

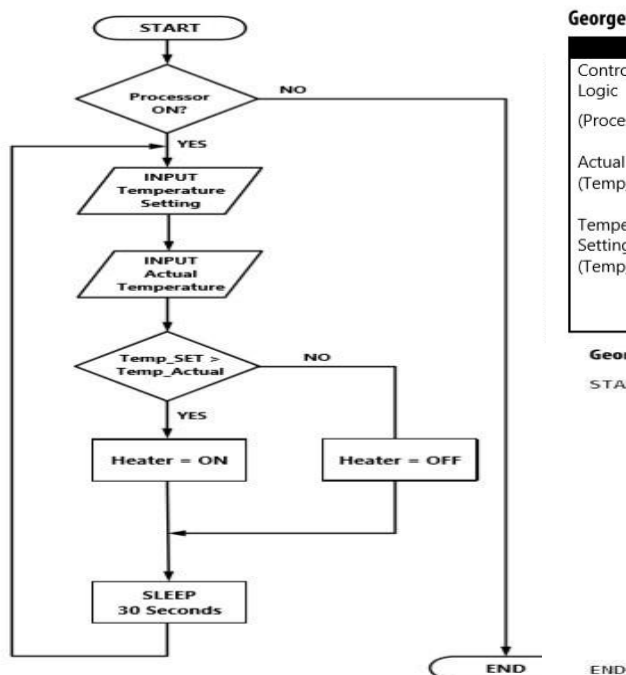


Computational Thinking - Year 12 Summer Task

At King Edward VI Handsworth Grammar School for boys, we will use the Python programming language in the IDLE/PyCharm environment to create and modify programs. A starting point is to analyse the input, output and processes. Then create a flowchart, algorithm/pseudocode for the given scenarios. E.g. George's Greenhouse.

George is the caretaker at school, and he has been given a greenhouse to grow plants for the school grounds. He would like to keep the greenhouse at a set temperature so that plants grow quickly; he would like to be able to change the set temperature between 17 °C and 26 °C, depending on what he is growing.

He has bought a greenhouse control kit online, which consists of a heater and a wireless temperature sensor, which can be connected to his computer.



George's Greenhouse Control (Task A Solution)

Inputs	Outputs	Process
Control Computer Powered Logic (Processor = ON or OFF)	Heater (ON/OFF)	While the computer control system is switched on, the actual temperature of the greenhouse will be checked against the temperature setting.
Actual Temperature (Temp_Actual)		The heater will be switched ON if the greenhouse is too cold
Temperature Control Setting (Temp_Set)		or The heater will be switched OFF if the greenhouse is too hot
		This process will be continued, although a time delay will be added to give the system time to respond.

George's Greenhouse Control (Task C Solution)

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START
# Repeat process while computer control processor is operating
WHILE (Processor = ON) THEN
    # Read control setting (17 to 27 °C) and actual temperature
    Temp_Set ← INPUT      # Inputs from temperature sensors
    Temp_Actual ← INPUT

    # Greenhouse needs to heat up
    IF (Temp_Set > Temp_Actual) THEN
        Heater ← ON
    # Greenhouse needs to cool down
    ELSE
        Heater ← OFF
    END IF

    # Time delay for system to respond
    SLEEP (30)
END WHILE
END
  
```

You have been provided with (1) An "Answer_Sheet_Template" document for you to complete the ANALYSIS, FLOW CHART and PSEUDOCODE of each task in the (2) "Summer Task" document that outlines all the computational thinking tasks. (3) You may use the "Help with Flowcharts and Pseudocode" to complete the tasks.



We are going to use distance learning with Python to familiarise you with programming constructs before you begin the course in September. <https://www.python.org/> Some of Python's notable features:

- Uses an elegant syntax, making the programs you write easier to read.
- Is an easy-to-use language that makes it simple to get your program working. This makes Python ideal for prototype development and other ad-hoc programming tasks, without compromising maintainability.
- Comes with a large standard library that supports many common programming tasks such as connecting to web servers, searching text with regular expressions, reading and modifying files.

Python's simple, easy to learn syntax emphasises readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Main Task

1. Head over to the web site: <https://www.learnpython.org/>
2. Complete the following python tutorials under the heading:
 - Hello, World!
 - Variables and Types
 - Lists
 - Basic Operators
 - String Formatting
 - Basic String Operations
 - Conditions
 - Loops
 - Functions
3. Each section presents you with theory, code to run and exercises to try out.
4. If you want to practice writing your own python programs you can download and install a simple python development tool here: <https://www.python.org/downloads/>
5. Ensure you save all exercises and place a print screen of your code in Microsoft Word. Add suitable comments throughout your code.

Extension Task:

All scenarios can be programmed using Python and we will like you to bring your solutions in September with you. Those students who have completed a GCSE in Computer Science can extend their programs including validation and error handling.

Baseline Tests in September:

You must familiarise yourself with these tasks provided as a baseline test will be given to students at the beginning of the A Level course.