SUBJECT - AS & A Level Computer Science 9618

| **Units** **9618 CIE** | Unit 1 Information Representation
Unit 2 Communication
Unit 3 Hardware
Unit 4 Processor Fundamentals
Unit 5 System Software
Unit 6 Security, Privacy and Data Integrity
Unit 7 Ethics and Ownership
Unit 8 Databases
Unit 9 Algorithm Design and Problem Solving
Unit 10 Data Types and Structures
Unit 11 Programming
Unit 12 Software Development
Unit 13 Data Representation
Unit 14 Communication and Internet Technologies
Unit 15 Hardware and Virtual Machines
Unit 16 System Software
Unit 17 Security
Unit 18 Artificial Intelligence (AI)
Unit 19 Computational Thinking and Problem-Solving
Unit 20 Further Programming | The 5Cs and their application in Computer Science:

Computer science can serve as a powerful tool for cultivating and promoting our values: **community, compassion, creativity, confidence, and challeng**e. Through computer science education, students can engage in collaborative projects that foster a sense of **community**, encouraging them to work together, share ideas, and learn from one another. The use of technology can also provide opportunities for demonstrating **compassion** by developing applications that address societal issues and empower marginalised communities. Additionally, computer science nurtures **creativity** by encouraging students to think outside the box, explore innovative solutions, and express their ideas through coding and programming. As students tackle complex problems and overcome coding challenges, they develop **confidence** in their abilities, learning to persevere, problem-solve, and adapt in the face of adversity. Ultimately, computer science education provides a platform for instilling these values, equipping students with the skills and mindset necessary to positively impact the world around them.

Computer science is essential to education because it equips students with critical thinking, problem-solving, and digital literacy skills necessary for navigating an increasingly technology-driven world. | |
| **Exams 9618** | 1 Theory and 1 Practical in Year 12
1 Theory and 1 Practical in Year 13
Y12 Theory is units 1 to 8
Y12 Practical is units 9 to 12
Y13 Theory is units 13 to 18
Y13 Practical is units 19 and 20 | **Past Papers 9618** | Past/specimen papers and mark schemes are available to download at www.cambridgeinternational.org/support |

Assessment	Assessment in Computing is ongoing throughout the year and will focus on the ability and command of the Domains, Concepts and objectives of the Computer Science Course. **Past Paper questions should be used prior to each reporting point to ensure accurate data.** Methods of assessment show all exam questions from 2017 - present for each of the Units
Domains of Knowledge & Application to Key Concepts	*This scheme of work is underpinned by the assumption that Computer Science is a practical subject and learners should be engaged in practical activities throughout the course. The key concepts are highlighted as a separate item in the new syllabus. Reference to the key concepts is made throughout the scheme of work using the key shown below.* **Key Concept 1 (KC1) – Computational thinking** *Computational thinking is a set of fundamental skills that help produce a solution to a problem. Skills such as abstraction, decomposition and algorithmic thinking are used to study a problem and design a solution that can be implemented. This may involve using a range of technologies and programming languages.* **Key Concept 2 (KC2) – Programming paradigms** *A programming paradigm is a way of thinking about or approaching problems. There are many different programming styles that can be used, which are suited to unique functions, tools and specific situations. An understanding of programming paradigms is essential to ensure that they are used appropriately, when designing and building programs.* **Key Concept 3 (KC3) – Communication** *Communication is a core requirements of computer systems. It includes the ability to transfer data from one device or component to another and an understanding of the rules and methods that are used in this data transfer. Communication could range from the internal transfer of data within a computer system, to the transfer of a video across the internet.* **Key Concept 4 (KC4) – Computer architecture and hardware** *Computer architecture is the design of the internal operation of a computer system. It includes the rules that dictate how components and data are organised, how data are communicated between components, to allow hardware to function. There is a range of architectures, with different components and rules, that are appropriate for different scenarios.* *All computers comprise of a combination of hardware components, ranging from internal components, such as the Central Processing Unit (CPU) and main memory, to peripherals. To produce effective and efficient programs to run on hardware, it is important to understand how the components work independently and together to produce a system that can be used. Hardware needs software to be able to perform a task. Software allows hardware to become functional. This enables the user to communicate with the hardware to perform tasks.* **Key Concept 5 (KC5) – Data representation and structures** *Computers use binary and understanding how a binary number can be interpreted in many different ways is important. Programming requires an understanding of how data can be organised for efficient access and/or transfer.*

