Diploma Programme
Programme du diplôme
Programa del Diploma

Computer science
Standard level
Paper 1

2 May 2025

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

1 hour 30 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer all questions.
- The maximum mark for this examination paper is **[70 marks]**.

7 pages

Section A

Answer **all** questions.

1. Identify **two** features of an application interface. [2]

2. Explain **one** reason why a virtual private network (VPN) might be used. [3]

3. Describe **two** advantages of using surveys to determine user requirements for updating a computer system. [4]

4. Construct a logic diagram for the following expression:

X = NOT A OR B AND NOT C [4]

5. Construct a trace table for the following algorithm:

```
N = 5
S = 0
R = 0
loop while N > 0
    A = N mod 3
    if A = 0
        then
            S = S - N
        else
            if A = 1
                then
                    S = S + N
                else
                    S = S + 1
            end if
    end if
    R = R + S
    N = N - 1
end loop
output ('The result is ', R)
```

[6]

6. Identify **two** methods of implementing a new computer system. [2]

7. Describe the role of a DNS server. [2]

8. A binary number is held in the following 12-bit register:

1	1	1	1	0	0	1	1	1	0	1	0

(a) State the hexadecimal representation of this binary number. [1]

(b) State how many different binary numbers can be represented in a 12-bit register. [1]

Section B

Answer **all** questions.

9. An architect uses a single computer for her business. She uses hand-drawn sketches to present her ideas to clients and computer-aided design (CAD) software to create construction projects, alterations, and redevelopments.

(a) (i) State what is meant by CAD software. [1]

(ii) Outline **two** benefits for the architect of using CAD software. [4]

The architect often creates large graphic files that are sent via the internet.

(b) Explain the need for data compression software in storing and transferring these large graphic files. [3]

Data loss can cause downtime, which can force the architect to pause business operations.

The impact on productivity depends on the amount of data lost as well as the time it takes for data recovery.

(c) (i) Describe how the architect could minimize downtime if the disk system on her computer fails. [3]

(ii) Outline **two** causes of data loss **other than** hardware failure. [4]

10. A school has a local area network (LAN) with a central server that stores many files containing personal, health, and financial information.

The LAN is used by the following types of user: network administrators, teachers, students and guests.

(a) Explain how the different levels of access for the users of this LAN could be implemented. [6]

(b) (i) Suggest **one** communications link that would provide high-speed internet access for the school. [2]

(ii) Suggest **two** measures to protect the school's LAN from external network security threats. [4]

The school gives students and teachers their own school email account.

(c) List **three** problems that might result from providing email access to all students and teachers. [3]

11. There are 200 students in a school. Their names are held in the one-dimensional string array `STUDENTS`.

The one-dimensional integer array `MARKS` stores marks (0–100 inclusive) that students scored in an examination.

Figure 1: Example data stored in the two arrays `STUDENTS` and `MARKS`

	STUDENTS
[0]	Ximena Alba
[1]	Boris Mount
[2]	Hugh Parr
[3]	Arjinder Singh
[4]	Mei Chen
	...
[199]	Tammy Teller

	MARKS
[0]	5
[1]	88
[2]	45
[3]	75
[4]	59
	...
[199]	51

The one-dimensional integer array `GRADES` will be used to store the grades awarded to students based on their examination marks.

In **Figure 1**, Boris Mount scored 88 marks. His grade will be stored in `GRADES[1]`.

Consider the following algorithm that the school currently uses for awarding grades:

```
loop K from 0 to 199
    GRADES[K] = 1 + (MARKS[K] div 10)
    if GRADES[K] >= 7 then
        GRADES[K] = 7
    end if
end loop
```

(a) (i) Determine the value of `GRADES[0]`. [1]

(ii) Determine the value of `GRADES[1]`. [1]

(iii) Determine the value of `GRADES[2]`. [1]

(iv) State the minimum mark necessary to achieve Grade 7. [1]

(This question continues on the following page)