



STEAM CLOWN™ PRODUCTIONS

PYTHON LAB

UP / DOWN COUNTER



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OVERVIEW & INTRODUCTION

- This lesson and Lab is to bring together the basic Python constructs, including:
 - Conditional IF statements
 - For loops
 - While Loops
- Using Top Down design flow to break a coding problem down



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RESOURCES & MATERIALS NEEDED

- Raspberry Pi or Laptop to with Python 3 installed and updated
- Interactive Notebook or Google doc to create Top Down design flow diagram

WHAT YOU WILL KNOW...

- Prior Knowledge
 - How to open and run Python on a Raspberry Pi or other device
 - Familiarity with Python constructs like if, elif, else, while, for loops
 - Debugging skills to break down a python coding challenge
- What You Will Know & Be Able To Do
 - Use your Debugging skill to construct a top down flowchart to describe the python coding challenge
 - Implement Python code to solve the coding challenge
 - Describe to classmates how you solved the coding challenge



HOW WILL YOU BE MEASURED

- Individual Students will submit working code
- Students teams will present diagram of Top Down design flow chart, and this will be graded
- Students teams will present orally how they solved the coding challenge, and depth of understanding will be graded

INTRODUCTION - THE CODING TASK

- Up/Down Counter
 - Create a Python program to count up from 0 to 25, and then count back down from 25 to 0
 - Identify the smaller tasks of this challenge, and create a modular flow diagram
 - Implement the code in a modular function based method that will allow for easy modification

FIRST CHALLENGE - COUNT UP/DOWN

- Challenge 1: - Up / Down Counter: Write a standalone Python program that will count from 0 to 25 and then back down to 0. The output should print to the console the following:

```
Starting to count up
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25
Starting to count down
25,24,23,22,21,20,19,18,17,16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,0
Done
```

- Before you run off to Google to find code that is already built to do this, please take some time to solve this on your own.

Hint: - You will need a variable to hold the countValue. I expect this program to use a while loop, and a few If /else statements to test what the current value to the counterValue is. You will need to test the counterValue to see when it should be counting up and when it should be counting down.



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BREAK THE PROBLEM DOWN

- Counter – You will need a countValue variable
- Process to increment and then decrement the countValue
- Some type of Loop to count up and then count down
- Detect the countValue and act when it is 25 and 0

Answer Slide – Post after Students have had a chance to work the challenge



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BREAK THE PROBLEM DOWN

Define
countVariable

- Counter – You will need a countValue variable

Answer Slide – Post after Students have had a chance to work the challenge



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BREAK THE PROBLEM DOWN

- Counter – You will need a countValue variable
- Process to increment and then decrement the countValue

Define
countVariable

increment
countVariable

Answer Slide – Post after Students have had a chance to work the challenge

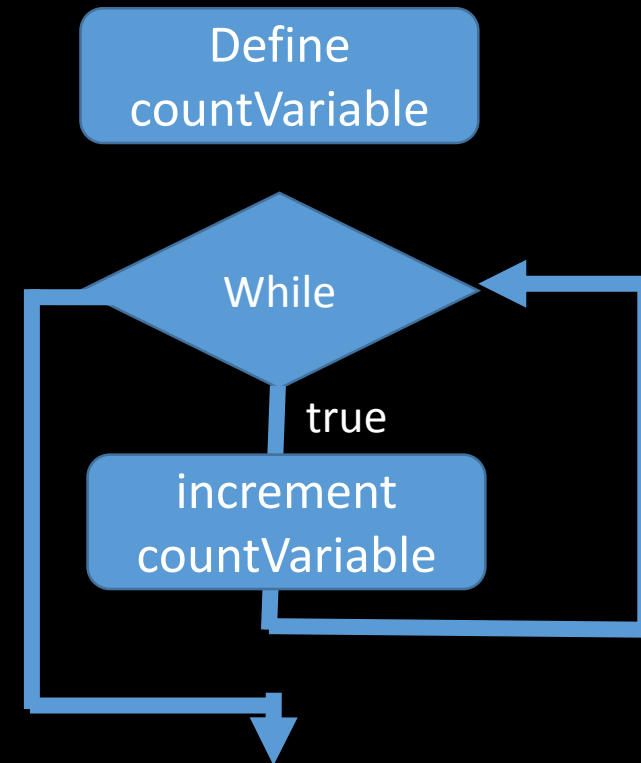


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BREAK THE PROBLEM DOWN

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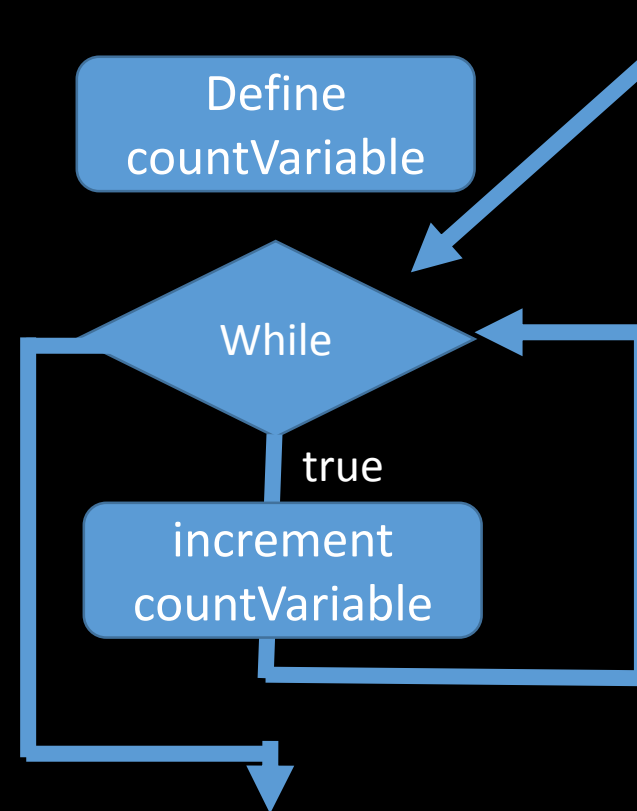
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BREAK THE PROBLEM DOWN