Some content is designed to be taught in an continuously integrated manner throughout the course:

AS Level - Continuous application
9 Algorithm Design and Problem-Solving
10 Data Types and structures
11 Programming

A Level - Continuous application
19 Computational thinking and problem solving
20 Further Programming

	Year 12	Year 13
Term 1	Unit 1 Information Representation Unit 2 Communication Unit 3 Hardware	Unit 13 Data Representation Unit 14 Communication and Internet Technologies Unit 15 Hardware and Virtual Machines
Topic and Content	**Unit 1 Information Representation** 1.1 Data Representation (binary) **(KC5)** 1.1 Data representation (character sets) **(KC5)** 1.2 Multimedia (*Graphics*) **(KC5)** 1.2 Multimedia (*Sound*) **(KC5)** 1.3 Compression **(KC5)** **Unit 2 Communication** 2.1 Networks including the internet (introduction to types of network) **(KC3)** 2.1 Networks including the internet (hardware) **(KC3)** 2.1 Networks including the internet (Data transmission) **(KC3)** **Unit 3 Hardware**	**Unit 13 Data Representation** 13.1 User-defined data types **(KC1) (KC2) (KC5)** 13.2 File organisation and access **(KC1) (KC2) (KC5)** 13.3 Floating-point numbers, representation and manipulation**(KC5)** **Unit 14 Communication and Internet Technologies** 14.1 Protocols **(KC3)** 14.2 Circuit switching, packet switching **(KC3)** **Unit 15 Hardware and Virtual Machines** 15.1 Processors, Parallel Processing and Virtual Machines **(KC4)** 15.2 Boolean Algebra and Logic Circuits **(KC4) (KC1) (KC5)**

	3.1 Computers and their components (primary and secondary storage)**(KC4)** 3.1 Computers and their components (operation of hardware devices) **(KC4)** 3.1 Computers and their components (monitoring and control systems)**(KC4)** 3.2 Logic Gates and Logic Circuits**(KC4)**	
Skills	See full detailed skills and objectives here.	See full detailed skills and objectives here.
Methods of Assessment	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 1 Information Representation** 9618/1 Specimen paper Q1 9608/11 Jun 18 Q2, 8c 9608/11 Jun 17 Q3, 4d 9608/12 Jun 18 Q4, 5a, 5b, 5c 9608/12 Jun 17 Q3, 4c 9608/13 Jun 18 Q3c, 6a-d **Unit 2 Communication** 9618/1 Specimen paper Q2 9608/11 Jun 18 Q1, Q5a, b 9608/12 Jun 17 Q6a, b 9608/11 Nov 18 Q2 9608/12 Nov 18 Q2 9608/31 Jun 16 Q1 9608/31 Jun 17 Q5a 9608/31 Jun 18 Q3a 9608/31 Nov 17 Q1a, ci, cii 9608/32 Nov 17 Q1 9608/31 Jun 16 Q1 9608/31 Jun 17 Q5aii 9608/32 Jun 18 Q3a, b, c 9608/31 Nov 17 Q1 **Unit 3 Hardware** 9618/1 Specimen paper Q4, 5 9608/11 Jun 18 Q4, Q7 9608/11 Jun 17 Q2	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 13 Data Representation** 9618/3 Specimen paper Q1 9608/31 Jun 16 Q4 9608/31 Jun 17 Q1, 4 9608/32 Jun 17 Q1 9608/32 Jun 17 Q4 9608/32 Jun 18 Q1 9608/32 Jun 18 Q2 9608/31 Nov 16 Q1 9608/32 Nov 16 Q1 **Unit 14 Communication and Internet Technologies** 9618/3 Specimen paper Q2 9608/31 Jun 16 Q1c 9608/31 Jun 17 Q5ai, aiii, b 9608/32 Jun 17 Q5 9608/32 Jun 18 Q3c 9608/31 Nov 16 Q5 9608/32 Nov 16 Q4 9608/32 Nov 16 Q6b, c 9608/32 Nov 17 Q1B **Unit 15 Hardware and Virtual Machines** 9618/3 Specimen paper Q3 9608/31 Jun 16 Q3, 5 9608/31 Jun 17 Q3c, d 9608/32 Jun 17 Q3c, d 9608/32 Jun 18 Q4

