Correlation

VIC

Victoria

Level 1
(Kindergarten)

Topic	Relevant exercise
Number *Key Ideas:* • Students develop a basic understanding of the concepts of number and numerals • Can group objects into sets (collections) and for simple correspondence (relations) between two sets. • Students learn to count up to 20. • Can describe and place objects in order such as first, second and third, • Students model addition but putting groups of objects together and counting the combined set. Students model subtraction by moving apart groups. • Students can add and subtract by counting forward and backward using numbers from 0-20.	**Concept – counting** Skill – Reading and Printing Numerals Level A and B Skill – Counting Backwards Level A and B Skill – Reading and Printing Numerals Level A and B Skill – Use ordinal numbers Level A Skill – Counting Using Money Level B **Concept – Comparing and Ordering** Skill – Locate numbers on a numberline Level A **Concept – Operations** Skill – Introduce addition concretely…"in all" and "altogether" Level A Skill – Introduce addition concretely…"And" Level A Skill – Introduce subtraction concretely…"take away" Level A **Concept - Comparing and Ordering** Skill – Understand "more" and "less" Level A

Space *Key Ideas:* • Students manipulate and investigate properties of basic two and three-dimensional objects such as triangles, circles, squares and boxes and balls. • Use everyday objects to describe points, lines, edges and surfaces. • Students recognise inside and outsiden of objects and shapes. • Students participate in activities in which they create and follow simple verbal instructions to locate items in classroom and immediate environment • Students recognise, copy and draw points and simple freehand curves.	**Concept – Counting** Skill – recognise and count two-dimensional figures Level B Skill – Recognise and count solids Level B and C
Measurement, Chance and data *Key Ideas:* • Students learn to compare common objects using terms longer, heavier, fuller and taller etc. • Students begin to make estimates and simple measurements using informal units such as number of paperclips in length. • Students understand continuity and natural cycles such as day/night and the seasons. • In chances, students begin to recognise unpredictability and uncertainty of events such as roll of a die. • Students investigate situations requiring data collection and presentation in simple displays such as a pictograms of family pets.	**Concept – Counting** Skill – Estimating the number of objects and reasonableness Level A and B **Concept – Comparing and ordering** Skill – Understand Measurement of Time Level B (The clock Worksheets # 1 & 2, and Times to the Hour worksheets #1 & 2)

Level 2
(Years 1 and 2)

Topic	Relevant Exercises
Number *Key Ideas:* • Students model the place value of natural numbers form 0-1000 • Students can order and count to 1000 by 1's, 10's and 100's. • Students can Skip count by 2's, 4's and 5's from 0-100 starting from any natural number. • Students form patterns and sets of numbers based on simple criteria such as odd and even numbers. • Students order money amounts in dollars and cents and carry out simple money calculations. • Students describe simple fractions such as one half, one third, and one quarter, in terms of equal sized parts or a whole objects. • Students can add and subtract one and two-digit numbers by counting on and counting back. • Students mentally compute simple addition and subtraction calculations involving one or two-digit natural numbers using number facts such as complement to 10, doubles and near doubles. • Students can describe and calculate simple multiplication as repeated addition such as 3x5=5+5+5. And division as sharing such as 8 shared between 4.	**Concept – Counting** Skill – Reading and printing numerals Level A, B and C Skill – counting backwards Level A and B Skill – Skip counting and patterns Level C Skill – Count on from a given number Level A Skill – Counting using money Level B, C and D Skill – Introduction to Arrays Level C Skill – Introduction to Division Level C Skill – Introduce Fractions…Equal Parts Level B (all) Skill – Introduce common fractions as parts of whole Level B (One half of a shape, three quarters of a shape, cut in half worksheet #1 and 2) **Concept – operations** Skill – Introduce Multiplication Concretely Level C Skill – Introduce the symbolism # + # = Level A Skill – Introduce the words… 'plus' and 'equals' Level A Skill – Demonstrate Addition facts…Making 5, 6, 7, 8, 9 and 10. Level A **Concept – Comparing and Ordering** Skill – Introduce "Greater than" "less than" Level A Skill – Use ordinal Numbers Level A and B
Measurement, Chance and Data *Key Ideas:* • Students make, describe and compare measurements of length, area, volume and mass and time	**Concept – Comparing and ordering** Skill – Described elapsed Time...Hours, 5 minutes Level C Skill – Understand Measurement of Time

