

# **Brunei Numeracy Standards**

**Numeracy Pathways Progression:  
Level 7 (Year 7) to Level 8 (Year 8)**



## Numeracy Pathway Progression: Level 7 (Year 7) to Level 8 (Year 8)

Problem Solving		
	Level 7 (Year 7)	Level 8 (Year 8)
<b>Formulating</b>	<ul style="list-style-type: none"> <li>Identify the information needed to solve a problem, classifying and sorting it where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>Identify what additional information is needed to solve a problem, and obtain it.</li> </ul>
	<ul style="list-style-type: none"> <li>Represent problems mathematically, making appropriate use of diagrams, words, symbols, tables and graphs.</li> </ul>	<ul style="list-style-type: none"> <li>Represent problems appropriately in algebraic, geometric or graphical form, using correct mathematical notation and diagrams.</li> </ul>
	<ul style="list-style-type: none"> <li>Use and apply mathematical knowledge, methods and techniques across different mathematical domains, including solving problems in unfamiliar contexts.</li> </ul>	<ul style="list-style-type: none"> <li>Select appropriate mathematical knowledge, methods and techniques to solve unfamiliar and non-routine problems.</li> </ul>
	<ul style="list-style-type: none"> <li><b>Break a complex calculation into simpler steps, choosing and using appropriate and efficient operations, methods and resources.</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Solve complex problems by breaking them into simpler steps or tasks, choosing and using efficient numeric, algebraic, geometric or statistical techniques and resources.</b></li> </ul>

Problem Solving

Problem Solving		
Analysing & reasoning	Level 7 (Year 7)	Level 8 (Year 8)
	<ul style="list-style-type: none"> <li>Use appropriate mathematical techniques and notation to explain how to solve a problem</li> </ul>	<ul style="list-style-type: none"> <li>Present solutions in algebraic, geometric or graphical form, using correct notation and diagrams.</li> </ul>
	<ul style="list-style-type: none"> <li>Check calculations, methods and mathematical arguments.</li> </ul>	
	<ul style="list-style-type: none"> <li><b>Extend the answer to a problem to a wider context by generalising.</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Make conjectures, test their validity and generalise.</b></li> </ul>
	<ul style="list-style-type: none"> <li>Extend problems by asking 'What if...?' and altering some of the original variables or constraints.</li> </ul>	

Problem Solving

Problem Solving		
	Level 7 (Year 7)	Level 8 (Year 8)
<b>Interpreting &amp; justifying</b>	<ul style="list-style-type: none"> <li>• <b>Decide whether an answer is reasonable.</b></li> </ul>	
	<ul style="list-style-type: none"> <li>• Interpret answers referring to the context of the original problem.</li> </ul>	<ul style="list-style-type: none"> <li>• Give solutions to an appropriate degree of accuracy in the context of the original problem.</li> </ul>
	<ul style="list-style-type: none"> <li>• Justify answers and conclusions, orally and in writing.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Justify answers and conclusions using mathematical reasoning.</b></li> </ul>
	<ul style="list-style-type: none"> <li>• Explore whether statements are always true, sometimes true or never true. Recognise that some statements or conclusions may be misleading or uncertain.</li> </ul>	<ul style="list-style-type: none"> <li>• Use logical argument and mathematical reasoning to establish the truth of a statement and prove in simple contexts.</li> </ul>
	<ul style="list-style-type: none"> <li>• Understand the importance of a counter-example in disproving something is always true.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Give counter-examples and identify exceptional cases.</b></li> </ul>