	9608/12 Jun 18 Q2 9608/12 Jun 17 Q2c 9608/13 Jun 18 Q5, Q7 9608/12 Jun 16 Q1, Q3, 6 9608/11 Nov 17 Q5 9608/11 Nov 18 Q1a 9608/12 Nov 17 Q6 9608/13 Jun 17 Q3a, b, Q6a, b 9608/32 Jun 17 Q3a, b, Q6a 9608/31 Jun 18 Q7 9608/32 Jun 18 Q6a, b 9608/31 Nov 17 Q6a, b 9608/31 Jun 16 Q6 9608/31 Jun 17 Q3a, b, 6 9608/32 Jun 17 Q3a, b 9608/32 Jun 17 Q6 9608/32 Jun 18 Q7 9608/31 Nov 17 Q5ai 9608/31 Nov 17 Q6 9608/32 Nov 17 Q5a 9608/32 Nov 17 Q6	9608/31 Nov 16 Q4 9608/32 Nov 16 Q5 9608/31 Nov 17 Q2 9608/31 Nov 17 Q5b, c, d 9608/32 Nov 17 Q2 9608/32 Nov 17 Q3 9608/32 Nov 17 Q5b, c
Term 2	Unit 4 Processor Fundamentals Unit 5 System Software Unit 6 Security, Privacy and Data Integrity	Unit 16 System Software Unit 17 Security Unit 18 Artificial Intelligence (AI)
Topic and Content	**Unit 4 Processor Fundamentals** 4.1 Central Processing Unit (CPU) Architecture **(KC4)** 4.2 Assembly Language **(KC4) (KC2) (KC1)** 4.3 Bit manipulation **(KC4) (KC2) (KC5)** **Unit 5 System Software** 5.1 Operating System **(KC4)** 5.2 Language Translators **(KC4) (KC2)** **Unit 6 Security, Privacy and Data Integrity**	**Unit 16 System Software** 16.1 Purposes of an Operating System (OS) **(KC4)** 16.2 Translation Software **(KC4) (KC1) (KC2)** **Unit 17 Security** 17.1 Encryption, Encryption Protocols and Digital certificates **(KC3) (KC1)** **Unit 18 Artificial Intelligence (AI)** 18.1 Artificial Intelligence (AI) (graphs) **(KC1) (KC2)** 18.1 Artificial Intelligence (AI) (applications) **(KC2) (KC1)**

	6.1 Data Security **(KC3) (KC1) (KC5)** 6.2 Data integrity **(KC3) (KC1) (KC5)**	
Skills	See full detailed skills and objectives <u>here</u>.	See full detailed skills and objectives <u>here</u>.
Methods of Assessment	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 4 Processor Fundamentals** 9608/11 Jun 18 Q8a, b 9608/11 Jun 17 Q4a 9608/12 Jun 17 Q5 9608/13 Jun 18 Q3a, b 9608/12 Nov 16 Q5 9608/11 Nov 17 Q4 9608/11 Nov 18 Q4a, b, d 9608/12 Nov 17 Q4 9608/12 Nov 18 Q3, 4 9608/31 Jun 17 Q6c 9608/32 Jun 17 Q6c **Unit 5 System Software** 9608/11 Jun 18 Q3 9608/11 Jun 17 Q6 9608/12 Jun 18 Q1 9608/12 Jun 17 Q4 9608/12 Nov 16 Q8 9608/12 Nov 17 Q1 9608/12 Nov 17 Q2 9608/12 Nov 18 Q6b, c **Unit 6 Security, Privacy and Data Integrity** 9618/1 Specimen paper Q4 9608/11 Jun 18 Q6 9608/11 Jun 17 Q5 9608/11 Jun 17 Q7civ, cv 9608/12 Jun 18 Q3	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 16 System Software** 9618/3 Specimen paper Q4 9608/32 Jun 18 Q5 9608/31 Nov 16 Q2 9608/31 Nov 16 Q2, 3 9608/32 Nov 16 Q2, 3 9608/31 Nov 17 Q3 9608/32 Nov 17 Q3 **Unit 17 Security** 9618/3 Specimen paper Q5 9608/31 Jun 16 Q2 9608/31 Jun 17 Q2c 9608/32 Jun 17 Q2 9608/31 Nov 16 Q6 9608/31 Nov 17 Q4 **Unit 18 Artificial Intelligence (AI)** 9618/3 Specimen paper Q6

