AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

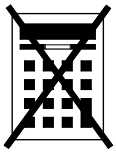
Candidate signature _____

GCSE
COMPUTER SCIENCE

Paper 2 - Computing concepts

Specimen Assessment Materials Time allowed: 1 hour 45 minutes

Materials
- There are no additional materials required for this paper.
- You must **not** use a calculator.



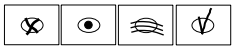
Instructions
- Use black ink or black ball-point pen. Use pencil only for drawing.
- Answer **all** questions.
- You must answer the questions in the spaces provided.
- Do all rough work in this book.
- Cross through any work you do not want to be marked.

Information
- The total number of marks available for this paper is 90.

Advice

For the multiple-choice questions, completely fill in the lozenge alongside the appropriate answer.

CORRECT METHOD 

WRONG METHODS 

If you want to change your answer you must cross out your original answer as shown. 

If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown. 

Answer **all** questions.

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0 1 A bit pattern is shown in **Figure 1**.

Figure 1

```
01001110
```

0 1 . 1 Convert the bit pattern shown in **Figure 1** into decimal.

[1 mark]

0 1 . 2 Convert the bit pattern shown in **Figure 1** into hexadecimal.

[2 marks]

Answer: _____

Do not write outside the box

0 1 . 3 A student's answer to the question "Why is hexadecimal often used instead of binary?" is shown in **Figure 2**.

Figure 2

> Because it uses fewer digits it will take up less space in a computer's memory.

Explain why the student's answer is incorrect.

[2 marks]

0 1 . 4 Explain how a binary number can be multiplied by 8 by shifting bits.

[2 marks]

ASCII (American Standard Code for Information Interchange) is a coding system that can be used to represent characters. In ASCII the character A is represented by the numeric code 65.

0 1 . 5 Shade **one** lozenge to indicate which character is represented by the numeric code 70.

[1 mark]

A E ⬭

B F ⬭

C f ⬭

D 6 ⬭

E e ⬭

Do not write outside the box

0 1 . 6 Unicode is an alternative to the ASCII coding system.

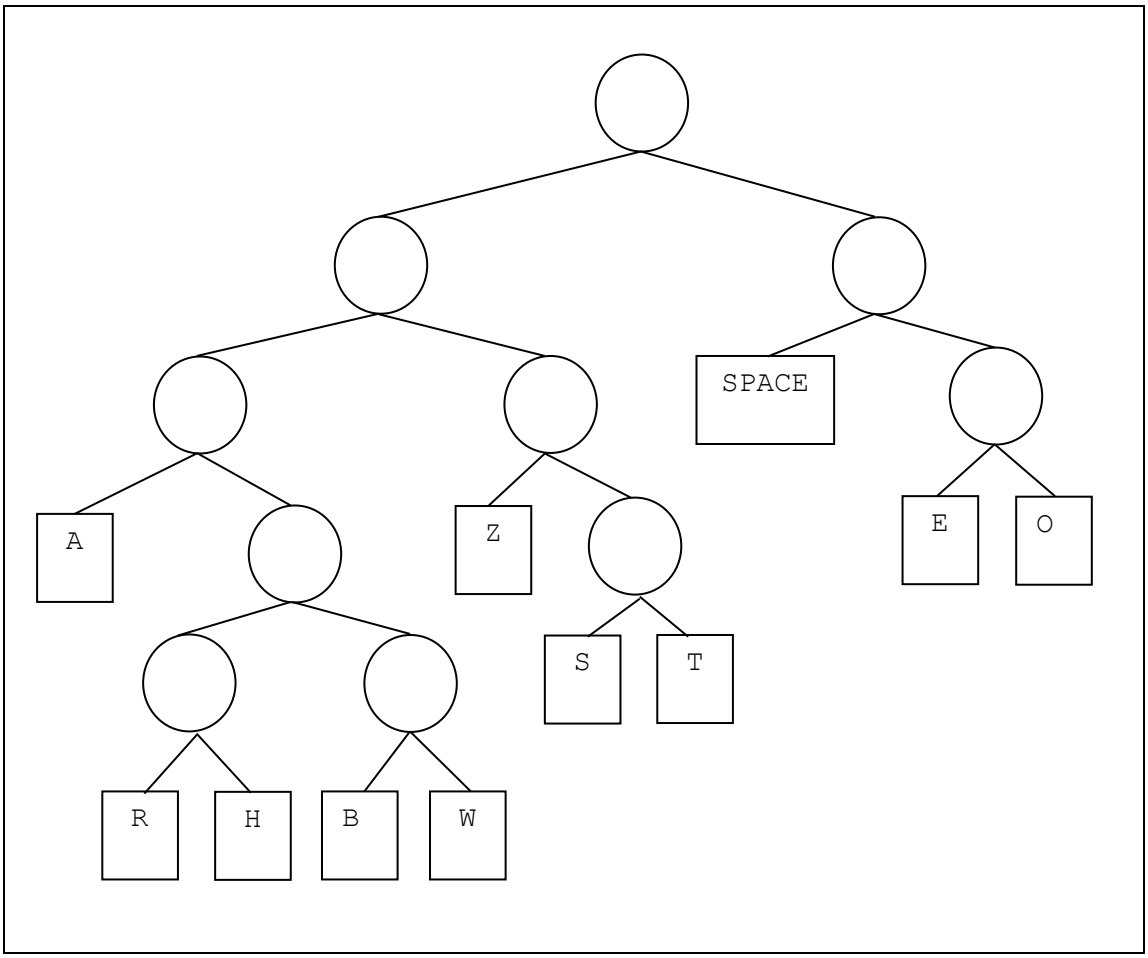
State **two** advantages of using Unicode to represent characters instead of using ASCII.