Number, Operations and Algebra

**Integers, fractions & decimals**

	Level 7 (Year 7)		Level 8 (Year 8)
7N1	<ul style="list-style-type: none"> <li>Understand and use place value to solve problems involving whole numbers and decimals, including problems that require numbers to be rounded to the nearest 0.01, 0.1, 1, 10, 100, 1000, etc.</li> <li>Understand the concept of 'decimal places' and use it to round decimals to up to three decimal places when solving problems.</li> </ul>	8N1	<ul style="list-style-type: none"> <li><b>Understand the concept of significant figures and use it to round whole numbers and decimals to given numbers of significant figures when solving problems.</b></li> </ul>
7N2	<ul style="list-style-type: none"> <li>Consolidate understanding of positive and negative integers in context.</li> </ul>		
7N3	<ul style="list-style-type: none"> <li>Solve problems involving comparisons and ordering of integers, decimals and fractions in a range of different contexts including those involving different units of measurement, using the symbols =, ≠, &lt;, ≤, &gt;, ≥.</li> </ul>		
7N4	<ul style="list-style-type: none"> <li><b>Understand, read and write index (exponent, power) notation for <math>a^n</math> where <math>n</math> is a positive integer.</b></li> <li>Understand, read and write index notation for positive integer powers of 10.</li> </ul>	8N4	<ul style="list-style-type: none"> <li>Understand, read and write index notation for <math>a^n</math> where <math>n</math> is an integer.</li> <li>Understand, read and write index notation for integer powers of 10.</li> </ul>
		8N5	<ul style="list-style-type: none"> <li>Write whole numbers in standard form (using index notation), <math>A \times 10^n</math>, (where <math>1 \leq A &lt; 10</math> and <math>n</math> can be positive or zero).</li> <li>Expand numbers written in standard form.</li> <li>Round numbers expressed in standard form to a given number of significant figures.</li> </ul>
		8N6	<ul style="list-style-type: none"> <li>Recognise and use reciprocals.</li> </ul>
		8N7	<ul style="list-style-type: none"> <li>Understand recurring decimals and that they can be written as fractions.</li> <li>Recognise simple recurring decimals for <math>\frac{1}{3}</math>, <math>\frac{2}{3}</math>, <math>\frac{1}{9}</math>.</li> </ul>

Number, Operations and Algebra

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Percentages</b>	7NP1	<ul style="list-style-type: none"> <li>Understand percentage and recognise the equivalence of percentages, fractions and decimals. Express percentages as decimals or fractions.</li> </ul>		
	7NP2	<ul style="list-style-type: none"> <li>Express one quantity as a percentage of another and use this in problems to compare simple proportions.</li> </ul>	8NP2	<ul style="list-style-type: none"> <li>Use the equivalence of fractions, decimals and percentages to compare proportions.</li> </ul>
	7NP3	<ul style="list-style-type: none"> <li><b>Calculate percentages of quantities, mentally and through jottings.</b></li> </ul>	8NP3	<ul style="list-style-type: none"> <li><b>Solve real-life problems involving percentage increase or decrease of a given quantity, including discounts.</b></li> </ul>

Number, Operations and Algebra

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Ratio &amp; proportion</b>	7NR1	<ul style="list-style-type: none"> <li>• <b>Understand and recognise proportionality and the relationship between ratio and proportion.</b></li> </ul>		
	7NR2	<ul style="list-style-type: none"> <li>• Express ratios of two or three quantities in their simplest form.</li> </ul>		
	7NR3	<ul style="list-style-type: none"> <li>• Divide a quantity into two or three parts in a given ratio.</li> </ul>		
	7NR4	<ul style="list-style-type: none"> <li>• Determine whether or not two ratios are in proportion.</li> </ul>		
	7NR5	<ul style="list-style-type: none"> <li>• <b>Solve simple ratio and proportion problems using informal methods, including those involving scales on maps or diagrams.</b></li> </ul>	8NR5	<ul style="list-style-type: none"> <li>• <b>Use a unitary method to solve word problems involving ratio and direct proportion.</b></li> </ul>
			8NR6	<ul style="list-style-type: none"> <li>• Make simple scale drawings.</li> </ul>
	7NR7	<ul style="list-style-type: none"> <li>• Understand rate as a comparison, or ratio, of two measurements with different units.</li> </ul>		

