



HIGH SCHOOL & COLLEGE

Mathematics Policy

Curriculum purpose 'Curriculum for life'

Our curriculum allows all learners to flourish, have parity of opportunity, be life ready, harness their potential, creativity, have rich experiences and broaden their life choices. Our curriculum is built on the principle of 'powerful knowledge' which is described as 'the most powerful knowledge that goes beyond 'common sense' (what we acquire in our everyday experience).

Purpose

Our policy and practice is intended to:

- Introduce the aims and objectives of the Mathematics department
- Outline the key components within Mathematics
- Outline the knowledge skills and understanding for all Key stages
- Explain the effective Teaching and Learning strategies utilised in Mathematics
- Provide the monitoring strategies used within Mathematics

Aim:

At Oakfield we aim is to raise the achievement of all learners by developing their numeracy skills through consistent and accurate application of Mathematics across the curriculum. The emphasis is on empowering learners to notice, make connections, explain, justify, conjecture, prove. We adopt a Mastery approach with one set of mathematical concepts and big ideas for all. We encourage learners to deploy particular models to support their development (ratio tables, area model, graphing) as well as draw a pictorial representation to make sense of a given situation. Challenge is provided through depth rather than acceleration.

Objective:

- To develop knowledge, skills and understanding in mathematics
- To develop fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time
- To develop reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- To solve problems by applying their mathematics to a variety of routine and nonroutine problems.
- To encourage to take mathematical risk-taking and creativity; challenging learners to become independent and confident Mathematicians in the real world

Components of powerful knowledge:

- Learners will develop coherence
- Learners will explore representation and structure
- Learners will develop mathematical thinking
- Learners will develop fluency
- Learner will explore variation

Key Stage 3

Knowledge, Skills and Understanding

- Number
 - To understand and use place value for decimals, measures, and integers of any size
 - To order positive and negative integers, decimals, and fractions; use the number line as a model for ordering the real numbers; use the symbols $=$, \neq , $<$, $>$, \leq , \geq
 - To define percentage as “number of parts per 100,” interpret percentages and percentage changes as fractions or as decimals, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100 percent
- Algebra
 - To use and interpret algebraic notation, including ab in place of axb , $3y$, in place of $y+y+y$ and $3xy$, a^2 , in place of axa , and a^3 in place of $axaxa$
 - To reduce a given linear equation in two variables to the standard form $y=mx+c$; calculate and interpret gradients and intercepts of graphs of standard form linear equations numerically, graphically, and algebraically
 - To recognize geometric sequences and appreciate other sequences that arise
- Ratio, proportion, and rates of change
 - To change freely between related standard units (e.g., time, length, area, volume/capacity, and mass)
 - To use scale factors, scale diagrams, and maps
 - To express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1
- Geometry and measures
 - To derive and apply formulas to calculate and solve problems involving perimeter and area of triangles, parallelograms, and trapezoids, and volume of cuboids (including cubes) and other prisms (including cylinders)
 - To apply the properties of angles at a point, angles at a point on a straight line, and vertically opposite angles

- To interpret mathematical relationships both algebraically and geometrically
- Probability
 - To record, describe, and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, and equally and unequally likely outcomes, using appropriate language and the 0–1 probability scale
 - To understand that the sum of the probabilities of all possible outcomes equals 1
 - To generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes, and use these to calculate theoretical probabilities
- Statistics
 - To describe, interpret, and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous, and grouped data, and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)
 - To construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data
 - To describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs

Key Stage 4

Knowledge, Skills and Understanding

Calculation and structure:

- To know and understand integers (both positive and negative),
- To know and understand the relationships between operations and inverse operations.
- To know and understand the concept of prime numbers, divisors, multiples, HCF or highest common factor, LCF or lowest common factor, prime factorization

Fractions, percentages, and decimals:

- To know and understand terminating decimals and their related fractions
- To identify fractions in ratio problems and interpretation of percentages and fractions as operators

Measures and accuracy:

- To know and understand different units such as units of mass, time, length, money. To know and understanding how to round numbers, approximate, estimate significant figures an accuracy including lower and upper bounds

Algebraic vocabulary, notation, and manipulation:

- To know and understanding algebraic notations and the algebraic vocabulary
- To know and understand all the algebraic notation and apply numerical values in formulae and algebraic expressions
- To know and understand how to simplify and manipulate regular algebraic expressions and algebraic fractions

Inequalities and solving equations:

- To know and understand how to solve quadratic equations, linear equations, simultaneous linear equations in one or two variables.

