Grade 13 A/L ICT · Lesson 9

9.8 Control Structures: Sequence, Selection and Repetition

Syllabus 9.8. Every algorithm is built from three **control structures**: **sequence** (steps in order), **selection** (if / elif / else) and **repetition** – **iteration** with a known count (for) and **looping** while a condition is true (while). Structures can be **nested** inside each other.

1. The three structures

Sequence
Statements run one after another.

Selection
if, elif, else choose a path using a condition.

Repetition
for repeats a set number of times; while repeats while a condition is True.

🐍 Sequence, selection and repetition

```
mark = 67
if mark >= 75:
    print("A")
elif mark >= 65:
    print("B")
elif mark >= 50:
    print("C")
else:
    print("F")

for i in range(1, 4):        # iteration (count-controlled)
    print(i, end=" ")
print()

n = 472                      # looping (condition-controlled)
digit_sum = 0
while n > 0:
    digit_sum += n % 10
    n = n // 10
print("Digit sum:", digit_sum)

for r in range(1, 4):        # nested loops
    for c in range(1, 4):
        print(r * c, end=" ")
    print()
```

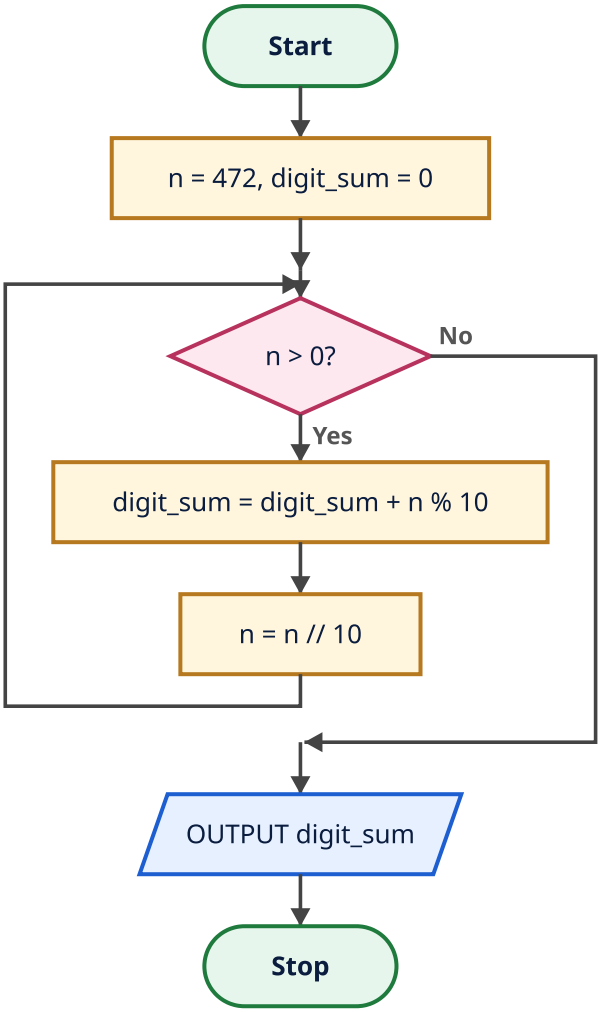
▶ Output

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```
B
1 2 3
Digit sum: 13
1 2 3
2 4 6
3 6 9
```

🧱 **Worked example: Why does mark 67 print B?**
Conditions are tested in order: 67 ≥ 75 is False, 67 ≥ 65 is **True**, so B is printed and the rest are skipped.

2. Tracing the while loop



Flowchart: sum of digits of 472

n % 10	digit_sum	n after // 10
2	2	47
7	9	4
4	13	0

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🧮 **Worked example: Trace the digit-sum loop for 472.**
The loop runs **3** times: 2 → sum 2, 7 → sum 9, 4 → sum 13. n becomes 0, the condition is False and it prints **Digit sum: 13**.

💡 Use for when you know how many times; use while when you stop on a condition. Indentation shows what is inside.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Python 3.10+ adds match-case, a neat multi-way selection that many 2026 programs use instead of long elif chains.

Key Words

Control structure – Way of controlling the order in which statements run.	**Sequence** – Statements executed one after another.
Selection – Choosing a path depending on a condition.	**Repetition** – Running a block of statements more than once.
Iteration – Count-controlled repetition such as a for loop.	**Looping** – Condition-controlled repetition such as a while loop.
if statement – Runs a block only when its condition is True.	**elif** – Further condition tested when earlier ones are False.
for loop – Repeats for each value in a range or sequence.	**while loop** – Repeats while a condition stays True.
Nested structure – A control structure placed inside another.	**Infinite loop** – Loop whose condition never becomes False.

Sample Q&A

1. Three control structures?

Answer: Sequence, selection, repetition.

2. Iteration vs looping?

Answer: Iteration is count-controlled (for); looping is condition-controlled (while).

3. What does range(1, 4) give?

Answer: 1, 2, 3.

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4. Digit sum of 472?

> **Answer:** 13.

5. Last row of the 3 × 3 table?

> **Answer:** 3 6 9.

6. What causes an infinite loop?

> **Answer:** A condition that never becomes False, e.g. forgetting n = n // 10.

MCQ

1. if / elif / else is an example of

A. iteration
B. recursion
C. looping
D. selection
E. sequence

2. A for loop over range(1, 4) is

A. iteration (count-controlled)
B. sequence only
C. selection
D. looping (condition-controlled)
E. a function

3. Mark 67 in the program prints

A. nothing
B. A
C. F
D. B
E. C

4. range(1, 4) produces

A. 4 3 2 1
B. 0 1 2 3
C. 1 2 3 4
D. 1 4
E. 1 2 3

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5. The digit sum of 472 printed is

A. 14
B. 472
C. 7
D. 11
E. 13

6. The while loop body runs for 472

A. 472 times
B. 2 times
C. 1 time
D. 3 times
E. 4 times

7. Placing a loop inside another loop is

