GradeMax

CAMBRIDGE
International Education

# Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*5017583715*

**COMPUTER SCIENCE** **9618/12**

Paper 1 Theory Fundamentals **May/June 2026**

**1 hour 30 minutes**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

**INFORMATION**

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **16** pages. Any blank pages are indicated.

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**[Turn over**

**1** **(a)** Tick (✓) **one** box to identify the correct definition of a pixel in a bitmap image.

- ☐ a colour in an image
- ☐ a row of consecutive identical colours in an image
- ☐ the binary code for one colour in an image
- ☐ the smallest element of an image that can be one colour

[1]

**(b)** Describe the difference between the terms image resolution and screen resolution.

.....

.....

.....

..... [2]

**(c)** Two items in a bitmap image file header are the resolution and colour depth.

Identify **one** other item included in the file header of a bitmap image.

.....

..... [1]

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**(d)** The following bitmap image is created. Each letter represents a colour: R is red, W is white, B is blue.

| | | | | | |
|---|---|---|---|---|---|
| R | R | W | W | W | W |
| B | B | R | R | W | W |
| W | W | W | R | R | R |
| W | W | W | W | R | R |
| W | W | R | R | R | R |
| R | R | R | R | R | B |
| B | B | B | B | B | B |

**(i)** Identify the smallest bit depth that can be used for the image shown.

..... [1]

**(ii)** Explain how the image shown can be compressed using lossless compression.

.....

.....

.....

.....

.....

..... [3]

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**2** Personal data is entered into a computer using a keyboard. The data is validated and verified during data entry.

**(a)** Describe **two** methods of data verification that can be used during data entry.

1 .....

.....

.....

2 .....

.....

.....

[4]

**(b)** The personal data includes the date of birth, for example 05/07/2010.

Complete the table by identifying **two** methods of validation that can be used on the date of birth.

State how each validation method will be used for the date of birth.

| data validation method | use |
|---|---|
| ..... | ..... |
| ..... | ..... |
| | ..... |
| ..... | ..... |
| ..... | ..... |
| | ..... |

[3]

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**(c)** The data needs to be kept secure whilst on the computer.

**(i)** A virus is a threat to data.

Complete the table by describing what is meant by a virus.

Identify **and** describe **one** method to restrict the risk posed by a virus.

| | |
|---|---|
| **virus description** | .....<br>..... |
| **method to restrict risk** | ..... |
| **description of method to restrict risk** | .....<br>.....<br>..... |

[3]

**(ii)** A hacker is another threat to data.

Complete the table by describing what is meant by a hacker.

Identify **and** describe **one** method to restrict the risk posed by a hacker.

| | |
|---|---|
| **hacker description** | .....<br>..... |
| **method to restrict risk** | ..... |
| **description of method to restrict risk** | .....<br>.....<br>..... |

[3]

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**3** A computer game developer stores data about a computer game in a database. The database has three entities:

- the users, who are called players
- the characters that users can create
- the groups that users can create and allow characters to join.

**(a)** Describe the relationships between the **three** entities.

.....

.....

.....

..... [2]

**(b)** The database is created with **four** tables:

```
PLAYER(PlayerID, PlayerName, DateJoined)

CHARACTER(CharacterID, CharacterName, DateCreated, Level,
          NumberOfPoints, PlayerID)

GROUP(GroupID, GroupName, Category)

CHARACTER_GROUP(CharacterGroupID, CharacterID, GroupID,
                DateJoinedGroup)
```

Sample data for the table `CHARACTER` is given:

| CharacterID | CharacterName | DateCreated | Level | NumberOfPoints | PlayerID |
|---|---|---|---|---|---|
| 00123 | Crystal | 05/05/2025 | 5 | 35687 | 85AD |
| 00124 | Diamond | 06/06/2025 | 4 | 21055 | 69CD |
| 00125 | Ruby | 07/10/2025 | 1 | 1002 | 85AD |

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**(i)** The given Structured Query Language (SQL) script is written to define the table `CHARACTER`.

```
01   CREATE TABLE CHARACTER(
02         CharacterID INT,
03         CharacterName VARCHAR,
04         DateCreated DATE,
05         TheLevel INT,
06         NumberOfPoints INT,
07         PlayerID VARCHAR,
08         PRIMARY KEY CharacterID,
09         FOREIGN KEY(PlayerID)
10   );
```

The SQL script contains **four** errors.

