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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics Number and Algebra *toward* Level 7 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* create shapes in the plane by joining sets of points with line segments
* interpret and analyse graphs from real life data, such as water level in a dam over time
* develop algorithms for simple mathematical processes, such as converting between fractions, decimals and percentages using language, flowcharts and simple programs

**Content Descriptions:** Compare, order, add and subtract integers [(VCMNA241)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA241)Explore the use of brackets and order of operations to write number sentences (VCMNA220)Extend and apply the laws and properties of arithmetic to algebraic terms and expressions (VCMNA253)Design and implement mathematical algorithms using a simple general-purpose programming language (VCMNA254) |
|  | **Example of Indicative Progress toward Level 7 Achievement Standard** | **Mathematics Level 7 Achievement Standard** |
| By the end of Level 6:* Students recognise the properties of prime, composite, square and triangular numbers and determine sets of these numbers.
* They solve problems that involve all four operations with whole numbers and describe the use of integers in everyday contexts.
* Students locate fractions and integers on a number line and connect fractions, decimals and percentages as different representations of the same number.
* They solve problems involving the addition and subtraction of related fractions.
* Students calculate a simple fraction of a quantity and calculate common percentage discounts on sale items, with and without the use of digital technology.
* They make connections between the powers of 10 and the multiplication and division of decimals.
* Students add, subtract and multiply decimals and divide decimals where the result is rational.
* Students write number sentences using brackets and order of operations, and specify rules used to generate sequences involving whole numbers, fractions and decimals.
* They use ordered pairs of integers to represent coordinates of points and locate a point in any one of the four quadrants on the Cartesian plane.
 | In **Mathematics**, indicative progression towards the Level 7 achievement standard may be when students:* solve practical problems involving differences that are modeled by integers and integer operations
* plot points from tables of values involving real life bivariate numerical data
* Use structured English or pseudo-code to devise an algorithm for the addition of fractions implemented using a simple general purpose programming language
 | By the end of Level 7:* Students solve problems involving the order, addition and subtraction of integers.
* They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots.
* They solve problems involving all four operations with fractions, decimals, percentages and their equivalences, and express fractions in their simplest form.
* Students compare the cost of items to make financial decisions, with and without the use of digital technology.
* They make simple estimates to judge the reasonableness of results.
* Students use variables to represent arbitrary numbers and connect the laws and properties of number to algebra and substitute numbers into algebraic expressions.
* They assign ordered pairs to given points on the Cartesian plane and interpret and analyse graphs of relations from real data.
* Students develop simple linear models for situations, make predictions based on these models, solve related equations and check their solutions.
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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics Number and Algebra *toward* Level 8 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* use tables of values and the squaring function to approximate the square root of a given number
* explore increasingly accurate finite decimal approximations to square roots
* use grid and lattice methods for multiplication and model the expansion and factorisation of simple linear expression with algebra blocks
* use simple programs to generate sequences with a constant difference between consecutive terms and check whether a given sequence satisfies this condition or not

**Content Descriptions:**Investigate the concept of irrational numbers, including π [(VCMNA275)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA275)Extend and apply the distributive law to the expansion of algebraic expressions [(VCMNA279)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA279)Use algorithms and related testing procedures to identify and correct errors (VCMNA282) |
| **Mathematics Level 7 Achievement Standard**  | **Example of Indicative Progress toward Level 8 Achievement Standard** | **Mathematics Level 8 Achievement Standard** |
| By the end of Level 7:* Students solve problems involving the order, addition and subtraction of integers.
* They make the connections between whole numbers and index notation and the relationship between perfect squares and square roots.
* They solve problems involving all four operations with fractions, decimals, percentages and their equivalences, and express fractions in their simplest form. Students compare the cost of items to make financial decisions, with and without the use of digital technology.
* They make simple estimates to judge the reasonableness of results. Students use variables to represent arbitrary numbers and connect the laws and properties of number to algebra and substitute numbers into algebraic expressions.
* They assign ordered pairs to given points on the Cartesian plane and interpret and analyse graphs of relations from real data.
* Students develop simple linear models for situations, make predictions based on these models, solve related equations and check their solutions.

  | In **Mathematics**, indicative progression towards the Level 8 achievement standard may be when students:* use graphical and numerical relationships between numbers and their squares to estimate square root of numbers which are not perfect squares and specify an interval in which a square root lies.
* apply the distributive law to mental calculation with numbers such as $4×27=\left(4×20\right)+(4×7)$ and generalise this to algebraic expression such as $4×\left(2x+3\right)=\left(4×2x\right)+(4×3)$ and vice versa
* apply a simple recurrence relation to generate consecutive terms of a linear function (arithmetic sequence), and check whether a given recurrence relation correctly generates an intended sequence
 | By the end of Level 8:* Students use efficient mental and written strategies to make estimates and carry out the four operations with integers, and apply the index laws to whole numbers.
* They identify and describe rational and irrational numbers in context.
* Students estimate answers and solve everyday problems involving profit and loss rates, ratios and percentages, with and without the use of digital technology.
* They simplify a variety of algebraic expressions and connect expansion and factorisation of linear expressions.
* Students solve linear equations and graph linear relationships on the Cartesian plane.
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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics Number and Algebra *toward* Level 9 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* use technology to plot points in the plane, construct corresponding right angled triangles, and calculate exact and approximate values for the length of the line segment joining the two points using Pythagoras theorem and the Cartesian distance formula
* use data from measurement situations that involves very large and very small quantities and express this data in scientific notation and vice versa
* use technology to plot families of related graphs derived from a basic graph using a single parameter, and indicate the corresponding transformation that relates these graphs

