

Scope and Sequence for Secondary Mathematics series

Copyright © 2008 [SingaporeMath.com Inc.]

NEM: *New Elementary Mathematics*

NSM: *New Syllabus Math*, 6th edition

DM: *Discovering Mathematics*, 1st edition

NMC: *New Math Counts*, 2nd edition for levels 1-3, 1st edition for levels 4 and 5

AM: *Additional Mathematics*, 8th edition

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Numbers and algebra																		
Numbers and the four operations																		
Review the idea of place value.	✓																	
Review the use of the four operations for calculations with positive whole numbers, fractions, and decimals.	✓												✓					
Review simplest form of a fraction and mixed numbers.	✓																	
Solve arithmetic simple and multi-step word problems.	✓																	
Recognize prime numbers.					✓				✓				✓					
Express a composite number as the product of prime numbers using index (exponential) notation.	✓				✓				✓				✓					
Find the HCF and LCM using prime factorization.	✓				✓				✓				✓					
Find square roots and cube roots using prime factorization.	✓				✓				✓				✓					
Understand negative numbers.	✓				✓				✓				✓					
Use a number line to order integers.	✓				✓				✓				✓					
Find the absolute value of an integer.	✓				✓													
Use the symbols $<$, $>$, \leq , and \geq .	✓				✓				✓				✓					
Perform the four operations on integers.	✓				✓				✓				✓					
Understand and use the commutative, associative, and distributive laws with integers.	✓				✓								✓					
Review order of operations.	✓				✓				✓				✓					
Understand rational numbers.	✓				✓				✓				✓					
Locate rational numbers on the number line.	✓				✓													
Perform the four operations on rational numbers.	✓				✓				✓				✓					
Solve word problems involving rational numbers.	✓				✓				✓				✓					
Perform mental calculations using grouping and decomposing.	✓																	
Convert rational numbers to terminating or recurring decimal numbers.	✓				✓				✓				✓					
Understand that irrational numbers.	✓				✓				✓				✓					
Use the calculator to perform operations on real numbers.	✓				✓				✓				✓					
Round numbers to a specified number of decimal places.	✓				✓				✓				✓					
Understand accuracy of measurement indicated by the number of significant figures or digits.	✓				✓				✓				✓					
Round numbers to a specified number of significant figures.	✓				✓				✓				✓					
Understand potential rounding and truncation errors resulting from calculator use.					✓				✓	✓			✓	✓				

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Rate, ratio, proportion, and speed																		
Relate ratios to fractions.	✓	✓			✓				✓				✓					
Find the ratio of two or more quantities.	✓				✓				✓				✓					
Find equivalent ratios and simplify ratios.	✓				✓				✓				✓					
Solve simple problems involving ratios.	✓	✓			✓				✓				✓					
Solve problems involving an increase or decrease in ratio.	✓				✓				✓				✓					
Recognize and use common measures of rate.	✓				✓				✓				✓					
Convert rate units (e.g. km/h to m/s).	✓				✓				✓				✓					
Solve problems involving rate.	✓				✓				✓				✓					
Solve problems involving elapsed time.					✓													
Understand concepts of speed, uniform speed, and average speed.	✓				✓				✓				✓					
Solve problems involving speed and average speed.	✓				✓				✓				✓					
Determine whether two quantities are in direct proportion or inverse proportion from a graph, a table, or an equation.			✓			✓				✓				✓				
Solve problems involving direct and inverse proportions.	✓	✓			✓				✓				✓					
Understand map scales (distance and area).	✓				✓				✓				✓		✓			
Solve map problems given map scales or representative fractions.	✓				✓				✓				✓		✓			
Percentage																		
Express a percentage as a fraction or a decimal and vice versa.	✓	✓			✓				✓				✓					
Express one quantity as a percentage of another.	✓				✓				✓				✓					
Compare quantities by percentages.	✓				✓				✓				✓					
Use percentages greater than 100%.	✓				✓				✓									
Solve problems involving reverse percentages (find the total given the percentage and quantity of a part).	✓	✓			✓				✓				✓					
Solve problems involving increasing or decreasing a quantity by a given percentage.	✓	✓			✓				✓				✓					
Applications of mathematics in practical situations																		
Solve problems involving discount, commission, and value-added tax.	✓	✓			✓				✓				✓			✓		
Solve problems involving profit and loss.	✓	✓				✓				✓			✓			✓		
Solve problems involving simple and compound interest.	✓	✓				✓				✓			✓			✓		
Solve problems involving hire purchase, earnings, utility bills, money exchange, and taxation	✓	✓				✓				✓			✓			✓		
Algebraic representation and formulae																		
Use letters to represent numbers.	✓				✓				✓				✓					
Interpret algebraic notations: e.g. ab as $a \times b$, $\frac{a}{b}$ as $a \div b$, a^2 as $a \times a$.	✓				✓				✓				✓					
Express basic arithmetical processes algebraically.	✓				✓				✓				✓					
Evaluate algebraic expressions using substitution.	✓				✓				✓				✓					
Find the terms in a sequence.	✓				✓				✓				✓				✓	
Find the formula for the general term of a sequence.	✓				✓				✓				✓				✓	
Solve problems involving sequences and number patterns.	✓				✓				✓				✓				✓	