Number, Operations and Algebra

Operations with integers

	Level 7 (Year 7)		Level 8 (Year 8)
7N8	<ul style="list-style-type: none"> <li>Consolidate the rapid recall of number facts including:                             <ul style="list-style-type: none"> <li>complements (number bonds) for whole numbers to 100 and decimals with one and two decimal places to 1;</li> <li>multiplication and associated division facts up to <math>12 \times 12</math>;</li> <li>doubles of whole numbers up to 100 and corresponding halves.</li> </ul>                             Consolidate mental methods for calculating with whole numbers, including multiplication and division by 10, 100 and 1000.                         </li> </ul>	8N8	<ul style="list-style-type: none"> <li>Consolidate the rapid recall of number facts including:                             <ul style="list-style-type: none"> <li>complements (number bonds) for whole numbers to 100 and decimals with one and two decimal places to 1;</li> <li>multiplication and associated division facts up to <math>12 \times 12</math>;</li> <li>doubles of whole numbers up to 100 and corresponding halves.</li> </ul>                             Consolidate mental methods for calculating with whole numbers, including multiplication and division by 10, 100, 1000, 0.1 and 0.01.                         </li> </ul>
7N9	<ul style="list-style-type: none"> <li><b>Choose when it is appropriate and when it is not appropriate to use a calculator to carry out calculations.</b> Use a calculator efficiently, checking answers appropriately.</li> </ul>		
7N10	<ul style="list-style-type: none"> <li>Solve one- and two-step word problems involving calculations with whole numbers choosing appropriately:                             <ul style="list-style-type: none"> <li>the operation(s) to use;</li> <li>whether to use mental, written or calculator method(s);</li> <li>whether the answer needs to be rounded due to the context of the problem.</li> </ul> </li> </ul>	8N10	<ul style="list-style-type: none"> <li><b>Solve multi-step problems involving calculations with whole numbers</b> choosing appropriately:                             <ul style="list-style-type: none"> <li>the operation(s) to use;</li> <li>whether to use mental, written or calculator method(s);</li> <li>whether the answer needs to be rounded due to the context of the problem.</li> </ul> </li> </ul>
7N11	<ul style="list-style-type: none"> <li>Make and justify estimates of calculations involving whole numbers.</li> </ul>	8N11	<ul style="list-style-type: none"> <li>Make and justify estimates of more complex calculations with whole numbers.</li> </ul>
7N12	<ul style="list-style-type: none"> <li>Check answers to calculations involving whole numbers by using:                             <ul style="list-style-type: none"> <li>approximations, to verify whether the answer is the right order of magnitude;</li> <li>inverse operations and working the problem backwards;</li> <li>a different method.</li> </ul> </li> </ul>		
7N13	<ul style="list-style-type: none"> <li><b>Know and use the order of operations, including brackets, to carry out more calculations involving the four operations.</b></li> </ul>	8N13	<ul style="list-style-type: none"> <li>Know and use the order of operations, including brackets and powers, to carry out more complex calculations involving the four operations.</li> </ul>
		8N14	<ul style="list-style-type: none"> <li>Understand the effects of multiplying and dividing by numbers between 0 and 1.</li> </ul>
7N15	<ul style="list-style-type: none"> <li><b>Add and subtract positive and negative integers, including through using number lines and other models.</b> Multiply positive and negative integers by a positive integer.</li> </ul>	8N15	<ul style="list-style-type: none"> <li><b>Add, subtract, multiply and divide positive and negative integers, including through using number lines and other models.</b></li> </ul>

Number, Operations and Algebra

Operations with fractions & decimals

	Level 7 (Year 7)		Level 8 (Year 8)
7N16	<ul style="list-style-type: none"> <li>Consolidate the rapid recall of number facts including:                             <ul style="list-style-type: none"> <li>complements (number bonds) for decimals with one and two decimal places to 1;</li> <li>doubles of 2-digit decimal numbers and corresponding halves.</li> </ul>                             Consolidate mental methods for calculating with decimals, including multiplication and division by 10, 100 and 1000.                         </li> </ul>	8N16	<ul style="list-style-type: none"> <li>Consolidate the rapid recall of number facts including:                             <ul style="list-style-type: none"> <li>complements (number bonds) for decimals with one and two decimal places to 1;</li> <li>doubles of 2-digit decimal numbers and corresponding halves;</li> <li>fraction and decimal equivalents.</li> </ul>                             Use known facts to derive unknown facts such as, <math>0.7 \times 0.6</math>.                             Consolidate mental methods for calculating with decimals, including multiplication and division by 10, 100, 1000, 0.1 and 0.01.                         </li> </ul>
7N17	<ul style="list-style-type: none"> <li><b>Choose when it is appropriate and when it is not appropriate to use a calculator to carry out calculations.</b> Use a calculator efficiently, checking answers appropriately.</li> </ul>		
7N18	<ul style="list-style-type: none"> <li>Solve one- and two-step word problems involving calculations with decimals choosing appropriately:                             <ul style="list-style-type: none"> <li>the operation(s) to use;</li> <li>whether to use mental, written or calculator method(s);</li> <li>whether the answer needs to be rounded due to the context of the problem.</li> </ul> </li> </ul>	8N18	<ul style="list-style-type: none"> <li><b>Solve multi-step word problems involving calculations with decimals</b> choosing appropriately:                             <ul style="list-style-type: none"> <li>the operation(s) to use;</li> <li>whether to use mental, written or calculator method(s);</li> <li>whether to use equivalent calculations;</li> <li>whether the answer needs to be rounded due to the context of the problem.</li> </ul> </li> </ul>
7N19	<ul style="list-style-type: none"> <li>Make and justify estimates of calculations involving decimals.</li> </ul>	8N19	<ul style="list-style-type: none"> <li>Make and justify estimates of more complex calculations involving decimals.</li> </ul>
7N20	<ul style="list-style-type: none"> <li>Check answers to calculations involving decimals by using:                             <ul style="list-style-type: none"> <li>approximations, to verify whether the answer is the right order of magnitude;</li> <li>inverse operations and working the problem backwards;</li> <li>a different method.</li> </ul> </li> </ul>		
7N21	<ul style="list-style-type: none"> <li><b>Add and subtract fractions and mixed numbers, mentally or with jottings when appropriate.</b></li> </ul>	8N21	<ul style="list-style-type: none"> <li>Use efficient methods to solve problems that involve adding and subtracting fractions and mixed numbers.</li> </ul>
7N22	<ul style="list-style-type: none"> <li>Multiply and divide fractions, interpreting division as a multiplicative inverse.</li> </ul>	8N22	<ul style="list-style-type: none"> <li>Use efficient methods to solve problems that involve multiplying and dividing fractions and mixed numbers.</li> </ul>

