Mathematics

Curriculum Intent

By the end of their secondary education, a student of mathematics at Dixons McMillan will have:

- The mathematical knowledge required to thrive in the modern world as well as having the skills to ensure that they are able to solve problems. For example students should be able to use skills learnt in mathematics to identify which is a better deal when comparing investments or be able to identify how much it will cost to carpet a room
- Have the skills to apply this knowledge in a range of contexts and to recognize this as a central element of culture, art, life, present and past which permeates and underpins Science and Technology. For example students should be able to work out compound measures such as speed and density and be able to link this to other areas of life.

In order to truly appreciate the subject and create deep schema, topics within mathematics have been intelligently sequenced with the following rationale:

- Students will develop key skills within mathematics by being able to regularly visit them in all year groups as well as building in complexity each year. For example a Y7 student will start by re-visiting key algebraic skills such as simplifying and substituting learnt in KS2 and then further expand on this by using these skills to solve simultaneous equations in KS4
- Students will be able to learn key skills and be given the opportunity to practice key skills through the I do/we do/you do approach which allows the opportunity of mastery.
- Skills learnt are linked to real-life situations allowing all students to be able to see the purpose of where and how these skills are learnt. For example area and perimeter is linked to real-life examples of working out how much flooring might be needed for a room as well as how much fencing might be needed for a garden.
- Regular mini tests and DIRT lessons ensure that any gaps in knowledge are closed effectively. Students are given time within a lesson to address these gaps as well as be able to work on them independently outside of lessons using suggested resources
- Collective Learning sessions also further embed key skills by allowing students to further develop and master key skills, particularly those not mastered in mini tests or assessments.

The Mathematics curriculum at Dixons McMillan has been influenced by:

- Students are just not taught a curriculum which is knowledge focused or exam based. Powerful knowledge (Young: 2014, 2020) will be taught in all areas of the mathematics curriculum to ensure that all students can access beyond their examinations
- A desire to challenge any negative perceptions of mathematics by embedding the joy factor into accessible but challenging lessons.
- Challenging the social acceptance of 'not being able to do maths' by promoting a can do attitude. Lessons are planned by taking into account the needs of all students and how to develop and build resilience for all students.
- Supporting the vast number of students aspiring for careers in STEM subjects by contextualising lessons when possible and ensuring outstanding outcomes.

Our mathematics curriculum ensures that social disadvantage is addressed through:

- Instilling a strong work ethic and high ambition for all students.
- Promoting the mathematics achievements of modern and historical figures from a range of cultures and backgrounds. This allows students to appreciate the mathematics has been contributed to by a diverse community
- Offering alternate qualifications, such as Level 1 Mathematics/Entry Level Mathematics/Further Mathematics.
- Providing all students with reduced price revision/practice workbooks.
- Offering easy access to reduced price specialist equipment such as calculators
- Providing appropriate interventions such as intervention plans and DEAR Interventions to close gaps in learning.
- Booklets are used to ensure that all work completed by students when learning new skills is in one place. Mini tests and DIRT are kept in exercise books so that students can easily see where their gaps are well as what gaps have been closed.

Our belief is that homework is used for deliberate practice of what has been taught in lessons. We also use retrieval practice and spaced revision to support all students with committing knowledge to long term memory.

- Homework allows spaced revision to ensure students are developing high level skills with precise knowledge and informed understanding of mathematics.
- Homework develops students independent study skills in preparation for revision for internal and external examinations. For example Y11 are provided with highly tailored homework booklets which contain deliberate practice of their next steps.

Opportunities to build an understanding of social, moral and ethical issues are developed alongside links to the wider world, including careers. We fully believe mathematics can contribute to the personal development of students at Dixons McMillan through:

- Students spend time in lessons helping each other with mathematics, this helps social development. They do this by recognizing that failure is part of learning and having resilience as well as autonomy will support their social and emotional well-being in a wider context.
- The use of reasoning to develop a mathematical argument encourages logical thought and the ability to form a strong moral argument. This links into students acquiring powerful knowledge to be able to become specialists in their future careers.
- The deep thought processes required for mathematics supports students spiritual development.
- Mathematics develops students culturally by providing opportunities for students to study concepts and theorems from around the world and their applications to the natural world.
- A rigorous financial education, grounded in strong numeracy skills is essential for personal development. Such as budgeting and financial literacy to make money wise decisions as well as pattern seeking and logical thinking. These are skills that can be used in any future career choices.

Further information can be found in:

- Edexcel Mathematics GCSE (9-1) exam specification
- Mathematics Curriculum Overview
- Mathematics Long Term Plans (Years 7-11)
- Y7-11 Schemes of Work

References:

- Young, Michael (2014), 'Powerful Knowledge as a Curriculum Principle' in Knowledge and the Future School: Curriculum and Social Justice. Bloomsbury Academic: London. pp. 65-88
- Young, Michael (2020), 'From Powerful Knowledge to the Powers of Knowledge' in Sealty, C. et al, The researchED Guide to the Curriculum (2000), pp. 21-28

Curriculum Overview - Mathematics

All children are entitled to a curriculum and to the powerful knowledge which will open doors and maximise their life chances. Below is a high-level overview of the critical knowledge children will learn in this particular subject, at each key stage from Y7 through to Y11 in order to equip scholar with the cultural capital they need to succeed in life. The curriculum is planned vertically and horizontally giving thought to the optimum knowledge sequence for building schema.