using informal units. • Students recognise the difference between non-uniform measures such a hand-spans to measure length and uniform measures such as icy-pole sticks. • Students judge relative capacity of familiar objects and containers by eye and make informal comparisons of weight by hefting. • Students describe temperature using qualitative terms (e.g. cold, warm, hot) • Students use formal units such as hour and minute for time, litre for capacity, and standard units of metres, kilograms and seconds. • Students recognise key elements of calendar and place in sequence days, weeks and months. • Students describe common and familiar time patterns and such as the time, duration and day of regular sport training and tell the time at hours and half hours using an analogue clock and to hours and minutes using a digital clock • Students predict the outcome of chance events such as rolling of a die, using qualitative terms such as certain, likely, unlikely and impossible. • Students can collect simple categorical and numerical data and present this data using pictographs and simple car graphs	Level B **Concept – Counting** Skill – Estimating the number of Objects and Reasonableness Level A and B Skill – 1 to 1 correspondence of # to objects Level A **Concept – Operations** Skill – Given Graph…Perform operations Level D

Level 3
(Years 3 and 4)
Using Understanding Numeration

Topic	Relevant Exercises
Number *Key Ideas:* • Students use place value (as the idea that 'ten of these is one of those") to determine the size and order of whole numbers to tens of thousands, and decimals to hundredths. • Students round numbers up and down to the nearest unit, ten, hundred or thousand. • Students develop fraction notation and compare simple common fractions such as 2/4 > 2/3 using physical models. • Students can skip count forwards and backwards from various starting points using multiples of 2, 3, 4, 5, 10 and 100 • Students estimate the results of computations and recognise whether these are likely to be over-estimates or under-estimates • Students compute with number up to 30 using all four operations. They provide automatic recall of multiplication facts up to 10 x 10. • Students devise and use written methods for: whole number problems of addition and subtraction involving numbers up to 999, multiplication by single digits (using recall of multiplication tables) and multiples and powers of ten (for example 5 x 100, 5 x 70), and division by single-digit divisor (cased on inverse relations in multiplication tables) • Students devise and use algorithms for the addition and subtraction of numbers to two decimal places,	**Concept – Place Value** Skill – Break numbers into Groups Level B and C Skill – Model Numbers Grouped in Packages Level C Skill – Identify Value Patterns (to 20) Level C Skill – Identify Place value Patterns (to 100) Level C Skill – Identify Place value Patterns (to 1000) Level C and D **Concept – Operations** Skill – Add 3 or 4 number Level A and B Skill – Addition Strategies Level A, B and C Skill – Add 2 Digit numbers...concretely Level C Skill- Add 2 Digit Numbers…Abstractly Level C Skill – Add 3 Digit Numbers..concretly Level D Skill- Add 3 Digit numbers…Abstractly Level D Skill- Fact Families...Add & Subtract Level A, B and C Skill- Subtract 2 Digit Numbers...concretely Level C Skill- Subtract 2 digit Numbers...Abstractly Level C Skill- Subtract 3 digit numbers…concretely Level D Skill- subtract 3 digit numbers…abstractly Level D Skill – Introduce Multiplication Facts, 2, 3, 4, 5, and 6, 7, 8, 9.

including situations involving money. • Students add and subtract simple common fractions with the assistance of physical models.	Level C and D Skill – Patterns in multiplication Level C and D Skill – Note patterns in 10 x 10 Multiplication tables. Level D Skill- add 3 or 4 numbers Level C (Magic Square) Skill – Introduce Multiplication by 1 and 0 Level C Skill – Introduce division Facts 2, 3, 4, 5 and 6, 7, 8, 9. Level C and D **Concept – Counting** Skill- Introduce Fractions as Parts of A Whole. Level B and C Skill – Introduce Fractions of a set Level C Skill – Introduce decimals Level D Skill – Counting using money Level C and D
Measurement, Chance and Data *Key Ideas:* • Students estimate and measure length, area, volume, capacity, mass and time using appropriate instruments. • Students recognise and use different units of measurements including informal (e.g. paces), formal (e.g. centimetres) and standard metric measures (e.g. metre) in appropriate context. • Students can read linear scales (e.g. tape measures) and circular scales (e.g. Bathroom scales) in measurement contexts. • Students read digital time displays and analogue clock times at five minute intervals. Students can interpret timetables and calendars in relations to familiar events. • Students can compare the likelihood of everyday events (e.g.	**Concept – Comparing and Ordering** Skill – Understand Measurement of Time Level B, C and D Skill – Described Elapsed Time…Hours, 5 minutes Level C and D Skill – Describe Elapsed Time…Minutes Level D Skill – Describe Back in Time …Hours, 5 minutes Level C and D Skill – Describe Back in Time…Minutes Level D **Concept – Operations** Skill – Finding the area of a Shape Level D