Number, Operations and Algebra

Properties of numbers & sequences	Level 7 (Year 7)		Level 8 (Year 8)	
	7N23	<ul style="list-style-type: none"> <li>• <b>Recognise and use multiples, factors, common factors, lowest common multiples, highest common factors, primes (less than 100) and tests of divisibility when solving problems.</b></li> </ul>		
	7N24	<ul style="list-style-type: none"> <li>• Express 2-digit whole numbers as prime factors.</li> </ul>	8N24	<ul style="list-style-type: none"> <li>• <b>Express whole numbers as prime factors.</b></li> </ul>
	7N25	<ul style="list-style-type: none"> <li>• Understand square numbers and positive square roots of positive integers and recognise patterns in their sequence.</li> </ul>	8N25	<ul style="list-style-type: none"> <li>• Recognise and use square numbers and positive and negative square roots in a variety of contexts and problems.</li> </ul>
	7N26	<ul style="list-style-type: none"> <li>• Understand cube numbers and cube roots of positive integers and recognise patterns in their sequence.</li> </ul>		
	7N27	<ul style="list-style-type: none"> <li>• Understand and recognise the sequence of triangle numbers.</li> </ul>		
	7N28	<ul style="list-style-type: none"> <li>• Describe and continue linear growing patterns and sequences of integers.</li> </ul>		
	7N29	<ul style="list-style-type: none"> <li>• Generate terms of a sequence given a simple rule (term-to-term and general term).</li> </ul>	8N29	<ul style="list-style-type: none"> <li>• <b>Generate terms of a linear sequence, recognising and using term-to-term and position-to-term rules.</b></li> </ul>
	7N30	<ul style="list-style-type: none"> <li>• Generate sequences from practical contexts and describe the general term using words, mapping diagrams and symbols.</li> </ul>	8N30	<ul style="list-style-type: none"> <li>• <b>Use algebraic linear expressions to describe the <math>n^{\text{th}}</math> term of a variety of arithmetic sequences from practical contexts.</b> Explain and justify rules of sequences through reference to their context.</li> </ul>

