G.C.E. O/L Grade 11 ICT · Lesson 1

Lesson 1 O/L Exam Practice: Questions and Answers

These questions are in the style of the O/L ICT exam. Paper I has multiple choice questions. Paper II has structured questions with parts, model answers and marking points. They cover all of Lesson 1 (1.1 to 1.11): problem analysis, algorithms, flowcharts and pseudocode, variables and data types, operators, selection, iteration, nesting, arrays, sub-programs, languages and translators, testing and debugging. Every program answer was really run in Pascal (Free Pascal) and Python. Try them first, then check the answers.

Paper I – Multiple choice questions (25)

1. In IPO, the price and quantity in a bill program are

A. processes
B. inputs
C. constants
D. outputs

2. The step-by-step solution to a problem is an

A. array
B. operator
C. algorithm
D. identifier

3. Choosing between two paths using a condition is

A. iteration
B. nesting
C. sequence
D. selection

4. The flowchart symbol for a decision is a

A. oval
B. diamond
C. parallelogram
D. rectangle

5. Input and output are shown with a

A. parallelogram
B. rectangle
C. circle
D. diamond

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6. Which is a valid identifier?

A. 2ndMark
B. Total Marks
C. Total_Marks
D. begin

7. The best data type for an average such as 71.67 is

A. real
B. integer
C. char
D. Boolean

8. 17 mod 5 equals

A. 3.4
B. 3
C. 12
D. 2

9. The value of 2 + 3 * 4 is

A. 24
B. 14
C. 20
D. 9

10. (Mark >= 35) AND (Mark <= 100) for Mark = 120 is

A. True
B. 120
C. False
D. an error

11. Using O/L limits, a mark of 66 gets grade

A. A
B. S
C. C
D. B

12. In Pascal, before else you must NOT write

A. a semicolon
B. a space
C. begin
D. then

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13. Choosing a day name from a number 1–7 is best done with

A. FOR

B. an array index error

C. CASE

D. REPEAT

14. A loop that always runs at least once is

A. IF

B. REPEAT … UNTIL

C. FOR

D. WHILE

15. for i in range(1, 6) runs the body

A. 7 times

B. 6 times

C. 5 times

D. 1 time

16. Entering 0 to stop reading numbers uses 0 as a

A. reserved word

B. index

C. constant

D. sentinel value

17. The value of 5! calculated by the factorial program is

A. 25

B. 60

C. 15

D. 120

18. Outer loop 4 times, inner loop 3 times each: the inner body runs

A. 4 times

B. 12 times

C. 1 time

D. 7 times

19. Array elements are stored in

A. contiguous memory

B. separate files

C. the CPU only

D. random places

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20. In Python, the third element of marks is

A. marks[3]
B. marks[2]
C. marks(3)
D. marks[1]

21. A sub-program that returns a value is a

A. function
B. loop
C. procedure
D. array

22. Changing a task in only one place shows the sub-program benefit

A. maintainability
B. random access
C. iteration
D. precedence

23. A translator that translates the whole program at once is a

A. editor
B. interpreter
C. compiler
D. assembler

24. A program that runs but gives a wrong answer has a

A. no error
B. runtime error
C. syntax error
D. logic error

25. A responsible use of an AI coding assistant is to

A. understand and test the code it suggests
B. share your passwords with it
C. submit its code as your own exam answer
D. never read its code

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Paper II – Structured questions

1. Problem analysis and algorithms. A shop sells items. The cashier enters the price and quantity and the program shows the total. *(9 marks)*

(i) Identify the input, process and output. *(3 marks)*
(ii) Name the three basic control structures. *(3 marks)*
(iii) Draw a flowchart for the bill program. *(3 marks)*

2. Flowcharts, pseudocode and trace tables. *(9 marks)*

(i) Write pseudocode to find the sum of 1 to N. *(3 marks)*
(ii) Complete a trace table for N = 5. *(3 marks)*
(iii) Name the symbols used for start, process and decision. *(3 marks)*

