple ratios (ACMNA173)* understanding that rate and ratio problems can be solved using fractions or percentages and choosing the most efficient form to solve a particular problem

**Money & Financial maths:**Investigate and calculate 'best buys', with and without digital technologies (ACMNA174)* applying the unitary method to identify ‘best buys’ situations, such as comparing the cost per 100g

**Patterns & algebra:**Introduce the concept of variables as a way of representing numbers using letters (ACMNA175)* understanding that arithmetic laws are powerful ways of describing and simplifying calculations and that using these laws leads to the generality of algebra

Create algebraic expressions and evaluate them by substituting a given value for each variable (ACMNA176)* using authentic formulas to perform substitutions

Extend and apply the laws and properties of arithmetic to algebraic terms and expressions (ACMNA177)* identifying order of operations in contextualised problems, preserving the order by inserting brackets in numerical expressions, then recognising how order is preserved by convention
* moving fluently between algebraic and word representations as descriptions of the same situation

**Linear & non-linear relationships:**Given coordinates, plot points on the Cartesian plane, and find coordinates for a given point (ACMNA178)* plotting points from a table of integer values and recognising simple patterns, such as points that lie on a straight line

Solve simple linear equations (ACMNA179)* 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 substitution to check solutions
* solving real­life problems by using pronumerals to represent unknowns
* writing an equation, estimating the answer, solving and checking the solution and creating linear relationships to represent the answer/sequence of operation

Investigate, interpret and analyse graphs from authentic data (ACMNA180) * using travel graphs to investigate and compare the distance travelled to and from school
* interpreting features of travel graphs such as the slope of lines and the meaning of horizontal lines
* using graphs of evaporation rates to explore water storage
 | **Using units of measurement:**Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving (ACMMG159)* building on the understanding of the area of rectangles to develop formulas for the area of triangles, using manual strategies and digital technologies
* establishing that the area of a triangle is half the area of an appropriate rectangle and using the formula A = 1⁄2bh, where b is the base and h is the perpendicular height of the triangle
* using area formulas for rectangles and triangles to solve problems involving areas of surfaces, such as how many litres of paint will be needed to paint a shed wall if each litre covers 16m2

Calculate volumes of rectangular prisms (ACMMG160)* investigating volumes of cubes and rectangular prisms and establishing and using the formula V = l × b × h
* understanding and using cubic units when interpreting and finding volumes of cubes and rectangular prisms

**Shape:**Draw different views of prisms and solids formed from combinations of prisms (ACMMG161)* using aerial views of buildings and other 3­D structures to visualise the structure of the building or prism

**Location & transformation:**Describe translations, reflections in an axis, and rotations of multiples of 90° on the Cartesian plane using coordinates. Identify line and rotational symmetries (ACMMG181)* understanding transformations to help identify the movement of shapes and rotational and line symmetry
* describing patterns and investigating different ways to produce the same transformational changes, such as using two successive reflections to provide the same result as a translation, or using digital technologies to experiment with, create and re­create patterns using combinations of flips, slides, turns and enlargements or reductions
* building on students’ understanding of the reflection and rotation of figures, and reflection and rotational symmetry, to identify combinations of transformations that produce the same result, and to distinguish this as an example of how mathematical results can often be obtained using multiple alternative methods

**Geometric reasoning:**Identify corresponding, alternate and co­ interior angles when two parallel straight lines are crossed by a transversal (ACMMG163)* defining and classifying angles such as acute, right, obtuse, straight, reflex and revolution, and pairs of angles such as complementary, supplementary, adjacent and vertically opposite
* constructing parallel and perpendicular lines using their properties, a pair of compasses and a ruler, and dynamic geometry software

Investigate conditions for two lines to be parallel and solve simple numerical problems using reasoning (ACMMG164)* defining and identifying alternate, corresponding and allied angles and the relationships between them for a pair of parallel lines cut by a transversal, including using dynamic geometry software

Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166)* using concrete materials and digital technologies to investigate the angle sum of a triangle and quadrilateral

Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165)* identifying side and angle properties of scalene, isosceles, right­angled and obtuse­angled triangles
* describing squares, rectangles, rhombuses, parallelograms, kites and trapeziums
 | **Chance:**Construct sample spaces for single­step experiments with equally likely outcomes (ACMSP167)* distinguishing between ‘equally likely’ outcomes and outcomes that are ‘not equally likely’
* discussing the meaning of probability terminology (for example probability, sample space, favourable outcomes, trial, chance events and experiments)

Assign probabilities to the outcomes of events and determine probabilities for events (ACMSP168)* understanding the advantages and limitations of calculating theoretical probabilities
* expressing probabilities in common and decimal fractional and percentage forms

**Data representation & interpretation:**Identify and investigate issues involving continuous or large count data collected from primary and secondary sources (ACMSP169) **ã*** investigating secondary data sets to answer comparative questions (for example the most common country of birth for a class in a Chinese school or a school in the Philippines)
* investigating the relationship between wealth or education and the health of populations from different countries

Construct and compare a range of data displays including stem­and­leaf plots and dot plots (ACMSP170)* understanding that some data representations are more appropriate than others for particular data sets, and answering questions about those data sets
* using ordered stem­and­leaf plots to record and display numerical data collected in a class investigation, such as constructing a class plot of height in centimetres on a shared stem­and­leaf plot for which the stems 12, 13, 14, 15, 16 and 17 have been provided

Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171) * understanding that summarising data by calculating measures of centre and spread can help make sense of the data
* calculating mean areas set aside for parkland, manufacturing, retail and residential dwellings to compare land use in the local municipality

Describe and interpret data displays and the relationship between the median and mean (ACMSP172)* using mean and median to compare data sets and explaining how outliers may affect the comparison
* locating mean, median and range on graphs and connecting them to real life
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| **Year 7 Achievement Standard**By the end of Level 7, students solve problems involving the comparison, 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 percentages and all four operations with fractions and decimals. They compare the cost of items to make financial decisions. Students represent numbers using variables. They connect the laws and properties for numbers to algebra. They interpret simple linear representations and model authentic information. Students describe different views of three­dimensional objects. They represent transformations in the Cartesian plane. They solve simple numerical problems involving angles formed by a transversal crossing two parallel lines. Students identify issues involving the collection of continuous data. They describe the relationship between the median and mean in data displays. Students use fractions, decimals and percentages, and their equivalences. They express one quantity as a fraction or percentage of another. Students solve simple linear equations and evaluate algebraic expressions after numerical substitution. They assign ordered pairs to given points on the Cartesian plane. Students use formulas for the area and perimeter of rectangles and calculate volumes of rectangular prisms. Students classify triangles and quadrilaterals. They name the types of angles formed by a transversal crossing parallel line. Students determine the sample space for simple experiments with equally likely outcomes and assign probabilities to those outcomes. They calculate mean, mode, median and range for data sets. They construct stem­and­leaf plots and dot­plots. |

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 ()

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.