



SVC Mathematics Learning Pathway – Year 9



LP	Key Skills	Essential Knowledge
8-9	<p>Students will:</p> <ul style="list-style-type: none"> • Calculate with roots and integer indices • Manipulate algebraic expressions by expanding the product of two binomials • Manipulate algebraic expressions by factorising a quadratic expression of the form $x^2 + bx + c$ • Understand and use the gradient of a straight line to solve problems • Solve two linear simultaneous equations algebraically and graphically • Plot and interpret graphs of quadratic functions • Change freely between compound units • Use ruler and compass methods to construct the perpendicular bisector of a line segment and to bisect an angle • Solve problems involving similar shapes • Calculate exactly with multiples of π • Apply Pythagoras' Theorem in two dimensions • Use geometrical reasoning to construct simple proofs • Use tree diagrams to list outcomes 	<p>Students will:</p> <ul style="list-style-type: none"> • Know how to interpret the display on a scientific calculator when working with standard form • Know the difference between direct and inverse proportion • Know how to represent an inequality on a number line • Know that the point of intersection of two lines represents the solution to the corresponding simultaneous equations • Know how to find the nth term of a quadratic sequence • Know the characteristic shape of the graph of a cubic function • Know the characteristic shape of the graph of a reciprocal function • Know the definition of speed • Know the definition of density • Know the definition of pressure • Know Pythagoras' Theorem • Know the definitions of arc, sector, tangent and segment • Know the conditions for congruent triangles
6-7	<ul style="list-style-type: none"> • Apply the four operations with negative numbers • Convert numbers into standard form and vice versa • Apply the multiplication, division and power laws of indices • Convert between terminating decimals and fractions • Find a relevant multiplier when solving problems involving proportion • Solve problems involving percentage change, including original value problems • Factorise an expression by taking out common factors • Change the subject of a formula when two steps are required • Find and use the nth term for a linear sequence • Solve linear equations with unknowns on both sides • Plot and interpret graphs of linear functions • Apply the formulae for circumference and area of a circle • Calculate theoretical probabilities for single events 	<ul style="list-style-type: none"> • Know how to write a number as a product of its prime factors • Know how to round to significant figures • Know the order of operations including powers • Know how to enter negative numbers into a calculator • Know that $a^0 = 1$ • Know percentage and decimal equivalents for fractions with a denominator of 3, 5, 8 and 10 • Know the characteristic shape of a graph of a quadratic function • Know how to measure and write bearings • Know how to identify alternate angles • Know how to identify corresponding angles • Know how to find the angle sum of any polygon • Know that circumference = $2\pi r = \pi d$ • Know that area of a circle = πr^2 • Know that volume of prism = area of cross-section \times length • Know to use the midpoints of groups to estimate the mean of a set of grouped data • Know that probability is measured on a 0-1 scale • Know that the sum of all probabilities for a single event is 1
4-5	<ul style="list-style-type: none"> • Use positive integer powers and associated real roots • Apply the four operations with decimal numbers • Write a quantity as a fraction or percentage of another • Use multiplicative reasoning to interpret percentage change • Add, subtract, multiply and divide with fractions and mixed numbers • Check calculations using approximation, estimation or inverse operations • Simplify and manipulate expressions by collecting like terms • Simplify and manipulate expressions by multiplying a single term over a bracket • Substitute numbers into formulae • Solve linear equations in one unknown • Understand and use lines parallel to the axes, $y = x$ and $y = -x$ • Calculate surface area of cubes and cuboids • Understand and use geometric notation for labelling angles, lengths, equal lengths and parallel lines 	<ul style="list-style-type: none"> • Know the first 6 cube numbers • Know the first 12 triangular numbers • Know the symbols =, \neq, $<$, $>$, \leq, \geq • Know the order of operations including brackets • Know basic algebraic notation • Know that area of a rectangle = $l \times w$ • Know that area of a triangle = $b \times h \div 2$ • Know that area of a parallelogram = $b \times h$ • Know that area of a trapezium = $((a + b) \div 2) \times h$ • Know that volume of a cuboid = $l \times w \times h$ • Know the meaning of faces, edges and vertices • Know the names of special triangles and quadrilaterals • Know how to work out measures of central tendency • Know how to calculate the range

LP	Key Skills	Essential Knowledge
2-3	<p>Students will:</p> <ul style="list-style-type: none"> • Multiply and divide numbers with up to three decimal places by 10, 100, and 1000 • Use long division to divide numbers up to four digits by a two-digit number • Use simple formulae expressed in words • Generate and describe linear number sequences • Use simple ratio to compare quantities • Write a fraction in its lowest terms by cancelling common factors • Add and subtract fractions and mixed numbers with different denominators • Multiply pairs of fractions in simple cases • Find percentages of quantities • Solve missing angle problems involving triangles, quadrilaterals, angles at a point and angles on a straight line • Calculate the volume of cubes and cuboids • Use coordinates in all four quadrants • Calculate and interpret the mean as an average of a set of discrete data 	<p>Students will:</p> <ul style="list-style-type: none"> • Know percentage and decimal equivalents for fractions with a denominator of 2, 3, 4, 5, 8 and 10 • Know the rough equivalence between miles and kilometres • Know that vertically opposite angles are equal • Know that the area of a triangle = $\text{base} \times \text{height} \div 2$ • Know that the area of a parallelogram = $\text{base} \times \text{height}$ • Know that volume is measured in cubes • Know the names of parts of a circle • Know that the diameter of a circle is twice the radius • Know the conventions for a 2D coordinate grid • Know that $\text{mean} = \text{sum of data} \div \text{number of pieces of data}$
0-1	<p>Students will:</p> <ul style="list-style-type: none"> • Identify multiples and factors of a number • Count forwards and backwards through zero • Round to one decimal place • Use columnar addition and subtraction with numbers of any size • Multiply a three- or four-digit number by a two-digit number using long multiplication • Divide numbers up to four-digits by a single-digit number using short division and interpret the remainder • Add and subtract fractions with denominators that are multiples of the same number • Write decimals as fractions • Understand that per cent relates to number of parts per hundred • Convert between adjacent metric units of measure for length, capacity and mass • Measure and draw angles • Calculate the area of rectangles • Distinguish between regular and irregular polygons 	<p>Students will:</p> <ul style="list-style-type: none"> • Know the place value headings up to millions • Recall primes to 19 • Know the first 12 square numbers • Know percentage and decimal equivalents for $1/2, 1/4, 1/5, 2/5, 4/5$ • Know rough conversions between metric and Imperial units • Know that angles are measured in degrees • Know angles in one whole turn total 360° • Know angles in half a turn total 180° • Know that area of a rectangle = $\text{length} \times \text{width}$