	Knowledge, skills and understanding to be gained at each stage		
	Cycle 1	**Cycle 2**	**Cycle 3**
Year 7	***Number*** Order of operations; factors and multiples; negative numbers; Place value; +/- methods; decimals; estimation; rounding; perimeter; ***Algebra*** Simplifying; substituting; solving equations; simple changing the subject of a formula; sequences; coordinates	***Number*** x/÷ methods; decimals; calculating with fractions; writing ratios as fractions, simplifying ratios ***Geometry*** Converting Units, Perimeter, Area of 2D shapes including trapezium and compound shapes	***Geometry*** Symmetry; reflections; translations, rotations, calculating angles on lines, triangles and quadrilaterals; angles in polygons ***Statistics*** Averages; charts & tables; stem and leaf diagrams ***Probability*** Language; probability scale; sample space diagrams, relative frequency, frequency trees
CEAIG	Careers in crypto analysis (forming and solving equations) accountancy (negatives)	Careers in Interior design (perimeter and area) and catering (fractions of amounts)	Careers in market research (sampling), medicine (statistical diagrams) astronomy (angles)
Year 8	***Geometry*** 2D and 3D shapes; plans and elevations; constructing triangles; constructing bisectors ***Statistics*** Line Graphs; moving averages; averages from a table; scatter graphs; pie charts ***Algebra*** Expanding brackets; factorising; changing subject of a formula, inequalities on a number line; solving equations/inequalities; gradients and equation of a straight line	***Number*** Writing numbers in standard form; simple calculations with standard form; Converting FDP; increasing and decreasing; percentage change; reverse percentages; compound interest ***Geometry*** Congruence; Similar shapes; reflection, rotation; translation and enlargement; circumference and area of a circle as well as parts of a circle	***Geometry*** Pythagoras; volume of cubes, cuboids and prisms; surface area of cubes, cuboids and prisms ***Probability*** Setts and Venn notation; listing elements, drawing and shading Venn, independent tree diagrams ***Algebra*** Nth term, generate quadratic sequences; find nth term of quadratic sequences ***Number*** Combining ratios; scale diagrams and maps; exchange rates; direct proportion; exchange rates and recipes
CEAIG	Careers in crypto analysis (forming and solving equations); architecture (plans and elevations),	Careers in finance (percentages)	Careers in architecture (Pythagoras), animation and computer game design (sequences)

Year 9 **CEAIG**	***Number*** Standard form, index laws including fractional and negative; ***Algebra*** plotting graphs; gradient; parallel and perpendicular lines; Speed, Distance Time Graphs; real-life graphs; solving quadratics including finding turning points; completing the square; quadratic formula	***Probability*** Listing outcomes; relative frequency; frequency trees; tree diagrams; Venn diagrams ***Number*** Percentage change; simple and compound interest; repeated percentage change; original amount; ratios re-cap including combining and FDP and ratio problems; inverse and direct proportion ***Geometry*** Angle rules recap for angles in triangles, angles in quadrilaterals; bearings; circle theorems	***Geometry*** Pythagoras Re-Cap; Trigonometry sine rule; cosine rule; area of a triangle; graphs; exact values; 3D Pythagoras and Trigonometry; Volume and Surface area of prisms including cylinders, cones, spheres and pyramids; Transformations; congruence; similarity ***Algebra*** Simultaneous Equations including constructing and solving
	Careers in medicine (algebra); ecology (index laws)	Careers in risk analysis (probability); finance (percentages)	Careers in cartography (Trigonometry)
Year 10 **CEAIG**	***Statistics*** Averages from tables; charts and diagrams; pie charts; capture and re-capture; cumulative frequency graphs; box plots; histograms ***Number:*** Simplifying surds; calculating with surds; expanding brackets with surd; rationalising denominator ***Algebra:*** Inequalities on a number line; solving inequalities including quadratic inequalities; iteration; algebra with sett and Venn diagrams	***Geometry*** Volume and surface area of prisms, cones, spheres and pyramids; trigonometry in right-angled and non-right-angled triangles; angles recap with use of algebra; LOCI ***Number and Algebra*** Ratio; ratio with algebra; adapting recipes; direct proportion; inverse proportion; algebraic fractions	***Algebra*** Changing subject of formula; functions; composite functions; turning points; graph transformations; algebraic proof; equation of a circle; area under a graph; ***Number*** Error intervals; truncation; calculating with bounds; considering bounds ***Geometry*** Column vectors; labelling and drawing vectors; calculating with vectors; vector proofs
	Careers in ecology (index laws)	Careers in catering (proportion); surveyance and cartography (Trigonometry)	Careers in scientific research (functions); computer programming;

Year 11 **CEAIG**	***Algebra*** Linear equations; quadratic equations; recurring decimals; algebraic proof; geometric proof; graph transformations	***Vectors and Functions*** Column vectors; vector problems; inverse functions; composite functions; graph transformations	Revision and Examinations
	Careers in politics (algebraic argument)	Careers in distribution (vectors)	

* Skills and understanding are seen as forms of knowledge and we do not believe that there are any real generic skills that can be taught outside of specific knowledge domains. Please refer to the DAT Curriculum Principles.

**Please note that all Y11 classes will be following a highly tailored long term plan which is responsive to mock exams