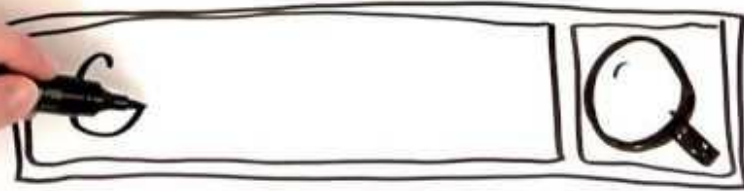


APCSP Exam Terms & Concepts

Coding & Algorithm

Algorithm

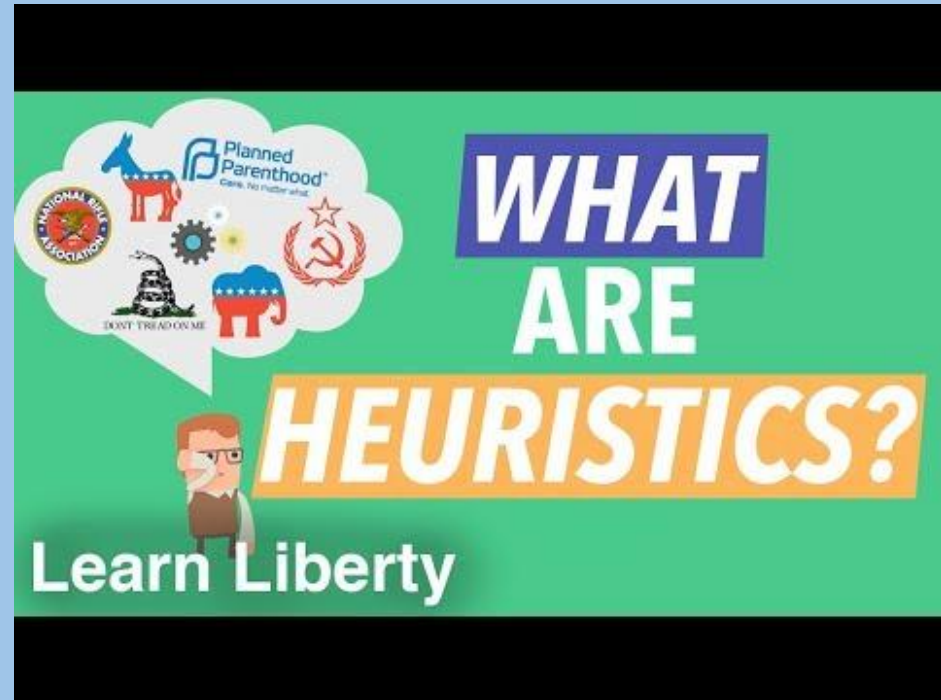
- A precise sequence of instructions for processes that can be executed by a computer and are implemented using programming languages
- In computer programming it can include operators like $+$, $-$, $*$, $/$



