Topic 19: Computational Thinking and Problem-Solving

Keyword sheet - Cambridge AS & A Level Computer Science 9618. Tick each term once you can define it from memory.

Keyword	Definition	Know it?
Linear search / binary search	Check each item in turn, O(n) / halve a sorted list repeatedly, O(log n).	
Insertion sort / bubble sort	Both O(n^2) in the worst case; insertion sort is efficient on nearly sorted data.	
Stack (ADT)	LIFO; operations push, pop, peek, isEmpty, isFull.	
Queue (ADT)	FIFO; operations enqueue, dequeue, isEmpty, isFull.	
Circular queue	Array-based queue where pointers wrap around to reuse space.	
Linked list	Nodes linked by pointers; head pointer; insertion and deletion without shifting data.	
Binary tree	Each node has up to two children; binary search tree stores ordered data.	
Tree traversal	Pre-order, in-order (sorted output for a BST), post-order.	
Dictionary (ADT)	Collection of key-value pairs with look-up by key.	
Graph representation	Adjacency matrix (2D array) or adjacency list.	
Big O notation	Describes worst-case growth of time or space requirements with input size n.	
Common complexities	O(1) constant, O(log n), O(n), O(n log n), O(n^2), O(2^n).	
Recursion	A subroutine that calls itself until a base case is reached.	
Base case / general case	Condition that stops recursion / part that calls itself with a simpler problem.	
Stack overflow	Call stack exhausted by too many recursive calls.	
Recursion vs iteration	Recursion: concise but uses more memory; iteration: efficient but may be less clear.	