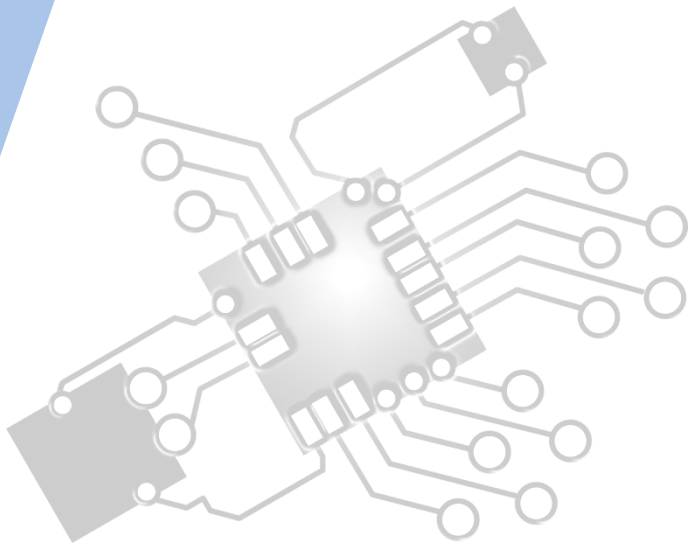
Computational thinking, problem-solving and programming:

Connecting computational thinking and program design

IB Computer Science



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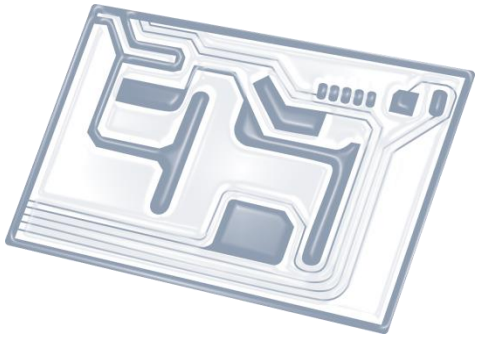
HL Topics 1-7, D1-4



1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP

HL & SL 4.2 Overview

4.2.1 Describe the characteristics of standard algorithms on linear arrays

4.2.2 Outline the standard operations of collections

4.2.3 Discuss an algorithm to solve a specific problem

4.2.4 Analyse an algorithm presented as a flow chart

4.2.5 Analyse an algorithm presented as pseudocode

4.2.6 Construct pseudocode to represent an algorithm

4.2.7 Suggest suitable algorithms to solve a specific problem

4.2.8 Deduce the efficiency of an algorithm in the context of its use

4.2.9 Determine the number of times a step in an algorithm will be performed for given input data

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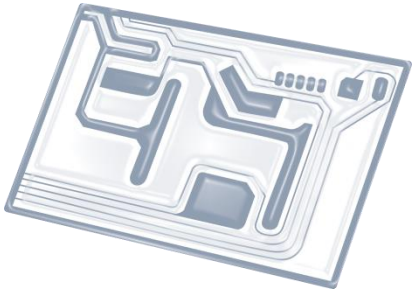
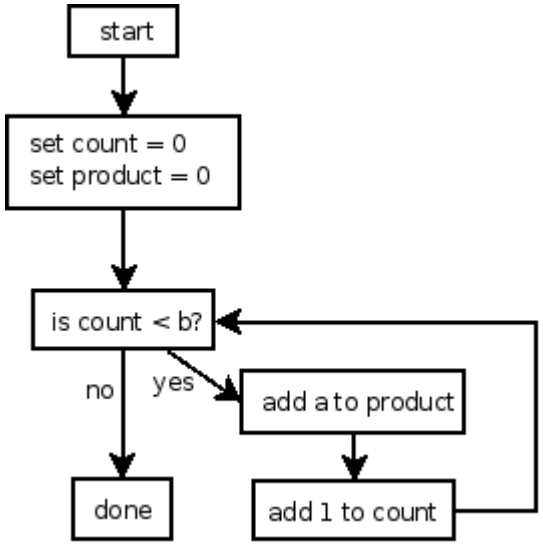