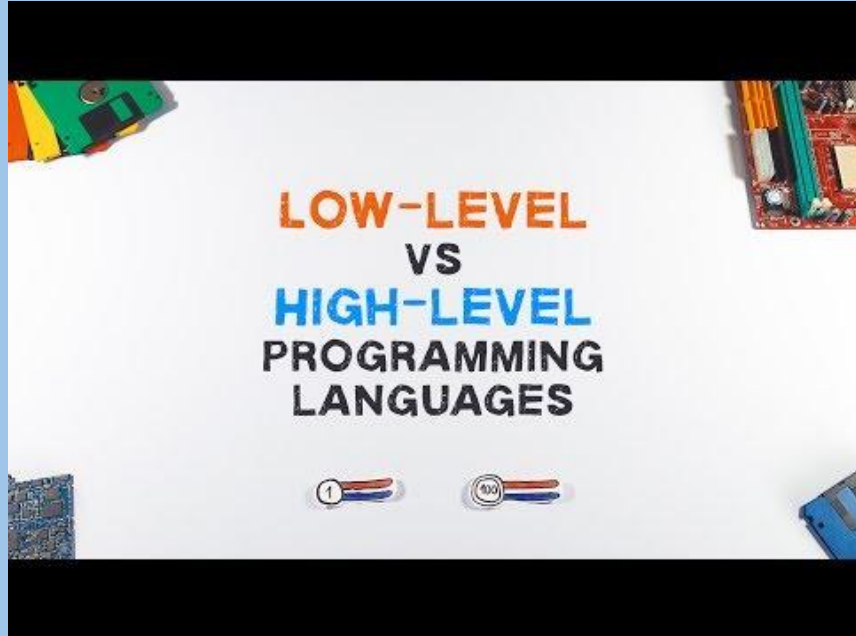
Heuristic Algorithm

- One that is designed to solve a problem in a faster and more efficient fashion than traditional methods by sacrificing optimality, accuracy, precision, or completeness for speed
- Solutions are close to the best one but does not guarantee to be the best solutions

<https://studio.code.org/s/csp2/stage/2/puzzle/1>



Low Level Programming Language



- A programming language that captures only the most primitive operations available to a machine. Anything that a computer can do can be represented with a combinations of low commands
 - Language that a machine can process, ie. binary
 - Does not need a compiler or interpreter
-

High Level Programming Language



- A programming language with many commands and features designed to make common tasks easier to program. Any high level functionality is encapsulated as combinations of low level commands.
 - Any languages that human can process like Python, Java, C, etc...
 - Needs a compiler and interpreter
-

Sequencing

- Putting commands in correct order so computers can read the commands (or follow the algorithm)



Selection

- A generic term for a type of programming statement (usually an if-statement) that uses a Boolean condition to determine, or select, whether or not to run a certain block statements



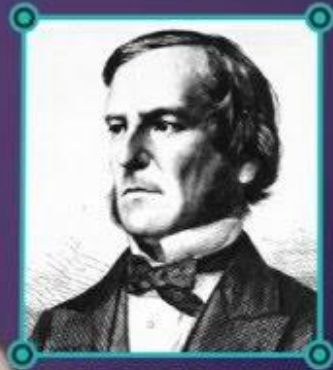
Conditionals

- If, then
- If, else
- $>$, $<$, $=$
- Booleans



Booleans Expression

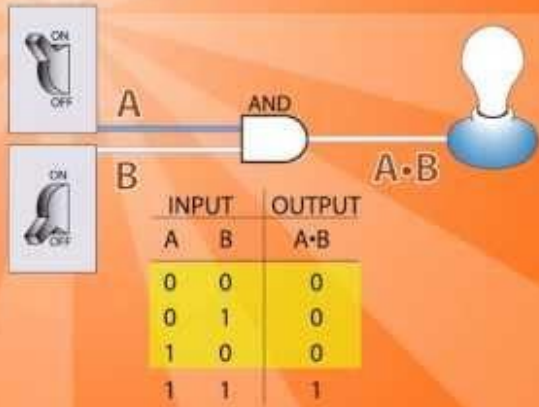
- True/False
- $<$, $>$, $=$
- $<=$, $>=$, $==$



GEORGE BOOLE

[illegible]

Logic Gates



- Use logical operators (AND, OR, NOT)
- Which task should be executed and when

Overflow

- Occurs when a computer attempts to handle a number that is too large for its capacity