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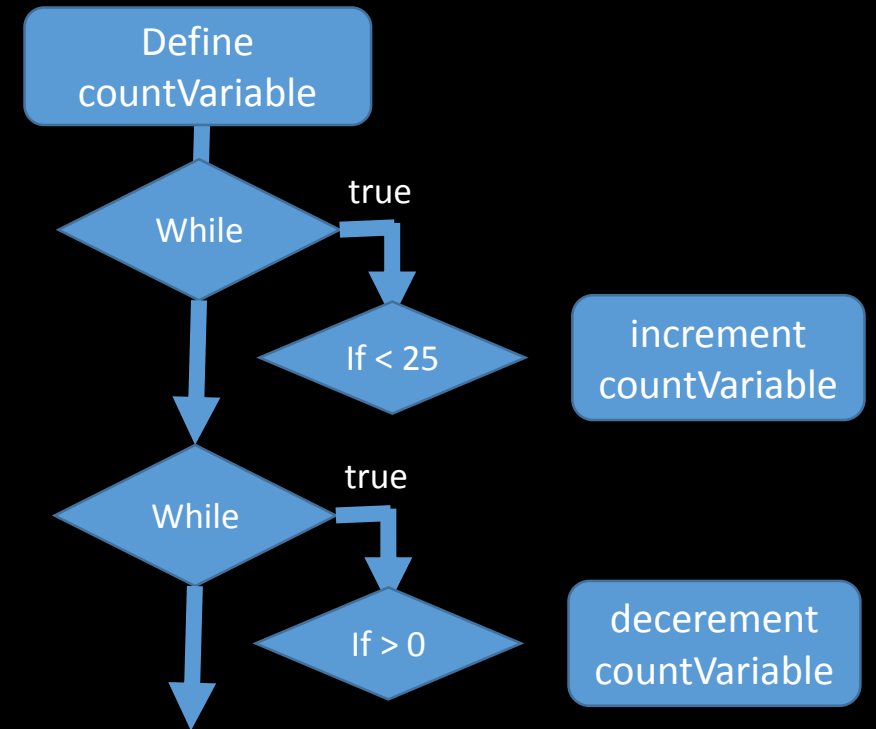
Recommend using “flags” to control while loops



Answer Slide – Post after Students have had a chance to work the challenge

BREAK THE PROBLEM DOWN

- Counter – You will need a countValue variable
- Process to increment and then decrement the countValue
- Some type of Loop to count up and then count down



Answer Slide – Post after Students have had a chance to work the challenge

CHALLENGE 2- DO EVERY THING IN ONE WHILE LOOP...

- Clean up so you are printing the countValue in one while loop... so when ever you are printing the countValue it is actually the current countValue...



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CHALLENGE 3- TRAP A FEW NUMBERS

- Trap a specific number while counting up and counting down
 - Trap when reach the number 15 when you are counting up and 17 when counting down. Print something like:

```
Starting to count up  
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,  
You found 15,  
16,17,18,19,20,21,22,23,24,25,24,23,22,21,20,19,18,  
You found 17,  
16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,0  
Done
```



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CHALLENGE 4 - GET INPUT STARTING NUMBER

- Get your starting counter number as a user input
 - If the input was 12 Print something like:

```
Starting to count up
12,13,14,
You found 15,
16,17,18,19,20,21,22,23,24,25,24,23,22,21,20,19,18,
You found 17,
16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,0
Done
```



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CHALLENGE 5 - TEST FOR VALID INPUT

- Make sure your user input is a value from 0-25
 - Test the input
 - Maybe add an option to 'quit'
 - When you have counted up and down, ask for another input

```
enter a value between 0 and 25 45
enter a value between 0 and 25 12
Starting to count up
12,13,14,
You found 15,
16,17,18,19,20,21,22,23,24,25,24,23,22,21,20,19,18,
You found 17,
16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,0
Done
```



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ASSESSMENT

- Assessment Type(s):
 - ✓ Demonstrations
 - ✓ Rubrics
- C = working challenge 1 code
- B- = working challenge 2 code
- B+ = working challenge 3 code
- A- = working challenge 4 code
- A+ = working challenge 5 code
- +1 extra point = add random up/down count



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REFERENCE SLIDES

NEW WORDS...

LEARNING DOMAIN, CTE STANDARDS AND STUFF LIKE THAT...

- Learning Domain
 - [] cognitive [] affective [] psychomotor
 - What are some cognitive skills required for success in your pathway?
 - What are some affective skills required for success in your pathway?
 - What are some psychomotor skills required for success in your pathway?
- Time:
 - Lecture
 - Lab
- Standards
 - CTE
 - CCSS
 - NCSS



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APPENDIX



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WHAT TO FIX FOR NEXT TIME



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