The Victorian Curriculum and AusVELs F-10: Comparison of the introductory notes in the Levels.

Level	AusVELs	The Victorian Curriculum F-10
A	Understanding: develops from becoming aware of their physical state and encountering, reacting and responding to the world around them and to some everyday events and routines Fluency: includes students learning to control their behaviour and internal state and developing a repertoire of reactions to everyday experiences and events Problem Solving: includes students attending to and exploring the world around them with as much independence as possible Reasoning: includes students coactively exploring and manipulating objects in their immediate environment and experiencing the language associated with Maths activities.	In Level A, students experience and respond to personally relevant and familiar situations and events that regularly and routinely involve activities and actions such as comparing, adding and removing, distributing, placing and moving.
В	Understanding: develops through participating in a variety of everyday activities that involve objects, events and number Fluency: includes following regular routines, and matching objects using a repertoire of responses Problem Solving: includes students attending to, exploring and sorting objects in the world around them Reasoning: includes manipulating and playing with objects to develop links between their immediate environment, everyday language and mathematical activity.	In Level B, students participate in everyday activities involving making simple correspondences between objects, and explore qualitative, quantitative and comparative concepts in action and language such as none, one, more, same, different, again and gather. They recognise regularity in some events and that not all events are certain.
С	Understanding: includes connecting names and quantities (of objects, events and numbers to five)	In Level C, students demonstrate awareness in practical situations, connecting objects, numbers names and numerals from one to

	Fluency: includes counting numbers in sequence, matching objects to replicate a pattern and predicting day and night events Problem Solving: includes matching groups and objects Reasoning: includes manipulating and playing with objects to develop links between their immediate environment, everyday language and mathematical activity.	three, using 'one more than' and 'one less than'. They match like objects, describe differences between objects for given attribute, show familiarity with stages of time and events within a day using visual schedules, visually locate named objects in a familiar environment and identify some data relevant to a situation.
D	Understanding: includes connecting names, numerals and quantities of objects, events and numbers to 10) Fluency: includes counting number in sequence, continuing patterns, comparing objects, recognising events in the day Problem Solving: includes manipulating, comparing and sorting objects, such as which group (out of three) has more or less Reasoning: includes manipulating and playing with objects to develop links between their immediate environment, everyday language and mathematical activity.	In Level D, students actively use concrete models to represent number in various situations, and use number names when comparing, counting, ordering, adding to or taking away from sets of one to five objects. They form the initial terms of basic patterns and identify and sequence regular daily events, make simple qualitative measurement comparisons, match objects with their pictorial representations, and name them. Students follow instructions to place and find objects in various locations and they recognise that similar events or activities may have different outcomes at different times.
F	Understanding: includes connecting names, numerals and quantities Fluency: includes readily counting numbers in sequences, continuing patterns, and comparing the lengths of objects Problem Solving: includes using materials to model authentic problems, sorting objects, using familiar counting sequences to solve unfamiliar problems, and discussing the reasonableness of the answer	In Foundation level, students play with objects and draw pictures to develop links between their immediate environment, everyday language and mathematical activity. Students classify and sort objects into sets and form simple correspondences between them. They decide when two sets are of equal size, or one is smaller or bigger than another. They develop an understanding of the concepts of number and numeral, count,

Reasoning: includes explaining comparisons of quantities, creating patterns, and explaining processes for indirect comparison of length

order, add and share using small sets of objects. They create and continue simple patterns.

Students compare common objects with respect to length, mass and capacity, and order events and compare their duration. They make rough estimates and simple measurements with respect to informal units. Students name, sort and describe familiar everyday shapes and objects, and describe position and movement in their immediate environment.

Students investigate situations requiring data collection and presentation in simple displays, and recognise unpredictability and uncertainty in some events.

1 Understanding: includes connecting names, numerals and quantities, and partitioning numbers in various ways Fluency: includes counting number in sequences readily forward and backwards, locating numbers on a line, and naming the days of the week

Problem Solving: includes using materials to model authentic problems, giving and receiving directions to unfamiliar places, and using familiar counting sequences to solve unfamiliar problems and discussing the reasonableness of the answer

Reasoning: includes explaining direct and indirect comparisons of length using uniform informal units, justifying representations of data, and explaining patterns that have been created

In Level 1, students use mathematical symbols and language as well as materials and drawings in their mathematical explorations of daily life.

Students recognise, represent and order numbers to at least 100 using materials, diagrams, words, numerals and a number line, and apply this with respect to the value of Australian coins. They group and skip count by twos, fives and tens, and count to 100 by partitioning and using place value. Students solve simple addition problems, and share into two equal groups or parts to model one-half.