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Algebraic manipulation																		
Add and subtract linear algebraic expressions.	✓				✓				✓				✓					
Simplify linear algebraic expressions e.g. $\frac{2x}{3} - \frac{3(x-5)}{2}$.	✓				✓				✓				✓					
Use the distributive law to expand algebraic expressions of the form $\pm a(b \pm c)$.	✓	✓			✓	✓			✓	✓			✓	✓				
Expand the product of two algebraic expressions e.g. $(a + b)(x + y)$.		✓				✓				✓				✓				
Recognize and apply the special products: $(a \pm b)^2 = a \pm 2ab + b^2$; $(a + b)(a - b) = a^2 - b^2$.		✓				✓				✓				✓				
Factorize linear algebraic expressions in the form $ax + bx + kay + kby$, where a, b , and k are constants.	✓	✓			✓	✓			✓	✓				✓				
Factorize algebraic expressions of the form: $a^2x^2 - b^2y^2$; $a^2 \pm 2ab \pm b^2$; $ax^2 \pm bx \pm c$.		✓				✓				✓				✓				
Simplify algebraic fractions.		✓				✓				✓				✓		✓	✓	
Multiply and divide algebraic fractions.		✓				✓				✓				✓		✓	✓	
Add or subtract simple algebraic fractions with numerical denominators.		✓				✓				✓				✓		✓	✓	
Add or subtract algebraic fractions with linear or quadratic denominators, e.g. $\frac{1}{x-3} + \frac{2}{(x-3)^2}$.		✓	✓			✓				✓						✓	✓	
Change the subject of a formula, including those involving square roots.		✓	✓			✓				✓						✓	✓	
Solutions of linear equations and inequalities																		
Solve linear equations with one unknown.	✓				✓				✓					✓				
Find the value of an unknown quantity in a formula.	✓				✓				✓							✓		
Solve simple fractional equations that can be reduced to linear equations, e.g. $\frac{x}{3} + \frac{x-2}{4} = 3$ or $\frac{3}{x-2} = 6$.	✓	✓			✓				✓					✓		✓		
Construct simple linear equations from given situations and solve these equations.	✓				✓				✓					✓				
Solve simple linear equations with decimal coefficients.	✓																	
Solve problems using bar models to create algebraic equations.					✓				✓					✓				
Solve simultaneous linear equations in two unknowns using the graphical method.		✓				✓				✓				✓				
Solve simultaneous linear equations in two unknowns using the substitution and elimination methods.		✓				✓				✓				✓				✓
Formulate a pair of linear equations in two unknowns to solve problems.		✓				✓				✓				✓				
Solve simple inequalities such as $ax > b$, where $a > 0$.		✓				✓				✓				✓			✓	
Solve word problems involving simple inequalities.		✓				✓				✓				✓			✓	
Solve linear inequalities in one unknown, e.g. $ax + b < c$ where $a < 0$.		✓	✓				✓				✓						✓	✓
Solve simultaneous linear inequalities and represent the solution set on a number line.			✓				✓				✓						✓	✓
Solve word problems involving inequalities.			✓				✓				✓							

