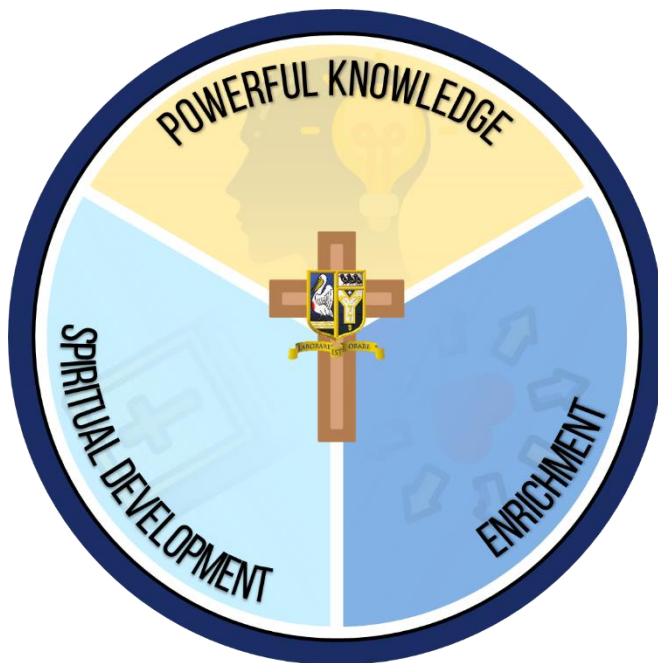


# THE BECKET SCHOOL



## COMPUTER SCIENCE

### CURRICULUM INTENT



*"I HAVE COME IN ORDER THAT YOU MIGHT HAVE  
LIFE  
—LIFE IN ALL ITS FULLNESS."*

~JOHN 10:10

**COMPUTERS ARE INCREDIBLY FAST, ACCURATE, AND STUPID. HUMAN BEINGS ARE INCREDIBLY SLOW, INACCURATE, AND BRILLIANT. TOGETHER THEY ARE POWERFUL BEYOND IMAGINATION. - ALBERT EINSTEIN**

EVERYTHING AROUND US IN THIS MODERN WORLD IS UNDERPINNED BY ALGORITHMS BE THAT THE ALGORITHMS WHICH CHOOSE WHAT VIDEO YOU SEE ON TIK TOK NEXT TO HOW QUICKLY YOU GOT TO WORK TODAY. COMPUTERS HAVE BECOME AND ARE BECOMING AS INTEGRAL AS THE WHEEL TO HUMANS. THE IMPACT OF COMPUTER SCIENCE IS PARAMOUNT TO THE FUTURE OF OUR SOCIETY. AT THE BECKET WE AIM TO DO OUR PART TO ENSURE STUDENTS LEAVE WITH A WIDE RANGE OF POWERFUL KNOWLEDGE AND SKILLS THAT ALLOWS THEM TO BECOME DIGITALLY LITERATE CITIZENS. BY EMBEDDING THIS KNOWLEDGE, WE HOPE THAT THIS WILL ALSO ALLOW THEM TO PERFORM WELL IN TERMINAL EXAMS AND PURSE THEIR AMBITIONS AT THE NEXT STAGE IN THEIR EDUCATION AND LIFE. TO ENABLE STUDENTS TO BE DIGITALLY LITERATE WE DELIVER A KNOWLEDGE AND SKILLS-BASED CURRICULUM THROUGHOUT KEY STAGES THREE AND FOUR. WE TEACH THEM DIGITAL LITERACY SKILLS INCLUDING COMPUTATIONAL THINKING AND CREATIVITY TO UNDERSTAND AND BE ABLE TO CHANGE THE WORLD. WE DEVELOP AN APPRECIATION OF HOW COMPUTER SCIENCE IMPACTS ON THEIR EVERYDAY LIVES AS WELL AS DEVELOPING THEIR ABILITY TO BE CRITICAL THINKERS AND ANALYTICALLY SOLVE PROBLEMS BEFORE APPLYING CODING-BASED SOLUTIONS

# INTENDED OUTCOMES

## By the end of Year 7 Students will:

- Learn how to be safe users of computers in terms of online and e-safety and in their general use of IT
- Gain knowledge of file management skills that they can use for all subjects
- Develop their understanding of some of the key foundational components of computing so they can access more complex topics this includes developing knowledge and understanding of key numeracy topics, problem solving skills using flow charts, block programming skills and the concept of physical computing.