chances of rain and snow) and they describe the fairness of events in qualitative terms. They plan and conduct chance experiments (e.g. using colours on a spinner) and display the results of these experiments. • They recognise different types of data: non-numerical (categories), Separate numbers (discrete), or points on an unbroken number line (continuous). • Students use a column or bar graph to display the results of an experiments (e.g. the frequencies of possible categories.)	
Structure: *Key Ideas:* • Students recognise that the sharing of a collection into equal sized parts (division) frequently leaves a remainder. • Students investigate sequences of decimal numbers generated using multiplication or division by 10 • Students understand the meaning of the = in mathematical statements and technology displays (e.g. to indicate either the result of a computation or equivalence) • Students use number properties in combination to facilitate computations (e.g. 13 x 5 = (10 +3) x 5 = 10 x 5 + 3 x 5) • Students list all possible outcomes of a simple chance event • Students recognise samples as subsets of the population under consideration (e.g. Pets owned by classmates as subset of pets owned by all children) • Students construct number sentences with missing numbers and solve them.	**Concept – Problem Solving** Skill – Number Sentence Lesson Oranges Lesson Bills Ball

Level 3
(Years 3 and 4)
Using Understanding Maths

Topic	Relevant Exercises
Number *Key Ideas:* • Students use place value (as the idea that 'ten of these is one of those") to determine the size and order of whole numbers to tens of thousands, and decimals to hundredths. • Students round numbers up and down to the nearest unit, ten, hundred or thousand. • Students develop fraction notation and compare simple common fractions such as 2/4 > 2/3 using physical models. • Students can skip count forwards and backwards from various starting points using multiples of 2, 3, 4, 5, 10 and 100 • Students estimate the results of computations and recognise whether these are likely to be over-estimates or under-estimates • Students compute with number up to 30 using all four operations. They provide automatic recall of multiplication facts up to 10 x 10. • Students devise and use written methods for: whole number problems of addition and subtraction involving numbers up to 999, multiplication by single digits (using recall of multiplication tables) and multiples and powers of ten (for example 5 x 100, 5 x 70), and division by single-digit divisor (cased on inverse relations in multiplication tables) • Students devise and use algorithms for the addition and subtraction of numbers to two decimal places,	**Understanding Whole Numbers and Integers** 1) The meaning of whole Numbers Can/Us. 2) Adding and Subtracting Whole Numbers 3) Multiplying and Dividing Whole Numbers Multiplication facts Commutative Property The 10 x 10 Multiplication Table **Understanding Fractions** 2) The multiplication Table 1) The Meaning of Fractions 5) Introduction to decimals. 6) Percents…Fractions…Decimals **Understanding Percent** 1) The meaning of Percent 2) Percent to Fraction/Decimal Fraction/Decimal to Percent

including situations involving money. • Students add and subtract simple common fractions with the assistance of physical models.	
Space *Key Ideas:* • Students recognise and describe the directions of lines as vertical, horizontal, or diagonal. • Students recognise angles are the result of rotation of lines with a common end-point. • Students can recognise and describe polygons. They can also recognise and name common three dimensional shapes such as spheres, prisms, and pyramids. • Students can recognise vertices, edges and faces. The use two dimensional nets, cross-sections and simple projections to represents simple three-dimensional shapes. • Students follow instructions to produce simple tessellations (for example with triangles, rectangles and hexagons.) and puzzles such as tangrams • Students locate and identify places on maps and diagrams and can give travel directions and describe the positions using simple compass directions (e.g. N for north) and grid references on a street directory.	**Understanding Measurement** 1) An Introduction to Measurement 4) Solids…Volume and Surface Area Classifying Solids Volume of a Solid 2) Perimeter and Area of Polygons Polygons…What are they? 5) Angles and their measure
Measurement, Chance and Data *Key Ideas:* • Students estimate and measure length, area, volume, capacity, mass and time using appropriate instruments. • Students recognise and use different units of measurements including informal (e.g. paces), formal (e.g. centimetres) and standard metric measures (e.g. metre) in appropriate context.	**Understanding Probability** 1) Introduction to Probability 2) What's the Chance 3) Dice Probabilities **Understanding Graphing** 1) Reading and Sketching Graphs 2) Statistics

• Students can read linear scales (e.g. tape measures) and circular scales (e.g. Bathroom scales) in measurement contexts. • Students read digital time displays and analogue clock times at five minute intervals. Students can interpret timetables and calendars in relations to familiar events. • Students can compare the likelihood of everyday events (e.g. chances of rain and snow) and they describe the fairness of events in qualitative terms. They plan and conduct chance experiments (e.g. using colours on a spinner) and display the results of these experiments. • They recognise different types of data: non-numerical (categories), Separate numbers (discrete), or points on an unbroken number line (continuous). • Students use a column or bar graph to display the results of an experiments (e.g. the frequencies of possible categories.)	

