Subject: Maths

From day to day finances, to predicting the behaviour of large groups of people, from designing bridges to the language of computers, from understanding the evidence for the efficacy of a new medicine to working out how environmentally friendly your next car will be, mathematics underpins every aspect of modern life. A beautiful and interesting subject worthy of study for its own sake, mathematics is also a practical tool for a better understanding of our world. In an ever changing world, a sound understanding of mathematical principles backed up with excellent qualifications is essential for continuing education and employment.

Key Stage Three

At Sydenham School, we aim to enthuse young people to enjoy maths, to prepare them thoroughly for public examinations and to equip them with mathematical skills for the 21st century. Students study the five strands: Number; Algebra; Ratio and Proportion; Geometry and Measures and lastly Probability and Statistics.

Key Stage Four

Throughout Key Stage 3 and 4, in a five-year preparation for their GCSE, students study Number, Algebra, Ratio and Proportion, Geometry and Measures, Probability and Statistics. In all of these strands students aim to become firstly confident in recall of knowledge and fluent in standard application of skills. Then they seek to be able to use this base of knowledge to reason mathematically and to solve problems in a variety of contexts.

Key Stage Five

Sydenham is fortunate to be able to offer both A Level Mathematics as well as A Level Further Mathematics courses. These build on the foundations laid down in GCSE with increasingly abstract 'Pure' mathematics but also explore how mathematical models can be used in Statistics and Mechanics to solve genuine real world problems that arise in diverse fields such as Engineering, Psychology and Medicine.

Subject: Computer Science

Studying Computer Science equips students in this Digital Age to use computational thinking and creativity to understand and change the world. The subject has deep links with Mathematics, Science, and Design and Technology, and provides insights into both natural and artificial systems. At Sydenham the Computer Science curriculum aims to ensure that students become digitally literate and to enthuse them about the principles of information and computation, how digital systems work, and how to use information technology to create programs, systems and a range of content.

Key Stage Three

At KS3, students are introduced to Computer Science through practical involvement in a range of activities. Topics covered: Using computers safely, effectively and responsibly; Intro to coding through Kodu; Spreadsheet Modelling; App Development in AppShed; Control Systems with Flowol; Coding with Python; Computer crime and cyber security; Creating web pages with HTML and CSS; Understanding Computers; Networks; and Graphics.

Key Stage Four

At KS4, students further develop their knowledge and understanding of Computer Science through studying the importance of computation in the world and how it will evolve in the future. Topics covered are:

- Principles of Computer Science
- Application of Computational Thinking
- Programming.

Key Stage Five

At KS5, students pursue a vocational qualification that will help prepare them for a huge range of careers in Information Technology. Topics covered: Information Technology Systems; Creating systems to manage information; Using social media in business; and Website development

Curriculum Breakdown Maths: Key Stage Three

	Autumn 1: 7 weeks	Autumn 2: 7 weeks	Spring 1: 6 weeks	Spring 2: 6 weeks	Summer 1: 6 weeks	Summer 2: 6 weeks
Year 7	**1.1** a. *Place Value & Standard Form* b. *Rounding and Estimating* c. *Adding and Subtracting* d. Forming and Simplifying Expressions e. *Perimeter* **1.2** a. *Multiplying & Dividing and Order of Operations* b. *Area*	**2.1** a. *Proportional Reasoning* b. *Introduction to Speed* c. Value For Money d. Exchanging Money e. Similar Shapes f. Enlargement **2.2** a. *Factors* & HCF, *Multiples* & LCM b. *Indices* c. HCF and LCM	**3.1** a. Laws of Indicies b. Expanding and Factorising c. Substitution **3.2** a. *Equivalent Fractions* b. *Adding and Subtracting Fractions*	**4.1** a. *Describing Angles* b. *Angles Facts* c. *Triangles* d. *Quadrilaterals* e. Angles in Parallel lines **4.2** a. Solving Equations b. Symmetry	**5.1** a. *Converting between Fractions, decimals, percentages* b. *Multiplying & Dividing Fractions* c. *Percentage of a Quantity* d. Percentage Increase and Decrese e. Reverse Percentages	**6.1** a. *Calculatie the Mean* b. Averages and Range c. Box Plots (H only) d. *Representing Data*
Year 8	**1.1** a. Proportional reasoning – Value for Money, Enalargment, similar shapes… b. Ratio c. Percentage inc and dec with a calculator - multipliers d. Compound and simple interest **1.2** a. Iteration (intro to vocab/ notation) **1.3** a. Frequency Trees	**2.1** a. Laws of Indices b. Expanding and Factorising c. Rearranging formulae d. Indices Negative and **Rational** Indices **2.2** a. Linear Sequences (incl nth term) b. Non linear sequences **2.3** a. Inequalities b. Error Intervals	**3.1** a. *Co-ordinates (incl geometrical reasoning on Cartesian axes)* b. Midpoints c. Plot linear equations d. Calculate gradient e. Circles (incl area sector) f. Standard Form	**4.1** a. Angles in Parallel Lines b. *Properties of 3D shapes* c. *Nets* d. Plans and Elevations e. Surface Area f. Volume of Solids – Prisms g. *Add and Subtract Fractions*	**5.1** a. Venn diagrams b. Angle sum of polygons c. Compass constructions d. Loci e. Grouped Data – averages f. Prime factor products – HCF and LCM	**6.1** a. Quantitative v Qualitative b. Sampling c. Scatter Diagrams d. Congruent triangles e. Introduction to Pythagoras f. Reverse % change (as multiplicative reasoning)