Students use uniform informal units to measure and compare length and capacity. They tell time to the half-hour and use time and calendar terms such as hours, days, weeks and months to describe duration. Students use terms such as corner, edge and

face to classify familiar shapes and objects, and are able to give and follow directions to familiar locations.

Students use one-to-one correspondences to display categorical data obtained from a simple investigation. They identify chance events in familiar contexts and use everyday language such as 'will happen', won't happen' or 'might happen' in relation to these.

Understanding: includes connecting number calculations with counting sequences, partitioning and combining numbers flexibly, identifying and describing the relationship between addition and subtraction and between multiplication and division

2

Fluency: includes counting numbers in sequences readily, using informal units iteratively to compare measurements, using the language of chance to describe outcomes of familiar chance events and describing and comparing time durations

Problem Solving: includes formulating problems from authentic situations, making models and using number sentences that represent problem situations, and matching transformations with their original shape

Reasoning: includes using known facts to derive strategies for unfamiliar calculations, comparing and contrasting related models of operations, and creating and interpreting simple representations of data

In Level 2, students use grouping partitioning and re-arrangement to apply place value and extend the range of numbers they use and apply to thousands.

Students recognise, model and order numbers to at least 1000 and use a variety of strategies to count efficiently, including skip counting forwards and backwards by twos threes, fives and tens, with and without the use of technology. They explore the relationship between addition and subtraction, and use a variety of strategies to solve problems, including missing number problems. Students use groups and arrays to represent multiplication and division and solve simple problems, including finding halves, quarters and eighths of sets and shapes. They count and order by value, small collections of Australian coins and notes.

Students compare and order sets of shapes and objects based on length, area, volume and capacity using uniform informal units. They compare masses using balance scales, tell the time to the quarter hour, and use months and seasons to describe sequences of events over a longer time frame. Students describe sets of shapes and objects defined in terms of properties, and draw examples of these with and without the use of technology. They use simple maps and identify relative locations, and investigate the

effect of simple transformations of slides, flips, half and quarter turns, both by hand and using technology.

Students use questions of interest to gather and display data for a single categorical variable and interpret it. They identify chance in a range of activities and describe related outcomes as 'likely' or 'unlikely'

Understanding: includes connecting number representations with number sequences, partitioning and combining numbers flexibly, representing unit fractions, using appropriate language to communicate times, and identifying environmental symmetry

3

Fluency: includes recalling multiplication facts, using familiar metric units to order and compare objects, identifying and describing outcomes of chance experiments, interpreting maps and communicating positions

Problem Solving: includes formulating and modelling authentic situations involving planning methods of data collection and representation, making models of three-dimensional objects and using number properties to continue number patterns

Reasoning: includes using generalising from number properties and results of calculations, comparing angles, creating and interpreting variations in the results of data collections and data displays

In Level 3, students increasingly use mathematical terms and symbols to describe computations, measurements and characteristics of objects.

Students recognise, model and order numbers to at least 10 000 and place four digit numbers on a number line with regard for scale. They partition and re-arrange to facilitate calculations involving addition and subtraction. Students have facility with single digit addition and related subtraction facts, and recall multiplication and related division facts for twos, threes, fives and tens. They formulate and solve simple multiplication and division problems, estimate answers and use technology to check calculations. Students group money to a specified value in several ways, and calculate change required in simple transactions. They model and represent multiples of unit fractions up to a whole, using arrays on a number line. They write simple rules for number patterns and generate those patterns.

Students use metric units of length, mass and capacity to measure, order and compare objects. They associate angle with measure of turn and compare angles in everyday situations. They tell the time in minutes and convert between units of time. They use simple grids in maps and identify symmetry.

Students carry out investigations, collect and organise data into categories and use different methods with and without technology to display the data. They conduct experiments involving chance, describe possible outcomes and recognise variability in results.

4 *Understanding:* includes making connections between representations of numbers, partitioning and combining numbers flexibly, extending place value to decimals, using appropriate language to communicate times, and describing properties of symmetrical shapes

Fluency: includes recalling multiplication tables, communicating sequences of simple fractions, using instruments to measure accurately, creating patterns with shapes and their transformations, and collecting and recording data

Problem Solving: includes formulating, modelling and recording authentic situations involving operations, comparing large numbers with each other, comparing time durations, and using properties of numbers to continue patterns

Reasoning: includes using generalising from number properties and results of calculations, deriving strategies for unfamiliar multiplication and division tasks, comparing angles, communicating information using graphical displays and evaluating the appropriateness of different displays

In Level 4, students extend the number system to simple decimal fractions, and broaden their use of measures and scales.

