Cambridge Assessment International Education

# Cambridge IGCSE™

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*6388865528*

**COMPUTER SCIENCE** **0478/12**

Paper 1 Theory **October/November 2021**

**1 hour 45 minutes**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- 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 or correction fluid.
- Do **not** write on any bar codes.
- 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 **12** pages. Any blank pages are indicated.


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**[Turn over**

**1** **(a)** Denary is a number system that is used by programmers.

Tick (✓) **one** box to show whether denary is a base-2, base-10 or base-16 number system.

| **Tick (✓)** | |
|---|---|
| ☐ | Base-2 |
| ☐ | Base-10 |
| ☐ | Base-16 |

[1]

**(b)** Hexadecimal values can be used to represent denary values.

Convert these **four** hexadecimal values into denary values.

05 .....

20 .....

1A .....

AB .....

[4]

Working space

.....

.....

.....

.....

.....

**(c)** Hexadecimal values can also be converted to binary values.

Tick (✓) **one** box to show the correct 8-bit binary value for each hexadecimal value.

**(i)** Hexadecimal value 25

| **Tick (✓)** | |
|---|---|
| ☐ | 00011001 |
| ☐ | 00100101 |
| ☐ | 10100001 |

[1]

**(ii)** Hexadecimal value 1B

| **Tick (✓)** | |
|---|---|
| ☐ | 00011011 |
| ☐ | 10110001 |
| ☐ | 00011010 |

[1]

**(d) (i)** Give **one** way that hexadecimal is used in website development.

..... [1]

**(ii)** Give **one** way that hexadecimal is used in low-level programming.

..... [1]

**2** A train company wants to install a self-service ticket machine system for its train stations. When the customer has purchased their tickets, the machine will provide a paper ticket.

**(a)** **One** output device that is used in the ticket machine is a display screen.

Identify **one** other output device that is used in the ticket machine system.

..... [1]

**(b)** The train company does **not** want users to use a keyboard or a mouse to enter their data, when buying a ticket. The company is worried that they may be stolen or get too dirty.

Identify **one** other input device that would be suitable for use in the ticket machine system, to allow users to enter their data.

..... [1]

**3** **(a)** **Six** statements are given about methods of data transmission.

Tick (✓) to show if each statement applies to serial simplex, parallel simplex, parallel half-duplex or serial duplex data transmission. Some statements may apply to more than **one** data transmission method.

| Statement | Serial simplex (✓) | Parallel simplex (✓) | Parallel half-duplex (✓) | Serial duplex (✓) |
|---|---|---|---|---|
| bits are transmitted along a single wire | | | | |
| data is transmitted in both directions | | | | |
| it is only suitable for distances less than 5 metres | | | | |
| bits from the same byte are transmitted one after the other | | | | |
| data may **not** arrive in the correct sequence | | | | |
| data is transmitted in both directions, but only **one** direction at a time | | | | |

[6]

**(b)** A Universal Serial Bus (USB) connection can be used to transmit data from a mobile device to a computer.

Give **three** benefits of using a USB connection for this purpose.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

.....

[3]

**4** The paragraph explains the operation of different touch screen technologies.

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- capacitive
- change
- circuit
- conductive
- coordinates
- grid
- heat
- infra-red
- insulating
- light
- manufacture
- pressure
- resistive

In ..... touch screen technology, an electrostatic field is present on the surface of the touch screen. The ..... properties of a user cause a ..... in the field. The ..... of the user's touch can be calculated.

In ..... touch screen technology, a user pushes the top layer of the screen and makes it connect with the bottom layer to complete a ..... .

This type of touch screen is cheaper to ..... .

[7]

**5** Sammi works for a finance company and has a laptop that he uses for his work. He has confidential data about his customers stored on his laptop.

Sammi does **not** connect the laptop to any networks.

**(a)** Sammi is concerned about his customers' confidential data being viewed by other people in his office.

**One** method he uses to prevent others viewing the data is encryption.

Identify **three** other methods Sammi could use to prevent his customers' confidential data being viewed.