## By the end of Year 8 students will

- Develop their appreciation of the pioneers of computing and how their ideas inspired the technologist of today
- Build upon their awareness of the impact of IT on society (good and bad)
- Build upon and extend their skills in key computing numeracy topics
- Develop problem solving skills and understanding of key algorithms
- Develop a deeper understanding of script-based programming languages and be able to use these to solve problems

## By the end of year 9 students will

- Develop a clear understanding of the difference between Computer Science and IT
- Extend key computing numeracy topics
- Understand how to use Databases and Spreadsheets to further their digital literacy.
- Extend and become more efficient at problem solving skills and understanding of key algorithms
- Use arrays and develop complex solutions to problems using a text-based coding language.

## By the end of KS4 students will

OCR's GCSE (9–1) in Computer Science will encourage students to:

- understand and apply the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation
- analyse problems in computational terms through practical experience of solving such problems, including designing, writing, and debugging programs
- think creatively, innovatively, analytically, logically, and critically
- understand the components that make up digital systems, and how they communicate with one another and with other systems
- understand the impacts of digital technology to the individual and to wider society
- apply mathematical skills relevant to Computer Science.

## By then end of KS5 students will

The A Level in Computer Science will encourage students to be inspired, motivated and challenged by following a broad, coherent, practical, satisfying and worthwhile course of study. It will provide insight into, and experience of how computer science works, stimulating learners' curiosity and encouraging them to engage with computer science in their everyday lives and to make informed choices about further study or career choices. The key features of this specification encourage:

- emphasis on problem solving using computers
- emphasis on computer programming and algorithms
- emphasis on the mathematical skills used to express computational laws and processes, e.g. Boolean algebra/logic and comparison of the complexity of algorithms
- less emphasis on ICT. Centres and learners have the opportunity to:
- produce a programming project of the students choosing in a programming language of their choice.
- include agile methods.

# CURRICULUM INTENT

POWERFUL KNOWLEDGE	<p><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• Develop core knowledge and understanding starting with the 'big picture', studying Hardware and Algorithms, thus giving them the skills to access other topics such as Binary and Hexadecimal, where students study the mathematical makeup of machines.</li> <li>• Be able to abstract and decompose a problem to produce a solution through investigation.</li> <li>• Produce robust and considered solutions to problems posed in class.</li> <li>• Develop an understanding of how the hardware within a computer functions, removing the 'black box' nature of technology.</li> <li>• Learn how to programme in multiple languages</li> <li>• Develop and build upon skills through physical Computing tasks e.g. coding MicroBits with LED lights to effectively apply the knowledge learnt in Algorithm and Programming units.</li> </ul>
SPIRITUAL DEVELOPMENT	<p><b>Students will</b></p> <ul style="list-style-type: none"> <li>• Develop positive attitudes to study and education as lifelong sources of personal satisfaction and as a means of developing the individual's talents for the benefit of the wider community.</li> <li>• They share best practice in lessons they are patient and empathise with others when having difficulty with projects.</li> <li>• Be pushed to achieve through hard work and commitment to see a job through to the end.</li> <li>• Develop care and compassion in a computer environment, they very often give a helping hand to their peers when coding or working on IT skills.</li> <li>• They consider the social, moral and environmental issues surrounding computing and IT.</li> </ul>
ENRICHMENT	<p><b>Students will</b></p> <ul style="list-style-type: none"> <li>• Have the opportunity to enter a range of National Competitions these include:-             <ul style="list-style-type: none"> <li>• Bebras Computing Challenge</li> <li>• Cyber Security Challenge</li> <li>• The Oxford computing challenge</li> </ul> </li> <li>• Access girls and boys Minecraft Club in Y8 and Y9</li> <li>• Exposed to different career pathways into Computer Studies and IT through our curriculum from KS3 to KS5. Students are encouraged to use Unifrog to support their career pathways in this subject.</li> <li>• At KS5 extend their knowledge beyond the curriculum via studying topics which are part of The Becket Super Curriculum and/or Becket Reads</li> </ul>

