EGGLESCLIFFE SCHOOL AND SIXTH FORM COLLEGE

CRUCIAL KNOWLEDGE

What I will know and understand this term

This term in Computer Science we will be learning about

	Grade 7-9	Grade 5-6	Grade 4	Grade 1-3
KNOWLEDGE	• Know why hexadecimal numbers are used • Understand the relationship between logic circuits and computer algorithms • Understand the considerations that underpin decisions relating to hardware choices	• Know what is meant by hexadecimal numbers • Recognise logic gates based on their truth tables, diagrams and algebraic symbols • Know the different components within the CPU • Know the basic principles of different storage technologies	• Know the order of units for data storage • Know what a truth table is when looking at logic gates • Know the difference between RAM and ROM • Know the meaning of the words sequence, selection and iteration	• Know that binary numbers use 0s and 1s • Know the names of some units of data storage • Know the names of different logic gates • Know the names of some internal components • Know the names of at least two different data types
SKILLS&APPLICATION	• Be able to convert between hexadecimal, binary and denary numbers • Be able to build a logic circuit to solve a real-world problem • Be able to advise others on appropriate hardware choices in a range of scenarios • Be able to design, build and test complex programs that solve real-world problems • Be able to identify and solve a wide range of errors including both syntax and logic errors	• Be able to convert between hexadecimal and binary numbers • Be able to create a truth table based on a logic circuit of up to 3 logic gates • Be able to compare storage technologies • Be able to write programs that use multiple conditions • Be able to create a program without the aid of a flowchart or other detailed description of an algorithm • Be able to test programs fully, using both valid and invalid data	• Be able to convert 8-bit binary numbers to denary • Be able to create a truth table based on a logic gate • Be able to describe the factors that affect CPU performance • Be able to predict the outcome of a program that uses selection • Be able to use selection in a program • Be able to convert between different data types • Be able to convert between a flowchart and a simple program	• Be able to convert 4-bit binary numbers to denary • Be able to recognise logic gates based on their diagrams • Be able to state the purpose of a CPU • Be able to predict the outcome of a simple program • Be able to use print() and input() statements to create simple programs in Python • Be able to use simple arithmetic operations in Python

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	Grade 7-9	Grade 5-6	Grade 4	Grade 1-3
KNOWLEDGE	• Understand the significance of all 5 purposes of an operating system • Understand how to design and build a network to meet specific criteria • Understand how loops can be used to improve the efficiency and reusability of computer programs	• Understand the role of memory management in an operating system • Know the names and purposes for 5 different network devices • Understand factors relating to wifi reliability • Know when to use a FOR loop and when to use a WHILE loop • Know the key rules for completing trace tables	• Know all 5 purposes of an operating system • Know the features of LANS and WANS • Know the features of star and mesh networks • Recall the correct syntax for a FOR loop and a WHILE loop • Know what a trace table is	• Know the main purpose of an operating system • Know some advantages and disadvantages for using networks • Know some advantages and disadvantages for wired vs wifi connections • Identify the difference between a FOR and a WHILE loop
SKILLS&APPLICATION	• Be able to justify decisions about a range of network design decisions • Be able to create complex programs that uses multiple, nested loops to solve real-world problems • Be able to trace programs to identify and fix a range of logic errors • Be able to consistently validate inputs in order to produce programs with effective user interfaces	• Be able to explain when a LAN or WAN would be most appropriate • Be able to explain the pros and cons of star and mesh networks • Be able to create a program that uses a FOR loop without the aid of a flowchart or pseudocode • Be able to create a program that uses a WHILE loop without the aid of a flowchart or pseudocode • Be able to use a trace table to identify logic errors	• Be able to justify the expense of installing a network • Be able to create a program that uses a FOR loop based on a flowchart or pseudocode • Be able to create a program that uses a WHILE loop based on a flowchart or pseudocode • Be able to create a flowchart that uses loops • Be able to complete a simple trace table with reasonable accuracy	• Be able to state whether to use a wired or wifi network • Be able to predict the outcome of running a program that uses a loop • Be able to identify obvious syntax errors in programs that include the use of loops • Be able to state the value of a variable at a given point in a program