3. Variables, data types and operators. *(9 marks)*

(i) Give a suitable data type for (a) number of students (b) price (c) name (d) passed or not. *(4 marks)*
(ii) Find the values of 17 div 5, 17 mod 5 and (2 + 3) * 4. *(3 marks)*
(iii) Give two rules for naming identifiers. *(2 marks)*

4. Selection. Grades: A ≥ 75, B ≥ 65, C ≥ 50, S ≥ 35, otherwise W. *(8 marks)*

(i) Write a program (Pascal or Python) that inputs a mark and displays the grade. *(5 marks)*
(ii) What grades are shown for 82, 66 and 47? *(3 marks)*

5. Iteration and nesting. *(8 marks)*

(i) Write a program that calculates and displays 5! using a loop. *(3 marks)*
(ii) Give one difference between WHILE and REPEAT ... UNTIL. *(2 marks)*
(iii) Complete a trace table for the star triangle with 4 rows. *(3 marks)*

6. Arrays and sub-programs. Nums = 12, 45, 7, 30, 18. *(9 marks)*

(i) What are Nums[2] (Pascal) and nums[2] (Python)? *(2 marks)*
(ii) Trace a linear search for 30 and give the output. *(3 marks)*
(iii) Distinguish a function from a procedure and give two benefits of sub-programs. *(4 marks)*

7. Languages, translators and debugging. *(7 marks)*

(i) Give two differences between a compiler and an interpreter. *(2 marks)*
(ii) The average of 75, 68, 72 is shown as 107.50. Name the error and fix it. *(3 marks)*
(iii) Name one Python IDE and give one rule for using AI assistants responsibly. *(2 marks)*

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Exam tips

- IPO: input → process → output.
- Algorithm: clear, ordered, finite steps.
- Oval, parallelogram, rectangle, diamond.
- Trace tables: one row per change.
- Identifiers: letter first, no spaces, no reserved words.
- div = whole part; mod = remainder; brackets first.
- No semicolon before else in Pascal.
- FOR fixed; WHILE test first; REPEAT test last.
- Inner loop runs fully each outer run.
- Pascal array[1..5]; Python list index 0.
- Function returns a value; procedure does not.
- Compiler vs interpreter; syntax, runtime, logic errors.

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Answers and explanations

Paper I

1. **B** – Given in.
2. **C** – Algorithm.
3. **D** – Selection.
4. **B** – Decision.
5. **A** – I/O.
6. **C** – Letter first, no space.
7. **A** – Decimals.
8. **D** – Remainder.
9. **B** – * first.
10. **C** – Second part False.
11. **D** – 65–74.
12. **A** – No ; before else.
13. **C** – By value.
14. **B** – Test at end.
15. **C** – 1 to 5.
16. **D** – Sentinel.
17. **D** – 1×2×3×4×5.
18. **B** – 4 × 3.
19. **A** – Side by side.
20. **B** – From 0.
21. **A** – Function.
22. **A** – Maintain.
23. **C** – Compiler.
24. **D** – Logic.
25. **A** – Responsible.

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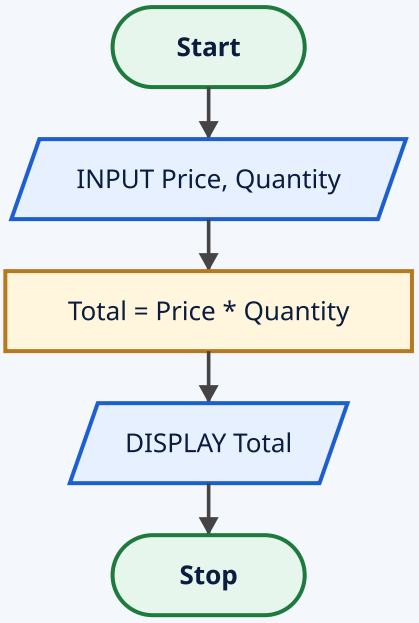
Paper II – model answers and marking points

1. *(9 marks)*

(i) (3 marks)
Input – price, quantity (1); process – total = price × quantity (1); output – total (1).