# CURRICULUM IN THE CLASSROOM

<b>B</b>	<b>EHAVIOUR IS EXCELLENT</b>	
<b>E</b>	<b>XPERT TEACHERS</b>	
<b>C</b>	<b>OGNITIVELY ACTIVE</b>	
<b>K</b>	<b>NOWLEDGE-RICH</b>	
<b>E</b>	<b>MBEDDED PRACTICE</b>	
<b>T</b>	<b>ESTING-FOR-LEARNING</b>	

## HOW WILL YOU LEARNING COMPUTING?

- Taught by a specialist expert Computer Science teacher
- Our classrooms follow the Becket Way to ensure we create an environment of confidence where students feel they can experiment, make mistakes, and develop their skills in an independent manner.
- Regular use of teacher and student led live modelling to demonstrate processes and applications both practically and theory based.
- Experience a wider range of block based and script-based languages to develop transferable programming skills
- Every half term an assessment is provided to identify gaps and measure attainment

# LEARNING SEQUENCE

## YEAR 7

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>7.0 - Introduction to school's systems and Google classroom</b> <i>Introduction to using Google Classroom and Computer systems at The Becket.</i></p> <p><b>7.4 – Spreadsheets</b> <i>Introduction to spreadsheets use of formula, graphs, and formatting.</i></p>	<p><b>7.3 - Algorithms</b> <i>Use of pseudocode and flowchart to complete everyday tasks. Understanding of the common algorithms such as Bubble sort, Linear and Binary search.</i></p> <p><b>7.5 – Scratch Programming Pt1</b> <i>Students take what they have learned from algorithms and start to develop simple programs using scratch a block based language.</i></p>	<p><b>7.1 – Digital Safety</b> <i>E-safety unit where students will develop an understanding on how to be safe online.</i></p>	<p><b>7.2 – Inside the Computer</b> <i>Students will learn what is inside a PC and how they work. This unit also touches on how computers calculate through binary.</i></p>	

# YEAR 8

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>8.4 – AI and Machine Learning</b> Students will get a first insight into the fascinating world of Artificial Intelligence and Machine Learning.</p>	<p><b>8.3 – Scratch Pt2</b> <i>Expanding their programming skills using iteration and selection to further the programming skills in a block-based language.</i></p> <p><b>8.5 – Small Basic Pt1</b> <i>Taking what they have learnt from block-based programming to using a high-level programming language.</i></p>	<p><b>8.2 – Cyber Security</b> <i>Continuing from Digital footprint students will look at threats to devices and data. They will also learn how to defend from these methods of attack.</i></p>		<p><b>8.1 – Cryptography</b> <i>Students will learn how cryptography came to be and how to do basic cyphers and how they link to the security of the Internet.</i></p>

# YEAR 9

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>9.4 – Databases</b> <i>Students will learn how to enter, manipulate, and search a database.</i></p>	<p><b>9.2 – Small Basic Pt2</b> <i>Students will use Small basic to model real world situations/</i></p>	<p><b>9.3 – Back to the future</b> <i>Students will learn how computers think and about the founders of modern computing.</i></p>	<p><b>9.1 - Networking</b> <i>Students will learn about how devices communicate across networks.</i></p>	<p><b>9.5 – HTML &amp; Web Development</b> <i>Students will develop websites with the use of HTML and CSS.</i></p>