1 .....

2 .....

3 .....

[3]

**(b)** Sammi creates videos for the finance company website that give customers advice about their finances.

He uses lossy compression to reduce the file size of the videos for the website.

**(i)** Give **three** ways that lossy compression can reduce the file size of the videos.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

**(ii)** Give **one** drawback of using lossy compression to reduce the file size of the videos.

.....

..... [1]

**(c)** Sammi could have used lossless compression to compress the videos for the website.

**(i)** Give **one** reason why he would use lossless compression, rather than lossy compression, for the videos.

.....

..... [1]

**(ii)** Give **two** disadvantages of Sammi using lossless compression, rather than lossy compression, for the videos.

Disadvantage 1 .....

.....

Disadvantage 2 .....

.....

[2]

**6** A programmer can use translators, such as an interpreter and a compiler, when developing a computer program.

**(a)** Give **one** similarity between a compiler and an interpreter.

.....

..... [1]

**(b)** Describe **two** differences between a compiler and an interpreter.

Difference 1 .....

.....

.....

.....

Difference 2 .....

.....

.....

.....

[4]

**(c)** Identify **one** other type of translator.

..... [1]

**7** **Five** statements are given about devices.

Tick (✓) to show if each statement applies to a 3D scanner, barcode reader or a Quick Response (QR) code reader. Some statements may apply to more than **one** type of device.

| Statement | 3D scanner (✓) | Barcode reader (✓) | QR code reader (✓) |
|---|---|---|---|
| uses position and alignment markers for orientation when scanning | | | |
| scans the shape and appearance of an object | | | |
| uses reflected light from a laser to convert a black-and-white pattern into binary | | | |
| can often be built into an Electronic Point Of Sale (EPOS) terminal, for example, a supermarket checkout | | | |
| it is an example of an input device | | | |

[5]

**8** An electronic game has **three** square mats that are coloured red, green and blue.

The player will see a colour displayed on a screen and has 1 second to hit the mat that matches the colour. If the player hits the correct mat, within 1 second, a counter is incremented. When a player hits an incorrect mat, the game ends.

The game uses sensors and a microprocessor to determine if the player hits the correct mat within 1 second.

Explain how the game uses sensors and a microprocessor to count the number of times a player hits a correct mat within 1 second.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [7]

**9** Padma opens an application on her computer.

An interrupt is generated to inform the Central Processing Unit (CPU) that the application has been opened.

**(a)** Give **three** other examples of when an interrupt signal could be generated.

1 .....

2 .....

3 .....

[3]

**(b)** State what would happen if interrupt signals were **not** used in a computer.

.....

..... [1]

**10** Jermain uses the Secure Socket Layer (SSL) protocol for secure transmission when sending data using the internet.

**(a)** Explain how the SSL protocol secures the data for transmission.

.....

.....

.....

..... [2]

**(b)** Identify an alternative protocol that could be used for secure transmission of data using the internet.

..... [1]

**(c)** Give **two** ways that a user can identify if a website uses secure data transmission.

1 .....

.....

2 .....

.....