Level 4
(End of year 6)

Topic	Relevant Exercise
Number *Key Ideas:* • Students comprehend the size and order of small numbers (to thousandths) and large numbers (to millions) • Students model integers (positive and negative whole numbers and zero), common fractions and decimals. • Students place integers, decimals and common fractions on a number line • Students create sets of number multiples to find the lowest common multiple of the numbers. They interpret the numbers and their fractions in terms of the area and dimensions of rectangular arrays (e.g. the factors of 12 can be found by making rectangles o rectangles of dimension 1 x 12, 2 x 6 and 3 x 4). • Students identify square, prime and composite numbers. They create factor sets (e.g. using factor trees) and identify the highest common factor of two or more numbers. • Students can recognise and calculate the simple powers of whole numbers • Students use decimals, ratios and percentages to find equivalent representations of common fractions (for example, 3/4= 9/12= 0.75 = 75% = 3 : 4 = 6 : 8) • They explain and use mental and written algorithms for the addition, subtraction, multiplication and division of natural numbers (positive whole numbers). They add, subtract, and multiply fractions	**Understanding Whole Numbers and Integers** 4) The meaning of Integers 2) Adding and Subtracting Whole Numbers 3) Multiplying and Dividing whole numbers. **Understanding Algebra** 3) Patterns, Patterns Patterns Prime and composite **Understanding Fractions** 8) Adding Fractions 9) Subtracting Fractions 10) Multiplying fractions 13) Improper Fractions and Mixed Numbers The Concept Improper Fractions and Mixed Numbers…What are they. Introductory Problem Mixed to Improper Improper to Mixed. 14) Addition and Subtraction of Decimals. 15) Multiplication and Division of Decimals. Recall the basics Multiply by repeated addition Special case: Multiply by a whole number. **Understanding Percent** 5) Percent of a number.

and decimals (to two decimal places) and apply these operations in practical contexts, including the use of money.	
Space *Key Ideas:* • students classify and sort shapes and solids (for example, prisms, pyramids, cylinders and cones) using the properties of lines (orientation and size), angles (less than, equal to, or greater than 90°), and surfaces. • They create two-dimensional representations of three dimensional shapes and objects found in the surrounding environment. They develop and follow instructions to draw shapes and nets of solids using simple scale. • They describe the features of shapes and solids that remain the same (for example, angles) or change (for example, surface area) when a shape is enlarged or reduced. They apply a range of transformations to shapes and create tessellations using tools (for example, computer software). • Students use the ideas of size, scale, and direction to describe relative location and objects in maps. They use compass directions, coordinates, scale and distance, and conventional symbols to describe routes between places shown on maps. • Students use network diagrams to show relationships and connectedness such as a family tree and the shortest path between towns on a map.	**Understanding Measurement and Geometry** 8) Projective Geometry 4) Angles and their Measure 5) Angles and Polygons.

Measurement, Chance and Data. *Key Ideas:* • students use metric units to estimate and measure length, perimeter, area, surface area, mass, volume, capacity, time and temperature. They measure angles in degrees. They measure as accurately as needed for the purpose of the activity. They convert between metric units of length, capacity and time (for example, L–mL, sec–min). • Students describe and calculate probabilities using words, and fractions and decimals between 0 and 1. They calculate probabilities for chance outcomes (for example, using spinners) and use the symmetry properties of equally likely outcomes. • They simulate chance events (for example, the chance that a family has three girls in a row) and understand that experimental estimates of probabilities converge to the theoretical probability in the long run. • Students recognise and give consideration to different data types in forming questionnaires and sampling. They distinguish between categorical and numerical data and classify numerical data as discrete (from counting) or continuous (from measurement). • They present data in appropriate displays (for example, a pie chart for eye colour data and a histogram for grouped data of student heights). They calculate and interpret measures of centrality (mean, median, and mode) and data spread (range).	**Understanding Probability** 1) Introduction to Probability 2) What's the chance 3) Dice Probabilities. **Understanding Graphs** 1) Reading and Sketching Graphs 2) Statistics **Understanding Measurement and Geometry** 1) An introduction to measurement Converting between metric units. 2) Perimeter and Area of Polygons 4) Solids…Volume and Surface Area