Students model, represent and order numbers to tens of thousands, and extend place value to tenths and hundredths. They investigate odd and even numbers and explore number patterns based on multiples of 3, 4, 6, 7, 8 and 9. Students develop facility with multiplication facts up to 10 x 10 and related division facts. They investigate simple equivalent fractions and count by halves, thirds and quarters, and locate corresponding elements on a number line. Students use simple decimals to solve money problems including total cost and change. They solve simple number sentences and word problems involving all four operations.

Students use scales instruments with metric units to measure and compare length, mass, capacity and temperature. They compare shapes and objects using familiar metric units for area and volume, and compare angles with respect to a right angle. Students use 'am' and 'pm' notations, and solve simple time problems, including conversions between units of time. They construct new shapes by combining or splitting common shapes, and create symmetric patterns, pictures and shapes with and without the use of technology. They interpret and use basic maps with simple scales, directions and legends.

Students select and trial different methods for collecting data, including surveys. They construct suitable data displays with and without the use of technology, where there is a many-to-one relationship between elements of graphs and data, and evaluate the effectiveness of different displays. They identify relative likelihood of everyday events, and identify events that are mutually exclusive and events that are independent.

Understanding: includes making connections between representations of numbers, using fractions to represent probabilities, comparing and ordering fractions and decimals and representing them in various ways, describing transformations and identifying line and rotational symmetry

Fluency: includes choosing appropriate units of measurement for calculation of perimeter and area, using estimation to check the reasonableness of answers to calculations and using instruments to measure angles

Problem Solving: includes formulating and solving authentic problems using whole numbers and measurements and creating financial plans

Reasoning: includes investigating strategies to perform calculations efficiently, continuing patterns involving fractions and decimals, interpreting results of chance experiments, posing appropriate questions for data investigations and interpreting data sets

In Level 5, students extend decimal fractions to thousandths, and explore the ideas of factors, multiples and divisibility.

Students use estimation and rounding for all four operations, with and without the use of technology for calculation. They solve multiple digit problems involving addition, subtraction, multiplication and division by single digit divisors with remainders. Students represent, compare and order unit fractions, and decimal fractions, and represent them on a number line. They construct simple budgets for familiar events and activities. They solve numbers sentences involving division, and create number patterns involving fractions and decimals.

Students choose and use suitable metric and other units for measurement of length, angle, area, volume, capacity and mass. They calculate the perimeter and area of rectangles, and construct specified angles using protractors and other relevant technologies. Students use 12 and 24 hour time systems, with measurements and conversions to seconds. They use grid reference systems to describe location and connect three-dimensional objects with two-dimensional representations. They translate, reflect and rotate shapes with and without the use of technology, and identify point

and line symmetries. They explore similarity of familiar shapes through enlargement.

Students pose questions to collect categorical and numerical data by observation and survey, and represent the data in a variety of ways with and without the use of technology. They describe and interpret data sets in context. Students recognise that probabilities are measured on a scale of 0 to 1 (inclusive), and represent the probability of events from simple experiments using fractions.

Understanding: includes describing properties of different sets of numbers, using fractions and decimals to describe probabilities, representing fractions and decimals in various ways and describing connections between them, and making reasonable estimations

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Fluency: includes representing integers on a number line, calculating simple percentages, using brackets appropriately, converting between fractions and decimals, using operations with fractions, decimals and percentages, measuring using metric units, and interpreting timetables

Problem Solving: includes formulating and solving authentic problems using fractions, decimals, percentages and measurements, interpreting secondary data displays, and finding the size of unknown angles

Reasoning: includes explaining mental strategies for performing calculations, describing results for continuing number sequences, explaining the transformation of one shape into another, explaining why the actual results of chance experiments may differ from expected results.

In Level 6, students work with prime, composite, square and triangular numbers and carry out mental, written and technology based computation to solve whole number problems involving all four operations. They explore everyday situations involving integers, and use a number line to represent them. They scale decimals by powers of ten, and add and subtract decimals with and without technology, and estimate their answers. Students calculate simple percentage discounts, multiply decimals by whole number, carry out divisions with terminating decimal remainders, and use simple fraction, decimal and percentage equivalences with and without technology. They create sequences involving whole numbers, fractions and decimals, describe their rules, and use brackets and order of operations to write numbers sentences involving multiple operations.

Students use decimals for metric measurement, convert between units, recognise the prefixes used in metric measurements, and relate and compare measures and units, including capacity and volume. They develop and use timetables. Students investigate combinations of transformations with and without technology, and use the Cartesian coordinate system to describe location in the

plane. They investigate the sum of angles at a point on a line and vertically opposite angles.