[2 marks]

When data is stored in a computer it is often compressed. One method that can be used to compress text data is Huffman coding. To produce a Huffman code each character in a piece of text is placed in a tree, with its position in the tree determined by how often the character was used in the piece of text.

A Huffman tree for the text `ZOE SAW A ZEBRA AT THE ZOO` is shown in **Figure 3**.

Figure 3



Do not write outside the box

Using this Huffman tree, the Huffman coding for the character E would be the bit pattern 110 because from the top of the tree E is to the right, then right again and then left.

The character Z is represented by the bit pattern 010 because from the top of the tree Z is to the left, then right and then left.

0 1 . 7 Using the Huffman code in **Figure 3**, complete the table to show the Huffman coding for the characters O, SPACE and B. **[3 marks]**

Character	Huffman coding
O	
SPACE	
B	

0 1 . 8 Using Huffman coding, the text ZOE SAW A ZEBRA AT THE ZOO can be stored in 83 bits.

Calculate how many additional bits are needed to store the same piece of text using ASCII. Show your working. **[3 marks]**

0 2 Bob purchases a 4GB SD card for use as secondary storage in his phone.

0 2 . 1 Calculate how many megabytes there are in 4GB. Show your working.

[2 marks]

0 2 . 2 An SD card is a type of solid state storage.

State **two** advantages of solid state storage compared to magnetic storage.

[2 marks]

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0 2 . 3 Many modern desktop computers have both solid state drives and magnetic hard disk drives.

Give **two** reasons why desktop computers have a magnetic hard disk drive and a solid state drive instead of having just a solid state drive.

[2 marks]

0 2 . 4 Describe how data is stored on, and read from, a magnetic hard disk.

[4 marks]

Turn over for the next question

Do not write outside the box

0 2 . 5 In recent years, there has been a large growth in the use of cloud storage.

Discuss the advantages and disadvantages of using cloud storage.

In your answer you should include an explanation of the reasons for the large growth in recent years and consider any legal, ethical and environmental issues related to the use of cloud storage. **[9 marks]**

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0 3 Most schools have a computer network.

0 3 . 1 Some schools allow teachers to access the school network from their home computers.

Give **one** reason why some schools allow this and **one** reason why some schools do not allow this.

[2 marks]

Reason for: _____

_____

Reason against: _____

_____

0 3 . 2 State **three** advantages of using a computer network.

[3 marks]

_____

_____

_____

_____

_____

_____

PANs and LANs are two different types of network.

0 3 . 3 Describe **one** difference between a PAN and a LAN.

[1 mark]

_____

_____

0 3 . 4 Give **one** example of where a PAN could be used.

[1 mark]

_____

_____

Do not write outside the box

0 3 . 5 When two computers on a network communicate with each other they need to use the same protocol.

Define the term network protocol.

[2 marks]

For questions **0 3 . 6** to **0 3 . 8** shade **one** lozenge to indicate the most suitable protocol to use in the situation described.

0 3 . 6 Used to retrieve email stored on a server

[1 mark]

A HTTP ⬭

B HTTPS ⬭

C FTP ⬭

D SMTP ⬭

E IMAP ⬭

0 3 . 7 Used to make a payment securely when purchasing goods from a website

[1 mark]

A HTTP ⬭

B HTTPS ⬭

C FTP ⬭

D SMTP ⬭

E IMAP ⬭

Do not write outside the box

0 3 . 8 Used to send an email from a client machine to an email server.

[1 mark]

A HTTP ⬭

B HTTPS ⬭

C FTP ⬭

D SMTP ⬭

E IMAP ⬭

0 3 . 9 TCP/IP is a protocol used in networking. There are 4 layers in the TCP/IP stack.

