



Computational thinking, problem-solving and programming: Introduction to programming

IB Computer Science



*Content developed by
Dartford Grammar School
Computer Science Department*



HL Topics 1-7, D1-4



1: System design



2: Computer Organisation



3: Networks



4: Computational thinking



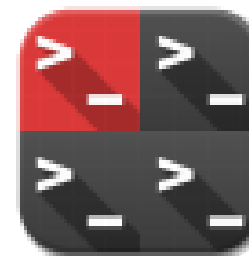
5: Abstract data structures



6: Resource management



7: Control



D: OOP

HL & SL 4.3 Overview

Nature of programming languages

- 4.3.1 State the fundamental operations of a computer
- 4.3.2 Distinguish between fundamental and compound operations of a computer
- 4.3.3 Explain the essential features of a computer language
- 4.3.4 Explain the need for higher level languages
- 4.3.5 Outline the need for a translation process from a higher level language to machine executable code

Use of programming languages

- 4.3.6 Define the terms: variable, constant, operator, object
- 4.3.7 Define the operators =, .., <, <=, >, >=, mod, div
- 4.3.8 Analyse the use of variables, constants and operators in algorithms
- 4.3.9 Construct algorithms using loops, branching
- 4.3.10 Describe the characteristics and applications of a collection
- 4.3.11 Construct algorithms using the access methods of a collection
- 4.3.12 Discuss the need for sub-programmes and collections within programmed solutions
- 4.3.13 Construct algorithms using predefined sub-programmes, one-dimensional arrays and/or collections



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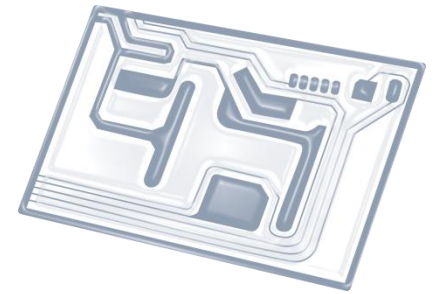
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Topic 4.3.3

Explain the **essential features** of a **computer language**



Two types of languages

- Human languages like English, Arabic, French, Flemish are called **natural languages**.
- **Computer languages** are either **high level** languages (like Java, C#, VisualBasic, Python, etc.) or **low level** (like Assembly or Machine Code).



Natural vs Computer languages



Natural (Human)

Computer (Java)

Varying vocabulary
'way'

Fixed vocabulary
int, public, String

Ambiguous
He saw that gas can explode

Unambiguous meaning
String answer = "#yolo";

Grammar & syntax
inconsistent

Grammar & syntax
consistent

Essential features of a computer language:

- ✓ Fixed vocabulary
- ✓ Unambiguous meaning
- ✓ Consistent grammar & syntax

