FRAMEWORK FOR LEARNING

CHS South

CREATIVE	An education where imagination, curiosity and resilience enable us to ignite our learning.
HAPPY	A shared belief that optimism, empathy and responsibility are the foundations for a respectful, safe and inclusive community.
SUCCESSFUL	Individuals who are ready to learn, practise being reflective, and are motivated to become champions.

SUBJECT	**COMPUTER SCIENCE**
INTENT	Studying Computer Science will help develop problem-solving, critical thinking and analytical skills. Computer Science is found in nearly all jobs and careers. Studying Computing will provide students with a versatile foundation for many different careers and allows students to develop interchangeable and transferable skills inside and outside of IT. Our students are now living in a digital age where more of their lives become intertwined with digital technologies. It is important that students understand this technology and are able to use it effectively. In Computer Science, students will develop knowledge and understanding of key computing topics that will prepare them for their future studies in Computing. They will: **Key Stage 4:** 1. Develop their capability, creativity and knowledge in computer science, digital media, and information technology. 2. Develop and apply their analytic, problem-solving, design, and computational thinking skills. 3. Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to report a range of concerns.

YEAR GROUP	YEAR 11

RATIONAL / NARRATIVE	Students studied a range of topics in year 10 towards their GCSE. They focussed a lot on programming skills. During this year they will continue to deepen their understanding of programming techniques as well as covering the remaining topics of paper 1 computer systems. They will also continue to develop their exam techniques throughout the year. **Year 11 Computer Science** **1.3 Computer networks, connections and protocols –** Students will study networks and topologies, wired and wireless networks, network protocols and layers. **1.4 Network security –** Students will study the possible threats to a computer system and networks as well as the ways to identify and prevent vulnerabilities **1.5 Systems software –** Students will study the purpose and functionality of the operating systems and utility software **2.3 Producing robust programs –** Students will study defensive design and testing of programs **2.4 Boolean logic –** Students will study logic diagrams, truth tables and Boolean operators **2.5 Programming languages and Integrated Development Environments –** Students will study the different types of programming languages and the common tools and facilities of an Integrated Development Environment (IDE)

TERM KNOWLEDGE	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
	1.3.1 Computer networks, connections, and protocols **1.3.1 Networks and topologies** • Types of network – LAN and WAN • Factors that affect performance • Client -server and peer to peer network • Network Hardware • The internet as a worldwide collection of computer networks **1.3.2 Wired and Wireless network, protocols, and layers** • Modes of connections • Encryption • IP and MAC addressing	**1.5.1 Operating systems** • The purpose and functionality of operating systems: • User interface • Memory management and multitasking • Peripheral management and drivers • User management • File management **1.5.2 Utility software** • The purpose and functionality of utility software • Utility system software: • Encryption software • Defragmentation • Data compression	**2.4.1 Boolean Logic** • Truth tables • Combining Boolean operators • Applying logical operators in truth tables to solve a problem. **2.5 – Programming languages and IDEs** **2.5.1 Languages** • Characteristics/purpose of different levels of programming language: • High-level • Low-level • The purpose of translators	**Revision and Recap** **1.1 Systems Architecture** **1.2 Memory and Storage** **1.3 Computer Networks** **2.1 Algorithms** **2.2 Programming Fundamentals** **2.3 Producing robust programs.**	**Revision and Recap** **1.4 Network Security** **1.5 System Software** **1.6 Ethical, legal, cultural, and environmental impact of digital technology** **2.4 Boolean Logic** **2.5 Programming languages and integrated Development environments**

- Standards
- Common protocols
- Concept of layers

1.4.1 Threats to computer systems and networks
- Forms of attack
- Malware
- Social engineering
- Brute force attack
- DoS
- Data Inception
- SQL injection

1.4.2 Identifying and preventing vulnerabilities.
- Common prevention methods:
- Penetration testing
- Anti-malware software
- Firewalls
- User Access levels
- Passwords
- Encryption
- Physical security

2.3.1 Defensive design
- Defensive design considerations:
- Anticipating misuse
- Authentication
- Input validation
- Maintainability:
- Use of sub programs.
- Naming conventions
- Indentation
- Commenting

2.3.2 Testing
- The purpose of testing
- Types of testing:
- Iterative
- Final/terminal
- Identify syntax and logic errors.
- Selecting and using suitable test data:
- Normal
- Boundary
- Invalid
- Erroneous
- Refining algorithms

2.4.1 Boolean Logic
- Simple logic diagrams
- Truth tables

- The characteristics of a compiler and an interpreter

2.5.2 The IDE

Common tools and facilities available in an IDE
- Editors
- Error diagnostics
- Run-time environment
- Translators