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Solutions of quadratic equations and inequalities																		
Solve quadratic equations in one unknown by factorization.	✓				✓	✓			✓	✓					✓			
Solve quadratic equations in one unknown by completing the square, using the quadratic formula, or drawing a graph.			✓				✓				✓				✓			
Solve fractional equations that can be transformed to quadratic equations, e.g. $\frac{1}{x-2} + \frac{2}{x-3} = 5$.	✓	✓					✓				✓					✓	✓	
Formulate a quadratic equation in one unknown to solve problems.	✓				✓	✓			✓	✓					✓			
Solve simultaneous linear and quadratic equations in two unknowns using substitution.																		✓
Identify the conditions for a quadratic equation to have two distinct real roots, two equal real roots, and no real roots.																		✓
Find the maximum or minimum of a quadratic function by completing the square, find the x and y intercepts, and sketch the graph of the function.																		✓
Identify conditions for a line to intersect a given curve, be a tangent to a given curve, or not intersect a given curve.																		✓
Solve quadratic inequalities, and represent the solution set graphically.																		✓
Indices (exponents)																		
State and apply the laws of indices (exponents).	✓					✓				✓					✓			
Use positive, zero, and negative integral indices.	✓					✓				✓					✓			
Simplify expressions involving integral indices.	✓					✓				✓					✓			✓
Use fractional indices.		✓				✓				✓					✓			
Simplify expressions involving fractional indices.		✓				✓				✓					✓			✓
Evaluate algebraic expressions with indices.		✓				✓				✓					✓			
Solve simple equations involving indices.		✓								✓					✓			✓
Understand examples of very small or very large numbers and measurements, such as nanometer or gigabyte.						✓				✓					✓			
Represent numbers using the standard form $A \times 10^n$ where $1 \leq A < 10$ and n is an integer.	✓					✓				✓					✓			
Multiply and divide numbers in standard form.	✓					✓				✓					✓			
Add and subtract numbers in standard form.										✓								
Simplify expressions involving algebraic indices.																		✓
Solve equations involving algebraic indices.																		✓
Logarithms and surds (radicals)																		
Simplify expressions involving indices (exponents), including those with algebraic indices.																		✓
Solve exponential equations.																		✓
Simplify surds (expressions involving radicals).																		✓
Convert between $y = a^x$ and $x = \log_a y$.																		✓
Understand and use the three basic laws of logarithms.																		✓
Understand and evaluate common and natural logarithms using the calculator.																		✓
Understand and apply change of base of logarithms.																		✓
Solve simple equations involving logarithmic functions.																		✓

