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

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

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

**For Year 9 Maths Students:**

* **Understanding** includes describing the relationship between graphs and equations, simplifying a range of algebraic expressions, explaining the function of relative frequencies and probabilities, calculating areas of shapes and surface areas of prisms and the constancy 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 and developing familiarity with calculations involving the Cartesian plane
* **Problem Solving** includes calculating 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 and issue
* **Reasoning** includes following mathematical arguments, evaluating media reports and using statistical knowledge to draw conclusions, developing strategies in investigating similarity and sketching linear graphs

\*This document intends to assist teachers in their understanding of the Australian curriculum – it is merely an attempt to understand the document at this time – it combines description and elaboration statements. Teachers are advised to consult the online documentation to clarify further detail for themselves. The ‘AusVELS’ to be released during 2011 will be the official documentation for Victorian schools.

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| **Number & Algebra:** | **Measurement & Geometry:** | **Statistics & Probability:** |
| **Real numbers:**   * Solve problems involving direct proportion. Explore the relationship between graphs & equations corresponding to simple rate problems– *understand the difference between direct & invers proportion, identify these in real-life contexts & use to solve problems* * Apply index laws to numerical expressions with integer indices – *connect different strategies for simplifying expressions with indices to illustrate the meaning of negative indices; move fluently between representations of numeric & algebraic terms with negative indices & apply understanding of negative indices to calculations; apply knowledge of index laws to algebraic terms & simplifying algebraic expressions, using both positive & negative integral indices* * Express numbers in scientific notation– *understand that use of index notation is an efficient way of representing numbers & symbols & has many applications, particularly in science; represent extremely small & large numbers in scientific notation, and numbers in scientific notation as whole numbers or decimals*   **Money & Financial maths:**   * Solve problems involving simple interest – *understand that financial decisions can be assisted by mathematical calculations*   **Patterns & algebra:**   * Extend & apply the index laws to variables, using positive integral indices & the zero index– *understand that they index laws apply to variables as well as numbers; evaluate numbers expressed as powers of positive integers* * Apply the distributive law to the expansion of algebraic expressions, including binomials, & collect like terms where appropriate– *understand that the distributive law can be applied to algebraic expressions as well as numbers & the inverse relationship between expansion & factorisation*   **Linear & non-linear relationships:**   * Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software– *investigate graphical & algebraic techniques for finding distance* * Find the midpoint & gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphical software – *investigate graphical & algebraic techniques for finding midpoint & gradient* * Sketch linear graphs using the coordinates of two points – *determine linear rules from suitable diagrams, tables of values & graphs & describe them both using words & algebra* * Sketch simple non-linear relations with & without the use of digital technologies - sketching parabolas, hyperbolas, circles. | **Using units of measurement:**   * Calculate the areas of composite shapes – *understand that partitioning composite shapes into rectangles & triangles is a strategy for solving problems involving perimeter & area* * Calculate the surface area & volume of cylinders & solve related problems– *analyse nets of prisms & cylinders to establish formulas for surface area* * Solve problems involving the surface area & volume of right prisms – *build on understanding of area & volume to become fluent with calculation, & identifying that area & volume relationships are used in the workplace & everyday life* * Investigate very small & very large time scales & intervals – *investigate the usefulness of scientific notation in representing very large & very small numbers*   **Geometric reasoning:**   * Use the enlargement transformation to explain similarity & develop the conditions for triangles to be similar– *understand that similarity & congruence help describe relationships between geometrical shapes & form the basis of reasoning & proof; establish similarity through use of enlargement transformation; compare conditions for similarity with those of congruence; use properties of similarity & ratio, correct mathematical notation & language, to solve problems involving enlargement (eg. scale diagrams)* * Solve problems using ratio & scale factors in similar figures – *establish relationship between areas of similar figures & the ratio of corresponding sides (scale factor)*   **Pythagoras and trigonometry:**   * Investigate Pythagoras’ Theorem and its application to solving simple problems involving right-angled triangles – *understand that it is useful in determining unknown lengths in right-angled triangles & has widespread applications; recognise that right-angle triangle calculations may generate results that can be integral, fractional or irrational numbers known as surds* * Use similarity to investigate the constancy of the sine, cosine& tangent ratios for a given angle in right-angled triangles – *develop understanding of the relationship between the corresponding sides of similar right-angled triangles* * Apply trigonometry to solve right-angled triangle problems – *understand terms ‘adjacent’ & opposite sides in a right-angled triangle; select & accurately use the correct trigonometric ratio to find the unknown sides (adjacent, opposite & hypotenuse) & angles in right-angled triangles* | **Chance:**   * List all outcomes for two-step chance experiments, both with & without replacement using tree diagrams or arrays. Assign probabilities to outcomes & determine probabilities for events. * Calculate relative frequencies from given or collected data to estimate probabilities of events involving ‘and’ or ‘or’ – *posing ‘and’, ’or’, ‘not’, & ‘given’ probability questions about objects or people; collecting data to answer the questions using Venn diagrams or two-way tables* * Investigate reports of surveys in digital media & elsewhere for information on how data were obtained to estimate population means & medians – *investigate a range of data & its sources, eg. the age of residents in Australia, Cambodia & Tonga; the number of subjects studied at school in a year by 14-year-old students in Australia, Japan & Timor-Leste*   **Data representation & interpretation:**   * Identify everyday questions & issues involving at least one numerical & at least one categorical variable, & collect data directly from secondary sources – *compare annual rainfall in various parts of Australia, Pakistan, New Guinea & Malaysia* * Construct back-to-back stem-and-leaf plots & histograms & describe data, using terms including ‘skewed’, ‘symmetric’ & ‘bi modal’ * Compare data displays using mean, median & range to describe & interpret numerical data sets in terms of location (centre) and spread * Investigate techniques for collecting data, including census, sampling & observation |