OCR Computer Science AS Level

2.2.1 Programming Techniques

Concise Notes

Specification:

2.2.1 a)

- **Programming constructs**
  - Sequence
  - Iteration
  - Branching

2.2.1 b)

- **Global and local variables**

2.2.1 c)

- **Modularity, functions and procedures**
  - Parameter passing by value
  - Parameter passing by reference

2.2.1 d)

- **Use of an IDE to develop/debug a program**

Programming Constructs

- Sequence
  - Code is executed line-by-line, from top to bottom
- Branching
  - Particular block of code is run if a specific condition is met
  - Uses IF and ELSE statements
- Iteration
  - Can be either:
    - Count-controlled
      - Block of code executed a certain number of times
    - Condition-controlled
      - Block of code is executed while a condition is met
  - Uses FOR, WHILE or REPEAT UNTIL loops

Global and Local Variables

- Variables can be defined with either global or local scope
- Scope is the section of code in which the variable can be accessed
- A local variable within a subroutine takes precedence over a global variable with the same name

Local Variables

- Can only be accessed within the subroutine in which they were defined
- Multiple local variables with the same name can exist in different subroutines
- Are deleted once subroutine ends
- Using local variables ensures subroutines are self-contained

Global Variables

- Can be accessed across the whole program
- Useful for values that need to be used by multiple parts of the program
- Danger of being unintentionally edited
- Not deleted until program terminates, so require more memory

Modularity, Functions and Procedures

- Modular programming is a technique used to split large, complex programs into smaller, self-contained modules
- Easier to divide tasks between a team and manage projects
- Simplifies the process of testing and maintenance, as each component can be dealt with individually
- Improves reusability of components

Top-down Design/ Stepwise Refinement

- Technique used to modularise programs
- Problem is broken down into sub-problems, until each is represented as an individual, self-contained module which performs a certain task
- Modules form blocks of code called subroutines

Functions and Procedures

- Both named blocks of code that perform a specific task
- Procedures do not have to return a value
- Functions must always return a single value
- Parameters can be passed into a subroutine either by value or by reference

Passing by Value

- A copy of the value is passed to the subroutine and discarded at the end
- Its value outside of the subroutine remains unaffected

Passing by Reference

- Address of parameter is given to the subroutine
- Value of the parameter will be updated at the given address

In exam questions, you should assume parameters are passed by value unless you are told otherwise. The following format will be used:

```
function multiply(x:byVal, y:byRef)
```

Use of an IDE (Integrated Development Environment)

- Program which provides a set of tools to make it easier for programmers to write, develop and debug code

- Features of IDEs include:
  - Stepping
  - Variable watch
  - Breakpoint
  - Source code editor
  - Debugging tools