

## St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing

<b>KS3 – Year 7</b>	<b>Autumn 1</b>	<b>Autumn 2</b>	<b>Spring 1</b>	<b>Spring 2</b>	<b>Summer 1</b>	<b>Summer 2</b>
Core Knowledge:	<b>Digital Literacy</b>	<b>Computational Thinking</b>	<b>Algorithms</b>	<b>Programming in Scratch</b>	<b>Programming a Computer</b>	<b>Creative Projects</b>
Core skills: Evaluation, Describe, Explain, etc	E- safety, how to stay safe online with key aspects: Social Media, Cyber bullying, Grooming, Online Fraud, Cat-phishing, Hacking, Digital Footprint/Tattoo	The four cornerstones of Computational Thinking: Decomposition, Pattern Recognition, Abstraction Algorithms, Sequencing Thinking Computationally Flowchart and Pseudocode Decisions and Outputs, Selection, Iteration	Processes, Decisions, Inputs Outputs, Flowcharts, Pseudocode to control real world scenarios	Scratch Block coding environment. The Block palette, Code Area, Start and stop buttons, Costumes, Sounds, Animating sprites, Moving sprites using co-ordinates, Using sensing blocks, Adding a variable to count the players score, Add their own functionality	Python Coding. Syntax of the code, the structure of the program, functions, variables and casting. Data Types: Boolean, String, Integer, Float, Selection Statements: Else, IF, Elseif, Iteration For and While loops,	Using a combination of Spreadsheets, Graphics Software using both Bitmap and Vector Graphics, students create an information leaflet combining artefacts from various sources and analyse data from a spreadsheet.
Title of Assessment Quiz.	<b>Digital Literacy</b>	<b>Computational Thinking</b>	<b>Algorithms</b>	<b>Programming in Scratch</b>	<b>Programming a Computer</b>	<b>Creative Projects</b>
Title of the Quality of Written Communication Task (QWC)	<b>Digital Literacy</b> Homework task. Summary of learning this term. Students are to explain what they have learnt this term and describe why Digital Literacy is important in the 21 <sup>st</sup> century.	<b>Computational Thinking</b> Summary of learning this term. Students are to explain what they have learnt this term and describe why Computation Thinking is necessary when creating and designing Algorithms.	<b>Algorithms</b> Homework task Summary of learning this term. Students are to explain what they have learnt about Algorithm design and creation and analyse how Flowchart representations are useful.	<b>Programming in Scratch</b> Summary of learning this term. Students are to describe how the Scratch program works and the coding blocks were used to code the solution.	<b>Programming a Computer</b> Homework task. Students are to explain how their Python Programs worked and to describe the different programming techniques used in their coded solutions.	<b>Creative Projects</b> Summary of learning this term. Students are to describe how they used a Spreadsheet to analyse data and combine this with Digital Artefacts in their creative project.
Resources:	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser
Examinations:		<b>Progress Test 1</b>			<b>Progress Test 2</b>	