Number, Operations and Algebra

		Level 7 (Year 7)	Level 8 (Year 8)	
<b>Seeing, expressing &amp; recording algebraic relationships</b>	7A1	<ul style="list-style-type: none"> <li>• <b>Understand the concepts of an unknown and a variable.</b> Understand the vocabulary of algebra: expression; equation; formula; term; constant; linear; evaluate; simplify; substitute; solve; factorise; expand.</li> <li>• <b>Recognise and use algebraic conventions when representing unknown numbers or variables in expressions and equations</b> (e.g. <math>3n</math>, <math>a - 7</math>, <math>2n + 4</math>, <math>\frac{a}{2}</math>, <math>3(n + 4)</math>, <math>4x - 1 = 7</math>, <math>2(a + 3) = 14</math>).</li> </ul>	8A1	<ul style="list-style-type: none"> <li>• Recognise and use algebraic conventions when representing unknown numbers or variables in expressions and equations, including the use of exponents.</li> </ul>
	7A2	<ul style="list-style-type: none"> <li>• Understand that algebraic expressions follow the same conventions and order as arithmetic operations, including the use of brackets.</li> </ul>	8A2	<ul style="list-style-type: none"> <li>• <b>Understand that algebraic expressions follow the same conventions and order as arithmetic operations, including the use of brackets and exponents.</b></li> </ul>
	7A3	<ul style="list-style-type: none"> <li>• <b>Generalise rules from simple practical situations and construct algebraic expressions using symbols to represent these.</b> Express previously learned simple mathematics formulae algebraically (e.g. <math>P = 2l + 2w</math>).</li> </ul>	8A3	<ul style="list-style-type: none"> <li>• Generalise rules from practical situations and construct algebraic expressions using symbols to represent these.</li> </ul>
	7A4	<ul style="list-style-type: none"> <li>• Express 'Think of a number' type problems as mappings, using symbols to represent the unknown number.</li> <li>• <b>Construct simple linear equations (integer coefficients and constants, unknown on one side only) to express unknown number problems arising from practical situations.</b></li> </ul>	8A4	<ul style="list-style-type: none"> <li>• Construct simple linear equations (rational coefficients and constants, unknown on one side only) to express unknown number problems arising from practical situations.</li> <li>• Construct simple linear equations (integer coefficients and constants, unknown on one or both sides) to express unknown number problems arising from practical situations.</li> </ul>

Number, Operations and Algebra

Simplifying & transforming algebraic relationships	Level 7 (Year 7)		Level 8 (Year 8)	
	7A5	<ul style="list-style-type: none"> <li>• <b>Show equivalence (or not) of algebraic expressions by collecting like terms (integer coefficients).</b></li> </ul>	8A5	<ul style="list-style-type: none"> <li>• Show equivalence (or not) of algebraic expressions by collecting like terms (rational coefficients).</li> </ul>
	7A6	<ul style="list-style-type: none"> <li>• <b>Show equivalence (or not) of algebraic expressions by multiplying a constant over a bracket (integer coefficients), using models and diagrams.</b></li> </ul>	8A6	<ul style="list-style-type: none"> <li>• Show equivalence (or not) of algebraic expressions by multiplying a single-term over a bracket.</li> <li>• <b>Understand and use the distributive law for algebraic multiplication.</b></li> </ul>
	7A7	<ul style="list-style-type: none"> <li>• Show equivalence (or not) of algebraic expressions by factorising: single-term common factors (e.g. <math>3n/3 = n</math>, <math>2a/a = 2</math>).</li> </ul>	8A7	<ul style="list-style-type: none"> <li>• <b>Simplify or transform algebraic expressions by factorising: single-term common factors (e.g. <math>3a + 6b = 3(a + 2b)</math>).</b></li> <li>• Understand that factorising is the inverse of expanding.</li> </ul>

Number, Operations and Algebra

		Level 7 (Year 7)	Level 8 (Year 8)	
<b>Solving linear equations</b>	7A8	<ul style="list-style-type: none"> <li>• <b>Evaluate simple algebraic linear expressions arising from practical contexts, including mathematical and scientific formulae, by substitution (positive integers).</b></li> </ul>	8A8	<ul style="list-style-type: none"> <li>• Evaluate algebraic linear expressions, including mathematical and scientific formulae, by substitution (integers and simple fractions and decimals), including expressions involving small positive integer exponents (e.g. <math>2a^2 - 5</math>, <math>4n^3</math>).</li> </ul>
	7A9	<ul style="list-style-type: none"> <li>• Solve 'Think of a number' type problems, using an appropriate method (e.g. 'seeing', doing the inverse).</li> <li>• <b>Solve simple linear equations (integer coefficients and constants, unknown on one side only) arising from practical situations using an appropriate method (e.g. 'seeing', inverse operations, trial and improvement).</b></li> <li>• Check solutions to equations by substitution.</li> </ul>	8A9	<ul style="list-style-type: none"> <li>• Solve simple linear equations (rational coefficients and constants, unknown on one side only) arising from practical situations using an appropriate method (e.g. inverse operations, trial and improvement).</li> <li>• <b>Solve simple linear equations (integer coefficients and constants, unknown on one or both sides) arising from practical situations using an appropriate method (e.g. 'seeing', inverse operations, 'balancing', trial and improvement).</b></li> <li>• Check solutions to equations by substitution.</li> </ul>
	7A10	<ul style="list-style-type: none"> <li>• Solve word problems that involve constructing and solving simple linear algebraic expressions and equations.</li> </ul>	8A10	<ul style="list-style-type: none"> <li>• Solve word problems that involve constructing and solving linear algebraic expressions and equations.</li> </ul>

