



Computing Year 10 Fundamentals

Knowledge	Skills
Algorithms	Aware of: <ul style="list-style-type: none"> • Computational Thinking (Abstraction, decomposition, pattern recognition and algorithmic thinking) • Standard Searching Algorithms (linear and binary search) • Standard Sorting Algorithms (bubble, merge and insertion) • Pseudocode • Flow Charts • Interpretation of Algorithms
Programming Techniques	<ul style="list-style-type: none"> • Use of variable constants, operators, inputs, outputs and assignments • Use of sequence, selection and iteration in the program • Use of basic string manipulation • Use of basic file handling operations (open, read, write & close) • Using records to store data • SQL to search for data • Use of Lists (1D & 2D) when solving problems • Structuring code using functions and procedures • Use of data types and casting • Common arithmetic and Boolean operators
Producing Robust Programs	<ul style="list-style-type: none"> • Defensive design considerations (input sanitisation, validation, planning for contingencies, anticipating misuse, authentication) • Maintainability (comments and indentation) • Purpose of iterative testing • Purpose of final testing • Identifying syntax and logic errors • Selecting and using suitable test data
Computational Logic	<ul style="list-style-type: none"> • Why data is represented in computer systems in binary form • Logic Diagrams using AND, OR & NOT • Combining Boolean operators using AND, OR and NOT • Applying logical operators in appropriate truth table to solve problems • Applying computing-related mathematics (arithmetic, exponentiation MOD & DIV)
Translators and Facilities of Languages	<ul style="list-style-type: none"> • Characteristics and purpose of different level languages including low level languages • The purpose of translators • The characteristics of an assembler, compiler, and interpreter • Common tools and facilities available in integrated development environments (IDEs) (editors, error diagnostics, run-time environment & translators)



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Data Representation

- Bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte.
- Converting to binary format to be processed by a computer
- Convert positive denary whole numbers (0-255) to 8-bit binary and vice-versa
- Add two 8-bit integers and explain overflow errors which may occur
- Binary shifts
- Convert positive denary whole numbers (0-255) to 2 digit hexadecimal numbers and vice-versa
- How to convert from binary to hexadecimal and vice-versa
- Check digits
- Using binary codes to represent characters
- Define the term 'character set'
- Explain the relationship between the number of bits per character in a character set and the number of characters which can be represented (eg ASCII, extended ASCII and Unicode)
- Explain how an image is represented as a series of pixels represented in binary
- Explain how meta data is included in a file
- Explain how colour depth and resolution affect file size for an image
- Explain how sound can be sampled and stored in digital form
- Explain how sampling intervals and other factors affect the size of a sound file and the quality of its playback (sample size, bit rate, sampling frequency)
- Explain the need for compression
- Define and explain the difference between lossy and lossless compression