Structure *Key Ideas:* • students form and specify sets of numbers, shapes and objects according to given criteria and conditions (for example, 6, 12, 18, 24 are the even numbers less than 30 that are also multiples of three). • They use venn diagrams and karnaugh maps to test the validity of statements using the words *none*, *some* or *all* (for example, test the statement '*all* the multiples of 3, less than 30, are even numbers'). • Students construct and use rules for sequences based on the previous term, recursion (for example, the next term is three times the last term plus two), and by formula (for example, a term is three times its position in the sequence plus two). • Students establish equivalence relationships between mathematical expressions using properties such as the distributive property for multiplication over addition (for example, 3 x 26 = 3 × (20 + 6)). • Students identify relationships between variables and describe them with language and words (for example, how hunger varies with time of the day). • Students recognise that addition and subtraction, and multiplication and division are inverse operations. They use words and symbols to form simple equations. They solve equations by trial and error.	**Understanding Algebra** 3) Patterns Patterns Patterns.

Level 5
(End of Year 8)

Topic	Relevant Exercise
Number *Key Ideas:* • students identify complete factor sets for natural numbers and express these natural numbers as products of powers of primes (for example, 36 000 = 25 x 32 x 53) • They write equivalent fractions for a fraction given in simplest form (for example, 2/3 = 4/6 = 6/9 = …). They know the decimal equivalents for the unit fractions 1/2, 1/3,1/4,1/5, 1/8,1/9 and find equivalent representations of fractions as decimals, ratios and percentages (for example, a subset: set ratio of 4:9 can be expressed equivalently as4/9 = 0. $\dot{4}$ ≈ 44.44%) • They write the reciprocal of any fraction and calculate the decimal equivalent to a given degree of accuracy. • Students use knowledge of perfect squares when calculating and estimating squares and square roots of numbers (for example, $20^2 = 400$ and $30^2 = 900$ so √700 is between 20 and 30). • They evaluate natural numbers and simple fractions given in base-exponent form (for example, 5¥ = 625 and $((2/3)^2 = 4/9)$. They know simple powers of 2, 3, and 5 (for example, 2§ = 64, 3¥ = 81, 5^3 = 125). They calculate squares and square roots of rational numbers that are perfect squares (for example, √0.81 = 0.9 and √9/16 = 3/4). • Students calculate cubes and cube roots of perfect cubes. Using	**Understanding Exponents:** 1) The meaning of Exponents 5) Square root **Understanding Fractions:** 7) Ratios and Proportions 8) Adding Fractions 9) Subtracting Fraction 10) Multiplying Fractions 11) Dividing Fractions 12) Order of Operations 13) Improper Fractions and Mixed 14) Numbers 15) Addition and Subtraction of Decimals 16) Multiplication and Division of Decimals

technology they find square and cube roots of rational numbers to a specified degree of accuracy e.g. to three decimal places. • Students express natural numbers base 10 in binary form. And add and multiply natural numbers in binary form. • Students understand ratios as both set: set comparison (i.e. number of boys: number of girls) and subset : comparison (e.g. number of girls : number of students) and find integer proportions of these, including percentages (e.g. ratio of girls : number of boys is 2 : 3 = 4 : 6 = 40% : 60% • Students use a range of strategies for approximating the results of computations, such as front-end estimation and rounding (e.g. $925 \div 34 \approx 900 \div 30 = 30$) • Students use efficient mental and/or written arithmetic computation involving rational numbers, including division of integers by two-digit divisors. They use approximations to π in related measurements calculations.	
<u>Measurement, Chance and Data</u> *Key Ideas:* • Students measure length, perimeter, area, surface area, mass, volume, capacity, angle, time and temperature using suitable units for these measurements in context. • They interpret and use measurement formulas for the area and perimeter of circles, triangles and parallelograms and simple composite shapes. They calculate the surface area and volume of prisms and cylinders. • Students estimate the accuracy of measurements and give suitable lower and upper bounds for	**Understanding Probability:** 4) <u>Binomial Probabilities</u> 5) <u>Geometric probabilities</u> **Understanding Graphing:** 3) <u>Points on a grid</u> 2) <u>Statistics</u> 5) <u>Relations, Equations and Functions</u>