Number, Operations and Algebra

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Relationships &amp; graphs</b>	7A11	<ul style="list-style-type: none"> <li>Understand that linear relationships can be expressed in different ways: algebraically; in tables; graphically.</li> </ul>		
	7A12	<ul style="list-style-type: none"> <li>Generate coordinate pairs that satisfy a simple linear rule using function machines, function tables and algebraic expressions.</li> </ul>		
	7A13	<ul style="list-style-type: none"> <li><b>Plot the graphs of simple linear functions (first quadrant), where <math>y</math> is given explicitly in terms of <math>x</math>.</b></li> </ul>	8A13	<ul style="list-style-type: none"> <li>Plot the graphs of simple linear functions (all four quadrants), where <math>y</math> is given explicitly in terms of <math>x</math>.</li> </ul>
			8A14	<ul style="list-style-type: none"> <li><b>Recognise that functions of the form <math>y = mx + c</math> correspond to straight-line graphs.</b> Recognise the algebraic form of straight-line graphs parallel to the <math>x</math>-axis (<math>y = k</math>) and <math>y</math>-axis (<math>x = k</math>).</li> </ul>
	7A15	<ul style="list-style-type: none"> <li>Plot and interpret the graphs of simple linear functions arising from real-life situations.</li> </ul>	8A15	<ul style="list-style-type: none"> <li>Construct, plot and interpret the graphs of linear functions arising from real-life situations, including direct proportion, conversion graphs, and simple distance-time graphs.</li> </ul>

Measurement and Geometry

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Time, perimeter, area, &amp; volume</b>	7M3	<ul style="list-style-type: none"> <li>Read the time on analogue and digital clocks and solve problems involving units of time, including start times, end times and duration of events.</li> </ul> <p>Understand and use 12-hour clock and 24-hour clock notation.</p> <p>Solve problems involving timetables.</p>		
	7M4	<ul style="list-style-type: none"> <li>Solve problems that involve calculating the perimeter and area of plane figures: rectangles (including squares), triangles, parallelograms (including rhombuses) and trapeziums.</li> </ul>	8M4	<ul style="list-style-type: none"> <li>Solve problems that involve the perimeter and area of plane figures: rectangles (including squares), triangles, parallelograms (including rhombuses), trapeziums and kites.</li> </ul>
	7M5	<ul style="list-style-type: none"> <li>Solve problems that involve calculating the perimeter and area of polygons that can be split into rectangles and triangles.</li> </ul>		
	7M6	<ul style="list-style-type: none"> <li><b>Understand <math>\pi</math> as the ratio of circumference to diameter of a circle.</b></li> <li><b>Understand and use the formulae <math>C = \pi d</math> or <math>C = 2\pi r</math> to solve problems involving circumference, diameter and radii of circles.</b></li> </ul>	8M6	<ul style="list-style-type: none"> <li>Understand and use the formula <math>A = \pi r^2</math> to solve problems involving area, diameter and radii of circles.</li> <li><b>Solve problems involving circumference and areas of circles.</b></li> </ul> <p>See sectors and lengths of arcs as fractions of circles and solve problems involving areas of sectors and lengths of arcs.</p>
	7M7	<ul style="list-style-type: none"> <li>Solve problems that involve calculating the volume of cuboids (including cubes) and simple composite solids made from cuboids.</li> </ul>	8M7	<ul style="list-style-type: none"> <li><b>Solve problems that involve the surface area and volume of right prisms (including cylinders).</b></li> </ul>