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Polynomials, identities, and binomial expansion																		
Identify the terms and the degree of a polynomial.	✓																	✓
Add, subtract, multiply, and divide polynomials.	✓																	✓
Distinguish between equations and identities.	✓																	✓
Find unknown coefficients of terms and constant terms in identities.	✓																	✓
Express one variable of an algebraic expression in terms of another variable.	✓																	
Use the remainder theorem and factor theorem.																		✓
Factorize polynomials.																		✓
Solve cubic equations.																		✓
Use the binomial theorem to expand expressions in the form $(x + y)^n$ where n is a positive integer.																		✓
Use the binomial theorem to find a coefficient in the expansion of $(x + y)^n$.																		✓
Understand and use the notations $n!$, $\binom{n}{r}$, and ${}^n C_r$.																		✓
Use the general term $\binom{n}{r} a^{n-1} b^r$ or ${}^n C_r a^{n-1} b^r$.																		✓
Partial fractions																		
Identify proper and improper algebraic fractions.																		✓
Express improper fractions as the sum of a polynomial and a proper fraction.																		✓
Express a single algebraic fraction as partial fractions.																		✓
Perform partial fraction decomposition of an algebraic fraction with a denominator $(ax + b)(cx + d)$, $(ax + b)(cx + d)^2$, or $(ax + b)(x^2 + c^2)$.																		✓
Set language and set notation																		
Define the idea of a set and interpret the terms finite set, infinite sets, equal sets, equivalent sets, intersection or union of sets, empty set, disjoint set, subset, and proper subset.		✓				✓				✓								
Use set language and set notation to describe a set of objects, its elements, and its subsets.		✓				✓				✓								
Define the complement, union, and intersection of two sets and illustrate them using Venn diagrams.		✓				✓				✓								
Define the complement, union, and intersection of up to three sets and illustrate them using Venn diagrams.		✓																
Solve word problems with Venn diagrams.		✓																
Matrices																		
Display information of a matrix in any order.													✓					
Interpret the data in a given matrix.													✓					
Calculate the product of a scalar quantity and a matrix.													✓					
Solve problems involving the calculation of the sum, difference, or product of two matrices (where appropriate).													✓					✓
Find the inverse of a 2 x 2 matrix.																		✓
Solve a pair of linear equations using the inverse matrix method.																		✓

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Coordinate Geometry, Graphs, and Functions																		
Applications of graphs in practical situations																		
Draw graphs from given data.	✓						✓					✓				✓		
Use data from graphs in practical situations.	✓						✓					✓				✓		
Interpret and draw distance-time graphs (travel graphs).	✓						✓	✓				✓						✓
Interpret and draw speed-time graphs.			✓					✓				✓						✓
Solve problems involving rate of changed in distance-time and speed-time graphs.			✓					✓										✓
Solve problems involving area under a speed-time graph.			✓					✓										✓
Graphs of linear functions and relations.																		
Plot coordinate points on a graph.	✓				✓				✓				✓					
Plot a set of ordered pairs satisfying a function.	✓				✓				✓				✓					
Find the gradient (slope) of a straight line on a graph as the ratio of vertical change to horizontal change.						✓			✓				✓					
Graph a linear equation in two unknowns.	✓					✓				✓			✓					
Understand the definition of a function.		✓			✓					✓			✓					
Understand the terms domain and range.		✓																
Use function notation such as $f: x \mapsto ax + b, f(x) = ax + b$ to describe simple functions.			✓															✓
Use function notation such as $f^{-1} \mapsto \frac{x-b}{a}, f^{-1}(x) = ax + b$ to describe the inverse of simple functions.			✓															
Draw the graph of a linear function from ordered pairs.						✓				✓			✓					
Find the gradient and y-intercept of a function in the form $y = mx + b$ where m and b are constants.						✓				✓								✓
Draw a graph of a linear function given the gradient and y-intercept.						✓				✓								✓
Find the length of a line segment given the coordinates of the end points.		✓					✓				✓							✓
Find the midpoint of a line segment.		✓					✓											✓
Find the gradient of a straight line given the coordinates of two points on it.		✓					✓				✓							✓
Interpret and find the equation of a straight line graph in the form $y = mx + c$.		✓					✓				✓							✓
Solve geometric problems involving the use of coordinates.		✓					✓				✓							✓
Find the area of a quadrilateral given its vertices.		✓																✓
Understand and apply the condition for two lines to be parallel.		✓																✓
Understand and apply the condition for two lines to be perpendicular.																		✓
Given different conditions, write different forms of the equation of a straight line.																		✓
Find the area of a rectilinear figure given the vertices.																		✓

