Curriculum Intent - Maths

At Dixons Croxteth we develop students to lead successful and happy lives and make a positive contribution to their community. Our curriculum in each year is designed to provide experiences, opportunities, knowledge and skills that enrich and challenge our students. We understand that the curriculum is key to determining the life chances and choices for our students and therefore we will not compromise on providing the very best. We achieve this in Maths through the below:

By the end of Year 11 students at Dixons Croxteth studying Maths will be exposed to the following:

- **Number** and place value including decimals, fractions, integer powers and roots, equivalent terminating decimals, fractions, and percentages
- **Ratio and Proportion**, e.g. ratio of amounts, proportionality, volume and compound units, e.g. speed and density
- **Algebraic** terms to include expression, equation, inequality, term, factor, variable, function, solution, substitute, gradient, intercept, root, expand, functions and sequences both arithmetic and geometric.
- **Shape** properties and formulae which include area and perimeter of triangles, parallelograms, trapezia, circles; volume and surface area of cuboids and prisms. In addition, properties of transformations, congruent and similar shapes
- **Geometry** facts which include circle definitions, angles at a point, at a point on a straight line, in a triangle, vertically opposite, alternate and corresponding; in any polygon, interior and exterior angles; Pythagoras' Theorem and trigonometric ratios in right-angled triangles.
- **Probability:** 0-1 probability scale, independent events, equally and unequally likely outcomes, possible outcomes sum to one
- **Statistics**: Representing and analysing discrete, continuous, and grouped data, calculating averages mean, median, mode, range

By the end of Year 11 students at Dixons Croxteth studying Maths will be taught the following skills:

- know the fundamental skills in mathematics which allow students to understand how to use this knowledge in future learning and employment. These include money management; reading timetables; discovering and understanding patterns in data and being able to solve problems.
- recognise the beauty in sophisticated mathematical methods; be analytical thinkers and have a thirst for mathematical reasoning. On leaving Dixons, students will have developed fluency in procedures and be keen problem solvers.

In order to truly appreciate the subject and create deep schema Maths has been sequenced with the following rationale:

- the overall aim of the all-through mathematics curriculum is to provide students with the knowledge they need to increase their cultural capital and be successful in their lives beyond the academy. With this in mind, throughout KS3 and KS4, the schemes of work sequence topics in an order closely following that set out by the 'mathematics Mastery Programme'[1]. Adopting a spiral curriculum, in which topic areas are revisited and extended on a yearly basis, this sequence of learning promotes a deeper understanding of the mathematical concepts being taught, both in-line with the National Curriculum and in the wider domain.
- within the classroom, lessons roughly follow a six-part lesson format: Do Now, New Learning, Talk Task, Develop Learning, Independent Task, Plenary[1]. In key stage 3 and 4 students spend more time on practice and application to promote resilience and independence. Secondary lessons in key stage 3 synthesise knowledge learned in a lesson with an exam question and there is a greater emphasis on this in key stage 4 to provide students with applied practice, underpinned by real life contexts. In accordance with the curriculum overview, each stage throughout Secondary promotes a slight variation in pedagogy suitable to the students' developmental stage, whilst continuing to promote ambitious expectations for all pupils and educational equality throughout.
- the concept of interrupting the forgetting process[2] permeates the all-through mathematics long term plan (LTP) and schemes of work (SOW). Interleaving and spaced learning are utilised in several ways. Across each year, new learning is split into units of work, each beginning with quick revision, then focussing on extension and application of similar learning the year before. As a result, students will consistently revisit topics (spaced learning) and interleave concepts throughout their mathematics career. In Secondary, every lesson begins with a 'Do Now', which promotes recall of integral knowledge, along with applied practice, from topics in the previous unit of work, allowing for spaced practice of up to six weeks. The 'Do Now' also includes prerequisite knowledge of upcoming topics, to allow for a smooth transition into a new topic and a reduction of cognitive load. In addition, each topic taught has a mini-test and consolidation or extension re-test attached to assess understanding. Staff mark all re-tests and gaps in learning are addressed through global feedback, with opportunity for targeted additional practice. These tests ensure learning is visited repeatedly. Spaced learning through retrieval practice and brain dumps in morning meetings and recall homework from knowledge

organisers, are supplementary ways in which the forgetting process is interrupted, leading to true mastery of the mathematical curriculum.

The Maths curriculum at Croxteth has been influenced by:

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Our Maths curriculum ensures that social disadvantage is addressed through:

- the spiral nature of the mathematics curriculum is designed with the most vulnerable student in mind, assuming a basic mathematical understanding from previous learning, each stage builds the students' knowledge. Key Stage 3 in particular is used to ensure fluency in fundamental mathematics by closing any knowledge gaps evidenced in assessment, whilst also providing suitable extension.
- on entry, students in Year 7 working below the nationally expected level are immediately targeted in interventions such as 'Morning Meeting' sessions. Priority is given to students recognised as disadvantaged and topics covered in these sessions are identified through baseline testing. Throughout the year, attendance and topics covered in intervention sessions are altered according to mini-test scores, question level analysis from cycle assessments and in-class effective formative assessment.
- students with special educational needs or disabilities have additional support. Over timetabling and double staffing are used, where possible, all through to target this cohort in order to help close any gaps. Such students also receive further intervention through 'Morning Meeting'. All students access the same curriculum, and we have the highest expectations of all. We teach to the top with scaffolding and support for those who need it in order to allow all students to achieve and experience the very best of what has been thought and said.
- Do Nows across all year groups are designed to recap prior knowledge to interrupt the forgetting curve, usually 4-8 weeks after the knowledge was last covered as well as addressing gaps in student knowledge from both formative and summative assessments.
- Homework is set digitally through Sparx Maths so to ensure all students have equal opportunity to access this, SParx club is held every Wednesday after school for students to access a device to complete their homework and access support from Maths specialists.

