Brae High School

Mathematics

Website Booklet

Staff	Mrs Patricia Batty (PT)	Mrs Linda Morrison	Mrs Dorcas Johnson
Subjects Taught	Mathematics	Mathematics	Mathematics

Broad General Education S1 – 3

Mathematics is important in our everyday life, allowing us to make sense of the world around us and to manage our lives. Using Mathematics enables us to model real-life situations and make connections. It equips us with the skills we need to interpret and analyse information, simplify and solve problems.

Using a wide variety of resources and teaching methods, pupils experience four main outcomes:

- Number, Money and Measure e.g. working with the four operations, time, fractions, percentages and looking at budgeting for future life. They will also look at the impact Maths has on the world past, present and future.
- Shape, Position and Movement. This involves 2D and 3D shapes and how they are used in our world eg packing and the importance of angles and symmetry eg navigation.
- Information Handling looks at data and analysis. Pupils have to be able to collect, organise, display and interpret information using charts, tables and graphs.
- Problem solving. This plays a big part in the BGE and challenges pupils to think about what they are doing, to question and explain. This will help them build up their reasoning skills for their progression into their National or Application of Mathematics course.

Our BGE course is designed into bundles of topics that link into each other with pupils being assessed at the end of a unit in various forms of assessment from written assessments, presentations to treasure hunts. The course enables pupils to:

- develop a secure understanding of the concepts, principles and processes of mathematics and apply these in different contexts, including the world of work
- engage with more abstract mathematical concepts and develop important new kinds of thinking
- understand the application of mathematics, its impact on society past and present, and its potential for the future
- develop essential numeracy skills which allow full participation in society
- establish firm foundations for further specialist learning
- understand that successful independent living requires financial awareness, effective money management, using schedules and other related skills
- interpret numerical information appropriately and use it to draw conclusions, assess risk, and make reasoned evaluations and informed decisions
- apply skills and understanding creatively and logically to solve problems, within a variety of contexts
- appreciate how the imaginative and effective use of technologies can enhance the development of skills and concepts.

Senior Phase

Mathematics is important in our everyday life, allowing us to make sense of the world around us and to manage our lives. Using Mathematics enables us to model real-life situations and make connections. It equips us with the skills we need to interpret and analyse information, simplify and

solve problems.	
National 2 Lifeskills Mathematics	The course consists of five units. The two mandatory units are: • Number and Number Processes • Shape, Space and Data Then two optional units will be picked from: • Money • Time • Measurement For more course details follow the link below: https://www.sqa.org.uk/files/nq/CfE_CourseSpec_N2_Mathematics_LifeskillsMathematics.pdf
National 3 Applications of Mathematics	This course consists of three units: • Numeracy • Shape, Space and Measurement • Money, Measurement For more course details follow the link below: https://www.sqa.org.uk/files/nq/AppsofMathsCourseSpecN3.pdf
National 4 Mathematics	This course consists of three units and an end of course assessment: • Numeracy • Expressions and Formulae • Relationships • Added Value assessment For more course details follow the link below: https://www.sqa.org.uk/files/nq/CfE_CourseSpec_N4_Mathematics_Mathematics.pdf
Personal Finance Level 4 and Level 5	These courses will develop knowledge and skills to cope confidently and effectively with the types of financial matters individuals are likely to encounter. From student loans, to pensions, the awards will prepare learners for financial decision making and managing personal finances throughout their lives. The Awards cover a range of topics, including: calculating and comparing costs; household budgeting; different forms of borrowing; tax and National Insurance; credit cards; bank accounts; exchange rates, interest and inflation rates. For more course details follow the link: https://www.sqa.org.uk/sqa/79416.html
National 5 Mathematics	The course assessment has two components: Component 1 - question paper 1 (non-calculator) 50 marks in 1 hour and 15 minutes. Component 2 - question paper 2 (calculator) 60 marks in 1 hour and 50 minutes. **Course content** The course is split into three units: **Unit 1: Expressions and Formulae.** This unit involves the manipulation of abstract terms (indices, factorising, completing the square, algebraic fractions), the simplification of expressions