## St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing

KS3 – Year 8	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Core Knowledge	<b>Programming 1</b>	<b>Programming 2</b>	<b>Hardware and Software</b>	<b>Data Representation</b>	<b>Searching and Sorting Algorithms</b>	<b>Safety and Responsibility</b>
Core skills: Evaluation, Describe, Explain etc	Students will learn how to code using Python. In this second coding module student's focus on Algorithms that contain Iteration (repeating steps) For Loops (Count controlled) While Loops (Condition controlled) Representing Iteration in Flowchart algorithms	In this second coding module student's focus on Algorithms that contain logical reasoning (Boolean logic). Students will go onto to learn about Arrays and Lists and develop their own programs. Boolean conditions (True / False), Expressions =, >, <, >=< <=, <>, AND, OR, NOT. Statements Boolean logic selection Variables, Arrays & Lists	<ul style="list-style-type: none"> <li>Students will learn about:</li> <li>Digital Devices</li> <li>Input devices</li> <li>Output devices</li> <li>Storage Devices</li> <li>Logic Gates</li> <li>Software</li> <li>Systems software</li> <li>Applications software</li> <li>The CPU and the Fetch execute cycle.</li> <li>Clock speed</li> <li>Cores</li> <li>Cache</li> <li>Introduction to Networks</li> <li>WAN – Wide Area Networks</li> <li>LAN – Local Area Networks</li> <li>Internet and communication</li> </ul>	Students will learn about Alan Turing and his contribution to Computer Science. To learn how computers see the world To learn the denary system is 0-9 Binary is 0-1 Students learn about: <ul style="list-style-type: none"> <li>Number systems</li> <li>Denary</li> <li>Binary</li> </ul> They also learn how to convert: <ul style="list-style-type: none"> <li>Denary to Binary</li> <li>Binary to Denary</li> <li>Binary Addition</li> <li>Representing Sound, Images And Text</li> </ul>	Students will learn about sorting and searching algorithms. How to represent sorting algorithms in a flowchart <b>Searches:</b> <ul style="list-style-type: none"> <li>Serial</li> <li>Linear</li> <li>Binary</li> <li>Comparison of searches</li> </ul> <b>Sorts:</b> <ul style="list-style-type: none"> <li>Bubble, Merge</li> <li>Insertion</li> <li>Logical Reasoning</li> <li>Other types of sorting Algorithm – Merge sort, insertion sort,</li> <li>Shell sort, quick sort.</li> <li>Logical reasoning</li> </ul>	Students will learn about: <b>Online safety</b> <ul style="list-style-type: none"> <li>Online dangers</li> <li>Malware</li> <li>Phishing</li> <li>Unsavory characters</li> <li>Trolling</li> <li>Anti-virus software</li> <li>Firewall</li> <li>Cyber bullying</li> </ul> <b>Bias and reliability</b> <ul style="list-style-type: none"> <li>Sources of information</li> </ul> <b>Computers and the Law</b> <ul style="list-style-type: none"> <li>The Data Protection Act 1998</li> <li>Computer Misuse Act 1990</li> <li>Copyright Designs and Patents Act 1988</li> </ul>
Title of Assessment Quiz.	<b>Programming 1</b> Homework task. Students are to explain how their Python Programs worked and to describe the different programming techniques used in their coded solutions.	<b>Programming 2</b> Summary task. Students are to explain how their Python Programs worked and to describe the different programming techniques and Boolean logic used in their coded solutions.	<b>Hardware and Software</b> Homework task. Students are to explain what the Hardware and Software devices do, what the CPU is and what a Network is and why they are required.	<b>Data Representation</b> Summary Task: Explain who Turing is and his contribution. What are Denary and Binary numbers systems and how to convert between the two.	<b>Searching and Sorting Algorithms</b> Homework task: Students are to explain the Algorithmic differences in the operation of Sorts and Searches.	<b>Safety and Responsibility</b> Summary Task: Explain the issues with online safety linked to real world examples and explain which legal remedies are available to keep data protected.
Title of the QWC Task	<b>Programming 1</b>	<b>Programming 2</b>	<b>Hardware and Software</b>	<b>Data Representation</b>	<b>Searching and Sorting Algorithms</b>	<b>Safety and Responsibility</b>
Resources:	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser
Examinations:			<b>Progress Test 3</b>			<b>Progress Test 4</b>