Students carry out experiments involving chance with and without technology, compare variation in frequencies across experiments with expected frequencies, and use fractions, decimals and percentages to describe probabilities. They interpret a range of data displays, including those for two categorical variables, and interpret data presented in the media.

7 Understanding: includes describing patterns in uses of indices with whole numbers, recognising equivalences between fractions, decimals, percentages and ratios, plotting points on the Cartesian plane, identifying angles formed by a transversal crossing a pair of lines, and connecting the laws and properties of numbers to algebraic terms and expressions

Fluency: includes formulating and solving authentic problems using numbers and measurements, working with transformations and identifying symmetry, calculating angles and interpreting sets of data collected through chance experiments.

Problem Solving: includes calculating accurately with integers, representing fractions and decimals in various ways, investigating best buys, finding measures of central tendency and calculating areas of shapes and volumes of prisms

In Level 7, students work with powers of whole numbers, use index notation, represent numbers as products of powers of prime numbers, and investigate square roots of perfect squares. They use number properties to assist with calculation and order, and to add and subtract integers. Students find equivalent fractions, represent positive and negative fractions and mixed numbers on a number line and add, subtract, multiply and divide fractions and decimals with and without the use of technology. They express one quantity as a fraction of another, round to a specified number of decimal places, and convert between fractions, decimals and percentages. They find percentages of quantities and one quantity as a percentage of another. They solve simple ratio problems and calculate best buys with and without the use of technology.

Students use variables to express relationships in real life data, and interpret and analyse corresponding graphs. They use pro-numerals to construct simple algebraic expressions and substitute numerical values into these. They solve simple linear equations and plot points on the Cartesian plane.

Reasoning: includes applying the number laws to calculations, applying known geometric facts to draw conclusions about shapes, applying an understanding of ratio and interpreting data displays.

Students use formulas for calculating areas of triangles, rectangles and related shapes, and volumes of cubes and rectangular prisms.

They form two-dimensional representations of prisms, buildings and other structures. They use simple combinations of transformations, with and without technology, to create geometric patterns and identify line and point symmetry, apply parallel line and transversal angle properties, angles sums in triangles and quadrilaterals, classify triangles and quadrilaterals, and construct them using compass and straight edge and dynamic geometry technology.

Students construct sample spaces for simple experiments involving chance, and assign probabilities to outcomes. They use data from primary and secondary sources to investigate issues of interest, and employ data displays such as dots plots and stem and leaf plots to compare data sets, and calculate measures of centre and simple measures of spread to analyse and interpret the data.

Understanding: includes describing patterns involving indices and recurring decimals, identifying commonalities between operations with algebra and arithmetic, connecting rules for linear relations their graphs, explaining the purpose of statistical measures, and explaining measurements of perimeter and area

8

Fluency: includes calculating accurately with simple decimals, indices and integers, recognising equivalence of common decimals and fractions including recurring decimals, factorising and simplifying basic algebraic

In Level 8, students consolidate their proficiency with the four arithmetic operations, and combinations of these, for general computation involving natural numbers, integers and rational numbers, with and without the use of technology. They represent these numbers on the real number line. They extend the use of indices and develop the index laws using number examples. Students investigate the relationship between decimal and fraction representations of rational numbers (terminating and recurring decimals) and work with some irrational real numbers such as square roots and multiples and fractions of π (pi). They solve a range of problems involving ratios, proportions, percentages and rates, with and without the use of digital technologies.

expressions, and evaluating perimeters, areas of common shapes and their volumes and three dimensional objects

Problem Solving: includes formulating, and modelling practical situations involving ratios, profit and loss, areas and perimeters of common shapes, and using two-way tables and Venn diagrams to calculate probabilities

Reasoning: justifying the result of a calculation or estimation as reasonable, deriving probability from its complement, using congruence to deduce properties of triangles, finding estimates of means and proportions of populations

Students generalise from number to algebra, and expand, factorise, simplify and substitute into simple algebraic expressions. They plot linear relations on the Cartesian plane, with and without the use of digital technology, solve linear equations and apply linear models.

Students convert between units for area and for volume, and solve problems involving duration using 12-hour and 24-hour time, within a given time zone. They develop and use formulas for calculating perimeters and areas of quadrilaterals and circles, and volumes of prisms, and solve related measurement problems.

Students use congruence and transformations to establish properties of plane shapes related to sides, angles and symmetry, and solve related problems.