Curriculum Breakdown Maths: Key Stage Four

		Higher
	Chapter /Unit	Topic
Year 1	1a	Calculations, checking and rounding
	1b	Indices, roots, reciprocals and hierarchy of operations
	1c	Factors, multiples, primes, standard form and surds
		October Half Term
	2a	Algebra: the basics, setting up, rearranging and solving equations
	2b	Sequences
	3a	Averages and range
	3b	Representing and interpreting data and scatter graphs
		Christmas
	4a	Fractions and percentages
	4b	Ratio and proportion
	5a	Polygons, angles and parallel lines
	5b	Pythagoras' Theorem and trigonometry
		Feb Half Term
	6a	Graphs: the basics and real-life graphs
	6b	Linear graphs and coordinate geometry
	6c	Quadratic, cubic and other graphs
		Easter
	7a	Perimeter, area and circles
	7b	3D forms and volume, cylinders, cones and spheres
	7c	Accuracy and bounds
		May Half Term
	8a	Transformations
	8b	Constructions, loci and bearings
	9a	Solving quadratic and simultaneous equations
		Summer
Year 2	9b	Inequalities
	13a	Graphs of trigonometric functions
	13b	Further trigonometry
		October Half Term
	10	Probability
	11	Multiplicative reasoning
	12	Similarity and congruence in 2D and 3D
	14a	Collecting data
	14b	Cumulative frequency, box plots and histograms
		Christmas
	15	Quadratics, expanding more than two brackets, sketching graphs, graphs of circles, cubes and quadratics
	16a	Circle theorems
	16b	Circle geometry
		Feb Half Term
	17	Changing the subject of formulae (more complex), algebraic fractions, solving equations arising from algebraic fractions, rationalising surds, proof
	18	Vectors and geometric proof
	19a	Reciprocal and exponential graphs; Gradient and area under graphs
	19b	Direct and inverse proportion
		Easter