	9608/13 Jun 18 Q4 9608/11 Nov 17 Q3 9608/12 Nov 18 Q6a 9608/31 Jun 17 Q2a, b 9608/32 Jun 18 Q6a 9608/31 Nov 16 Q6a	
Term 3	Unit 7 Ethics and Ownership Unit 8 Databases Unit 9 Algorithm Design and Problem Solving	Unit 19 Computational Thinking and Problem-Solving Unit 20 Further Programming
Topic and Content	**Unit 7 Ethics and Ownership** 7.1 Ethics and Ownership (ethics and copyright) **(KC3) (KC1)** 7.1 Ethics and Ownership (Artificial Intelligence) **(KC3) (KC1)** **Unit 8 Databases** 8.1 Database Concepts **(KC5) (KC1)** 8.2 Database Management System (DBMS) **(KC5) (KC1)** 8.3 Data Definition Language (DDL) and Data Manipulation Language (DML) **(KC5) (KC2) (KC1)** **Unit 9 Algorithm Design and Problem Solving** 9.1 Computational Thinking Skills **(KC1)** 9.2 Algorithms **(KC1) (KC2)**	**Unit 19 Computational Thinking and Problem-Solving** 19.1 Algorithms (searching and sorting) **(KC1) (KC2) (KC5)** 19.1 Algorithms (Abstract Data Types) **(KC1) (KC2) (KC5)** 19.1 Algorithms (performance) **(KC1) (KC2) (KC5)** 19.2 Recursion **(KC1) (KC2) (KC5)** **Unit 20 Further Programming** 20.1 Programming Paradigms **(KC1) (KC2) (KC5)** 20.1 Programming Paradigms (OOP) **(KC1) (KC2) (KC5)** 20.1 Programming Paradigms (Declarative) **(KC1) (KC2) (KC5)** 20.2 File Processing and Exception Handling **(KC1) (KC2) (KC5)**
Skills	See full detailed skills and objectives here.	See full detailed skills and objectives here.
Methods of Assessment	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 7 Ethics and Ownership** 9618/1 Specimen paper Q4e 9608/11 Nov 17 Q6 9608/11 Nov 18 Q3 9608/11 Nov 18 Q5 9608/12 Nov 17 Q5	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 19 Computational Thinking and Problem-Solving** 9618/3 Specimen paper Q7 9618/4 Specimen paper Q1, 2, 3 9608/41 Jun 16 Q1, 2 9608/41 Jun 17 Q2, 3, 4 9608/42 Jun 17 Q2

	9608/12 Nov 18 Q5 **Unit 8 Databases** 9618/1 Specimen paper Q3 9608/11 Jun 17 Q1 9608/12 Jun 18 Q7 9608/12 Jun 17 Q1 9608/13 Jun 18 Q2 9608/12 Nov 16 Q9 9608/11 Nov 17 Q7 9608/11 Nov 18 Q7 9608/12 Nov 17 Q7 **Unit 9 Algorithm Design and Problem Solving** 9618/2 Specimen paper Q5, 6, 7 9608/21 Jun 16 Q1ai, aii, 2b, 3, 4 9608/22 Jun 16 Q1ai, aii, 2, 3, 4, 6 9608/23 Jun 16 Q1ai, aii, 2, 3, 4, 6 9608/21 Jun 17 Q1, 2, 3, 5, 6 9608/22 Jun 17 Q1, 2, 3, 5, 6 9608/23 Jun 17 Q1, 2, 3, 5, 6 9608/21 Jun 18 Q1, 2, 6, 7 9608/22 Jun 18 Q1, 2, 5c, d, 6 9608/23 Jun 18 Q1, 2, 5, 6, 7 9608/21 Nov 16 Q3, 4e, 5 9608/22 Nov 16 Q1c, 2, 3, 6 9608/23 Nov 16 Q1c, 3, 4e, 5 9608/21 Nov 17 Q1, 3, 5	9608/41 Jun 18 Q2, 6 9608/42 Jun 18 Q3, 6 9608/41 Nov 16 Q2aiii 9608/42 Nov 16 Q4aiii 9608/42 Nov 17 Q4 9608/41 Nov 18 Q3c, 4 9608/42 Nov 18 Q3, 6 **Unit 20 Further Programming** 9618/3 Specimen paper Q8 9618/4 Specimen paper Q1, 2, 3, 9608/41 June 16 Q4, 5, 6b, c 9608/41 June 17 Q1, 4 9608/42 June 17 Q1, 2, 3 9608/41 June 18 Q1, 5 9608/42 June 18 Q2, 4 9608/41 Nov 16 Q1b, c, 3 9608/42 Nov 16 Q1b, c, 3 9608/41 Nov 17 Q3, 4, 6 9608/42 Nov 17 Q3, 5, 6 9608/41 Nov 18 Q1, 2c, 5 9608/42 Nov 18 Q2, 4
Term 4	Unit 10 Data Types and Structures Unit 11 Programming Unit 12 Software Development	Exam & Revision
Topic and Content	**Unit 10 Data Types and Structures** 10.1 Data Types and Records **(KC1) (KC2) (KC5)** 10.2 Arrays **(KC1) (KC2) (KC5)**	