Give the line number of each error and the corrected line.

error line 1 .....

corrected line .....

error line 2 .....

corrected line .....

error line 3 .....

corrected line .....

error line 4 .....

corrected line .....

[4]

**(ii)** Write an SQL script to return each player's name and the number of characters each player has created.

The result needs to include a suitable field name for the number of characters.

Order the results in descending order of player ID.

.....

.....

.....

.....

.....

..... [5]

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**(c)** Complete the description of database key terms by writing the missing words.

The ..... stores data about the data in the database. The table names, field names and relationships will be stored. Two other examples of data that will be stored are ..... and ..... .

When designing a database, the ..... schema is the design of the database tables, fields and relationships independent of any Database Management System (DBMS).

A DBMS provides security features to protect the data. ..... are used to give user accounts permission to read data, some to read and write data and others may be unable to read the data.

When creating a database, a ..... provides tools to create visual components for example forms and reports.

[5]

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**4** A sound file has a sampling rate of 44.1 kHz.

**(a)** Describe what is meant by a sampling rate of 44.1 kHz.

.....

..... [1]

**(b)** A student creates a recording of a sound with a sampling resolution of 2 bytes.

The student creates a second recording of the same sound but with a sampling resolution of 8 bits.

Explain how the two sound recordings **and** the two sound files will be affected by the different sampling resolutions.

.....

.....

.....

.....

.....

..... [3]

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**5** **(a)** Complete the table by calculating the missing values.

| denary | unsigned binary | hexadecimal | Binary Coded Decimal (BCD) |
|---|---|---|---|
| 160 | 10100000 | A0 | |
| | 100100001 | 121 | 001010001001 |
| 2486 | | 9B6 | 0010010010000110 |
| 35123 | 1000100100110011 | | 0011010100010010011 |

[4]

working space .....

.....

.....

.....

.....

.....

**(b)** Complete the table by writing the answer to each statement.

| statement | answer |
|---|---|
| The smallest 12-bit two's complement binary number | |
| The denary value represented by the 8-bit unsigned binary number 01100010 after a logical right shift of 2 places has been applied. | |
| The binary value after a cyclic left shift of 4 places has been applied to the binary number 10010101 | |

[3]

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**6** A health monitor attaches to a person's arm and measures key health information, for example heart rate. The monitor transmits data to the user's smartphone. The results are analysed by the phone, which displays information to the user about their health.

**(a)** Explain the reasons why the health monitor is an example of an embedded system.

.....

.....

.....

.....

.....

..... [3]

**(b)** Tick (✓) **one** box to identify if the health monitor is an example of a monitoring system or a control system.

| system | tick (✓) |
|---|---|
| monitoring | |
| control | |

Justify your choice.

.....

.....

.....

..... [2]

**(c)** The health monitor contains Random Access Memory (RAM) and Read Only Memory (ROM).

Describe **two** differences between RAM and ROM.

1 .....

.....

.....

2 .....

.....

.....

[2]

**(d)** The data from the health monitor is transmitted to the smartphone and stored in the cloud.

Discuss the benefits and drawbacks of storing the data from the health monitor in the cloud.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

**7** A student is writing a computer program for a school project.

**(a)** The student uses a computer that comes with an Operating System (OS) and utility software.

**(i)** Identify **two** tasks the OS performs as part of process management.

1 .....

2 .....

[2]

**(ii)** Identify **two** tasks the OS performs as part of memory management.

1 .....

2 .....