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	Grade 7-9	**Grade 5-6**	**Grade 4**	**Grade 1-3**
KNOWLEDGE	• Know the importance of providing a balanced argument that considers a range of viewpoints and consequences • Know that benefits and drawbacks of specific searching and sorting algorithms	• Know what the word stakeholders means and that different computing issues have different stakeholders • Know the basic steps in at least 2 searching algorithms • Know the basic steps in at least 2 sorting algorithms	• Know what is meant by ethical, legal, cultural and environmental consequences • Know what each computing law covers • Know the names of at least 2 searching and at least 2 sorting algorithms	• Know of at least 3 different laws relating to computing • Know that data can be stored in a list • Know that lists can be searched • Know that lists can be sorted into an order
SKILLS&APPLICATION	• Can consider the consequences for a wide range of computing issues in terms of moral, environmental, legal and cultural considerations • Can create programs to carry out a linear search and a binary search • Can create programs to carry out a bubble sort and an insertion sort	• Can identify a range of stakeholders for a given scenario • Can demonstrate the steps in a linear search and a binary search for a specific value • Can demonstrate the steps in a bubble sort and a merge sort for a specific value	• Can match a specific law to its aims • Can use a loop to step through a list, e.g. to find a total or an average • Can follow a simple algorithm to perform a search • Can follow a simple algorithm to perform a sort	• Can use Python code to find a value in a list • Can use Python code to change a value in a list • Can predict the outcome of searching a list • Can predict the outcome of sorting a list

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	Grade 7-9	Grade 5-6	Grade 4	Grade 1-3
KNOWLEDGE	• Understand how check digits can be used to ensure that data is valid • Know what metadata is, and what metadata might typically be stored within a file • Understand the difference between lossy and lossless compression • Explain how cache and RAM size affect CPU performance	• Know what is meant by overflow and underflow in binary addition and binary shifts • Know how images and sounds can be stored using binary numbers • Know what cache and Virtual Memory refer to • Know the range of values that can be stored in ASCII, extended ASCII and Unicode	• Know how to add 2-digit binary numbers • Know what is meant by a binary shift • Know that images are made up of pixels • Know that FDE stands for the Fetch-Decode-Execute cycle	• Know how to add single-digit binary numbers • Know what is meant by a character set • Know that images and sounds can be stored as binary • Know that compression is about reducing file size
SKILLS&APPLICATION	• Can plan and create programs that make use of a range of encryption techniques • Can use subroutines, including parameter passing and return statements • Can make effective use of file handling techniques to read, write and append to files • Can create, populate, interrogate and carryout data analysis on 2D arrays	• Can carry out a range of binary arithmetic tasks, including the identification of overflow and underflow • Can plan and create programs to carry out one or more encryption algorithms • Can create individual subroutines to make programs easier to write and to follow • Can create programs that use file handling techniques • Can interrogate a 2D array to extract meaningful data	• Can add binary numbers with reasonable accuracy • Can carry out binary shifts with reasonable accuracy • Can plan and create sections of code that can help carry out encryption algorithms • Can describe the functionality of a subroutine and identify the key syntax elements • Can adapt existing code to open text files for reading and writing	• Can predict the outcome of running a program that uses a subroutine • Can manually carry out simple encryption techniques, such as the Caesar Cipher • Can recognise Python code involved with file handling

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	Grade 7-9	Grade 5-6	Grade 4	Grade 1-3
KNOWLEDGE	• Understand why users might require different storage devices for a wide range of scenarios • Understand the processes of fragmentation and defragmentation • Understand the concept and advantages of using layered protocols	• Know the benefits and drawbacks of a range of storage devices and technologies • Know the difference between types of backup • Understand the process and purpose of DNS • Know which protective measures are designed to prevent which threats	• Accurately identify the storage technology used by different devices • Know the purpose of at least 2 different software utilities • Know what is meant by client-server and peer-peer network • Identify at least 2 protective measures against threats	• Can identify the three different types of storage technology • Can name at least 3 different software utilities • Know what is meant by a protocol • Identify at least 2 different security threats
SKILLS&APPLICATION	• Be able to design, code, test and correct complex programs, using a wide range of programming techniques • Be able to decompose a problem into subprograms, and implement these, making use of parameter passing and return statements with a high level of accuracy • Complete trace tables for complex programs, using this technique to identify and correct errors and inefficiencies within the code	• Be able to complete trace tables for simple programs • Be able to identify and correct errors in existing programs • Be able to create programs that make use of subroutines • Be able to independently identify and implement validation techniques to ensure that code is effective	• Be able to accurately predict the outcome of complex programs • Be able to identify a range of syntax and logic errors in existing programs • Be able to create simple programs, without support from pseudocode or flowcharts • Be able to apply basic validation techniques on data entry	• Be able to accurately predict the outcome of simple programs • Be able to identify basic errors in existing programs • Be able to create simple programs, with support from pseudocode or flowcharts • Be able to identify areas where input validation might be possible