Students use the logical connectives 'not', 'and', 'or' and 'either ... or' to relate events to probabilities, and use Venn diagrams and two-way tables to calculate probabilities. They develop an understanding that probabilities range from 0 to 1 and that the sum of probabilities for events in a sample space is 1.

Students investigate and use various techniques for collecting data, including random sampling. They use digital technology to explore the variability of proportions and means in random samples drawn from a given population, and investigate the effect of individual data values, including outliers, on the measure of centre (average).

9 *Understanding:* includes describing the relationship between graphs and equations, simplifying a range of algebraic expressions, explaining the use of relative frequencies to estimate probabilities, and the use 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 and calculating areas of shapes and surface areas of prisms Problem Solving: includes formulating, and modelling practical situations involving 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 an issue

Reasoning: includes following mathematical arguments, evaluating media reports and using statistical knowledge to clarify situations, developing strategies in investigating similarity and sketching linear graphs

In Level 9, students develop familiarity with a broader range of non-linear and linear functions and relations, and related algebra and graphs.

Students apply index laws with integer indices to a range of numerical expressions and extend this to algebraic expressions involving numbers and pro-numerals. They use indices to express very large and very small numbers in scientific notation, and apply this in measurement contexts. Students solve problems involving direct proportion and rates, and simple interest. They apply coordinate geometry to finding the distance between two points in the Cartesian plane, and the midpoint and gradient of a line segment joining two points. Students graph linear relations and solve linear equations, using tables of values, graphs and algebra. They graph simple non-linear relations such as parabolas, the reciprocal function, and circles at the origin, and solve simple related equations with and without the use of digital technology.

Students find areas of composite shapes and the surface area and volumes of right prisms and cylinders. They solve problems involving very small and very large time scales and intervals, and use scientific notation in this context. Students use similarity, enlargement transformations and apply geometric reasoning to solve problems involving ratio and scale factors. They use Pythagoras theorem and trigonometry ratios to solve problems in the plane involving right angles triangles, and develop an understanding that these involve irrational real numbers, which are generally represented by rational approximations specified to a given accuracy.

Students list outcomes for two-step experiments involving selections with and without replacement, using arrays and tree

diagrams, and determine related probabilities. They use Venn diagrams and two-way tables to calculate probabilities and relative frequencies from collected or given data to estimate probabilities. They identify issues and questions involving categorical and numerical data, use back-to-back stem-plots and histograms to describe and compare the distribution of data in terms of location (centre), spread and symmetry or skew.

10 Understanding: includes applying the four operations to algebraic fractions, finding unknowns in formulas after substitution, making the connection between equations of relations and their graphs, comparing simple and compound interest in financial contexts and determining probabilities of two and three step experiments

Fluency: includes factorising and expanding algebraic expressions, using a range of strategies to solve equations and using calculations to investigating the shape of data sets

Problem Solving: includes calculating the surface area and volume of a diverse range of prisms to solve practical problems, finding unknown lengths and angles using applications of trigonometry, using algebraic and graphical techniques to find solutions to simultaneous equations and inequalities, and investigating independence of events

Reasoning: includes formulating geometric proofs involving congruence and similarity interpreting and evaluating media statements and interpreting and comparing data sets

In Level 10, students extend their use of mathematical models to a wide range of familiar and unfamiliar contexts, involving the use of all types of real numbers. They recognise the role of logical argument and proof in establishing mathematical propositions. Students apply mental, written or technology-assisted forms of computation as appropriate, and routinely use estimation to validate or provide bounds for their answers. They use exponential functions to model compound interest problems.

Students expand, factorise, simplify and substitute into a wide range of algebraic expressions, including linear, quadratic, and exponential terms and relations, as well as simple algebraic fractions with numerical denominators. They solve related equations, linear inequalities and simultaneous linear equations, with and without the use of digital technology. They explore the connection between tabular, graphical and algebraic representations of non-linear relations, including circles with centres at any location in the Cartesian plane.

Students solve problems involving surface area and volume for a range of objects, and follow proofs of key geometric results involving the application of congruence and similarity. They solve

practical problems in two and three dimensions involving right angles triangles, Pythagoras theorem and trigonometry.

Students extend their work in probability to combinations of up to three events, using lists, tables, Venn diagrams, tree diagrams and grids as applicable to determine probabilities. They explore the concepts of conditional probability and independence, and their application to solving problems involving chance events.

Students use quartiles and the interquartile range as a measure of spread, and construct and interpret boxplots to compare data sets. They relate box plots to corresponding dot plots and histograms. Students explore the association between two numerical variables using scatterplots, in particular with time as the independent variable. They discuss claims made using statistics in various media articles and other reports, on issues of interest.