# YEAR 10

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>1.4 Network Security</b> Students will learn about threats to computer systems and networks. They will also be able to identify and prevent vulnerabilities.</p>	<p><b>2.1 Algorithms</b> Students will learn about Computational thinking. They will also learn to design, create, and refine algorithms. They will also cover the sorting and searching algorithms.</p> <p><b>2.2 Programming fundamentals</b> Students will learn the three constructs of programming. Understand different data types and their use. Use string manipulation. Basic file handling. Use of arrays.</p> <p><b>Learning to Code in VB</b> Learning a high-level language which will allow them to solve complex problems.</p>	<p><b>1.6 Ethical, legal and environmental</b> Impacts of digital technology on wider society and legislation relevant to Computer Science</p>	<p><b>1.1 Systems architecture</b> Students will understand the purpose of the CPU. Common CPU components and their functions. How common characteristics of CPU's affect their performance. Embedded systems.</p>	<p><b>1.3 Computer networks, connections, and protocols</b> Students will learn about Networks and topologies. Wired, Wireless networks, protocols, and layers.</p>

# YEAR 11

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>1.5 – System Software</b>  <i>Students will learn about operating systems and utility software</i></p>	<p><b>2.3 – Producing robust programs</b>  <i>Students will learn defensive design and testing in all its forms.</i></p> <p><b>2.4 Boolean Logic</b>  <i>Students will learn to make simple logic diagrams. Be able to use truth tables. Combining multiple gates and solves problems</i></p> <p><b>2.5 Programming languages and Integrated development environment</b>  <i>Students will learn about the different types of programming language. They will understand how to use the features of an IDE.</i></p> <p><b>Programming Project in VB</b>  <i>The programming project combines all the learning in VB to create a solution to a programming problem. (20 hours of lesson time)</i></p>	<p><b>1.6 - Ethical, legal, cultural.</b>  <i>Impacts of digital technology on wider society and legislation relevant to Computer Science</i></p>	<p><b>1.2 Memory &amp; Storage</b>  <i>Students will learn Primary storage (Memory) and Secondary storage. Units of data storage. Being able to convert Binary and Hexadecimal to Denary or vice versa. In binary they will be to add and do binary shifts. Students will also look at how Characters, Images and Sound is represented. They will also look at the two types of compression</i></p>	



# YEAR 12

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>1.2 Software and software development</b>  <i>Students will learn the types of software and the different methodologies used to develop software.</i></p> <p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	<p><b>2.1 Elements of computational thinking</b>  <i>Students will have an understanding what is meant by computational thinking.</i></p> <p><b>2.2 Problem solving and programming</b>  <i>Students will learn how computers can be used to solve problems and programs can be written to solve them.</i></p> <p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	<p><b>1.5 - Legal, moral, cultural, and ethical issues</b>  <i>The individual moral, social, ethical, and cultural opportunities, and risks of digital technology. Legislation surrounding the use of computers and ethical issues that can or may arise from the use of computers.</i></p>	<p><b>1.1 The characteristics of contemporary processors, input, output and storage devices</b>  <i>Students will learn the characteristics of contemporary processors, input, output, and storage devices.</i></p> <p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	<p><b>1.3 Exchanging data</b>  <i>Students will learn how data is exchanged between different systems.</i></p>



# YEAR 13

TOPIC	Digital Literacy	Computational Thinking/Programming	Ethical, Legal, Cultural impacts of CS	Hardware	The Internet
EXPLANATION	<p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	<p><b>1.4 Data types, data structures and algorithms</b>  <i>Students will learn how data is represented and stored within different structures. Different algorithms that can be applied to these structures.</i></p> <p><b>2.3-Algorithms</b>  <i>Students will continue learn the use of algorithms to describe problems and the standard algorithms.</i></p> <p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	<p><b>1.5 - Legal, moral, cultural, and ethical issues</b>  <i>The individual moral, social, ethical, and cultural opportunities, and risks of digital technology. Legislation surrounding the use of computers and ethical issues that can or may in the future arise from the use of computers.</i></p>	<p><b>3 Programming Project</b>  <i>Students will be expected to analyse, design, develop, test, evaluate and document a program written in a suitable high-level language.</i></p>	