	10.3 Files **(KC1) (KC2) (KC5)** 10.4 Introduction to Abstract Data Types (ADT) **(KC1) (KC2) (KC5)** **Unit 11 Programming** 11.1 Programming Basics **(KC1) (KC2) (KC5)** 11.2 Constructs **(KC1) (KC2) (KC5)** 11.3 Structured Programming **(KC1) (KC2) (KC5)** **Unit 12 Software Development** 12.1 Program Development Life cycle **(KC1) (KC2)** 12.2 Program Design **(KC1) (KC2) (KC5)** 12.3 Program Testing and maintenance **(KC1) (KC2)**
Skills	See full detailed skills and objectives here.
Methods of Assessment	**Past Paper questions should be used prior to each reporting point to ensure accurate data.** **Unit 10 Data Types and Structures** 9618/2 Specimen paper Q1, 3, 5, 7 9608/21 Jun 16 Q3b, 5 9608/22 Jun 16 Q3b, 5 9608/23 Jun 16 Q3b, 5 9608/21 Jun 17 Q5 9608/22 Jun 17 Q5 9608/23 Jun 17 Q5 9608/21 Jun 18 Q5, 6 9608/22 Jun 18 Q5, 6 9608/23 Jun 18 Q5, 6 9608/21 Nov 16 Q4c, e 9608/22 Nov 16 Q4, 5 9608/23 Nov 16 Q4c 9608/21 Nov 17 Q1, 3 9608/22 Nov 17 Q1, 2, 3 9608/23 Nov 17 Q1, 3, 5 9608/41 Nov 18 Q2a, 3a, b **Unit 11 Programming**

9618/2 Specimen paper Q1c, 4
9608/21 Jun 16 Q1, 2, 3, 4, 5, 6
9608/22 Jun 16 Q1, 2, 3, 4, 5, 6
9608/23 Jun 16 Q1, 2, 3, 4, 5, 6
9608/21 Jun 17 Q1c, 2, 3, 5, 6
9608/22 Jun 17 Q1c, 2, 3, 5, 6
9608/23 Jun 17 Q1c, 2, 3, 5, 6
9608/21 Jun 18 Q1a, b, 2, 4, 6, 7
9608/22 Jun 18 Q1, 2, 5
9608/23 Jun 18 Q1, 2, 4c, 6, 7
9608/21 Nov 16 Q1c, 3, 4d, e
9608/22 Nov 16 Q3, 4, 5, 6
9608/23 Nov 16 Q3, 4e, 5
9608/21 Nov 17 Q1, 3, 5
9608/22 Nov 17 Q2, 4, 5
9608/23 Nov 17 Q3, 5

Unit 12 Software Development
9618/2 Specimen paper Q2, 6bfile
9608/21 Jun 16 Q4
9608/21 Jun 17 Q4, 6b
9608/22 Jun 17 Q4, 6b
9608/23 Jun 17 Q4, 6b
9608/21 Jun 18 Q4b
9608/22 Jun 18 Q4
9608/23 Jun 18 Q3
9608/21 Nov 16 Q1b, 4c
9608/22 Nov 16 Q1b, 4d, 5ciii
9608/23 Nov 16 Q1b, 4c, 5d
9608/21 Nov 17 Q3
9608/41 June 16 Q5a
9608/41 June 16 Q6
9608/41 Nov 16 Q1a
9608/41 Nov 16 Q4
9608/42 Nov 16 Q1a, 2
9608/41 Nov 17 Q1, 5