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| **Year 12 Term 3****A Level Computer Science** | Our mission is to stimulate and challenge our students to excel and provide a desire for lifelong learning and pursue careers in the world of Business, Computing, and ICT. |
| **Enquiry Questions: What is the largest figure you can hold in your bank account on a computer? Can there be a third state in logic circuits?** |
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| **Component 01: Computer Systems**This component will introduce learners to the internal workings of the Central Processing Unit (CPU), the exchange of data and will also look at software development, data types and legal and ethical issues. It is expected that learners will draw on this underpinning content when studying computational thinking, developing programming techniques and devising their own programming approach in the Programming project component (03 or 04). Learners will be expected to apply the criteria below in different contexts including current and future uses of the technologies. |

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| **Knowledge**Students will know about… | **Application/Skills**Students will be able to… | **Vocabulary** | **Home Learning** | **Assessment** | **Extra Resources****Extended Reading** | **Cultural Capital** |
| **1.4 Representing Data****1.4.1 Primitives**There are many different types of data and many ways in which data can be organised. In this section, students will consider data types and data structures. You will also be introduced to abstract data types.**1.4.3 Logic**Students will study more complex logic gates, although all circuits can ultimately be derived from the combination of a small subset of basic gates. Using a formal notation for describing the combination of logical operations will allow students to apply standard rules to simplify complex Boolean expressions. You will explore some standard circuits in detail, such as a full adder, which allows arithmetic addition, and a D-type flip-flop circuit, which is a very basic unit of memory.  | * represent positive integers in binary
* use sign and magnitude and two’s complement to represent negative numbers in binary
* add two unsigned binary numbers
* represent positive numbers in hexadecimal
* convert between denary, binary and hexadecimal number systems

• normalise negative floating point numbers* Complete a truth table for a given logic gate circuit
* Represent and solve a problem using Boolean logic
* Use de Morgan’s laws to manipulate and simplify Boolean expressions
* Simplify an expression using a Karnaugh map
* Draw the logic circuit for a half adder
* Give the output from a series of connected D type flip flops
 | * Integer, Real
* Character, String
* Boolean
* Unsigned
* Signed
* Sign & Magnitude
* Two's compliment
* Fixed point
* Floating point
* Mantissa, Exponent
* Placing binary point
* Floating point limits
* Normalising Floating point
* Floating point addition/subtraction
* Bit manipulation
* Left/right shift
* Circular shift
* AND, OR, XOR applied
* ASCII
* Extended ASCII
* Unicode
* Hexadecimal
* Boolean algebra expressions
* NOT OR NOT operations
* XOR operation
* Expressions
* Combining gates
* Karnaugh Maps
* Simplification
* De Morgan's Theorems
* Adders
* Half Adder
* Full Adders
* Cascading
* Overflow
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