Measurement and Geometry

	Level 7 (Year 7)		Level 8 (Year 8)
Plane & solid shapes	7G1	<ul style="list-style-type: none"> <li>Identify and draw nets of cuboids, triangular prisms, regular tetrahedra, square-based pyramids.</li> </ul>	8G1 <ul style="list-style-type: none"> <li>Recognise, name and classify solid shapes: prisms (including cuboids and cylinders), pyramids (including tetrahedra and cones) and spheres.</li> </ul>
	7G2	<ul style="list-style-type: none"> <li>Understand and use correctly the vocabulary, notation and labelling conventions for lines, angles, plane and solid shapes.</li> <li>Understand and use correctly the vocabulary for parts of a circle: centre, radius, diameter, circumference, arc, chord, sector.</li> </ul>	
	7G3	<ul style="list-style-type: none"> <li><b>Solve geometrical problems involving line, angle and symmetry properties of equilateral, isosceles and right-angled triangles, including finding unknown angles.</b></li> <li>Explain geometrical reasoning using diagrams and words.</li> </ul>	8G3 <ul style="list-style-type: none"> <li>Solve geometrical problems involving line, angle and symmetry properties of special quadrilaterals, including finding unknown angles.</li> <li>Explain geometrical reasoning using diagrams and words.</li> </ul>
	7G4	<ul style="list-style-type: none"> <li><b>Solve problems involving angles on a straight line, angles around a point and vertically opposite angles.</b></li> </ul>	8G4 <ul style="list-style-type: none"> <li><b>Recognise and use supplementary, alternate and corresponding angles and solve problems involving these.</b></li> <li>Solve problems involving exterior angles of triangles.</li> <li>Know that the sum of the exterior angles of a polygon is <math>360^\circ</math> and solve problems involving exterior and interior angles of polygons.</li> </ul>
			8G5 <ul style="list-style-type: none"> <li>Be able to prove that:               <ul style="list-style-type: none"> <li>the angle sum of a triangle is <math>180^\circ</math> and the angle sum of a quadrilateral is <math>360^\circ</math>;</li> <li>the exterior angle of a triangle is equal to the sum of the two interior opposite angles.</li> </ul> </li> </ul>
			8G6 <ul style="list-style-type: none"> <li><b>Understand the concept of congruence and know that if plane shapes are congruent, corresponding sides and angles are equal.</b></li> </ul>
			8G7 <ul style="list-style-type: none"> <li><b>Understand the concept of similarity and know that if plane shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio.</b></li> </ul>
	7G8	<ul style="list-style-type: none"> <li>Use a protractor to measure and draw angles, including reflex angles, to the nearest degree.</li> <li>Use a ruler and protractor to construct a triangle given two sides and the included angle (SAS) or two angles and the included side (ASA).</li> <li>Construct a circle given: its centre and radius; its centre and a point on the circumference.</li> </ul>	

Measurement and Geometry

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Coordinate geometry</b>				
	7G11	<ul style="list-style-type: none"> <li>Use conventions and notation for 2D coordinates in all four quadrants to solve problems.</li> </ul>		

Measurement and Geometry

		Level 7 (Year 7)	Level 8 (Year 8)	
<b>Symmetry &amp; transformations</b>	7G15	<ul style="list-style-type: none"> <li>Understand and use the language and notation associated with reflections, rotations and translations.</li> </ul>		
	7G16	<ul style="list-style-type: none"> <li>Recognise, visualise and identify lines of symmetry. Reflect plane shapes in horizontal, vertical and diagonal mirror lines, including on a coordinate grid (all four quadrants).</li> </ul>		
	7G17	<ul style="list-style-type: none"> <li>Recognise, visualise and identify 2D rotational symmetry and identify centres of rotation. Rotate polygons on a coordinate grid (all four quadrants) after a rotation of <math>90^\circ</math> or <math>180^\circ</math> clockwise and anti-clockwise around one of its vertices.</li> </ul>	8G17	<ul style="list-style-type: none"> <li>Rotate polygons on a coordinate grid (all four quadrants) after a rotation of <math>90^\circ</math>, <math>180^\circ</math> or <math>270^\circ</math> clockwise and anti-clockwise around any point.</li> </ul>
	7G18	<ul style="list-style-type: none"> <li>Recognise and visualise 2D translations. Translate a polygon on a coordinate grid (all four quadrants).</li> </ul>		
			8G19	<ul style="list-style-type: none"> <li>Understand and use the language and notation associated with enlargement. <b>Enlarge polygons, given a centre of enlargement and a positive integer scale factor.</b></li> </ul>

Measurement and Geometry

Trigonometry	Level 7 (Year 7)		Level 8 (Year 8)	
			8G23	<ul style="list-style-type: none"> <li>• Understand and use Pythagoras' Theorem to calculate unknown sides in right-angled triangles.</li> </ul>