2.1.2 Designing, creating and refining algorithms.
- Identify common errors.
- Trace tables

2.2.3 Additional programming techniques
- The use of basic string manipulation
- The use of basic file handling operations:
- Open
- Read
- Write
- Close
- The use of records to store data
- The use of SQL to search for data
- The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and

SKILLS			two-dimensional arrays (2D) • How to use sub programs (functions and procedures) to produce structured code • Random number generation		
	• Comparing and contrasting information • Breaking down information • Identifying threats to a computer system • Identifying and selecting • Exam techniques	• Defensive Design • Input Validation • Testing Programs • Identifying syntax errors • Selecting and using suitable test data • Refining Algorithms • Identifying and selecting • Exam techniques	• Identifying and using variables • Using different types of data appropriately • Using operators • Using inputs and output • Using sequence • Using selection • Using iteration (for loops) • Using iteration (while loops) • Using basic string manipulation • Using records to store data • Using SQL to search for data. • Using arrays (one-dimensional and two dimensional) • Using sub programs (functions and procedures) • Using random number generation • Identifying and selecting • Exam techniques	• Identifying and using variables • Using different types of data appropriately • Using operators • Using inputs • Using outputs • Using sequence • Using selection • Using iteration (for loops) • Identifying and selecting • Exam techniques	• Identifying and evaluating the impact on computer systems • Comparing and contrasting information • Extending writing in exam questions • Identifying and selecting • Exam techniques
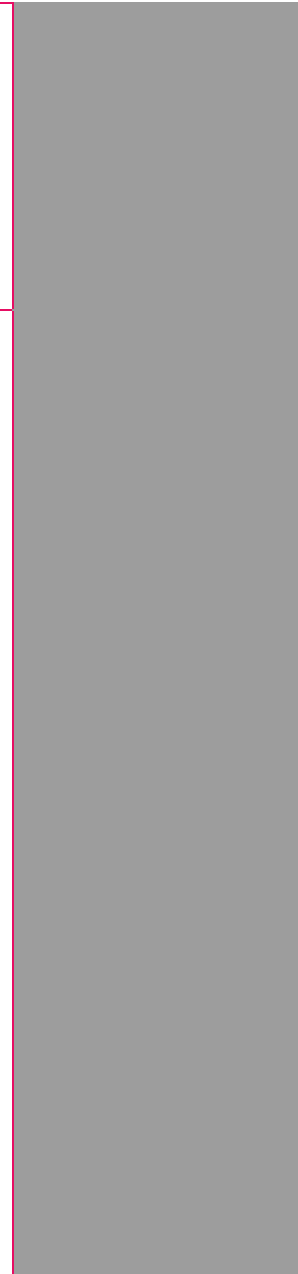
ASSESSMENT	Marking Point 1: OCR GCSE Computer Science exam questions on networks and topologies Marking Point 2: OCR GCSE Computer Science exam questions on networks, protocols, threats and vulnerabilities	Marking Point 1: College Entry Exam – Paper 1: Computer Systems Marking Point 2: OCR GCSE Computer Science exam questions on system software	Marking Point 1: OCR GCSE Computer Science exam questions on Boolean logic Marking Point 2: OCR GCSE Computer Science exam questions on Languages and the IDE	Marking Point 1: Paper 1 Computer Systems March Mock Marking Point 2: Paper 2 Computational thinking, algorithms, and programming March Mock	Marking Point 1: Paper 1 Exam Marking Point 2: Paper 2 Exam	
HOME LEARNING	Home Learning 1: Test 1 – 3 in Homework Booklet Home Learning 2: Test 4-6 in Homework Booklet Home Learning 3: Test 7-10 in Homework Booklet	Home Learning 1: Test 1 – 3 in Homework Booklet Home Learning 2: Test 4-6 in Homework Booklet Home Learning 3: Test 7-10 in Homework Booklet	Home Learning 1: Test 11 – 13 in Homework Booklet Home Learning 2: Test 14 – 16 in Homework Booklet Home Learning 3: Test 17-19 in Homework Booklet Home Learning 4: Test 20-22 in Homework Booklet	Home Learning 1: Test 23-25 in Homework Booklet Home Learning 2: Test 26 -30 in Homework Booklet	Home Learning 1: Revision Home Learning 2: Revision Home Learning 3: Revision	
READING, WRITING, TALK, NUMERACY	Reading: Students will read a range of different text as well as online resources. This half term students will focus on developing their skills in relating to their own experience, infer and asking questions. Writing: Students will develop a range of different writing skills focusing on descriptive writing to be able to explain the different computer networks. Students will also continue to work on extended writing questions on this topic.	Reading: Students will read a range of different text as well as online resources. This half term students will focus on developing their skills in breaking down information and learning new vocab. Writing: Students will develop a range of different writing skills focusing on expository and answering exam questions. Some of the exam questions will be extended writing. Oracy: Students will focus on develop their listening and responding skills (Social and Emotional) and their use of appropriate language (Linguistic)	Reading: Students will read a range of different text as well as online resources. This half term students will focus on developing their skills in learning new vocab, predict and infer. Writing: Students will develop a range of different writing skills focusing on their descriptive skills by being able to describe the steps needed to convert data effectively. Oracy: Students will focus on developing their clarity and summarising skills (Cognitive). They will also continue to develop their listening and responding.	Reading: Students will read a range of different text as well as online resources. This half term students will focus on developing their skills in asking questions, learning new vocab and infer. Writing: Students will develop a range of different writing skills focusing on summarising, explaining, and answering exam questions. Some of the exam questions will be extended writing. Oracy: Students will focus on developing their use of appropriate vocabulary choice (Linguistic). They will also develop working with others (Social and Emotional)	Reading: Students will read a range of different text as well as online resources. This half term students will focus on developing their skills in empathise, relating to experience and predict. Writing: Students will deepen their writing skills in expository, summarising, explaining, and answering exam questions to ensure that they are able to answer exam questions appropriately. Oracy: Students will continue to develop their working with others and listening and responding skills (Social and Emotional). They will also focus in developing their	

