Section A: Computational Thinking and Problem Solving – Paper 1

1. **Computational Thinking Techniques**
    - Key terms:
        - **Decomposition**: Breaking a problem into smaller parts.
        - **Abstraction**: Removing unnecessary details to focus on the core problem.
        - **Evaluation**: Assessing the solution's effectiveness.
    - Benefits of using subprograms:
        - Reusability and modular design.
        - Simplifies debugging and maintenance.
2. **Algorithms**
    - Reading and interpreting pseudocode.
    - Identifying loops (condition-controlled and count-controlled) and selection structures.
    - Sorting and searching algorithms:
        - **Binary search** (divide and conquer).
        - **Bubble sort** (comparison-based).
    - Efficiency in algorithms:
        - Impact of the number of comparisons on sorting execution time.
3. **Error Types in Programming**
    - Syntax errors: Violations of programming language rules.
    - Runtime errors: Errors during
    - execution, such as division by zero or accessing out-of-bounds array elements.
4. **Operators**
    - Arithmetic and relational operators.
    - Understanding modulus (//) and integer division.

Section B: Data Representation and Manipulation

5. ASCII and Unicode
    - ASCII:
        - Uses 7 or 8 bits to represent characters.
        - How ASCII codes correspond to characters (e.g., code 65 = 'A').
    - Unicode and its expanded range for global characters.
6. Binary Operations
    - Logical and arithmetic shifts.
    - Overflow errors: Results requiring more bits than available.
    - Binary conversions:
        - Positive integers to binary.
        - Two's complement for negative integers.
7. Sound and Image Representation
    - Sound:
        - Concepts of sampling intervals and resolution.
    - Images:
        - Calculating image size:
            - Size=Width×Height×Color depth\text{Size} = \text{Width} \times \text{Height} \times \text{Color depth}Size=Width×Height×Color depth.
8. Units of Measurement
    - Data size conversions:
        - Bytes to tebibytes (1 TiB=240 bytes1 \text{ TiB} = 2^{40} \text{ bytes}1 TiB=240 bytes).
    - Addressing limitations:
        - E.g., an 8-bit address bus can access 28=2562^8 = 25628=256 addresses.

Section C: Networks

9. **Network Types**
    - Local Area Network (LAN) and Wide Area Network (WAN).
    - Characteristics of wireless networks:
        - Signal range and interference.
10. **Network Topologies**
    - Disadvantages of bus networks:
        - Single point of failure.
        - Reduced performance with high traffic.
11. **Security**
    - Penetration testing:
        - Identifying vulnerabilities by simulating attacks.

Revision Resources

1. BBC Bitesize - Computer Science
2. W3Schools - Algorithms
3. Khan Academy - Computing
4. GCSEPod - Computer Science
5. Teach-ICT - GCSE Resources