Binary:
Overflow

| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

4

Abstraction

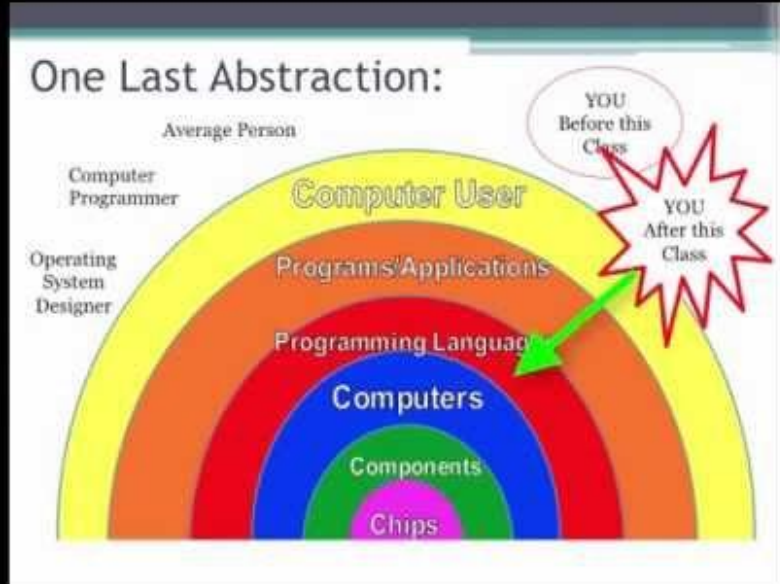
FOCUS ON WHAT IS IMPORTANT



- Hiding the details of your code
- A simplified representation of something more complex.
- Helps you to hide details to manage complexity, focus on relevant concepts, and reason about problems at a higher level.

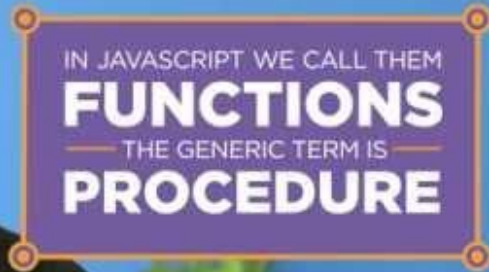
<https://studio.code.org/s/csp3/stage/5/puzzle/6>

Levels of Abstraction



Function

- A named group of programming instructions
- Functions are reusable abstractions that reduce the complexity of writing and maintaining programs



Parameter



- An extra piece of information that you pass to the function to customize it for a specific need
 - Parameter must have a name and input pass through the parameter must be of a datatype (usually a number)
 - A level of abstraction
-

Callback Function



- Is a function passed into another function as an argument, which is then invoked inside the outer function to complete an action

Concatenation

- Combining values, usually strings, together

| | | | | | |
|--|----------------|----------------|--|--------------------|-------------|
| CONCATENATE(text_string1,text_string2...) | | | | | Howcast.com |
| <u>ue 1</u> | <u>Value 2</u> | <u>Value 3</u> | | <u>Concatenate</u> | |
| A | B | C | | ABC | |
| 1 | 2 | 3 | | | |
| 4.5 | 7.1 | 8.2 | | | |
| | | | | | |
| | | | | | |
| tes | | | | | |
| a full reference guide on all the different rules and syntax, search for | | | | | |
| | | | | | |
| | | | | | |

Datatype

- Number (floats & integers)
- String
- Images
- Booleans
- (Lists)



Variable



data

- A variable can store any datatype
- Usually have a name
- And gets an assignment value as input
- Global & Local variables
- Global var can be accessed by the entire program
- Local var can only be accessed by specific function or block in which it was declared

Variable Reassignment

**VARIABLE
RE-ASSIGNMENT**



- A place to store information or data
 - A variable can store any datatype
 - Usually have a name
-

List



- A way to give a name to a collection of values or elements
 - The elements in the list can be of any datatype
-

Iteration



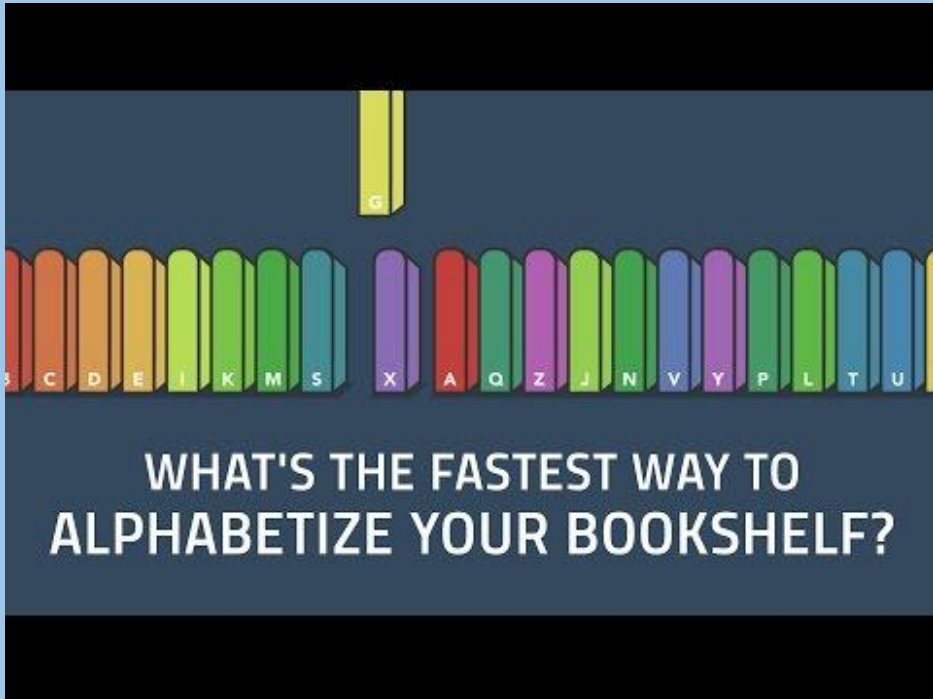
- Looping a function
 - Calling a function over and over again
 - Fixed loop (repeat 10)
 - Infinite loop (forever)
 - For loop
-