(ii) (3 marks)
Sequence, selection, iteration (1 each).

(iii) (3 marks)
Start; input price, qty; total = price × qty; display total; Stop (3).



Flowchart – Shop bill: price × quantity

🎯 Examiner tip: inputs come in, outputs go out – the process is between them.

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2. *(9 marks)*

(i) (3 marks)

INPUT N; Sum = 0; FOR i = 1 TO N, Sum = Sum + i; OUTPUT Sum (3).

Pseudocode

```
BEGIN
  INPUT N
  Total = 0
  i = 1
  WHILE i <= N DO
    Total = Total + i
    i = i + 1
  ENDWHILE
  DISPLAY Total
END
```

(ii) (3 marks)

Sum: 1, 3, 6, 10, 15; output 15 (3).

Step	i	Total	i <= 5 ?
start	1	0	–
loop	1	1	Yes
loop	2	3	Yes
loop	3	6	Yes
loop	4	10	Yes
loop	5	15	Yes
check	6	15	No

(iii) (3 marks)

Oval, rectangle, diamond (1 each).

🎯 Examiner tip: in a trace table, write a new row each time a variable changes.

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3. *(9 marks)*

(i) (4 marks)

(a) integer (b) real (c) string (d) Boolean (1 each).

(ii) (3 marks)

3, 2, 20 (1 each).

Arithmetic operators

Pascal

```
program Operators;
var
  a, b: integer;
begin
  a := 17;
  b := 5;
  writeln('Sum = ', a + b);
  writeln('Difference = ', a - b);
  writeln('Product = ', a * b);
  writeln('Division = ', a / b:0:2);
  writeln('Quotient = ', a div b);
  writeln('Remainder = ', a mod b);
end.
```

Python

```
a = 17
b = 5
print("Sum =", a + b)
print("Difference =", a - b)
print("Product =", a * b)
print(f"Division = {a / b:.2f}")
print("Quotient =", a // b)
print("Remainder =", a % b)
```

Sample run

```
Sum = 22
Difference = 12
Product = 85
Division = 3.40
Quotient = 3
Remainder = 2
```

(iii) (2 marks)

Start with a letter; no spaces; not a reserved word (any two).

🎯 Examiner tip: div gives the whole-number part, mod gives the remainder.

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4. *(8 marks)*

(i) (5 marks)

Input (1); IF ≥ 75 A (1); ELSE IF ≥ 65 B, ≥ 50 C (2); ≥ 35 S else W (1).

Marks to grade (A, B, C, S, W)

Pascal

```
program MarksToGrade;
var
  marks: integer;
  grade: char;
begin
  write('Enter marks: ');
  readln(marks);
  if marks >= 75 then
    grade := 'A'
  else if marks >= 65 then
    grade := 'B'
  else if marks >= 50 then
    grade := 'C'
  else if marks >= 35 then
    grade := 'S'
  else
    grade := 'W';
  writeln('Grade: ', grade);
end.
```

Python

```
marks = int(input("Enter marks: "))
if marks >= 75:
    grade = "A"
elif marks >= 65:
    grade = "B"
elif marks >= 50:
    grade = "C"
elif marks >= 35:
    grade = "S"
else:
    grade = "W"
print("Grade:", grade)
```

Sample run 1

```
Enter marks: 82
Grade: A
```

Sample run 2

```
Enter marks: 58
Grade: C
```

Sample run 3

```
Enter marks: 30
Grade: W
```

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(ii) (3 marks)
A, B, S (1 each).

🎯 Examiner tip: test the boundary marks 75, 65, 50 and 35.

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5. *(8 marks)*

(i) (3 marks)

Fact = 1 (1); FOR i = 1 TO 5, Fact = Fact × i (1); display 120 (1).