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Graphs of non-linear functions and relations																		
Draw the graph of a quadratic function $y = ax^2 + bx + c$ where $a > 0$ and where $a < 0$ by finding and plotting ordered pairs.	✓				✓				✓								✓	
Find the maximum or minimum point, x -intercepts, y -intercept, and the line of symmetry of graphs of quadratic functions.	✓				✓				✓								✓	
Sketch the graphs of quadratic functions of the forms $y = \pm(x - h)^2 + k$ and $y = \pm(x - p)(x - q)$.								✓			✓						✓	
Draw the graph of a function $y = ax^n$ for $-2 \leq n \leq 3$.								✓			✓						✓	
Draw the graph of the sum of not more than 3 functions of the form $y = ax^n$ for $-2 \leq n \leq 3$.								✓			✓						✓	
Draw the graph of a function $y = ax^n$ when n is a simple rational number.																		✓
Draw the graph of an exponential function $y = ka^x$ where a is a positive integer.								✓			✓						✓ ✓	✓
Estimate the gradient of a curve by drawing a tangent to the curve.		✓						✓			✓						✓ ✓	
Solve a simultaneous quadratic and a linear equation approximately by a graphical method.		✓						✓									✓	
Graph $ f(x) $ where $f(x)$ is linear or quadratic.																		✓
Transform given non-linear relationships, including $y = ax^n$, $y = kb^x$, and logarithmic functions to linear form to determine the unknown constants from the straight line graph.																		✓
Find the equation of a circle given the center and radius.																		✓
Find the center and radius of a circle when its equation is given.																		✓
Sketch the graph of a function $y = ax^n$ when n is a simple rational number.																		✓
Sketch the graph of a^x , e^x , $\log_a x$, and $\ln x$.																		✓
Transformations																		
Use and identify reflection, rotation, and translation to transform geometrical figures on the coordinate plane, including giving a full description of the transformation.	✓	✓	✓														✓	
Use enlargement to transform geometrical figures on the coordinate plane.	✓	✓	✓														✓	
Draw the image of a given figure involving combined transformations, including using coordinates.	✓	✓	✓														✓	
Use shear and stretch to transform geometric figures on the coordinate plane.		✓	✓														✓	
Use transformations and their combinations, identify and give precise descriptions of transformations connecting given figures.		✓	✓														✓	
Use column vectors to describe translations.				✓														

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Loci																		
Recognize that a locus is a set of points which satisfied certain given conditions.				✓														✓
Construct and/or describe a locus.				✓														✓
Recognize and use loci which are sets of points in two dimensions which are at a given distance from a given point, a given straight line, or two given points, or two given intersecting straight lines.				✓														✓
Solve problems involving loci including intersecting loci.				✓														✓
Vectors in two dimensions																		
Represent a vector by a directed line segment.				✓								✓						✓
Represent a vector and its magnitude using various notations: $\begin{pmatrix} x \\ y \end{pmatrix}$, \overline{AB} , \mathbf{a} , $ \overline{AB} $ and $ \mathbf{a} $.				✓								✓						✓
Find the magnitude and direction of a vector.				✓								✓						✓
Use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors.				✓								✓						✓
Multiply a vector by a scalar.				✓								✓						✓
Understand a position vector.				✓								✓						✓
Represent a vector in the coordinate plane using the column vector notation and find its magnitude.				✓								✓						✓
Solve geometric problems involving the use of vectors.				✓								✓						✓
Describe a translation by using a vector.				✓														
Geometry and Measurement																		
Mensuration																		
Convert between units of area (cm^2 , mm^2 , m^2 , ha, km^2) and volume (cm^3 , mm^3 , m^3 , liter, and milliliter).	✓				✓				✓				✓					
Convert between units of weight (kg, g)	✓												✓					
Solve problems involving the perimeter and area of composite plane figures (including triangles and circles).	✓				✓				✓				✓					
Solve problems involving volumes and surface areas of composite solids involving prisms, and cylinders.	✓				✓				✓				✓					
Solve problems involving density of solids.	✓																	
Find volumes and surface areas of pyramids, cones, and spheres.	✓				✓				✓				✓					
Find the surface areas and volumes of composite solids involving prisms, cylinders, pyramids, cones, and spheres.	✓				✓				✓				✓					
Identify chords, segments, and arcs.	✓					✓				✓				✓				
Understand the relationship between arc length and angle subtended by an arc and between sector area of a circle and angle subtended by an arc.	✓					✓				✓								
Calculate arc length and sector areas of a circle.	✓					✓				✓								
Calculate area of a segment.	✓					✓				✓								
Use radian measure of an angle, including conversion between radians and degrees.						✓				✓								
Solve problems involving arc length and sector area of a circle.	✓					✓				✓								