## St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing

KS3 – Year 9	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Core Knowledge	<b>Programming 3 Procedures &amp; functions</b>	<b>Programming 3 Writing Error Free Code</b>	<b>Data Representation Text Images and Sound</b>	<b>Memory and Storage</b>	<b>Spreadsheets 2</b>	<b>Databases</b>
Core skills: Evaluation, Describe, Explain etc	<ul style="list-style-type: none"> <li>What is a procedure</li> <li>Why use a procedure</li> <li>Advantages of using a procedure</li> <li>Writing a procedure</li> <li>Running a procedure</li> <li>What is a function</li> <li>Writing a Function</li> <li>Functions in Python</li> <li>Running a Function in Python</li> </ul>	<ul style="list-style-type: none"> <li>Errors and documenting code</li> <li>Syntax error and Logic error</li> </ul> <p><b>Types of syntax errors</b> - (variable, punctuation or statement errors)</p> <p><b>Types of logic errors</b> – (wrong sequence, wrong Boolean expression, wrong data type)</p> <ul style="list-style-type: none"> <li>Logic errors in practice, Boolean errors and missing steps, Sequence errors and Documenting code</li> </ul>	<p>How an image is represented</p> <p>Metadata included in the file</p> <p>The effect of colour depth and resolution</p> <p>Sound</p> <p>how sound can be sampled</p> <p>how sampling intervals affect the quality</p> <p>sample size</p> <p>bit rate</p> <p>sampling frequency</p> <p>Compression</p> <p>Need for compression</p> <p>Types of compression: Lossy</p> <p>Lossless</p>	<p>The difference between RAM and ROM</p> <p>The purpose of ROM in a computer system</p> <p>The purpose of RAM in a computer system</p> <p>The need for virtual memory</p> <p>Flash memory, Volatile Memory, Non-Volatile Memory, Cache Memory</p> <p>Secondary storage</p> <p>Optical, Magnetic, Solid state</p> <p>Characteristics: Capacity, Speed, Portability, durability, Reliability, Cost</p>	<p>Workbooks and worksheets</p> <p>Columns, rows and cells</p> <p>Entering data into a cell</p> <p>Sorting cell data</p> <p>Making a basic Spreadsheet</p> <p><b>Formatting</b></p> <p>Adjusting column width and row height, Cell formatting, Wrap text, Merge cells, Adding Formatting, Formulas &amp; functions, Symbols used</p> <p><b>Functions</b> – Autosum, Advanced Functions, Adding formulas and functions, Charts and Graphs, Axis Labels</p>	<ul style="list-style-type: none"> <li>Database uses</li> <li>Databases vs Paper</li> <li>Advantages of using Databases</li> <li>The difference between data, information and knowledge</li> <li>Storing Data in Tables</li> <li>Creating a table</li> <li>Data Types</li> <li>Setting a Primary Key</li> <li>Validation rules</li> <li>Running Queries</li> <li>Query scenario</li> <li>Narrowing down the results</li> <li>Forms and Reports</li> </ul>
Title of Assessment Quiz.	<b>Programming 3 Procedures &amp; functions</b> Homework task. Students are to explain the difference between procedure and functions and the advantages of using them with example code.	<b>Programming 3 Writing Error Free Code</b> Summary task. Explain the difference between logic and syntax errors with code examples offering an explanation of how logic errors occur.	<b>Data Representation Text Images and Sound</b> Homework Task: Explain how text, images and sound are represented in binary, describe what metadata is and what resolution, sample size bit rate and compression are.	<b>Memory and Storage</b> Summary task. Explain the difference between RAM and ROM, the characteristics and positives and the negatives of different storage media.	<b>Spreadsheets 2</b> Homework task: Explanation of workbooks and worksheets, formulas and how they work, operators, formatting tools and common functions used in a spreadsheet with example formulas.	<b>Databases</b> Summary task: The advantages of Databases, what is a data and information, what a primary key is, and what are queries and why we need Databases.
Title of the QWC Task	<b>Programming 3 Procedures &amp; functions</b>	<b>Programming 3 Writing Error Free Code</b>	<b>Data Representation Text Images and Sound</b>	<b>Memory and Storage</b>	<b>Spreadsheets 2</b>	<b>Databases</b>
Resources:	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser	Glossary Booklet Knowledge Organiser
Examinations:			<b>Progress Test 5</b>			<b>Progress Test 6</b>

