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

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

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

**For Year 10 Maths Students:**

* **Understanding** includes describing patterns in uses of indices, applying the four operations to algebraic fractions, finding unknowns in formulas after substitution, making the connection between algebraic & graphical representations of relations, connecting simple & compound interest in financial contexts & determining probabilities of multiple experiments
* **Fluency** includes formulating proofs using congruent triangles & angle properties, factorizing & expanding algebraic expressions, using a range of strategies to solve equations & using calculations to investigate the shape of data sets
* **Problem Solving** includes calculating the surface area and volumes of a diverse range of prisms, finding unknown lengths & angles using applications of trigonometry, using algebraic & graphical techniques to find solutions to simultaneous equations & inequalities, & investigating independence of events & their probabilities
* **Reasoning** includes formulating geometric proofs involving congruence & similarity, interpreting & evaluating media statements & interpreting & comparing data sets

\*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:** |
| **Money & Financial maths:**   * Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies – *working with authentic information, data & interest rates to calculate compound interest & solve related problems*   **Patterns & algebra:**   * Factorise algebraic expressions by taking out a common algebraic factor– *factorise a range of expressions by taking out a common facote, including those where the common factor is an algebraic expression* * Simplify algebraic products & quotients using index laws– *understand scientific notation as an efficents way of representing numbers & symbols & its many applications, particularly in science; connecting different strategies for simplifying expressions with indices to illustrate the meaning of negative indices, expanding & simplifying results; moving fluently between representations of numeric & algebraic terms with negative indices, & applying understanding of negative indices to calculations; applying knowledge of index laws to algebraic terms, & simplifying algebraic experessions using both positive & negative integral indices* * Apply the four operations to simple algebraic fractions with numerical denominators – *solving a wide range of linear equations, including those involving one or two simple algebraic fractions, & checking solutions by substitution* * Expand binomial products & factorise monic quadratic expressions using a variety of strategies – *identifying & using common factors, including binomial terms, to factorise algebraic expressions using the technique of grouping in pairs to factorise algebraic expressions with four terms; using expansion patterns for the special binomialproducts (a+b)(a-b) & (a* ± b)2 *inversely to factorise quadratic; using the area model inversely to factorise quadratic expressions of the form ax2 + bx = c, where a =* ± 1; *exploring the method of completing the square to factorise quadratic expressions & solve quadratic equations* * Substitute values into formulas to determine an unknown – *representing word problems with simple linear equations & solving them to answer questions*   **Linear & non-linear relationships:**   * Solving problems involving linear equations, including those derived from formulas– *solving equations that are the result of substitution into common formulas from mathematics & elsewhere, including those that involve rearrangement; check solutions by substation into the equation* * Solve linear inequalities & graph their solutions on a number line – *representing word problems with simple linear inequalities & solving them to answer questions* * Solve linear simultaneous equations, using algebraic & graphical techniques including digital technology – *use simple algebraic techniques to solve pairs of linear simultaneous equations; generalising pairs of equations from word problems & choosing an appropriate strategy for solving them simultaneously* * Solve problems involving parallel & perpendicular lines – *developing fluency with the geometric calculations which connect the graphical & analytical representations of parallel & perpendicular lines, using geometric software to carry out investigations of same* * Explore the connection between algebraic & graphical representations of relations such as simple quadratics, circles & exponentials using digital technology as appropriate – *identifying, matching & describing algebraic & graphical representations of parabolas, rectangular hyperbolas, exponential functions & circles, including those that have undergone a single transformation; sketching the graphical representations of parabolas, exponential functions & circles* * Solve linear equations involving simple algebraic fractions – *including those involving one or two simple algebraic fractions & checking solutions by substitution; representing word problems, including those involving fractions, as equations & solving them to answer the question* * Solve simple quadratic equations using a range of strategies – *understanding that many relationships are non-linear & can also be represented graphically & algebraically; identifying the connection between algebraic & graphical solutions of equations ( eg. that the x-intercepts are the solutions of f(x) =0) exploring the method of completing the square to factorise quadratic expressions & solve quadratic equations* | **Using units of measurement:**   * Solve problems involving surface area & volume for a range of prisms, cylinders & composite solids – *building on understanding of surface areas & volumes of prisms & cylinders, to include pyramids, cones & spheres*   **Geometric reasoning:**   * Formulate proofs involving congruent triangles & angle properties– *proving that a quadrilateral with equal-length diagonals bisecting at right angles is a square* * Apply logical reasoning, including the use of congruence & similarity, to proofs & numerical exercises involving plane shapes– *presenting formal geometric arguments to develop skills in mathematical reasoning & presenting reasoned arguments (proofs); using mathematical language & notation, based on congruence & similarity; applying an understanding of relationships to deduce properties of geometric figures (eg the base angles of an isosceles triangle are equal); distinguishing between a practical demonstration & a proof (eg. demonstrating triangles are congruent by placing them on top of each other, as compared to using congruence tests to establish that triangles are congruent)*   **Pythagoras and trigonometry:**   * Solve right-angled triangle problems including those involving direction & angles of elevations & depression – *applying Pythagoras’s Theorem & trigonometry to problems in surveying & design* | **Chance:**   * Describe the results of two- and three-step chance experiments, both with & without replacements, assign probabilities to outcomes & determine probabilities of events. Investigate the concept of independence – *recognize & identify that some sets of chance events are dependent on a previous result & others are not, that this distinction is important when calculating probabilities, & that events are independent if P(A) x P(B) = P(A and B); distinguishing that event A us mathematically dependent on event B if the occurrence of event A (eg. selecting a ball from a bag where one ball has already been taken & not replaced)* * Using the language of ‘if…then’, ‘given’, ‘of’, ‘knowing that’ to investigate conditional statements & identify common mistakes in interpreting such language– *evaluating media reports that refer to data from a range of contexts, where the evaluation allows students to demonstrate their statistical literacy*   **Data representation & interpretation:**   * Determine quartiles & interquartile range – *finding the five-number summary (minimum & maximum values, median & upper & lower quartiles) & using its graphical representation, the box plot, as tools for both numerically & visually comparing the centre & spread of data sets* * Construct & interpret box plots & use them to compare data sets – *understanding that box plots are an efficient & common way of representing & summarizing data & can facilitate comparisons between data sets; using parallel box plots to compare data about the distribution of Aboriginal & Torres Strait islander people by age with that of the Australian population as a whole* * Compare shapes of box plots to corresponding histograms & dot plots – *investigating data in different ways to make comparisons & draw conclusions* * Use scatter plots to investigate & comment on relationships between two continuous variables – *using authentic data to construct scatter plots, make comparisons & draw conclusions* * Investigate & describe bivariate numerical data where the independent variable is time – *constructing & interpreting data displays representing bivariate data over time; investigating biodiversity changes in Australia since white settlement* * Evaluate statistical reports in the media & other places by linking claims to displays, statistics & representative data – *investigating real-life examples that demonstrate that predicted outcomes can be accompanied by unpredicted effects, & understanding the causes for this (eg. Chinese one-child policy becoming the ‘one-male’ policy); evaluating statistical reports comparing the life expectancy of Aboriginal & Torres Strait Islander people with that of the Australian population as a whole* |