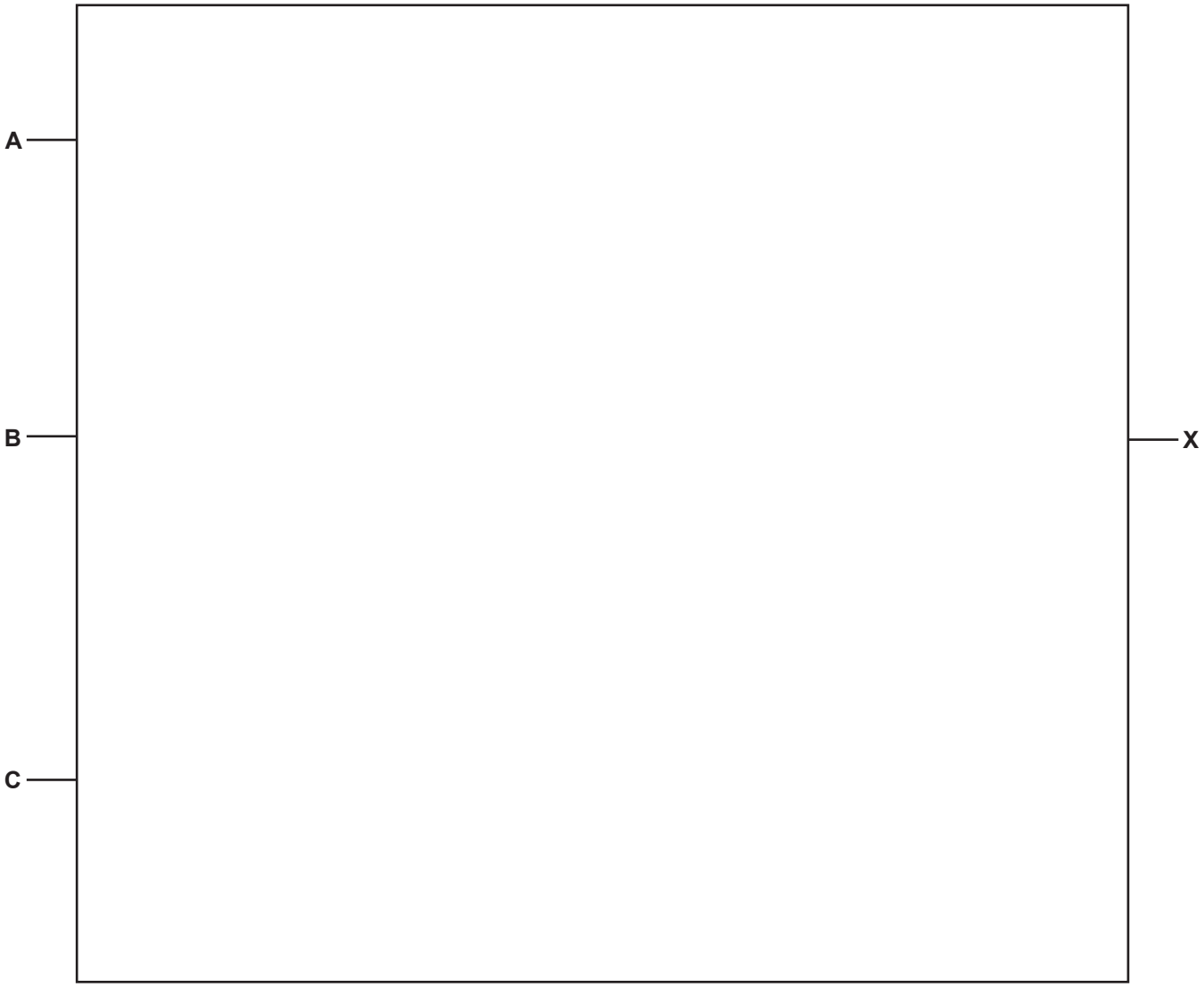
[2]

**11** Consider the following logic statement:

**X** = (((**A** AND **B**) OR (NOT (**B** OR **C**))) NAND **C**)

**(a)** Draw a logic circuit to represent the given logic statement.

Do **not** attempt to simplify the logic statement. All logic gates must have a maximum of **two** inputs.




[5]

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

| **A** | **B** | **C** | Working space | **X** |
|---|---|---|---|---|
| 0 | 0 | 0 | | |
| 0 | 0 | 1 | | |
| 0 | 1 | 0 | | |
| 0 | 1 | 1 | | |
| 1 | 0 | 0 | | |
| 1 | 0 | 1 | | |
| 1 | 1 | 0 | | |
| 1 | 1 | 1 | | |

[4]

**(c)** Identify **two** logic gates that are **not** included in the given logic statement.

Logic gate 1 .....

Logic gate 2 .....

[2]

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