## St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing

KS4 GSCE Exam Board: OCR	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
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Core knowledge	1.1 Systems architecture	1.2 Memory and storage	1.3 Computer networks, connections and protocols	1.4 Network security	1.5 Systems software	1.6 Ethical, legal, cultural and environmental impacts of digital technology
Core Skills	Understanding the fetch-execute cycle, Common CPU components and their function, ALU (Arithmetic Logic Unit), CU (Control Unit), Cache, Registers, Von Neumann architecture, MAR (Memory Address Register), MDR (Memory Data Register), Program Counter, Accumulator, Clock speed, Cache size, Number of cores, The purpose and characteristics of embedded systems, Examples of embedded systems.	Understanding RAM and ROM, Virtual memory. The need for secondary storage, Optical, Magnetic, Solid state, advantages and disadvantages of different storage media relating to: Capacity, Speed, Portability, Durability, Reliability, Cost. The units of data storage: Bit, Nibble, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte. Binary, Denary, Hexadecimal conversions, Binary Shifts. Characters, Images, Sound and Compression.	Types of network: LAN, WAN, performance of networks, client-server and a peer-to-peer network. Network hardware, Wireless access points, Routers, Switches, NIC, Transmission media, The Internet, DNS (Domain Name Server), Hosting, The Cloud, Web servers and clients. Star and Mesh network topologies. Modes of connection: Wired, Ethernet, Wireless, Wi-Fi, Bluetooth, Encryption " IP addressing and MAC addressing. Common protocols, TCP/IP, HTTP, HTTPS, FTP, POP, IMAP, SMTP.	Understanding the forms of attack: Malware, Social engineering, e.g. phishing, people as the 'weak point', Brute-force attacks, Denial of service attacks, Data interception and theft, The concept of SQL injection Common prevention methods: Penetration testing, Anti-malware software, Firewalls, User access levels, Passwords, Encryption, Physical security.	Understanding the purpose and functionality of operating systems: User interface, Memory management and multitasking, Peripheral management and drivers. User management, File management The purpose and functionality of utility software " Utility system software: Encryption software, Defragmentation and Data compression	Understanding the impacts of digital technology on wider society including: Ethical issues, Legal issues, Cultural issues, Environmental issues, Privacy issues, Legislation relevant to Computer Science: The Data Protection Act 2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1988, Software licences (i.e. open source and proprietary)
Title of Assessment piece (mini test)	<b>Systems architecture</b>	<b>Memory and storage</b>	<b>Computer networks, connections and protocols</b>	<b>Network security</b>	<b>Systems software</b>	<b>Ethical, legal, cultural and environmental impacts of digital technology</b>
Title of the Quality of Written Communication Task (Essay, Practical write up)	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked
Resources:	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.
Examinations:	<b>Examination 1</b>		<b>Examination 2</b>		<b>Examination 3</b>	

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KS4 GSCE Exam Board: OCR	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
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Core knowledge	<b>2.1 Algorithms</b>	<b>2.2 Programming fundamentals</b>	<b>2.3 Producing robust programs</b>	<b>2.4 Boolean logic</b>	<b>2.5 Programming languages and Integrated Development Environments</b>	
Core skills	Understanding the principles of computational thinking: Abstraction, Decomposition, Algorithmic thinking, Identify the inputs, processes, and outputs for a problem. Structure diagrams, Create, interpret, correct, complete, and refine algorithms using: Pseudocode, Flowcharts, Reference language/high-level programming language, Identify common errors, Trace tables. Standard searching algorithms: Binary search, Linear search, Standard sorting algorithms: Bubble sort, Merge sort, Insertion sort	Understanding the use of variables, constants, operators, inputs, outputs and assignments. The use of Sequence, Selection and Iteration. Arithmetic operator's Boolean operators AND, OR and NOT. Data types: Integer, Real, Boolean, Character and string. Casting and the use of string manipulation. Basic file handling operations: Open, Read, Write, Close. SQL to search for data, both one-dimensional and two-dimensional. How to use sub programs (functions and procedures) to produce structured code	Understanding the use of Defensive design considerations: Anticipating misuse, Authentication, Input validation, Maintainability: Use of sub programs, Naming conventions, Indentation, Commenting. Types of testing: Iterative, Final/terminal. Syntax and logic errors. Selecting and using suitable test data: Normal, Boundary, Invalid, Erroneous Refining algorithms.	Understanding the use of Simple logic diagrams using the operators AND, OR and NOT " Truth tables " Combining Boolean operators using AND, OR and NOT " Applying logical operators in truth tables to solve problems	Understanding the use of and purpose of different levels of programming language: High-level languages, Low-level languages, the purpose of translators, the characteristics of a compiler and an interpreter. Common tools and facilities available in an Integrated Development Environment (IDE): Editors, Error diagnostics, Run-time environment, Translators	
Title of Assessment piece (mini test)	<b>2.1 Algorithms</b>	<b>2.2 Programming fundamentals</b>	<b>2.3 Producing robust programs</b>	<b>2.4 Boolean logic</b>	<b>2.5 Programming languages and Integrated Development Environments</b>	
Title of the Quality of Written Communication Task (Essay, Practical write up)	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	50QQ/end of topic test Exam style questions Teacher marked	
Resources:	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.	Exercise books Revision Guides, Past papers, OCR Computer science quizzes.
Examinations:		<b>Mock examinations</b>		<b>Mock Examinations</b>	<b>GCSE Public examinations</b>	<b>GCSE Public examinations</b>