Topic 4.2.9

Determine the **number of times** a step in an algorithm will be performed for given input data



Teacher's notes:

- *"Number of steps" is officially called* ***ITERATIONS***
- *Examination questions will involve* ***specific algorithms*** *(in* ***pseudocode/flow charts****).*
- *Students may be expected to give an actual number (or range of numbers) of* ***iterations*** *that a step will execute.*

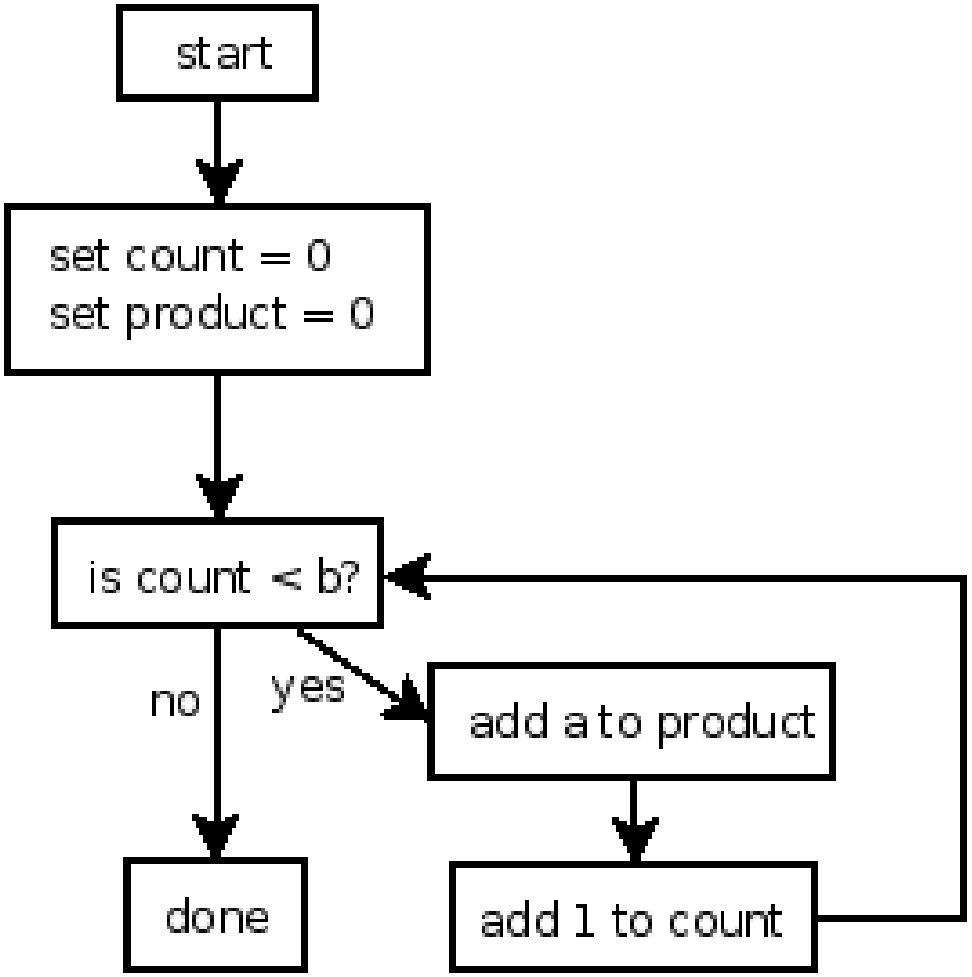
Example #1:

```
1.  DECLARE
2.  b NUMBER;
3.  BEGIN
4.  dbms_output.put_line('Program started.');
5.  FOR a IN 1 .. 3
6.  LOOP
7.  b:=1;
8.  WHILE (a>=b)
9.  LOOP
10. dbms_output.put_line(a);
11. b:=b+1;
12. END LOOP;
13. END LOOP;
14. dbms_output.put_line('Program completed.');
15. END;
16. /
```

Outer FOR Loop

Inner WHILE Loop

Example #2:


start
set count = 0
set product = 0
is count < b?
no
yes
add a to product
done
add 1 to count