**Content Descriptions:**Express numbers in scientific notation [(VCMNA303)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA303)Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software [(VCMNA308)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA308)Apply set structures to solve real-world problems (VCMNA307) |
| **Mathematics Level 8 Achievement Standard**  | **Example of Indicative Progress toward Level 9 Achievement Standard** | **Mathematics Level 9 Achievement Standard** |
| By the end of Level 8:* Students use efficient mental and written strategies to make estimates and carry out the four operations with integers, and apply the index laws to whole numbers.
* They identify and describe rational and irrational numbers in context.
* Students estimate answers and solve everyday problems involving profit and loss rates, ratios and percentages, with and without the use of digital technology.
* They simplify a variety of algebraic expressions and connect expansion and factorisation of linear expressions.
* Students solve linear equations and graph linear relationships on the Cartesian plane.
 | In **Mathematics**, indicative progression towards the Level 9 achievement standard may be when students:* express very large and very small numbers from practical situations in scientific form and vice versa
* plot a pair of points in the plane, construct a corresponding right-angled triangle and use Pythagoras theorem to calculate the distance between the two points

 * use technology to draw graphs of simple non-linear relations such as $xy=k$ where *k* is a factorisable positive integer, and identify these graphs as dilations of the graph of $xy=1$
 | By the end of Level 9:* Students apply the index laws using integer indices to variables and numbers, express numbers in scientific notation, solve problems involving very small and very large numbers, and check the order of magnitude of calculations.
* They solve problems involving simple interest.
* Students use the distributive law to expand algebraic expressions, including binomial expressions, and simplify a range of algebraic expressions.
* They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment using a range of strategies including the use of digital technology
* Students sketch and draw linear and non-linear relations, solve simple related equations and explain the relationship between the graphical and symbolic forms, with and without the use of digital technology.
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| Previous level’s achievement standard as a starting point of comparison Previous level’s achievement standard as a starting point of comparison **CURRICULUM AREA – Mathematics Number and Algebra *toward* Level 10 Achievement Standard** |
| **VCAA EXAMPLE****Context:**Students cover related content and proficiencies when they engage in learning activities where they:* solve simple interest and compound interest problems using recurrence relations, tables of values and graphs of corresponding linear and exponential models
* use algebra blocks, diagrams and technology to expand and factorise monic and non-monic quadratic expressions, and investigate when a quadratic expression with a single parameter factorises or not for a range of values of that parameter
* use a guess-check-refine graphical method to find an approximate root of an equation involving simple non-linear relations

**Content Descriptions:**Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies [(VCMNA328)](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA328) Expand binomial products and factorise monic quadratic expressions using a variety of strategies (VCMNA332)Implement algorithms using data structures in a general-purpose programming language (VCMNA334) |
| **Mathematics Level 9 Achievement Standard**  | **Example of Indicative Progress toward Level 10 Achievement Standard** | **Mathematics Level 10 Achievement Standard** |
| By the end of Level 9:* Students apply the index laws using integer indices to variables and numbers, express numbers in scientific notation, solve problems involving very small and very large numbers, and check the order of magnitude of calculations.
* They solve problems involving simple interest.
* Students use the distributive law to expand algebraic expressions, including binomial expressions, and simplify a range of algebraic expressions.
* They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment using a range of strategies including the use of digital technology.
* Students sketch and draw linear and non-linear relations, solve simple related equations and explain the relationship between the graphical and symbolic forms, with and without the use of digital technology.
* Students apply the index laws using integer indices to variables and numbers, express numbers in scientific notation, solve problems involving very small and very large numbers, and check the order of magnitude of calculations.
* They solve problems involving simple interest.
* Students use the distributive law to expand algebraic expressions, including binomial expressions, and simplify a range of algebraic expressions.
* They find the distance between two points on the Cartesian plane and the gradient and midpoint of a line segment using a range of strategies including the use of digital technology.
* Students sketch and draw linear and non-linear relations, solve simple related equations and explain the relationship between the graphical and symbolic forms, with and without the use of digital technology.
 | In **Mathematics**, indicative progression towards the Level 10 achievement standard may be when students:* model compound interest and solve related problems using simple exponential functions and their graphs
* use algebra to show the equivalence of expanded and factorised forms of quadratic expressions
* solve an equation involving a simple non-linear relation using a graphical guess-check and refine algorithm
 | By the end of Level 10:* Students recognise the connection between simple and compound interest.
* They solve problems involving linear equations and inequalities, quadratic equations and pairs of simultaneous linear equations and related graphs, with and without the use of digital technology.
* Students substitute into formulas, find unknown values, manipulate linear algebraic expressions, expand binomial expressions and factorise monic and simple non-monic quadratic expressions, with and without the use of digital technology.
* They represent linear, quadratic and exponential functions numerically, graphically and algebraically, and use them to model situations and solve practical problems.

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