Complete the table by placing the four layers of the TCP/IP stack into order (1-4) where 1 is the top layer and 4 is the bottom layer.

[3 marks]

Layer	**Order (1-4)**
Transport	
Link	
Internet	
Application	

0 4 Many computers use the Von Neumann architecture.

0 4 . 1 In a computer that uses the Von Neumann architecture, bit patterns can be stored in the main memory. Shade the correct lozenge to indicate what these bit patterns could represent. You should only shade **one** lozenge.

[1 mark]

A Data ⬭

B Instructions ⬭

C Data and instructions ⬭

D Data or instructions, but not both ⬭

0 4 . 2 Five components of a CPU are given below. For each row in **Table 1**, choose the letter **A**, **B**, **C**, **D**, **E** that best matches the description.

Letters should not be used more than **once**.

A. Bus
B. Arithmetic Logic Unit
C. Control Unit
D. Clock
E. Register

[3 marks]

Table 1

Description	Letter
Sends a continuous series of electronic pulses	
Decodes the current instruction	
Completes calculations	

Do not write outside the box

0 5 Social engineering is where someone is tricked or manipulated into providing secure information or access to a secure system. Describe each of the following social engineering techniques.

[3 marks]

Blagging: _____

Phishing: _____

Shouldering: _____

Turn over for the next question

0 6 A sound engineer is recording a singer.

0 6 . 1 Describe why the sound must be converted to a digital format before it can be stored on a computer system.

[2 marks]

0 6 . 2 The sound engineer is using a sampling rate of 2000 Hz and a sample resolution of 4 bits. What is the minimum file size of a 5-second recording? Your answer should be given in **bytes**.

You should show your working.

[4 marks]

0 6 . 3 The sound engineer currently uses a sample resolution of 4 bits which enables a sample to be stored as one of 16 different bit patterns. She wants to increase the number of bit patterns available from 16 to 32. Shade **one** lozenge which shows the **minimum** sample resolution (in bits) she can choose that will allow her to do this.

[1 mark]

Do not write outside the box

A 3 bits ⬭

B 5 bits ⬭

C 8 bits ⬭

D 16 bits ⬭

0 6 . 4 Shade **one** lozenge to show which of the following correctly states the effects of increasing the sampling rate.

[1 mark]

A Decreases both the quality of the recording and the file size ⬭

B Has no effect on the quality of the recording or the file size ⬭

C Improves the quality of the recording and has no effect on the file size ⬭

D Improves the quality of the recording and increases the file size ⬭

Turn over for the next question

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0 7 The three examples of code shown in **Figure 4** are all equivalent to one another.

Figure 4

Example 1	Example 2	Example 3

a ← 4
b ← 3
IF a = b THEN
  c ← a + b
ENDIF
	MOV R0, #4
	MOV R1, #3
	CMP R0, R1
	BNE end
	ADD R2, R0, R1
	end:
	HLT
		1001 0000 0100 0000
		1001 0001 0011 0000
		0100 0000 0001 0000
		1010 0101 0000 0000
		1100 0010 0000 0001
		1111 0000 0000 0000

0 7 . 1 Shade **one** lozenge to show the statement that is true about **Figure 4**.

[1 mark]

A None of the examples of code is in a low-level language. ⬭

B Only one of the examples of code is in a low-level language. ⬭

C Only two of the examples of code are in low-level languages. ⬭

D All three of the examples of code are in low-level languages. ⬭

0 7 . 2 Explain why a developer, who is good at both low-level and high-level programming, would normally use high-level languages when writing programs.

[4 marks]

0 7 . 3 Statements **A** and **B** refer to two different types of program translator.

Statement A: This type of translator can convert a high-level language program into machine code. The source code is analysed fully during the translation process. The result of this translation can be saved, meaning the translation process does not need to be repeated.

Statement B: This type of translator was used to convert the code in **Example 2** to the code in **Example 3** in **Figure 4**.

State the type of program translators referred to in statements **A** and **B**.

[2 marks]

Statement **A**: _____

_____

Statement **B**: _____

_____

Turn over for the next question

0 8 . 1 Complete the truth table for the AND logic gate.