A. compiling
B. nesting
C. sequencing
D. linking
E. tracing

8. The middle row of the nested 3 × 3 table is

A. 1 2 3
B. 4 5 6
C. 3 6 9
D. 2 4 6
E. 2 3 4

9. Which term means: “Way of controlling the order in which statements run”?

A. Looping
B. Selection
C. Control structure
D. Nested structure
E. elif

10. Which term means: “Statements executed one after another”?

A. Infinite loop
B. Sequence
C. Repetition
D. for loop
E. if statement

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11. Which term means: “Choosing a path depending on a condition”?

A. while loop
B. elif
C. Selection
D. Iteration
E. Control structure

12. Which term means: “Running a block of statements more than once”?

A. Repetition
B. Nested structure
C. Sequence
D. Looping
E. for loop

13. Which term means: “Count-controlled repetition such as a for loop”?

A. Selection
B. Iteration
C. while loop
D. if statement
E. Infinite loop

14. Which term means: “Condition-controlled repetition such as a while loop”?

A. Looping
B. Repetition
C. elif
D. Control structure
E. Nested structure

15. Which term means: “Runs a block only when its condition is True”?

A. Infinite loop
B. for loop
C. if statement
D. Sequence
E. Iteration

16. Which term means: “Further condition tested when earlier ones are False”?

A. while loop
B. Selection
C. Control structure
D. Looping
E. elif

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17. Which term means: “Repeats for each value in a range or sequence”?

A. Sequence
B. Nested structure
C. for loop
D. if statement
E. Repetition

18. Which term means: “Repeats while a condition stays True”?

A. elif
B. while loop
C. Selection
D. Infinite loop
E. Iteration

19. Which term means: “A control structure placed inside another”?

A. Nested structure
B. Control structure
C. Looping
D. Repetition
E. for loop

20. Which term means: “Loop whose condition never becomes False”?

A. Sequence
B. if statement
C. while loop
D. Iteration
E. Infinite loop

Structured Questions

1. Describe the three control structures with Python examples. *(3 marks)*

> Sequence statements; selection if/elif/else; repetition for/while.

2. Write a program that prints A, B, C or F for a mark. *(4 marks)*

> if >= 75 A; elif >= 65 B; elif >= 50 C; else F.

3. Trace the digit-sum loop for 472. *(4 marks)*

> 2/2/47; 7/9/4; 4/13/0; output 13.

4. Compare for and while loops. *(3 marks)*

> for known count; while condition; both repeat a block.

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5. Write nested loops to print a 3 × 3 multiplication table. *(4 marks)*

> for r in range(1, 4); for c in range(1, 4); print(r * c, end); print().

Summary

- Sequence, selection and repetition build every algorithm.
- if/elif/else tests conditions in order.
- for = iteration with a known count.
- while = looping until a condition is False.
- Structures can be nested.

MCQ answer key – 9.8

1. **D** – Selection.
2. **A** – Iteration.
3. **D** – 67 ≥ 65.
4. **E** – Stop excluded.
5. **E** – 4 + 7 + 2.
6. **D** – Three digits.
7. **B** – Nested.
8. **D** – 2 × 1..3.
9. **C** – Control structure – Way of controlling the order in which statements run.
10. **B** – Sequence – Statements executed one after another.
11. **C** – Selection – Choosing a path depending on a condition.
12. **A** – Repetition – Running a block of statements more than once.
13. **B** – Iteration – Count-controlled repetition such as a for loop.
14. **A** – Looping – Condition-controlled repetition such as a while loop.
15. **C** – if statement – Runs a block only when its condition is True.
16. **E** – elif – Further condition tested when earlier ones are False.
17. **C** – for loop – Repeats for each value in a range or sequence.
18. **B** – while loop – Repeats while a condition stays True.
19. **A** – Nested structure – A control structure placed inside another.
20. **E** – Infinite loop – Loop whose condition never becomes False.

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