A

Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

COMPUTER SCIENCE

Paper 2 Computing concepts

8525/2

Thursday 25 May 2023 Afternoon

Time allowed: 1 hour 45 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

[Turn over]

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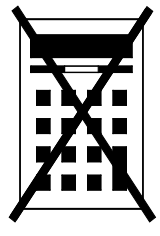
MATERIALS

- 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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).

[Turn over]

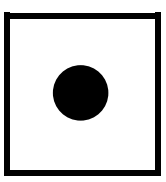
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

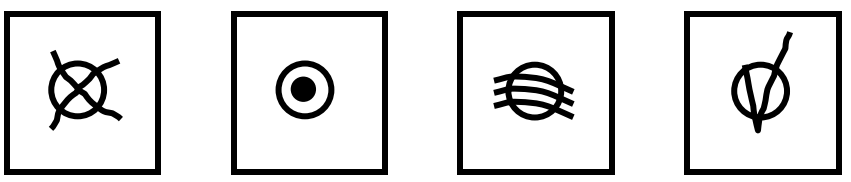
INFORMATION

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

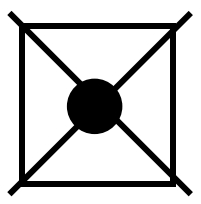
ADVICE

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

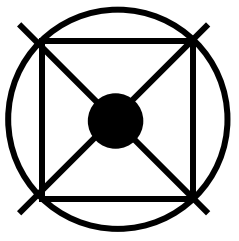
CORRECT METHOD 

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.



DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

0 1 . 1

The number base 2 is called BINARY.

Shade ONE lozenge to show which number base is called HEXADECIMAL.
[1 mark]

- ○ **A 6**
- ○ **B 8**
- ○ **C 10**
- ○ **D 16**

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[Turn over]

0 1 . 2

Shade TWO lozenges to show the statements that are true about hexadecimal. [2 marks]

- ○ **A** Hexadecimal can represent a greater range of numbers than binary.
- ○ **B** Hexadecimal is easier for people to read than binary.
- ○ **C** Hexadecimal is faster for a computer to process than binary.
- ○ **D** Hexadecimal is more accurate than binary.
- ○ **E** Hexadecimal takes less space in RAM than binary.
- ○ **F** Hexadecimal takes less time to type than binary.

0 2 . 1

Convert the decimal number `171` into binary. [1 mark]

0 2 . 2

Convert the hexadecimal number `2D` into binary.

You should show your working.
[2 marks]

Answer

0 3

Add together the following three binary numbers and give your answer in binary.
[2 marks]

```
  0 1 0 1 1 0 0 0
  0 0 0 1 1 0 0 1
+ 0 1 0 0 1 0 1 1
  ---------------
  ---------------
```

0 4

Convert 16 000 000 bits to megabytes (MB).

You should show your working.
[2 marks]

Answer _____ **MB**

0 5

Describe the binary shift that would be used to divide a binary number by four. [1 mark]

0 6 . 1

When a sound wave is converted to a digital form it is sampled. The sampling rate is measured in hertz (Hz).

Define the term HERTZ. [1 mark]

[Turn over]

0 6 . 2

A sampling rate of 20 000 Hz and a sample resolution of four bits is used to make a digital recording of a sound that lasts 50 seconds.

What is the minimum file size of the recording in megabytes (MB)?

You should show your working.
[3 marks]

