

© International Baccalaureate Organization 2025

All rights reserved. No part of this product may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without the prior written permission from the IB. Additionally, the license tied with this product prohibits use of any selected files or extracts from this product. Use by third parties, including but not limited to publishers, private teachers, tutoring or study services, preparatory schools, vendors operating curriculum mapping services or teacher resource digital platforms and app developers, whether fee-covered or not, is prohibited and is a criminal offense.

More information on how to request written permission in the form of a license can be obtained from <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organisation du Baccalauréat International 2025

Tous droits réservés. Aucune partie de ce produit ne peut être reproduite sous quelque forme ni par quelque moyen que ce soit, électronique ou mécanique, y compris des systèmes de stockage et de récupération d'informations, sans l'autorisation écrite préalable de l'IB. De plus, la licence associée à ce produit interdit toute utilisation de tout fichier ou extrait sélectionné dans ce produit. L'utilisation par des tiers, y compris, sans toutefois s'y limiter, des éditeurs, des professeurs particuliers, des services de tutorat ou d'aide aux études, des établissements de préparation à l'enseignement supérieur, des fournisseurs de services de planification des programmes d'études, des gestionnaires de plateformes pédagogiques en ligne, et des développeurs d'applications, moyennant paiement ou non, est interdite et constitue une infraction pénale.

Pour plus d'informations sur la procédure à suivre pour obtenir une autorisation écrite sous la forme d'une licence, rendez-vous à l'adresse <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

© Organización del Bachillerato Internacional, 2025

Todos los derechos reservados. No se podrá reproducir ninguna parte de este producto de ninguna forma ni por ningún medio electrónico o mecánico, incluidos los sistemas de almacenamiento y recuperación de información, sin la previa autorización por escrito del IB. Además, la licencia vinculada a este producto prohíbe el uso de todo archivo o fragmento seleccionado de este producto. El uso por parte de terceros —lo que incluye, a título enunciativo, editoriales, profesores particulares, servicios de apoyo académico o ayuda para el estudio, colegios preparatorios, desarrolladores de aplicaciones y entidades que presten servicios de planificación curricular u ofrezcan recursos para docentes mediante plataformas digitales—, ya sea incluido en tasas o no, está prohibido y constituye un delito.

En este enlace encontrará más información sobre cómo solicitar una autorización por escrito en forma de licencia: <https://ibo.org/become-an-ib-school/ib-publishing/licensing/applying-for-a-license/>.

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]**.

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 direct observations to determine user requirements for updating a computer system. [4]

4. Construct a logic diagram for the following expression: [4]

$$X = A \text{ OR NOT } B \text{ AND NOT } C$$

5. Construct a trace table for the following algorithm: [6]

```
K = 1
S = 0
Z = 0
loop while K < 6
  A = K mod 3
  if A = 2
    then
      S = S + K
    else
      if A = 1
        then
          S = S - K
        else
          S = S + 1
        end if
      end if
      Z = Z + S
      K = K + 1
    end loop
output ('The result: ', Z)
```

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:

0	0	0	1	1	0	1	1	0	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]

Blank page

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		MARKS	
[0]	Diego Smith	[0]	47
[1]	Eloise Abadie	[1]	9
[2]	Helen Weber	[2]	94
[3]	Paul Alley	[3]	75
[4]	Robert Wang	[4]	59

[199]	Isabella Teller	[199]	44

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

In **Figure 1**, Robert Wang scored 59 marks. His grade will be stored in `GRADES[4]`.

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)

(Question 11 continued)

Grade 1 is a failing grade. Each student who receives a failing grade must re-sit the examination.

- (b) Construct an algorithm in pseudocode to fill the one-dimensional string array `RESIT` with the names of students who must re-sit the examination.

[4]

A different method of awarding grades is proposed for the examinations. This new grading system will use three grades represented by the letters A, B, and C.

Grades A, B, or C will be calculated as follows:

- The average mark for all students is calculated.
- Grade A is awarded if an individual student's marks are more than 20 marks above the average mark for all students.
- Grade B is awarded if an individual student's marks are within 20 marks of the average mark for all students.
- Grade C is awarded if an individual student's marks are more than 20 marks below the average mark for all students.

For example, if the average mark for all students is 49.5:

- Grade A is awarded if a student's marks are greater than 69.5.
- Grade B is awarded if a student's marks are in the range from 29.5 to 69.5 inclusive.
- Grade C is awarded if a student's marks are less than 29.5.

- (c) Construct an algorithm in pseudocode to calculate and store the letter grades of all students in the one-dimensional string array `LETTERGRADES` as described.

[7]