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Symmetries and nets of solid figures																		
Identify line and rotation symmetries of plane figures.	✓																	
Identify plane symmetry and axes of rotational symmetry of solid figures.	✓																	
Give the number of planes and axes of symmetry and the order of rotational symmetry of given figures.	✓																	
Construct nets of solid figures and identify solid figures from their nets.	✓																	
Angles, triangles, and polygons																		
Describe points, rays, and planes.					✓				✓				✓					
Describe a line segments, lines, and angles	✓																	
Identify different types of angles (acute, right, obtuse, reflex).	✓				✓				✓				✓					
Understand the properties and find unknown angles in problems involving complementary angles, supplementary angles, adjacent angles on a line, and vertically opposite angles.	✓				✓				✓				✓					
Understand angle properties and find unknown angles in problems involving angles formed by two parallel lines and a transversal (corresponding, alternate, and interior angles).	✓				✓				✓				✓					
Classify triangles based on their sides and angles.	✓				✓				✓				✓					
Understand the angle properties and find unknown angles of triangles and special quadrilaterals.	✓				✓				✓				✓					
Find unknown angles in figures involving circles and radii.	✓																	
Understand the angle properties of regular pentagon, hexagon, octagon, and decagon.	✓				✓				✓				✓					
Find the angles sum of interior and exterior angles of any convex polygon.	✓				✓				✓				✓					
Use a compass and ruler to bisect an angle and draw the perpendicular bisector of a line segment.					✓				✓				✓					
Construct simple geometrical figures from given data (including perpendicular bisectors and angle bisectors) using compasses, ruler, set squares and protractors, where appropriate.					✓				✓				✓					
Properties of circles																		
Understand and apply symmetry properties of circles: <ul style="list-style-type: none"> equal chords are equidistant from the center the perpendicular bisector of a chord passes through the center tangents from an external point are equal in length the line joining an external point to the center of the circle bisects the angle between the tangents 			✓				✓				✓						✓	
Understand and apply angle properties of circles: <ul style="list-style-type: none"> angle in a semicircle is a right angle angle between tangent and radius of a circle is a right angle angle at the centre is twice the angle at the circumference angles in the same segment are equal angles in opposite segments are supplementary 		✓					✓				✓						✓	

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Congruence and Similarity																		
Recognize congruent figures.	✓				✓				✓				✓					
Match sides and angles of two congruent polygons.	✓				✓				✓				✓					
Use properties of congruent figures to find unknown sides and angles.	✓				✓				✓				✓		✓			
Identify reflection, translation, and rotation of congruent figures.		✓							✓									
Recognize similar figures.	✓				✓				✓								✓	
Use properties of similar polygons (corresponding angles are equal and corresponding sides are proportional) to find unknown sides and angles.	✓				✓				✓								✓	
Use similar and congruent figures to make designs and tessellations.	✓																	
Identify enlargement of a plane figure by a scale factor.	✓	✓			✓				✓								✓	
Interpret scale drawing.	✓				✓				✓								✓	
Solve problems involving similarity or congruence and scale drawings.	✓				✓				✓								✓	
Understand and use tests for congruent triangles (SSS, SAS, ASA, RHS).		✓				✓				✓								
Recognize that corresponding angles of similar triangles are equal and corresponding sides are proportional.		✓				✓				✓								
Demonstrate an understanding that two triangle are similar if their corresponding angles are equal or their corresponding sides are proportional or two pairs of their corresponding sides are proportional and the included angles are equal.		✓				✓				✓								
Solve problems involving congruent or similar triangles.		✓				✓				✓								
Determine whether two plane figures or solids are similar.		✓				✓				✓								
Solve problems involving the ratio of areas and of lengths of two similar plane figures.		✓				✓				✓								
Solve problems involving the ratio of volumes and the ratio of lengths of two similar solids.		✓				✓				✓								
Proofs in Plane Geometry																		
Prove geometrical properties using the symmetry and angle properties of triangles, special quadrilaterals and circles.																		✓
Prove and use the midpoint theorem and intercept theorem for triangles.																		✓
Prove and use the tangent-chord theorem (alternate segment theorem), intersecting chords theorem and tangent-secant theorem for circles.																		✓
Pythagoras' Theorem and Trigonometry																		
Pythagoras' Theorem																		
Apply Pythagoras' Theorem to solve problems.		✓				✓				✓					✓	✓		
Determine whether a triangle is right angled given the lengths of its three sides.		✓				✓				✓					✓			

