



GCSE Computer Science

Topic 2.2 Programming (1)

Variables and constants are used to store values in algorithms and programs. Variables and constants are defined as 'a **named memory location**'.

Variables' values can change while a program is running.

Constants' values must not change while a program is running.

Rules for naming variables/constants:

- Identifiers are the name of the variable or constant.
- They should 'describe' the data being stored.
- Short identifiers are quick/easy to write.
- Long identifiers are more descriptive.
- Identifiers cannot contain spaces must be consistent throughout the program.

CamelCaseUsesUpperAndLowerCaseLetters

Snake_case_links_all_the_words_with_an_underscore.

Operators are special characters that perform certain functions.

The **assignment operator** is =

It is used to assign values to constants or variables.

Comparison operators compare the value or expression on their left hand side to the value or expression on the right hand side and produce a Boolean value (True or False)

INPUT: Data that is put into the algorithm or program by the user.

OUTPUT:

- Data that is taken out of the program or algorithm and displayed to the user.
- This is usually done using a print statement.

SEQUENCE: Instructions are followed, one after the other in the order they are written.

SELECTION: Used in algorithms or programs to choose between two or more options. Selection usually uses a combination of IF, ELSE and ELSE-IF statements.

IF/ ELSE statements are used when there are only 2 options.

- IF = QUESTION, followed by what to do if the answer is true.
- ELSE, what to do if the answer is False
- If there are more than 2 options, ELSE-IF is used.

Switch-case statements can also be used in selection;

- They are used when you want to perform different actions based on the value of ONE variable's value.

ITERATION: The process of repeating a set of instructions for a fixed number of times OR until there is a desired outcome. Iteration is carried out using a programming construct called 'loops'.

COUNT CONTROLLED loops repeat code a fixed number of times. The number of iterations is known before the loop is started.

CONDITION CONTROLLED: loops are used when the number of iterations needed is not known. The code is iterated while or until a condition is met.

DATA TYPE: A category or classification of data. Used to make programs more robust and memory efficient.

- INTEGER: A negative or positive WHOLE number.
- REAL: A negative or positive decimal number.
- CHARACTER: A SINGLE number, letter or symbol.
- STRING: A collection of characters enclosed in speech marks.
- BOOLEAN: True or False

CASTING: A function which converts an item of data into a different data type.

int()	Converts to an integer
float()	Converts into a real number
bool()	Converts into Boolean
str()	Converts to a string
ASC()	Converts into ASCII code
CHR()	Converts into ASCII character

```

INT johnvote = 0, suevote = 0, alanvote = 0
STRING vote
vote = INPUT("Please cast your vote")
SWITCH vote:
CASE "John":
    johnvote = johnvote + 1
    print("You've voted for John.")
CASE "Sue":
    suevote = suevote + 1
    print("You've voted for Sue.")
CASE "Alan":
    alanvote = alanvote + 1
    print("You've voted for Alan.")
ENDSWITCH
    
```

```

IF usertype == "Teacher" THEN
    Allow unrestricted access.
ELSEIF usertype == "Parent" THEN
    Allow level 1 restricted access.
ELSEIF usertype == "Pupil" THEN
    Allow level 2 restricted access.
ELSE
    Deny all access.
ENDIF
    
```

Arithmetic operators: Characters that perform arithmetic functions.

+	Addition
-	Subtraction
*	Multiplication
/	Division (decimal answer)
**	To the power of...
// DIV	Division (integer answer)
% MOD	Divides and returns the remainder.

GCSE Computer Science - Topic 2.2 Programming (1)

What I need to know:

- State how variables and constants are used in programming.
- Define variable.
- Define constant.
- Outline the rules for naming constants/variables.
- State what is meant by an operator
- State what the assignment operator is used for in programming.
- State the function of comparison operators.
- Define the terms input / output.
- Define the term sequence.
- Outline what selection is used for in programming.
- Define the term 'iteration'.
- Describe the difference between count-controlled and condition controlled iteration.
- Define the term data type.
- Outline the 5 main data types.
- Define the term casting.
- Outline the function of the 6 main casting commands.
- Define the term arithmetic operator.
- List the 7 main arithmetic operators and their mathematic function.

REPEAT Loop:

```

INT total = 0
INT cost, coin, change
cost = total cost in pence
REPEAT
    coin = INPUT("Value of coin")
    total = total + coin
UNTIL total ≥ cost
change = total - cost
OUTPUT change
    
```

The loop starts at **REPEAT** and ends when the **UNTIL** condition is **true** — when the total is greater than or equal to the cost.

WHILE Loop:

```

INT total = 0
INT cost, coin, change
cost = total cost in pence
WHILE total < cost
    coin = INPUT("Value of coin")
    total = total + coin
ENDWHILE
change = total - cost
OUTPUT change
    
```

The loop starts by checking the **WHILE** condition is **true** and keeps repeating until it is **false** — when the total is greater than or equal to the cost.

DO WHILE Loop:

```

INT total = 0
INT cost, coin, change
cost = total cost in pence
DO
    coin = INPUT("Value of coin")
    total = total + coin
WHILE total < cost
change = total - cost
OUTPUT change
    
```

The loop starts at **DO** and repeats until the **WHILE** condition is **false** — when the total is greater than or equal to the cost.

Describe the differences between repeat, while and do while iteration.

An electric heater has four temperature settings (0, 1, 2 and 3). The code below controls the temperature of the heater.

```

INT setting, temperature
SWITCH setting:
CASE 3:
    temperature = 50
CASE 2:
    temperature = 30
CASE 1:
    temperature = 20
CASE 0:
    temperature = 0
ENDSWITCH
    
```

a) Rewrite this program using a different selection statement.

Warm-Up Put each of these statements into the correct box below.

REPEAT-UNTIL IF-THEN-ELSE SWITCH-CASE DO-UNTIL IF-ELSEIF WHILE

Selection Statements

Iteration Statements

Jasminda has written the following program to convert minutes into hours and minutes.

```

INT minutes, hours, mins
minutes = INPUT("Enter a number of minutes")
hours = minutes DIV 60
mins = minutes MOD 60
print(str(hours) + " hours and " + str(mins) + " minutes")
    
```

- a) Is this an example of a sequence, selection or iteration? Tick the correct box.
- Sequence Selection Iteration [1]
- b) What would the program print if the input was 150?
- [1]

State what the code will do in each of the following:

- a) int("76423")
.....
- b) ASC("T")
.....
- c) 12 MOD 5
.....