[2]

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**(iii)** Explain the reasons why defragmentation software improves the performance of a computer.

.....

.....

.....

.....

.....

..... [3]

**(b)** The student is using an Integrated Development Environment (IDE).

**(i)** Explain how the student can use debugging tools in the IDE.

.....

.....

.....

.....

.....

.....

.....

..... [4]

**(ii)** The high-level language the student is using can be partially compiled and partially interpreted.

Explain the reasons why some high-level languages are partially compiled and partially interpreted.

.....

.....

.....

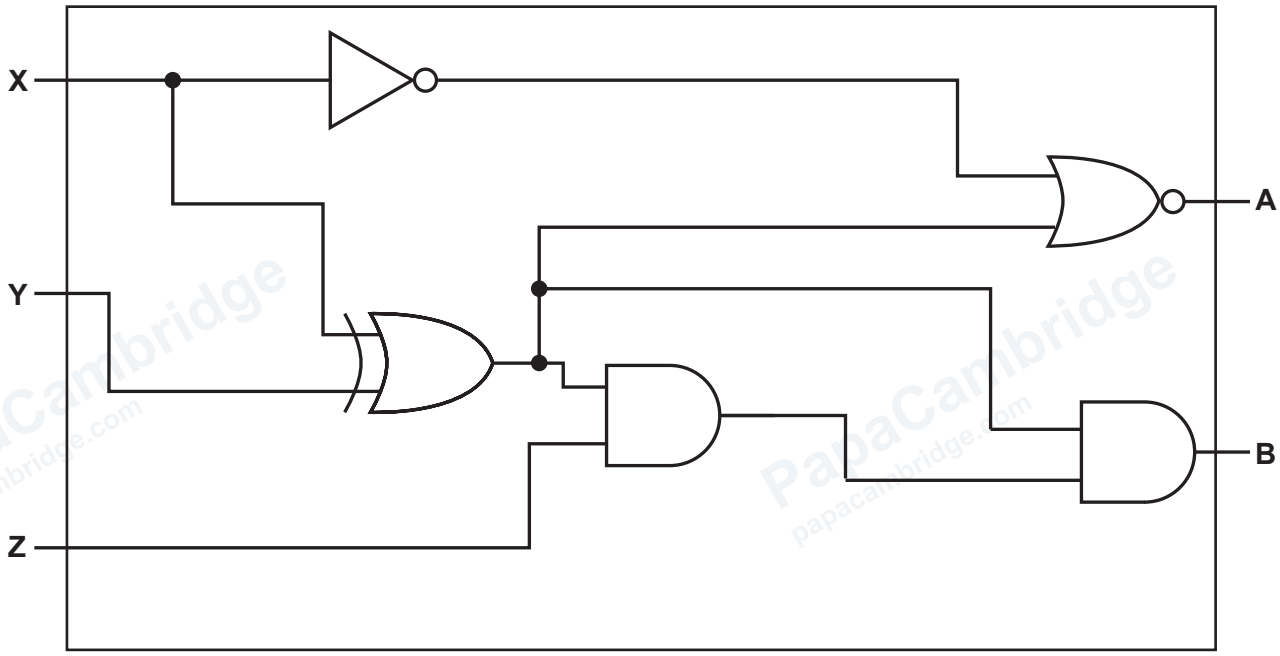
..... [2]

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**8** **(a)** Complete the truth table for the given logic circuit.




| X | Y | Z | working space | A | B |
|---|---|---|---|---|---|
| 0 | 0 | 0 | | | |
| 0 | 0 | 1 | | | |
| 0 | 1 | 0 | | | |
| 0 | 1 | 1 | | | |
| 1 | 0 | 0 | | | |
| 1 | 0 | 1 | | | |
| 1 | 1 | 0 | | | |
| 1 | 1 | 1 | | | |

[2]

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**(b)** Write the logic statement for the given truth table.

| input | | | output |
|---|---|---|---|
| **A** | **B** | **C** | **P** |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

P = ..... [1]

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