measurement values. They calculate absolute percentage error of estimated values. • Students use appropriate technology to generate random numbers in the conduct of simple simulations. • Students identify empirical probability as long-run relative frequency. They calculate theoretical probabilities by dividing the number of possible successful outcomes by the total number of possible outcomes. • They use tree diagrams to investigate the probability of outcomes in simple multiple event trials. • Students organise, tabulate and display discrete and continuous data (grouped and ungrouped) using technology for larger data sets. They represent univariate data in appropriate graphical forms including dot plots, stem and leaf plots, column graphs, bar charts and histograms • They calculate summary statistics for measures of centre (mean, median, mode) and spread (range, and mean absolute difference), and make simple inferences based on this data.	
Structure *Key Ideas:* • Students identify collections of numbers as subsets of natural numbers, integers, rational numbers and real numbers. • They use venn diagrams and tree diagrams to show the relationships of intersection, union, inclusion (subset) and complement between the sets. They list the elements of the set of all subsets (power set) of a given finite set and comprehend the partial-order relationship	**Understanding Whole Numbers and Integers** 5) Adding Integers 6) Subtracting Integers 7) Multiplying integers 8) Dividing Integers 9) Order of Operations **Understanding Algebra:** 1) Introduction to Algebraic thinking 2) Tiles and algebra 3) Patterns, Patterns, Patterns 4) Patterns, Formulas, Substitution 5) Adding expression 6) Subtracting Expressions

between these subsets with respect to inclusion (for example, given the set {*a*, *b*, *c*} the corresponding power set is {Ø, {*a*}, {*b*}, {*c*}, {*a*, *b*}, {*b*, *c*}, {*a*, *c*}, {*a*, *b*, *c*}}). • They test the validity of statements formed by the use of the connectives *and*, *or*, *not*, and the quantifiers *none*, *some* and *all*, (for example, '*some* natural numbers can be expressed as the sum of two squares'). They apply these to the specification of sets defined in terms of one or two attributes, and to searches in data-bases. • Students apply the commutative, associative, and distributive properties in mental and written computation (for example, 24 × 60 can be calculated as 20 × 60 + 4 × 60 or as 12 × 12 × 10). They use exponent laws for multiplication and division of power terms (for example $2^3 \times 2^5 = 2^8$, $2^0 = 1$, $2^3 \div 2^5 = 2^{-2}$, $(5^2)^3 = 5^6$ and $(3 \times 4)^2 = 3^2 \times 4^2$). • Students generalise from perfect square and difference of two square number patterns (e.g. $25^2 = (20 + 5)^2$= 4-- + 2 x (100) + 25 = 625.) • Students recognise and apply simple geometric transformations of the plane such as translation, reflection, rotation and dilation and combinations of the above, including their inverses. • They identify the identity element and inverse of rational numbers for the operations of addition and multiplication (for example, ½ + -1/2= 0 and 2/3 x 3/2 = 1). • Students use inverses to rearrange simple mensuration formulas, and to find equivalent algebraic expressions • They solve simple equations (for	7) Multiplying expressions 8) Factorising expressions 9) Dividing Expressions **Understanding Graphing:** 6) Linear Relations **Understanding Exponents:** 3) The Exponent Rules 4) Scientific Notation 5) Square Root **Understanding Equations** 3) Solving two-step Equations 4) Solving multi-step equations 5) Problem solving

example, $5x + 7 = 23$, $1.4x - 1.6 = 8.3$, and $4x^2 - 3 = 13$) using tables, graphs and inverse operations. They recognise and use inequality symbols. They solve simple inequalities such as $y \leq 2x + 4$ and decide whether inequalities such as $x2 > 2y$ are satisfied or not for specific values of x and y • Students identify a function as a one-to-one correspondence or a many-to one correspondence between two sets. They represent a function by a table of values, a graph, and by a rule. • They describe and specify the independent variable of a function and its domain, and the dependent variable and its range. They construct tables of values and graphs for linear functions. They use linear and other functions such as $f(x) = 2x - 4$, $xy = 24$, $y = 2x$ and $y = x2 - 3$ to model various situations.	
<u>Working Mathematically</u> *Key Ideas:* • Students formulate conjectures and follow simple mathematical deductions (for example, if the side length of a cube is doubled, then the surface area increases by a factor of four, and the volume increases by a factor of eight). • Students use variables in general mathematical statements. They substitute numbers for variables (for example, in equations, inequalities, identities and formulas) • Students explain geometric propositions (for example, by varying the location of key points and/or lines in a construction). • Students develop simple mathematical models for real	

situations (for example, using constant rates of change for linear models). They develop generalizations by abstracting the features from situations and expressing these in words and symbols. • They predict using interpolation (working with what is already known) and extrapolation (working beyond what is already known). They analyse the reasonableness of points of view, procedures and results, according to given criteria, and identify limitations and/or constraints in context. • Students use technology such as graphic calculators, spreadsheets, dynamic geometry software and computer algebra systems for a range of mathematical purposes including numerical computation, graphing, investigation of patterns and relations for algebraic expressions, and the production of geometric drawings.	