	NEM				NSM				DM				NMC					AM	
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5		
Trigonometry																			
Use trigonometric ratios (sine, cosine, and tangent) of acute angles to calculate unknown sides and angles in right-angled triangles.	✓						✓					✓					✓	✓	
Apply trigonometric ratios to simple problems.	✓						✓					✓					✓	✓	
Extend sine and cosine to obtuse angles and use the trigonometric identities $\sin(180^\circ - \theta) = \sin \theta$ and $\cos(180^\circ - \theta) = -\cos \theta$.			✓				✓					✓						✓	
Extend tangent to obtuse angles and use the trigonometric identity $\tan(180^\circ - \theta) = -\tan \theta$.			✓				✓												
Find the area of a triangle using the formula $\text{Area} = \frac{1}{2} bc \sin A$.			✓				✓					✓						✓	✓
Use the sine and cosine rules to solve problems involving the sides and angles of a triangle.			✓				✓					✓						✓	✓
Solve problems involving bearings and navigation.			✓				✓					✓						✓	
Solve problems involving angles of elevation and depression.	✓						✓					✓						✓	✓
Apply trigonometry to solve simple 3-dimensional problems involving angles between straight lines.			✓				✓					✓							✓
Apply trigonometry to solve simple 3-dimensional problems involving angles between a straight line and a plane.			✓																
Understand, use, and solve equations involving the trigonometric functions sine, cosine, tangent, secant, cosecant, and cotangent for angles of any magnitude in degrees or radians.																			✓
Evaluate inverse sine, cosine, and tangent functions.																			✓
Know the exact values of the trigonometric functions for special angles ($30^\circ, 45^\circ, 60^\circ$) or $(\frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2})$.																			✓
Graph simple sine and cosine functions and determine their amplitude, periodicity, and symmetries.																			✓
Graph $ f(x) $ where $f(x)$ is trigonometric.																			✓
Use the following trigonometric identities to solve equations: <ul style="list-style-type: none"> $\sin^2 \theta + \cos^2 \theta = 1$ $1 + \cot^2 \theta = \text{cosec}^2 \theta$ $\tan^2 \theta + 1 = \sec^2 \theta$ $\cos(90^\circ - \theta) = \sin \theta$ $\sin(90^\circ - \theta) = \cos \theta$ the expansions of $\sin(A \pm B)$, $\cos(A \pm B)$, and $\tan(A \pm B)$ the formulae for $\sin 2A$, $\cos 2A$, and $\tan 2A$ the formulae for $\sin A \pm \sin B$ and $\cos A \pm \cos B$ the expression for $a \cos \theta + b \sin \theta$ in the form $R \cos(\theta \pm \alpha)$ or $R \sin(\theta \pm \alpha)$ 																			✓
Prove trigonometric identities.																			✓