Graphs:

- To know and understand coordinates, axis, and how to plot them
- To know and understand how to plot graphs of straight and parallel lines, parabola, hyperbola and ellipse

Ratio, proportion, and Rates of change:

- To know and understand how to use of scale factors, maps, diagrams, ratio notation and reducing ratios to simplest forms

Geometry and measures:

- To know and understand how topics of points, vertices, edges, lines, planes, perpendicular or parallel lines, angles, polygons, triangles and medians

Vectors:

- To know and understand vector questions and the methods to solve two or three vectors

Probability and Statistics:

- To know and understand how to find the frequency of occurrence of events and outcomes.
- To know and understand the core statistics concepts such as distribution, sampling, mean, median and mode.

Key Stage 5**Knowledge, Skills and Understanding**

- To know and understand how to read, understand, and use mathematical information and mathematical terms
- To know and understand how to address individual problems as described above
- To know and understand how to use knowledge and understanding to a required level of accuracy
- To know and understand how to identify suitable operations and calculations to generate results
- To know and understand how to analyse and interpret answers in the context of the original problem
- To know and understand how to check the sense and reasonableness of answers

- To know and understand how to present and explain results clearly and accurately demonstrating reasoning to
- To know and understand how to support the process and show consistency with the evidence presented.

Teaching and learning

Oakfield has used the 'Unleashing Greatness Framework' to help leaders to deliver Instructional Rounds (appreciative inquiry) to provide a more detailed analysis of the best practice across the school. This has provided Theories of Action, a set of guidance, protocols and procedures that will hold us to account for the delivery and impact of our teaching and learning.

In Mathematics, the theories of action are:

Questioning

- When teachers ask probing questions, scaffolding them to build up more detailed understanding, directing and targeting them around the class and giving them time to think mathematically and develop their understanding and reasoning (removing any misconceptions). Then learners have increased level of understanding, becomes more secure in their knowledge and progress is accelerated

Coherence and scaffolding

- When teachers 'chunk' (in to small steps) learning around one big idea or narrative, steadily increasing the level of challenge. Then all learners are able to make progress with increasing levels of self confidence

Sequencing

- When teachers quickly engage students with starter and spaced learning activities recalling learning from previous sessions as a feedback mechanism before developing the next sequence of learning. Then learners cognitive load is reduced, retrieval strategies are developed, learners and teachers know where learning go next

Assessment and feedback

- When teachers use timely personal and individual feedback and praise. Then learners feel more secure about their learning are able to challenge themselves to improve their mathematical thinking and fluency and feel affirmed and positive about their progress

Vocabulary

- When teachers clearly and consistently develop vocabulary and terminology and precise language, explaining clearly, reinforcing definition and understanding. Then learners have a clear understanding of concept, develop skills more rapidly, communicate in a more precise manner (even if non-verbally), preparing them for their next steps in their learning and are more able to apply this understanding to a wide range of contexts

Relationships and high expectation

- When the school and all the adults consistently build authentic relationships where each learner's context is known and all adults model calm and respectful trusting behaviour. Then learners mirror that behaviour, feel known and respected and listen to and then the gained learning time enables students to make faster progress and deeper understanding

Collaborative work

- When teachers use collaboration or group activities as a part of problem solving or an enquiry. Then learners increasingly trust one another, develop a wider range of ideas and deeper mathematical thinking and motivation is increased

Assessment

At Oakfield we firmly believe that the focus should be on 'learning' rather than teaching, and value the importance of our school rubric assessment as a tool for all of our learners. The rubric assessments are written in a bronze, silver, gold and platinum structure. The rubrics are then shared and are made clear to learners to develop their independence and evaluation of their work (known as agency) and future target setting. Self-evaluation is key in getting learners to understand what they can do well and what they need to improve on further.

Monitoring arrangement

The Head of School and leadership team will:

- Monitor the subject through the Oakfield self-evaluation schedule and monitoring schedule which are reviewed annually

Governors will:

- Monitor the work of each subject through the Oakfield self-evaluation and monitoring schedule which includes a timetable of Departmental meetings and a Departmental leader's report to governors, which are reviewed annually

Departmental leader will:

- Monitor learners work and quality of teaching and learning
- Review Curriculum Maps and Schemes of Work based on suitability of use
- Review and monitor risk assessments for practical lessons
- Analyse performance data
- Produce a SES
- Attend link meeting

Links to other policies:

- Teaching and Learning
- Behaviour for Learning
- Monitoring
- Assessment for Learning
- Health and Safety
- Homework
- Marking and Feedback



Date approved:	
Review Date:	
Signed Executive Headteacher:	



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