Level 6
(End Year 10)

Topic	Relevant Exercise.
Number *Key Ideas:* • Students comprehend the set of real numbers containing natural, integer, rational and irrational numbers. They represent rational numbers in both fractional and decimal (terminating and infinite recurring) forms for example, 1 4/25 = 1.16, 0. $\overline{4}$ $\overline{7}$ = 47/99). • They comprehend that irrational numbers have an infinite non-terminating decimal form. They specify decimal rational approximations for square roots of primes, rational numbers that are not perfect squares, the golden ratio φ , and simple fractions of π correct to a required decimal place accuracy. • Students use the Euclidean division algorithm to find the greatest common divisor (highest common factor) of two natural numbers (for example, the greatest common divisor of 1071 and 1029 is 21 since $1071 = 1029 \times 1 + 42$, $1029 = 42 \times 24 + 21$ and $42 = 21 \times 2 + 0$). • Students carry out arithmetic computations involving natural numbers, integers and fi nite decimals using mental and/or written algorithms (one- or two-digit divisors in the case of division). They perform computations involving very large or very small numbers in scientific notation (for example, $0.0045 \times 0.000028 = 4.5 \times 10^{-3} \times 2.8 \times 10^{-5} = 1.26 \times 10^{-7}$). • They carry out exact arithmetic computations involving fractions	**Understanding Whole Numbers and Integers** 5) Adding Integers 6) Subtracting Integers 7) Multiplying integers 8) Dividing Integers 9) Order of Operations **Understanding Exponents:** 1) The meaning of Exponents 5) Square root **Understanding Fractions:** 7) Ratios and Proportions 8) Adding Fractions 9) Subtracting Fraction 10) Multiplying Fractions 11) Dividing Fractions 12) Order of Operations 13) Improper Fractions and Mixed 14) Numbers 15) Addition and Subtraction of Decimals 16) Multiplication and Division of Decimals

and irrational numbers such as square roots • They use appropriate estimates to evaluate the reasonableness of the results of calculations involving rational and irrational numbers, and the decimal approximations for them. They carry out computations to a required accuracy in terms of decimal places and/or significant figures	
<u>Space</u> *Key Ideas:* • Students represent two- and three-dimensional shapes using lines, curves, polygons and circles. They make representations using perspective, isometric drawings, nets and computer-generated images. • They recognize and describe boundaries, surfaces and interiors of common plane and three-dimensional shapes, including cylinders, spheres, cones, prisms and polyhedra. They recognise the features of circles (centre, radius, diameter, chord, arc, semi-circle, circumference, segment, sector and tangent) and use associated angle properties. • Students explore the properties of spheres. • Students use the conditions for shapes to be congruent or similar. They apply isometric and similarity transformations of geometric shapes in the plane. • They identify points that are invariant under a given transformation (for example, the point (2, 0) is invariant under reflection in the x-axis, so the x axis intercept of the graph of $y = 2x - 4$ is also invariant under this transformation). They determine the	

effect of changing the scale of one characteristic of two- and three-dimensional shapes (for example, side length, area, volume and angle measure) on related characteristics. • They use latitude and longitude to locate places on the Earth's surface and measure distances between places using great circles. • Students describe and use the connections between objects/location/events according to defined relationships (networks).	
Measurement, Chance and Data *Key Ideas:* • Students estimate and measure length, area, surface area, mass, volume, capacity and angle. They select and use appropriate units, converting between units as required. They calculate constant rates such as the density of substances (that is, mass in relation to volume), concentration of fluids, average speed and pollution levels in the atmosphere. • Students decide on acceptable or tolerable levels of error in a given situation. They interpret and use mensuration formulas for calculating the perimeter, surface area and volume of familiar two- and three-dimensional shapes and simple composites of these shapes. • Students use pythagoras theorem and trigonometric ratios (sine, cosine and tangent) to obtain lengths of sides, angles and the area of right-angled triangles • They use degrees and radians as units of measurement for angles and convert between units of measurement as appropriate. • Students estimate probabilities based on data (experiments, surveys, samples, simulations) and	**Understanding Probability:** 4) Binomial Probabilities 5) Geometric probabilities **Understanding Graphing:** 3)Points on a grid 2) Statistics 5) Relations, Equations and Functions **Understanding Exponents:** 6) Pythagoras Theorem **Understanding Measurement and Geometry** 6) The circle 4) Solids… Volume and Surface Area. 5) Angles and their measure 6) Angles and Polygons 9) Ratios for areas and volume