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.

Opportunities to build an understanding of social, moral and ethical issues are developed alongside links to the wider world, including careers, through:

- students will be encouraged to develop socially in mathematics lessons through the celebration of making mistakes and setting high expectations. This helps students to develop listening and speaking skills. Self-awareness is developed through self-assessment, which enables students to have an accurate understanding of their strengths and weaknesses, to accept them and the understand how to learn from them. Additionally, students are encouraged to tutor other students in Sparx clubs, developing further their social interaction skills in a professional manner.
- developing morality is evident in much of the mathematics curriculum where there is reference to real life contexts and students are encouraged to make decisions thus developing an understanding that certain choices may have different consequences and

outcomes. One example where this applies is in percentages where comparing interest rates occurs and the role of 'loan sharks' can be discussed. Additionally, topics such as tracking and how the media use misleading statistical diagrams are also addressed.

- encouraging students to question how mathematics impacts the way the world works promotes the spiritual growth of our students. Referring to 'big issues' such as the gender pay gap, birth and death rates, gambling through probability and global warming within contextual questions allows students to have a concrete understanding of where mathematics fits into the bigger picture.
- being a universal language, and having phenomena developed all over the world, lends mathematics to promoting cultural capital. Discussion when introducing many topics, such as place value, time, Fibonacci sequences, Pythagoras, and Trigonometry to name a few, allows cultural influences to be explored.

A true love of Maths is developed by teaching beyond the domain of the GCSE specification. Examples of such content:

- built into each Secondary SOW is content that will benefit students in their understanding of the wider impact of mathematics. For example, in Year 9 and Year 10, we offer an insight into the history of Pythagoras Theorem and the origins of Trigonometry. Whilst not strictly appearing on the GCSE specification, providing this additional information will allow students to build their cultural capital and deepen their understanding into the true beauty behind the mathematics they learn.
- the mathematics curriculum provides students with opportunities to consider the world of work and how mathematics leads to successful careers. Each LI has a purpose attached for all students to see and, where relevant, the SoW refers to how the skill in question relates to specific careers or a future life context. For example, when teaching constructions, reference can be made to any form of design work or navigational career. Every unit of work also contains a careers spotlight where students are introduced to a variety of careers, which utilise the learning of the unit. Information about qualifications needed, salaries and career progression are also referenced.
- Examples of extracurricular opportunities that are offered.

References

1 https://www.mathematicsmastery.org/Secondary-programme-teacher-training-classroom-resources?c=5d24a9d42dab7

2 https://elearningindustry.com/forgetting-curve-combat

3 https://learning.wellingtoncollege.org.uk/independent-learning-week-3-desirable-difficulties-part-2/

4 https://www.thetutortrust.org/

Further Information can be found in:

- Unit skill mapping
- Long term plans
- Knowledge organisers
- Schemes of work
- All through overview
- WTD Curriculum – weekly sequencing
- WTD Mathematics Assessment
- Curriculum introduction PPT

Maths

Curriculum Overview

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 Maths, at each key stage from Year 7 to Year 11, in order to equip students 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 secure schema.

	Knowledge, skills and understanding to be gained at each stage*		
	Cycle 1	**Cycle 2**	**Cycle 3**
YEAR 7	**Unit 1: Algebra** **Unit 2: Number CTD**	**Unit 2: Number CTD** **Unit 3: Geometry**	**Unit 4: Fractions** **Unit 5: Percentages**
YEAR 8	**Unit 6: Probability and Statistics** **Unit 7: Number**	**Unit 8: Algebra** **Unit 9: 2D Geometry**	**Unit 10: Proportional Reasoning**
YEAR 9	**Unit 11: 3D Geometry** **Unit 12: Statistics**	**Unit 13: Graphs and Proportion** **Unit 14: Algebraic Expressions**	**Unit 15: 2D Geometry** **Unit 16: Algebra - Graphs**
YEAR 10	**Unit 17: Geometry – Triangles and Transformations** **Unit 18: Statistics**	**Unit 19: Algebra - Graphs** **Unit 20: 3D Geometry and Limits**	**Unit 21: Probability** **Unit 22: Number**
YEAR 11	**Unit 23: Algebra** **Unit 24: 2D Geometry**	**Unit 25: Number and Algebra/Proportional Reasoning**	Bespoke to students QLA

*A powerful, knowledge-rich curriculum teaches both declarative knowledge (facts; knowing that something is the case; what we think about) and non-declarative or procedural knowledge (skills and processes; knowing how to do something; what we think with). There are no skills without bodies of knowledge to underpin them.

In some subjects, a further distinction can be made between substantive knowledge (the domain specific knowledge accrued e.g. knowledge of the past) and disciplinary knowledge (how the knowledge is accrued e.g. historical reasoning).