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Statistics and Probability																		
Data Analysis																		
Collect, classify, and tabulate data.	✓				✓				✓				✓					
Read and interpret tables and statistical diagrams.	✓				✓				✓				✓					
Construct bar graphs, pie charts, pictograms, and line graphs.	✓				✓				✓				✓					
Understand the purpose, use, advantages, and disadvantages of different forms of statistical diagrams.	✓				✓				✓				✓					
Draw simple inferences from statistical diagrams.	✓				✓				✓				✓					
Construct a group frequency table and histograms with equal intervals to represent the group frequency table.	✓				✓				✓				✓					
Interpret and analyze dot diagrams and stem-and-leaf diagrams.						✓				✓				✓				
Calculate the mean, mode, and median of a set of data.	✓					✓				✓				✓				
Compare usefulness of mean, median, and mode.	✓					✓				✓				✓				
Calculate the mean of grouped data.		✓				✓				✓				✓		✓		
Construct histograms for grouped data.		✓					✓				✓				✓		✓	
Understand and interpret cumulative frequency curves.		✓					✓				✓				✓	✓		
Understand and find range, quartile, interquartile range and percentile		✓					✓				✓				✓	✓		
Understand and interpret box-and-whisker plots.							✓				✓				✓			
Understand standard deviation as a measure of variation.								✓					✓					
Calculate standard deviation for grouped and ungrouped data.								✓					✓					
Use mean and standard deviation to compare two sets of data.								✓					✓					
Probability																		
Understand probability as a measure of chance.				✓		✓				✓				✓			✓	
Define the terms sample space, outcome, and event.				✓		✓				✓				✓			✓	
List the sample space for a simple chance situation.				✓		✓				✓				✓			✓	
Find the probability of a single event.				✓		✓				✓				✓			✓	
Calculate the probability of a simple combined event using a possibility diagram or a tree diagram.				✓			✓					✓						✓
Identify mutually exclusive events and independent events.				✓			✓					✓						✓
Understand and apply the addition of probabilities for two mutually exclusive events.				✓			✓					✓						✓
Understand and apply the multiplication of probabilities for independent events.				✓			✓					✓						✓
Apply probability of mutually exclusive and independent events to solve problems.				✓			✓					✓						✓
Solve probability problems involving area.																		✓

	NEM				NSM				DM				NMC					AM
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	
Differentiation and Integration																		
Differentiation																		
Understand the concept of limits and the derivative of $f(x)$ as the gradient of the tangent to the graph $y = f(x)$.																		✓
Understand derivative as rate of change.																		✓
Understand and use the standard notations $f'(x), f''(x), \frac{dy}{dx}$, and $\frac{d^2y}{dx^2}$.																		✓
Find the derivatives of x^n for any rational n , $\sin^n x$, $\cos^n x$, $\tan^n x$, e^x , and $\ln x$, together with constant multiples, sums and differences.																		✓
Find the derivatives of composite functions.																		✓
Find the derivatives of products and quotients of functions.																		✓
Evaluate maximum and minimum points, and points of inflection on a graph using the first derivative and second derivative tests.																		✓
Apply differentiation to gradients, tangents and normals, connected rates of change, and maxima and minima problems.																		✓
Integration																		
Understand integration as the reverse of differentiation.																		✓
Understand and use the standard notations $\int x^n dx$, $\frac{d}{dx}[f(x)]$, $\int_a^b f(x)dx$ and $[f(x)]_a^b$.																		✓
Integrate x^n for any rational n , $\sin x$, $\cos^n x$, $\tan x$, $\sec^2 x$, e^{ax} , and $\ln x$, together with constant multiples, sums and differences.																		✓
Integrate $(ax + b)^n$ for any rational n , $\sin(ax + b)$, $\cos(ax + b)$, and $e^{(ax + b)}$.																		✓
Definite integral as area under a curve.																		✓
Evaluate definite integrals.																		✓
Find the area of a region bounded by a curve and lines parallel to the coordinate axes.																		✓
Find the areas of regions below the x -axis.																		✓
Apply differentiation and integration to problems involving displacement, velocity and acceleration of a particle moving in a straight line with variable or constant acceleration.																		✓