



## Making Progress

### GCSE Computer Science

#### Grade 9

##### To achieve grade 9 students will be able to:

- Evaluate the effectiveness of algorithms and models for similar problems
- Uses logical reasoning to explain how an algorithm works
- Design and write nested modular programs that enforce reusability, utilising sub routines wherever possible
- Appreciate the effect of the scope of a variable e.g. can't be accessed outside of its function
- Apply a modular approach to error detection and correction
- Know that processors have instruction sets and these relate to low-level instructions carried out by a computer
- Know the purpose of the hardware and protocols associated with networking computer systems
- Understand the client-server model including how dynamic web pages use server-side scripting and that web servers process and store data entered by users
- Understand the hardware associated with networking computer systems, including WANs and LANs, understands their purpose and how they work, including MAC addresses
- Understand the ethical issues surrounding the application of information technology, and the existence of legal frameworks governing its use e.g. Data Protection Act, Computer Misuse Act, Copyright etc

#### Grade 8

##### To achieve grade 8 students will be able to:

- Develop and refine a complete solution that meets the requirements of a substantial problem
- Recognise that some problems share the same characteristics and use the same algorithm to solve both
- Appreciate the need for, and writes, custom functions including the use of parameters
- Know the difference between, and uses appropriately, procedures and functions
- Detect and correct syntactical errors
- Understand the relationship between binary and electrical circuits, including Boolean logic
- Know that processors have instruction sets and that these relate to low-level instructions carried out by a computer
- Know the purpose of the hardware and protocols associated with networking computer systems
- Understand the client-server model including how dynamic web pages use server-side scripting and that web servers process and store data entered by users
- Consider the properties of media when importing them into digital artefacts
- Document user feedback, the improvements identified, and the refinements made to the solution
- Explain and justify how the use of technology impacts on society, from the perspective of social, economic, political, legal, ethical and moral issues

#### Grade 7

##### To achieve grade 7 students will be able to:

- Understand that iteration is the repetition of a process such as a loop
- Recognise that different algorithms exist for the same problem

- Understand that programming bridges the gap between algorithmic solutions and computers
- Have practical experience of a high-level textual language, including using standard libraries when programming
- Understand how numbers, images, sounds and character sets use the same bit patterns
- Perform simple operations using bit patterns e.g. binary addition
- Understand the relationship between resolution and colour depth, including the effect on file size
- Distinguish between data used in a simple program (a variable) and the storage structure for that data

## Grade 6

### To achieve grade 6 students will be able to:

- Use a range of operators and expressions e.g. Boolean, and apply them in the context of program control
- Select the appropriate data types
- Understand how bit patterns represent numbers and images
- Understand the relationship between binary and file size (uncompressed)
- Recognise ethical issues surrounding the application of information technology beyond school
- Design criteria to critically evaluate the quality of solutions, uses the criteria to identify improvements and can make appropriate refinements to the solution

## Grade 5

### To achieve grade 5 students will be able to:

- Produce a working solution that meets most requirements of a substantial problem
- Know that a procedure can be used to hide the detail with sub-solution
- Query data on one table using a typical query language
- Understand the von Neumann architecture in relation to the fetch, decode, execute cycle, including how data is stored in memory
- Recognise and understand the function of the main internal parts of basic computer architecture
- Know there is a range of operating systems and application software for the same hardware

## Grade 4

### To achieve grade 4 students will be able to:

- Know that digital computers use binary to represent all data
- Understand the difference between, and appropriately uses if and if, then and else statements
- Use a variable and relational operators within a loop to govern termination
- Design, write and debug modular programs using procedures
- Understand why and when computers are used
- Understand the main functions of the operating system
- Know the difference between physical, wireless and mobile networks

## Grade 3

### To achieve grade 3 students will be able to:

- Design solutions (algorithms) that use repetition and two-way selection i.e. if, then and else.
- Use diagrams to express solutions
- Use logical reasoning to predict outputs, showing an awareness of inputs

- Declare and assigns variables
- Know that computers collect data from various input devices, including sensors and application software.
- Understand the difference between hardware and application software, and their roles within a computer system

## **Grade 2**

### **To achieve grade 2 candidates will be able to:**

- Demonstrate limited knowledge and understanding of fundamental concepts and principles including digital systems and societal impacts
- Apply fundamental concepts, principles and mathematical skills, using basic analytical and logical computational thinking, to straightforward problems with limited accuracy
- Produce a partially working solution that meets some requirements of a substantial problem
- Use arithmetic operators, if statements, and loops, within programs
- Recognise different types of data: text, number
- Recognise that a range of digital devices can be considered a computer
- Recognise and can use a range of input and output devices

## **Grade 1**

### **To achieve grade 1 students will be able to:**

- Understand that computers need precise instructions
- Understand that programs execute by following precise instructions
- Understand that computers have no intelligence and that computers can do nothing unless a program is executed
- Use software under the control of the teacher to create, store and edit digital content using appropriate file and folder names