	(scientific notation, surds & brackets & gradient) and the evaluation of formulae (volume of spheres, cones & cylinders, circle arcs and sectors). **Unit 2: Relationships.** This unit involves solving and manipulating equations (simultaneous equations, change the subject of formulae, quadratic equations & their roots, trigonometric equations), working with graphs (equations of straight lines, equations of and sketching of parabolas, trig graphs), and carrying out calculations on the lengths and angles of shapes (converse of Pythagoras, similar shapes, angles in polygons, tangent kites). **Unit 3: Applications.** The aim of this section is to develop skills linked to applications of mathematics. These include using trigonometry (sine & cosine rules and area of triangle), geometry (3-D co-ordinates & vectors), number processes (depreciation & reverse percentages) and statistics within real-life contexts (standard deviation & line of best fit). **Entry Recommendations for the Course** SQA recommends this course is suitable for learners who are secure in their attainment of the National 4 Mathematics Course. Achievement of this course gives automatic certification of Core Skill Numeracy at SCQF level 5. For more details follow the link: https://www.sqa.org.uk/files_ccc/MathematicsCourseSpecN5.pdf
Higher Mathematics	The course assessment has two components: Component 1 - question paper 1 (non-calculator) 70 marks in 1 hour and 30 minutes. Component 2 - question paper 2 (calculator) 80 marks in 1 hour and 45 minutes. **Course content** The course is split into three units: **Unit 1: Expressions and Functions** This unit involves the study of mathematical functions (composite functions and inverse functions). We work with graphs (radian and angle measure graphs of related trig functions, graphs of logarithmic and exponential functions and transformation of graphs). We expand the work with trigonometry (using the wave function, the addition formulae and double angle formulae; applications of trig to solve geometric problems; involving the addition formulae and the double angle formulae) and we look more in-depth at logarithm rules and exponential rules. To complete this unit, we further develop knowledge vector skills (collinear points; dividing a line in a given ratio; the scalar product). **Unit 2: Relationships and Calculus** This unit develops the knowledge and skills for solving equations (polynomials; the discriminant and its use in quadratic equations; intersections between lines and curves; condition for tangency; approximate roots); and manipulation of expressions, (polynomial functions). We introduce integral calculus (basic integration; rate of change; equation of tangent; definite integrals; integration of sinx, cosx and the chain rule for differentiation and integration). We use skills from unit 1 to solve trigonometry equations (involving the addition formulae and double angle formulae).

<table>
<tr><td></td><td colspan="3">Unit 3: Applications:
This unit develops the knowledge and skills for geometric applications (Straight Line coordinate geometry) and the applications of sequences in the form of Recurrence Relations). We introduce circle work (the equation of a circle; tangent to a circle), and applications of calculus (optimisation and using integration to find areas under or between two curves).
Entry Recommendations for the Course
SQA recommend this course is suitable for learners who are secure in their attainment of the National 5 Mathematics Course.
Achievement of this course gives automatic certification of Core Skill Numeracy at SCQF level 6.
For more details follow the link:
https://www.sqa.org.uk/files_ccc/HigherCourseSpecMathematics.pdf</td></tr>
<tr><td>Advanced Higher Mathematics</td><td colspan="3">The course assessment has two components:
Component 1 - question paper 1 (non-calculator) 35 marks in 1 hour.
Component 2 - question paper 2 (calculator) 80 marks in 2 hour and 30 minutes.
Course content
The course is split into three branches of maths:</td></tr>
<tr><td></td><td>Calculus</td><td>Algebra, Proof & Number Theory</td><td>Matrices, vectors and complex numbers</td></tr>
<tr><td></td><td>Differentiating exponential and natural logarithmic functions</td><td>Partial fractions (denominator of degree at most three)</td><td>Using Gaussian elimination to solve a 3x3 system of linear equations</td></tr>
<tr><td></td><td>Differentiating functions using the chain rule</td><td>Finding the asymptotes to the graphs of rational functions</td><td>Understanding and using matrix algebra</td></tr>
<tr><td></td><td>Differentiating functions given in the form of a product and in the form of a quotient</td><td>Investigating features of graphs and sketching graphs of functions</td><td>Calculating the determinant of a matrix</td></tr>
<tr><td></td><td>Differentiating inverse trigonometric functions</td><td>Expanding expressions using the binomial theorem</td><td>Finding the inverse of a matrix</td></tr>
<tr><td></td><td>Finding the derivative where relationships are defined implicitly</td><td>Finding the general term and summing arithmetic and geometric sequences</td><td>Using transformation matrices</td></tr>
<tr><td></td><td>Parametric differentiation</td><td>Applying summation formulae</td><td>Calculating a vector product</td></tr>
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	Applying differentiation to problems in context	Using the Maclaurin expansion to find specified terms	Working with lines in three dimensions
	Integrating expressions using standard results	Disproving a conjecture by providing a counter-example	Working with planes
	Integrating by substitution	Using indirect or direct proof in straightforward examples	Performing algebraic operations on complex numbers
	Integrating by parts	Using proof by induction	Geometry of complex numbers
	Applying integration to problems in context	Using Euclid's algorithm to find the greatest common divisor of two positive integers	
	Solving first order differential equations		
	Solving second order differential equations		
	Entry Recommendations for the Course SQA recommend this course is suitable for learners who are secure in their attainment of the Higher Mathematics Course. For more details follow the link: https://www.sqa.org.uk/files_ccc/AHCourseSpecMathematics.pdf		