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| **YEAR 12 A LEVEL COMPUTER SCIENCE AUTUMN TERM 1 – PAPER 2**  **‘An ambitious curriculum that meets the needs of all’**  **Medium Term Planning – Python Programming Techniques** | |
| **Curriculum Intent** | **Pupils will be taught the following National Curriculum guidelines this term:**  **At the end of this Unit all students should be able to:**   * use an IDE to develop and debug a program * describe the use of an IDE to check for syntax errors * explain the difference between a variable and a constant * write a pseudocode solution for a simple problem involving iteration and selection (branching) * use nested selection and iteration statements * use arithmetic operations and Boolean operations NOT, AND and OR   **Most students will be able to:**   * describe features of an IDE which are useful in developing and debugging a program * write a pseudocode solution for a problem involving iteration and selection (branching) * determine the output from a pseudocode program * construct algorithms using two-dimensional arrays   **Some students will be able to:**   * write complex algorithms involving sequence, selection, iteration and arrays |
| **Skills/Assessment Objective Links** |
| **Numeracy** | Arithmetic, BIDMAS, Comparison operators |
| **Literacy** | **Vocabulary Tier 3:**  Integrated Development Environment (IDE), syntax errors, logic errors, debug, watch, breakpoint, trace algorithm, structured programming, data type, variables, constants, assignment, arithmetic operations, Boolean operators, sequence, selection, branching, definite and indefinite iteration, top down design, modular programming, subroutine, procedure, function, parameter, argument, pass by value, pass by reference, global and local variables, recursion, object oriented programming, class, object, method, attribute, inheritance, encapsulation, polymorphism  **Vocabulary Tier 2:** code, program, arithmetic  **Reading:** Worksheets, presentations, answer sheets, exam questions, mark scheme, further reading for homework, conduct research for NEA  **Writing**: Answer on the worksheet via word, complete NEA  **Oracy: L**istening and using tier 3 words |
| **Becoming future ready** | **Careers/Employability:**  Understand the grade requirements at universities and the topics that can be applied for. Explore apprenticeship opportunities with a range of industries.   * Software Architect. * Data Scientist. * Machine Learning Engineer. * Blockchain Developer * Cybersecurity Engineer. * Cloud Solutions Architect. * AI Research Scientist. * Full-Stack Developer. |
| **Adaptation** | Throughout this topic, quality first teaching will provide differentiation:  **By product:** Learners are asked to present outcomes writing different code, not all code will be equal in style and sophistication, all code will work with teachers input, top end programmers will be set challenges on how to extend code and be expected to conduct a level of independent research  **By resource:** Worksheets are well presented and accessible. Instructions are clearly outlined and separate from the information so that pupils know where to begin and end. Handouts are differentiated by outcome. Resources used will appeal to the range of preferred learning styles of pupils e.g. visual, auditory or kinesthetic learners. Scaffolding of tasks – word frames.  **By Intervention:** By providing different levels of supervision and support depending on coding ability  **By Progressive Questioning:** Exploring pupils’ understanding of programming by setting adaptive challenges  **By Grouping:** According to coding ability, prior attainment, gender, social preference, preferred learning style.  **By Task:** Pupils identify targets which are meaningful via level of coding ability  **By Offering Optional Activities**: In class or as homework, to extend learning.  This QFT/SEND provision will be explicit within the lesson by lesson schemes of work. |
| **QFT/SEND Provision** |
| **Implementation**  **Curriculum Delivery** | To be able to:  **Topic 1 Programming Basics**  Be familiar with the use of an IDE to develop and debug a program  Define what is meant by an algorithm and pseudocode  Learn how and when different data types are used  Learn the basic arithmetic operations available in a typical programming language  Write pseudocode solutions to simple problems  **Topic 2 Concurrent Processing**  Determine which parts of a program can be tackled at the same time  Determine the benefits and trade offs of concurrent processing  **Topic 3 Selection**  Use relational operators  Use Boolean operations AND, OR, NOT  Use the switch/case statement for selection  Use nested selection statements  **Topic 4 Iteration for and while**  Be able to use counter controlled (for) loops  Write code using for loops  Understand when and why to use for loops  Be able to use condition controlled (while) loops  Write code using while loops  Understand when and why to use while loops  **Topic 5 Arrays and Sorting Arrays**  Understand why lists and arrays are useful  Be able to read and edit data in a list  Know how to declare and append to a list  Understand why you might want to sort a list  Know how to sort a list using Python  Be able to use other functions with lists  **Topic 6 Two Dimensional Arrays**  Understand the nature of a 2D list  Be able to use a 2D list to solve a problem  Be able to read from a 2D list  Be able to add to a 2D list  Programing end of unit assessment |
| **Learning Outcomes (Knowledge)** |
| **Current learning to be developed in the future within:** | Functions, procedures, regular expressions |
| **Assessment** | See assessment maps for formative and summative assessment opportunities. |
| **Impact** | Review assessment results and target pupils that require further support via:-   * Learning conversation * Changing seating plan * Plan lessons to address areas of concern in assessment * Targeted homework based on low performance areas identified in the assessment and marked pieces * Stretch and challenge high ability pupils by identifying ambitious next steps to expand knowledge   Create a feedback sheet for each student  Each student identifies areas of Green, Amber and Red using Mark Assessment on their feedback sheet  Complete NOW task on areas identified as Amber and Red |