Curriculum Breakdown Computer Science: Key Stage Three

Year 7

Aim and Content	Learning Outcomes and Success Criteria	Key concepts (subject specific)	HPL ACP	Literacy	SMSC (Linking learning to something bigger than the lesson)
AUT 1: **Using computers safely, effectively and responsibly**	• Search for and identify usable information • Identify ways to keep safe in a digital society • Identify the risks associated with work and leisure in a digital society • Identify how to minimise the risks with work and leisure in a digital society • Use IT safely and responsibly • Articulate the risks, dangers and benefits of the digital society to other	Social impact of Computer Technologies	Linking > Generalisation	Reading information to determine its trustworthiness and usability	Social Networking in Education
AUT 2: **Coding through Kodu**	• Create a simple game world which interacts with objects • Make a Kodu move in response to behaviours • Use advanced game techniques such as power ups, timers, etc. • Use scoring methods to add depth to games	Coding and Programming using block-based code	Creativity > Originality Analysing > Critical or Logical Thinking	Writing up interpretation for blocks of code	Game Development
SPR 1: **App development with AppShed**	• Identify the problem an application needs to solve • Determine the content of the app in planning the solution • Use of research to inform the design of screens in the app • Create an app prototype making use of images, icons, symbols and text	App Creation	Linking > Generalisation Creativity > Originality	Writing up generated ideas for app development and review of apps created by peers	Native, web-based and hybrid apps
SPR 2: **Control systems with Flowol**	• Produce systems that use simple loops and basic outputs • Produce systems that have multiple inputs and outputs • Refine solutions using subroutines and variables	Problem solving with flowcharts	Analysing > Critical or Logical Thinking	Reading information to determine how to produce a control system	Automation
SUM 1: **Spreadsheet Modelling**	• Use models or simulations to answer 'what if' questions • Design, create and use effective user interfaces • Use tools to ensure the accuracy of data input	Human Computer Interaction	Analysing > Critical or Logical Thinking Linking > Connection Finding	Use correct spellings and punctuation for model questions	Strategic Planning
SUM 2 **Introduction to Python**	• Develop and improve mark-up code • Create code that shows care for syntax • Create a product using code that shows an awareness of standards • Debug in a text-based language including documentation	Coding and Programming using text-based code	Analysing > Critical or Logical Thinking > Precision	Use correct spelling of code to reduce syntax errors	First female programmer Ada Lovelace

Curriculum Breakdown Computer Science: Key Stage Three

Curriculum Information

Year 8

Aim and Content	Learning Outcomes and Success Criteria	Key concepts (subject specific)	HPL ACP	Literacy	SMSC *(Linking learning to something bigger than the lesson)*
AUT 1: **Computer crime and cyber security**	• Explain legal safeguards regarding computer use • Explain phishing scams and other email frauds, hacking, "data harvesting" • Explain identity theft and ways of protecting online identity and privacy • Explain Health and Safety Law and environmental issues such as the safe disposal of old computers	Hacking, data protecting and the law	Linking > Generalisation	Reading information and writing about online safety and security	Cipher Encryption
AUT 2: **HTML and website development**	• Create text styles and add content, including text and graphics • Create navigation links to other pages and to external websites • Understand the basics of good design • Develop templates in a text editor such as Notepad.	Design and code webpages	Creativity > Originality Analysing > Precision	Write design brief for proposed website	Web Development
SPR 1: **Graphics**	• Explore how bitmap and vector images are represented and stored • Use skills in design, photo editing and image manipulation • Use layers to create a movie poster using Photoshop	Bitmap and vector graphics	Creativity > Originality Linking > Generalisation	Write design brief for proposed graphics	Computer Aided Design
SPR 2: **Understanding computers**	• Explain Input-Process-Output sequence and the Fetch-Decode-Execute cycle • Convert binary to decimal and do binary addition • Understand that text characters are represented using the ASCII code. • Understand data storage or representation using binary patterns • Explain history and development of communication and technology, and some of its applications.	Discover how computers work	Linking > Generalisation > Connection Finding	Reading information and writing about how computers work	Computer Architecture
SUM 1: **Networks**	• Understand that the World Wide Web is part of the Internet • Understand how web addresses are constructed and stored as IP addresses • Explain data transmission, different network topologies and network hardware • Understand client-server, peer-to-peer networks and the concept of cloud computing	How data travels the world	Linking > Generalisation	Reading information and writing about networks	Communication and the Internet
SUM 2: **Python: Next steps**	• Use For loops and compare their use with While loops • Use arrays (lists) and are used in conjunction with For loops. • Procedures and functions with parameters and benefits of modular programming.	Coding and Programming using text-based code	Analysing > Critical or Logical Thinking > Precision	Use correct spelling of code to reduce syntax errors	Problem Solving using Algorithms

Curriculum Breakdown Computer Science: Key Stage Four

	Year 9	Year 10	Year 11
AUT Term	Problem solving and programming; Models; Data rep: numbers; Programming Languages; Hardware;	Problem solving and programming; Hardware: internal components; Network security; The bigger picture;	Problem solving and programming; Non-Examined Assessment (NEA) Preparation;
SPR Term	Problem solving and programming; Software Networks; Logic; Data rep: text;	Problem solving and programming; Data storage and compression; Secondary Storage;	Problem solving and programming; NEA; Encryption; Databases;
SUM Term	Problem solving and programming; The bigger picture; Data rep: graphics; Data rep: sound;	Problem solving and programming; Internet and WWW; Embedded Computers;	Revision