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| **Computer Systems** |

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| Topic | Concept | Red | Amber | Green |
| Data Representation | Describe and exemplify the use of binary to represent positive integers. |  |  | x |
| Describe floating point representation of positive real numbers using the terms mantissa and exponent. |  | x |  |
| Convert from binary to denary and vice-versa. |  |  | x |
| Describe extended ASCII code (8-bit) used to represent characters. | x |  |  |
| Describe the vector graphics method of graphic representation for common objects: rectangle, ellipse, line, polygon with attributes:co-ordinates, fill colour, line colour | x |  |  |
| Describe the bit-mapped method of graphics representation. | x |  |  |
| Computer Structure | Describe the purpose of the basic computer architecture components and how they are linked together: processor (registers, ALU, control unit), memory locations with unique addresses, buses (data and address) | x |  |  |
| Explain the need for interpreters and compilers to translate high level program code to binary (machine code instructions). | x |  |  |
| Environmental Impact | Describe the energy use of computer systems, the implications on the environment and how these could be reduced through: settings on monitors, power down settings, leaving computers on standby | x |  |  |
| Security Precautions | Describe the role of firewalls. |  | x |  |
| Describe the use made of encryption in electronic communications. | x |  |  |

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| **Database Design and Development** |

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| Topic | Concept | Red | Amber | Green |
| Analysis | Identify the end-user and functional requirements of a database problem that relates to the implementation at this level. | x |  |  |
| Design | Describe and identify the implications for individuals and businesses of the UK General Data Protection Regulation (UK GDPR) that data must be: processed lawfully, fairly and in a transparent manner in relation to individuals; used for the declared purpose only limited to the data needed for the declared purpose; accurate; not kept for longer than necessary; held securely | x |  |  |
| Describe and exemplify entity-relationship diagrams with two entities indicating: entity name; attributes; relationship (one-to-many) | x |  |  |
| Describe and exemplify a data dictionary: entity name; attribute name; primary and foreign key; attribute type: (text, number, date, time, Boolean); attribute size; validation: (presence check, restricted choice, field length, range) | x |  |  |
| Exemplify a design of a solution to the query: multiple tables; fields; search criteria; sort order | x |  |  |
| Implementation | Implement relational databases with two linked tables, to match the design with referential integrity. | x |  |  |
| Describe, exemplify and implement SQL operations for pre-populated relational databases, with a maximum of two linked  Tables: select: (from, where with AND, OR, <, >, =, order by with a maximum of two fields); insert; update; delete; equi-join between tables | x |  |  |
| Read and explain code that makes use of the above SQL. | x |  |  |

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| **Database Design and Development** |

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| Topic | Concept | Red | Amber | Green |
| Testing | Describe and exemplify testing: SQL operations work correctly at this level | x |  |  |
| Evaluation | Evaluate solution in terms of: fitness for purpose; accuracy of output | x |  |  |

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| **Web Design and Development** |

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| Topic | Concept | Red | Amber | Green |
| Analysis | Identify the end-user and functional requirements of a website problem that relates to the design and implementation at this level. | x |  |  |
| Design | Describe and exemplify the website structure with a home page, a maximum of four linked multimedia pages, and any necessary external links |  | x |  |
| Describe, exemplify and implement, taking into account end-user requirements, effective user-interface design (visual layout and readability) using wire-framing: navigational links; consistency across multiple pages; relative vertical positioning of the media displayed; file formats of the media (text, graphics, video, and audio) | x |  |  |
| Describe and identify the implications for individuals and businesses of the Copyright, Designs and Patents Act 1988 relating to:  web content (text, graphics, video, and audio) | x |  |  |
| Compare a range of standard file formats:  audio WAV and MP3 in terms of compression, quality, and file size bit-mapped graphic JPEG, GIF, and PNG in terms of compression, animation, transparency, and colour depth | x |  |  |

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| **Web Design and Development** |

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| Topic | Concept | Red | Amber | Green |
| Design | Describe the factors affecting file size and quality, relating to resolution, colour depth, and sampling rate. |  |  |  |
| Describe the need for compression |  |  |  |
| Describe, exemplify and implement prototyping (low-fidelity) from wireframe design at this level. | x |  |  |
| Implementation (CSS) | Describe, exemplify and implement internal and external Cascading Style Sheets (CSS): selectors, classes and IDs; properties including text: (font (family, size); color; alignment) and background colour |  | x |  |
| Read and explain code that makes use of the above CSS. |  | x |  |
| Implementation (HTML) | Describe, exemplify and implement HTML code: HTML; head; title; body; heading; paragraph; DIV; link; anchor; IMG; audio; video; lists (ol, ul and li) |  | x |  |
| Describe and implement hyperlinks (internal and external), relative and absolute addressing |  | x |  |
| Read and explain code that makes use of the above HTML. |  | x |  |
| Implementation (Javascript) | Describe and identify Javascript coding related to mouse events: Onmouseover; Onmouseout | x |  |  |
| Testing | Describe and exemplify testing: matches user-interface design; links and navigation work correctly; media (such as text, graphics, and video) display correctly; consistency | x |  |  |
| Evaluation | Evaluate solution in terms of: fitness for purpose | x |  |  |

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| **Software Design and Development** |

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| Programming Language Used |  |

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| Topic | Concept | Red | Amber | Green |
| Development methodologies | Describe and implement the phases of an iterative development process: analysis, design, implementation, testing, documentation, and evaluation, within general programming problem-solving. |  | x |  |
| Analysis | Identify the purpose and functional requirements of a problem that relates to the design and implementation at this level, in terms of: inputs; processes; outputs |  | x |  |
| Design | Identify the data types and structures required for a problem that relates to the implementation at this level. |  | x |  |
| Describe, identify, and be able to read and understand: structure diagrams; flowcharts; pseudocode |  |  | x |
| Exemplify and implement one of the above design techniques to design efficient solutions to a problem |  | x |  |
| Describe, exemplify, and implement user-interface design, in terms of input and output, using a wireframe |  | x |  |
| Implementation (Data Types and Structures) | Describe, exemplify, and implement appropriately the following data types and structures: character; string; numeric (integer and real); Boolean; 1-D arrays |  | x |  |
| Implementation (Algorithm Specification) | Describe, exemplify, and implement standard algorithms: | x |  |  |
| input validation |  | x |  |
| running total within loop |  | x |  |
| traversing a 1-D array | x |  |  |

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| **Software Design and Development** |

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| Topic | Concept | Red | Amber | Green |
| Implementation (Computational Constructs) | Describe, exemplify, and implement the appropriate constructs in a high-level (textual) language: |  | x |  |
| expressions to assign values |  |  | x |
| expressions to return values using arithmetic operations (addition, subtraction, multiplication, division, and exponentiation) |  |  | x |
| expressions to concatenate strings |  | x |  |
| selection constructs using simple conditional statements with <, >, ≤, ≥, =, ≠ operators |  |  | x |
| selection constructs using complex conditional statements |  | x |  |
| logical operators (AND, OR, NOT) |  |  | x |
| iteration and repetition using fixed and conditional loops |  |  |  |
| predefined functions (with parameters): random; round; length |  |  |  |
| Read and explain code that makes use of the above constructs. |  |  |  |
| Testing | Describe, identify, exemplify, and implement normal, extreme, and exceptional test data for a specific problem, using a test table. |  |  |  |
| Describe and identify syntax, execution, and logic errors. |  |  |  |
| Evaluation | Describe, identify, and exemplify the evaluation of a solution in terms of: fitness for purpose; efficient use of coding constructs; robustness; readability: (internal commentary; meaningful identifiers; indentation; white space) |  |  |  |