Loops



- Ways of repeating an algorithm, a function, or an abstraction
 - For loop
 - While loop
 - Do while loop
 - For each loop
 - Repeat (times) loop
 - Repeat forever loop
-

Sorting Algorithms



- Quick Sort
- Bubble Sort
- Insertion Sort

Linear Search

OCR

GCSE

COMPUTER
SCIENCE

2.1

**LINEAR
SEARCH**



- A method for finding an element in an unsorted list by sequentially checking every element on the list
- Time-consuming and expensive

Binary Search

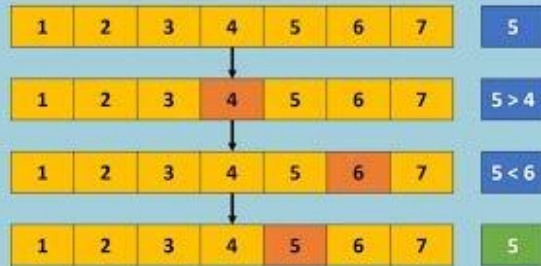
OCR

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2.1

**BINARY
SEARCH**



- A method for finding an element in a sorted list by continually calculating the midpoint of the list and compare the targeted element to the half lists
- More efficient compare to the Linear Search

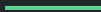
Top Down Design

- A problem solving approach (also known as stepwise design) in which you break down a system to gain insight into the sub-systems that make it up



Documentation

- A description of behavior of a command, function, library, API, etc...



Hexadecimal

Understanding
Binary
And
Hexadecimal

| | | | |
|---|---|---|---|
| | 1 | 0 | 1 |
| | 0 | 1 | 0 |
| B | A | D | |
| A | 5 | 5 | |
| | 1 | 0 | 1 |
| | 0 | 1 | 0 |

- Hiding the details of your code

Library

- A collection of commands/functions, typically with a shared purpose



Pseudocode & Flowchart

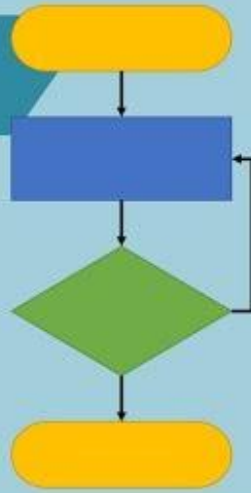
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2.1

PSEUDOCODE &
FLOW DIAGRAMS



- Simplified programming language that helps us to plan out our algorithms

Algorithmic Efficiency

A graphic featuring the text "Big O" in a large, white, sans-serif font. The text is set against a dark blue background with a network of white dots connected by thin white lines, resembling a graph or a neural network. The lines and dots extend across the background, creating a sense of connectivity and complexity.

Big O



- The measure of amount of time for an algorithm to execute
 - Depends on the amount of data being transferred
-

Program Runtime



Simulation



- Imitation of a situation or process

The Halting Problem

THE HALTING PROBLEM



- The problem of determining whether a program will finish running or will run forever with a hundred percents accuracy
- Undecidable or Unsolvable problem