Data Analysis and Probability

		Level 7 (Year 7)	Level 8 (Year 8)
<b>Data analysis</b>	7D1	<ul style="list-style-type: none"> <li>Understand and use the vocabulary to describe different types of data: quantitative; categorical (qualitative); discrete; ungrouped and grouped; continuous.</li> </ul>	
	7D2	<ul style="list-style-type: none"> <li><b>Collect and organise data and construct:</b> <ul style="list-style-type: none"> <li>pictograms;</li> <li>bar charts for discrete data;</li> <li><b>pie charts for categorical data;</b></li> <li>frequency tables for ungrouped and grouped discrete data.</li> </ul> </li> </ul> <p>Read, analyse and interpret these diagrams and charts and draw simple conclusions from them.</p> <p><b>Read information in a line graph and understand the relationship between the two given variables (e.g. distance/time, conversion graphs).</b></p>	8D2 <ul style="list-style-type: none"> <li><b>Collect and organise data and construct:</b> <ul style="list-style-type: none"> <li>bar charts for discrete and continuous data;</li> <li>pie charts for categorical data;</li> <li>frequency tables for discrete and continuous data;</li> <li>line graphs.</li> <li><b>simple scatter diagrams.</b></li> </ul> </li> </ul> <p>Read, analyse and interpret these diagrams and charts and draw conclusions from them.</p> <p>Identify which diagrams or charts are most useful given the context of the problem.</p> <p>Identify and understand possible approaches to representing data that could lead to misinterpretation.</p>
	7D3	<ul style="list-style-type: none"> <li>Calculate the mode, median, mean and range for a set of data, including from an ungrouped frequency table.</li> </ul> <p>Find the modal class for grouped discrete data.</p>	8D3 <ul style="list-style-type: none"> <li>Identify and understand the different purposes of the mean, median and mode.</li> </ul> <p>Identify and understand situations when using the mean, median or mode may lead to misinterpretation of data.</p>
	7D4	<ul style="list-style-type: none"> <li>Compare two simple distributions using the range and one measure of average (mode, median or mean).</li> </ul>	8D4 <ul style="list-style-type: none"> <li><b>Compare two distributions using measures of average and the range.</b></li> </ul> <p>Recognise when it is appropriate to use the mode or modal class, median, mean and range to compare distributions of data.</p>

Data Analysis and Probability

		Level 7 (Year 7)		Level 8 (Year 8)
<b>Probability</b>	7P1	<ul style="list-style-type: none"> <li>Recognise real-life examples of probability.</li> </ul> <p>Understand the concept of probability and use the vocabulary of probability when describing events: certain, more likely, equally likely, less likely, or impossible.</p>		
	7P2	<ul style="list-style-type: none"> <li>Understand and use the probability scale: a certain outcome is 1 or 100%, an impossible outcome is 0 or 0%, and an equally likely outcome is 0.5, <math>\frac{1}{2}</math> or 50%.</li> </ul>	8P2	<ul style="list-style-type: none"> <li><b>Understand that if the probability of an event occurring is <math>p</math>, then the probability of it not occurring is <math>1 - p</math>.</b></li> </ul>
	7P3	<ul style="list-style-type: none"> <li><b>Identify all the possible mutually exclusive outcomes of a single event.</b></li> </ul>	8P3	<ul style="list-style-type: none"> <li>Identify and record systematically all possible mutually exclusive outcomes for single events and for simple combined events using lists, tables and tree diagrams.</li> </ul>
	7P4	<ul style="list-style-type: none"> <li>Understand that the theoretical probability of a single event is the ratio of the number of favourable outcomes to the total number of possible outcomes where all outcomes are equally likely.</li> </ul> <p><b>Identify and justify probabilities of a single event based on equally likely outcomes in simple contexts.</b></p>	8P4	<ul style="list-style-type: none"> <li><b>Identify and justify probabilities based on equally likely outcomes.</b></li> </ul>
	7P5	<ul style="list-style-type: none"> <li>Understand that the experimental probability of a single event is the ratio of the number of favourable outcomes to the total number trials.</li> </ul> <p>Estimate probabilities based on data collected from simple experiments.</p> <p>Make and justify predictions about the population size when given a probability and experimental data in simple contexts.</p>	8P5	<ul style="list-style-type: none"> <li>Estimate probabilities based on data collected from experiments.</li> </ul> <p>Make and justify predictions about the population size when given a probability and experimental data.</p>
	7P6	<ul style="list-style-type: none"> <li>Understand the difference between theoretical and experimental probabilities and compare in simple contexts.</li> </ul>	8P6	<ul style="list-style-type: none"> <li>Understand that if an experiment is repeated there will usually be different outcomes.</li> </ul> <p>Understand that increasing the number of trials will lead to better estimates of probability, which will approach the theoretical probability.</p>