Factorial with a FOR loop

Pascal

```
program Factorial;
var
  n, i, f: integer;
begin
  write('Enter N: ');
  readln(n);
  f := 1;
  for i := 1 to n do
    f := f * i;
  writeln('Factorial = ', f);
end.
```

Python

```
n = int(input("Enter N: "))
f = 1
for i in range(1, n + 1):
    f = f * i
print("Factorial =", f)
```

Sample run

```
Enter N: 5
Factorial = 120
```

i	F = F * i
1	1
2	2
3	6
4	24
5	120

(ii) (2 marks)

WHILE tests at the start and may run zero times; REPEAT tests at the end and runs at least once (2).

(iii) (3 marks)

Rows print *, , *, **** (3).

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Iteration inside iteration: star triangle

Pascal

```
program Stars;
var
  row, col: integer;
begin
  for row := 1 to 4 do
  begin
    for col := 1 to row do
      write('*');
    writeln;
  end;
end.
```

Python

```
for row in range(1, 5):
    for col in range(1, row + 1):
        print("*", end="")
    print()
```

Sample run

```
*
**
***
****
```

Row	Inner loop runs (times)	Printed
1	1	*
2	2	**
3	3	***
4	4	****

🎯 Examiner tip: in a nested loop, the inner loop finishes completely before the outer loop moves on.

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6. *(9 marks)*

(i) (2 marks)
45 (1); 7 (1).

(ii) (3 marks)
Checks 12, 45, 7, 30 → Found at position 4 (3).

Array: search for a number

Pascal

```
program SearchArray;
var
  nums: array[1..5] of integer;
  i, key, pos: integer;
begin
  nums[1] := 12;
  nums[2] := 45;
  nums[3] := 7;
  nums[4] := 30;
  nums[5] := 18;
  write('Enter number to find: ');
  readln(key);
  pos := 0;
  for i := 1 to 5 do
    if nums[i] = key then
      pos := i;
  if pos > 0 then
    writeln('Found at position ', pos)
  else
    writeln('Not found');
end.
```

Python

```
nums = [12, 45, 7, 30, 18]
key = int(input("Enter number to find: "))
pos = 0
for i in range(5):
    if nums[i] == key:
        pos = i + 1      # position counted from 1
if pos > 0:
    print("Found at position", pos)
else:
    print("Not found")
```

Sample run 1

```
Enter number to find: 30
Found at position 4
```

Sample run 2

```
Enter number to find: 50
Not found
```

i	Nums[i]	Nums[i] = 30 ?	Pos

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1	12	No	0
2	45	No	0
3	7	No	0
4	30	Yes	4
5	18	No	4

(iii) (4 marks)
Function returns a value, procedure does not (2); reusability, readability, maintainability (any two) (2).

🎯 Examiner tip: Pascal arrays here start at 1, Python lists start at 0.

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7. *(7 marks)*

(i) (2 marks)

Whole program vs line by line; executable file vs none; faster vs slower (any two).

(ii) (3 marks)

Logic error (1); total was divided by 2 (1); divide by 3 → 71.67 (1).

Logic error: dividing by the wrong number

Pascal

```
program AverageBug;
var
  m1, m2, m3, total: integer;
  avg: real;
begin
  write('Enter mark 1: ');
  readln(m1);
  write('Enter mark 2: ');
  readln(m2);
  write('Enter mark 3: ');
  readln(m3);
  total := m1 + m2 + m3;
  avg := total / 2;            { BUG: should be / 3 }
  writeln('Average = ', avg:0:2);
end.
```

Python

```
m1 = int(input("Enter mark 1: "))
m2 = int(input("Enter mark 2: "))
m3 = int(input("Enter mark 3: "))
total = m1 + m2 + m3
avg = total / 2               # BUG: should be / 3
print(f"Average = {avg:.2f}")
```

Sample run

```
Enter mark 1: 75
Enter mark 2: 68
Enter mark 3: 72
Average = 107.50
```

(iii) (2 marks)

IDLE / Thonny / VS Code (1); understand and test code, do not submit it as your own (1).

🎯 Examiner tip: syntax = grammar, runtime = crash, logic = wrong answer.

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