## St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing

KS4 BTEC Tech Award DIT:	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11	COM - 3	COM - 3	COM – 2	COM - 2		
Core knowledge	A - Modern technologies B - Cyber security	C - The wider implications of digital systems	<b>Learning aim B:</b> Create a dashboard using data manipulation tools	<b>Learning aim C:</b> Draw conclusions and review data presentation methods		
Core skills	<b>A - Modern technologies</b> Learners should learn about how current and modern technologies are used by and have an impact on organisations and their stakeholders. Learners need to know the ways in which organisations and associated individuals use modern technologies to exchange information, communicate, and complete work-related tasks. Learners must be able to apply their knowledge to a range of vocational contexts. <b>B Cyber security</b> Learners must understand how the increased reliance of organisations on digital systems to hold data and perform vital functions presents a range of challenges and dangers. They should understand the nature of threats to digital systems and ways that they can be mitigated through organisation policy, procedures and the actions of individuals.	<b>C The wider implications of digital systems</b> Learners should understand the wider implications of digital systems and their use. Learners should understand how legislation covering data protection, computer crimes and intellectual property has an impact on the way that organisations and individuals use digital systems and data. Learners should understand the procedures that organisations must follow in order to conform to legal requirements and professional guidelines.	Learners will be provided with a large data set, which they will import into spreadsheet software. Learners will: • select and apply the data manipulation methods listed in B1 to manipulate data in order to provide appropriate summaries of the data • produce a dashboard to display the summaries of data using appropriate presentation features and presentation methods. <b>Evidence</b> must fully meet the requirements of the assessment criteria and could include: • a spreadsheet showing the imported dataset, the data manipulation methods used and a completed dashboard • a written document containing screenshots that show the manipulation methods used and a completed dashboard • annotated screenshots of the completed dashboard and dataset,	Learners will use their dashboard to draw conclusions and make appropriate recommendations. They will assess how the presentation features used in their dashboard affect how well the information is understood.  <b>Evidence</b> must fully meet the requirements of the assessment criteria and could include: • a written document that shows the drawing of conclusions and recommendations made, and assessment of how the presentation of the dashboard influences its effectiveness.		
Title of Assessment piece	<b>Mock Exam Learning Aim A</b> <b>Mock Exam Learning Aim B</b>	<b>Mock Exam 1 COM 3</b> <b>Mock Exam 2 COM 3</b>	<b>B.1P3</b> Use methods to carry out limited manipulation of data, with a limited degree of accuracy. <b>B.1P4</b> Produce a dashboard that produces a limited summary of data.	<b>C.1P5</b> Use the dashboard to identify trends in the data. <b>C.1P6</b> Identify the methods used to present data.		
Resources:	Revision Guides, SAMS	Revision Guides, SAMS	Revision Guides, SAMS	Revision Guides, SAMS		
Examinations:	<b>Mock Exam Learning Aim A</b> <b>Mock Exam Learning Aim B</b>	<b>Mock Exam 1 COM 3</b> <b>Mock Exam 2 COM 3</b>	<b>Mock Exam 3 COM 3</b> <b>Mock Exam 4 COM3</b>	<b>Project work deadlines</b>		

## **St Edmund Campion Catholic School 5 Year Curriculum Summary: SUBJECT Computing**