	Oracy: Students will continue to develop their social and emotional skills and their linguistic skills. Focusing on listening and responding and appropriate language choices. **Numeracy:** Students will use a range of numeracy skills. Students will explore network speeds and what can impact them.	**Numeracy:** Students will use a range of numeracy skills. Students will use logical operators to calculate and compare data.	**Numeracy:** Students will use a range of numeracy skills. Students will use logical operators to calculate and compare data.	**Numeracy:** Students will use a range of numeracy skills. They will be writing programs so may use logical operators and counting of data.	reasoning skills (Cognitive) **Numeracy:** Students will use a range of numeracy skills. They will develop numeracy skills we have explored before including converting binary and denary, hexadecimal and data capacity.	
TIER 2 VOCABULARY	• Identify • State • Explain • Complete • Justify • Describe • Define • Discuss • Write • Draw • Convert • Add • Give • Show • Calculate	• Identify • State • Explain • Complete • Justify • Describe • Define • Discuss • Write • Draw • Convert • Add • Give • Show • Calculate	• Identify • State • Explain • Complete • Justify • Describe • Define • Discuss • Write • Draw • Convert • Add • Give • Show • Calculate	• Identify • State • Explain • Complete • Justify • Describe • Define • Discuss • Write • Draw • Convert • Add • Give • Show • Calculate	• Identify • State • Explain • Complete • Justify • Describe • Define • Discuss • Write • Draw • Convert • Add • Give • Show • Calculate
TIER 3 VOCABULARY	• Network topologies • Transmission media • Domain Name Server • Hosting • The Cloud • Web server and clients • Encryption • IP Addressing • MAC addressing • Social Engineering • Brute Force attack • Denial of Service Attack	• Operating System • System Software • Defragmentation • Authentication • Validation • Maintainability • Iterative testing • Final/terminal testing • Test data	• Logic error • Programming languages • High level language • Low level language • Translators • Compiler • Interpreter • Integrated development environment (IDE) • Diagnostics • Analysis	• Integrated development environment (IDE) • Diagnostics • Analysis • Design • Development • Open • Read • Write • Records • Procedures	• Data Types • Central Processing Unit • Memory • Secondary Storage • Networks • Protocols • Algorithms • Decomposition • Abstraction • Exam Referencing Language

PSPSMC, BRITISH VALUES AND DIVERSITY	• Penetrating testing			• Design • Development			
	Personal: Developing the valuable transferable skill of logical thinking. **Social:** Paired programming opportunities. **British value:** Consideration of the working environment of a programmer **Moral:** Understand the importance of keeping data safe on a network to protect people's personal information **Cultural:** Understand the cultural norms associated with digital issues **Diversity:** examine the work of women and different ethnicities in networking including Radia Perlman.			**Personal:** Developing the valuable transferable skill of critical thinking. **Social:** Sharing ideas and being able to explain key topics. **British value:** Understanding how programs are created to comply with laws in data protection. **Moral:** Consider the privacy issues and effect that programs could have on the wider society. **Cultural:** Understand and consider different cultures and background when representing data and information in a computer system. **Diversity:** link to underrepresented groups in computer science and how they have developed the area further.			