[1 mark]

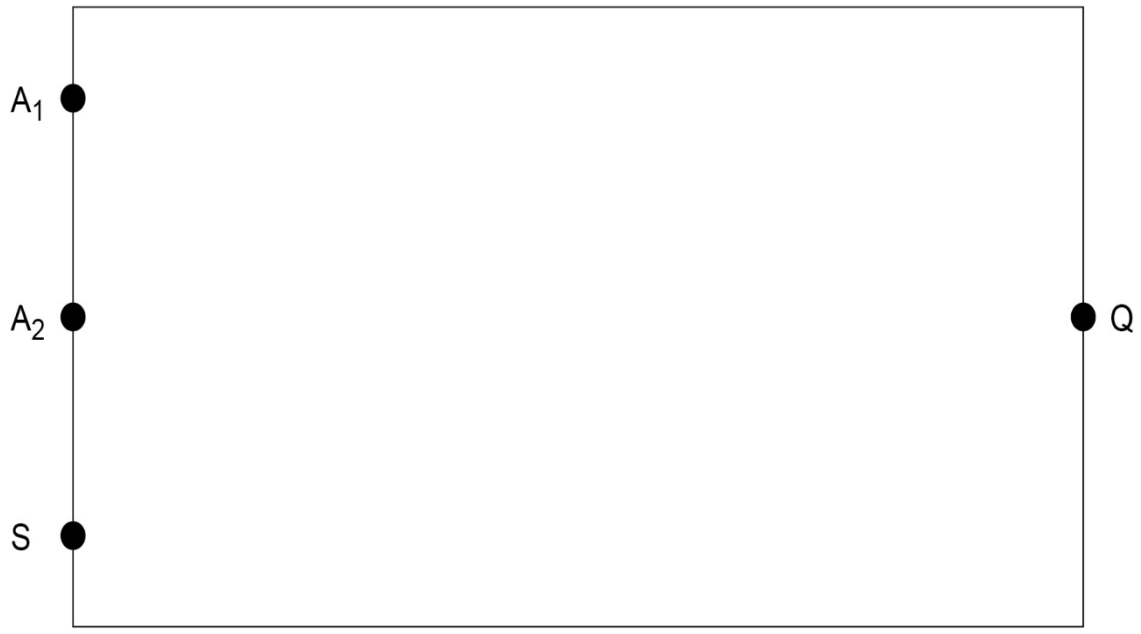
A	B	A AND B
0	0	
0	1	
1	0	
1	1	

0 8 . 2 A logic circuit is being developed for an audio advert in a shop that plays automatically if a customer is detected nearby.

- The system has two sensors, A_1 and A_2, that detect if a customer is near. The audio plays if either of these sensors is activated.
- The system should only play if another audio system, S, is not playing.
- The output from the circuit, for whether the advert should play or not, is Q.

Complete the logic circuit for this system.

[3 marks]



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 9 A relational database is being developed to store information about the games that are available to play at a games café and the advance bookings that have been made for those games. Each game has a unique name.

The database contains two tables: **Game** and **Booking**.

The database is currently being tested by the person who has developed it so the database tables only contain a small amount of data that is being used for testing.

The contents of the tables are shown in **Figure 5**.

Figure 5

Game

Name	MinPlayers	MaxPlayers	LengthOfGame	Complexity
Friday	1	1	25	2.12
Scythe	1	5	90	3.37
Terra Mystica	2	5	100	3.95
Agricola	1	4	90	3.31
Pandemic	2	4	45	2.42

Booking

GameTableID	Name	Date	StartTime	Customer	Hours
1	Friday	28/05/19	11	Hawkins	1
2	Scythe	28/05/19	11	Jemisin	1
3	Pandemic	28/05/19	15	Gormally	1
1	Pandemic	28/05/19	13	Van Perlo	2
1	Terra Mystica	29/05/19	15	Hawkins	2

0 9 . 1 State the field in the **Booking** table that is a foreign key.

[1 mark]

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0 9 . 2 State the most suitable data type to use for the `Complexity` field.

[1 mark]

0 9 . 3 Due to a change in layout at the café, the game table with an ID of 2 is no longer suitable for games that can have more than four players. The manager needs to find out the customer, date and time of all bookings made for the game table with an ID of 2 that are for a game that can have more than four players.

Write an SQL query that could be used to find this information for the manager. The results should be shown in date order.

[6 marks]

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0 9 . 4 The `LengthOfGame` field shows the average amount of time it takes to play a game in minutes.

A query to add 10 minutes to the length of time taken for all games that have a `Complexity` of more than three is shown in **Figure 6**.

Figure 6

```
UPDATE Game

SET LengthOfGame = LengthOfGame + 9

WHERE Complexity <= 3
```

The query contains two errors. Refine the query in **Figure 6** to correct the errors.

[2 marks]

1 0 The games café is evaluating the security for their network.

1 0 . 1 State **two** reasons why using a biometric authentication measure is better than password authentication for staff accounts.

[2 marks]

1 0 . 2 Explain why it would not be appropriate for the café to use MAC address filtering on their wireless network.

[2 marks]

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END OF QUESTIONS

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