assign and justify subjective probabilities in familiar situations. They list event spaces (for combinations of up to three events) by lists, grids, tree diagrams, venn diagrams and karnaugh maps (two-way tables). • They calculate probabilities for complementary, mutually exclusive, and compound events (defined using *and*, *or* and *not*). They classify events as dependent or independent • Students comprehend the difference between a population and a sample. They generate data using surveys, experiments and sampling procedures. They calculate summary statistics for centrality (mode, median and mean), spread (box plot, inter-quartile range, outliers) and association (by-eye estimation of the line of best fi t from a scatter plot). • They distinguish informally between association and causal relationship in bi-variate data, and make predictions based on an estimated line of best fit for scatter-plot data with strong association between two variables.	
Structure *Key Ideas:* • Students classify and describe the properties of the real number system and the subsets of rational and irrational numbers. They identify subsets of these as discrete or continuous, finite or infinite and provide examples of their elements and apply these to functions and relations and the solution of related equations. • Student express relations between sets using membership, $\in$, complement, $\cap$, intersection, $\cap$,	**Understanding Algebra:** 10) Introduction to Algebraic thinking 11) Tiles and algebra 12) Patterns, Patterns, Patterns 13) Patterns, Formulas, Substitution 14) Adding expression 15) Subtracting Expressions 16) Multiplying expressions 17) Factorising expressions 18) Dividing Expressions **Understanding Graphing:** 7) Linear Relations

union, $\cup$, and subset, $\subseteq$, for up to three sets. They represent a universal set as the disjoint union of intersections of up to three sets and their complements, and illustrate this using a tree diagram, venn diagram or karnaugh map. • Students form and test mathematical conjectures; for example, 'What relationship holds between the lengths of the three sides of a triangle?' • They use irrational numbers such as, π , $\varphi$and common surds in calculations in both exact and approximate form • Students apply the algebraic properties (closure, associative, commutative, identity, inverse and distributive) to computation with number, to rearrange formulas, rearrange and simplify algebraic expressions involving real variables. They verify the equivalence or otherwise of algebraic expressions (linear, square, cube, exponent, and reciprocal, • Students identify and represent linear, quadratic and exponential functions by table, rule and graph (all four quadrants of the cartesian coordinate system) with consideration of independent and dependent variables, domain and range. They distinguish between these types of functions by testing for constant first difference, constant second difference or constant ratio between consecutive terms • They use and interpret the functions in modelling a range of contexts. They recognise and explain the roles of the relevant constants in the relationships $f(x) = ax + c$, with	

reference to gradient and y axis intercept, $f(x) = a(x + b)^2 + c$ and $f(x) = ca^x$. • They solve equations of the form $f(x) = k$, where k is a real constant (for example, $x(x + 5) = 100$) and simultaneous linear equations in two variables (for example, $\{2x - 3y = -4$ and $5x + 6y = 27\}$ using algebraic, numerical (systematic guess, check and refine or bisection) and graphical methods.	
<u>Working Mathematically</u> *Key Ideas:* • Students formulate and test conjectures, generalisations and arguments in natural language and symbolic form (for example, 'if m^2 is even then m is even, and if m^2 is odd then m is odd'). They follow formal mathematical arguments for the truth of propositions (for example, 'the sum of three consecutive natural numbers is divisible by 3'). • Students choose, use and develop mathematical models and procedures to investigate and solve problems set in a wide range of practical, theoretical and historical contexts (for example, exact and approximate measurement formulas for the volumes of various three dimensional objects such as truncated pyramids) • They generalise from one situation to another, and investigate it further by changing the initial constraints or other boundary conditions. They judge the reasonableness of their results based on the context under consideration. • They select and use technology in various combinations to assist in mathematical inquiry, to manipulate and represent data, to analyse	

	functions and carry out symbolic manipulation. They use geometry software or graphics calculators to create geometric objects and transform them, taking into account invariance under transformation.	