Answer _____ **MB**

15

0 7 . 1

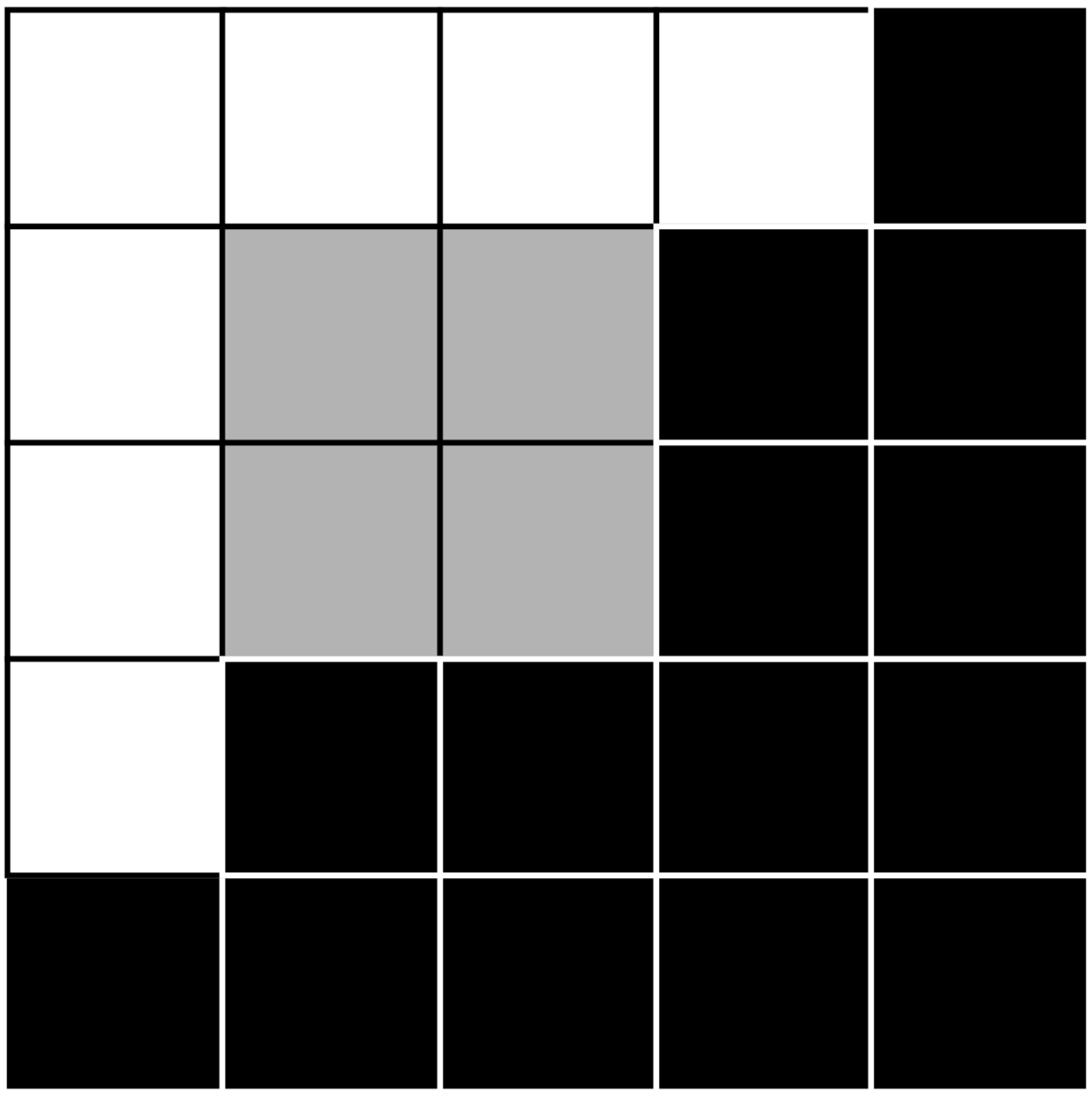
The term pixel is short for Picture Element.

Define the term PIXEL. [1 mark]

0 7 . 2

FIGURE 1 shows a 5 pixel x 5 pixel image. A minimum colour depth of two bits is needed to store the image.

FIGURE 1



Explain how the image in FIGURE 1 can be represented as a bitmap. [3 marks]

0 7 . 3

A 10 pixel x 10 pixel image contains five different colours.

Calculate the minimum file size, in bits, of this image when represented as a bitmap.

You should show your working.
[2 marks]

Answer _____ **bits**

BLANK PAGE

[Turn over]

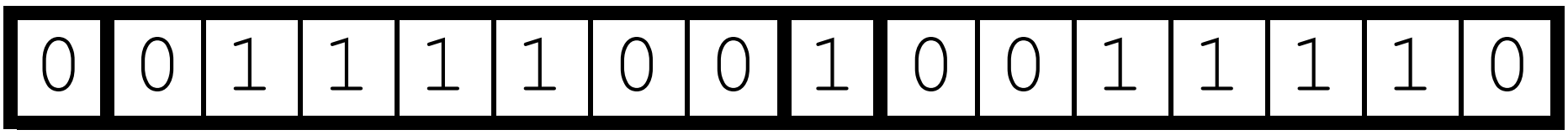
0 7 . 4

A black and white image has been compressed using run length encoding (RLE).

The first bit in each byte of the bit pattern represents the colour and the remaining seven bits of the byte represent the number of pixels in the run.

The image has a run of 60 black pixels followed by a run of 30 white pixels and is represented by the bit pattern shown in FIGURE 2.

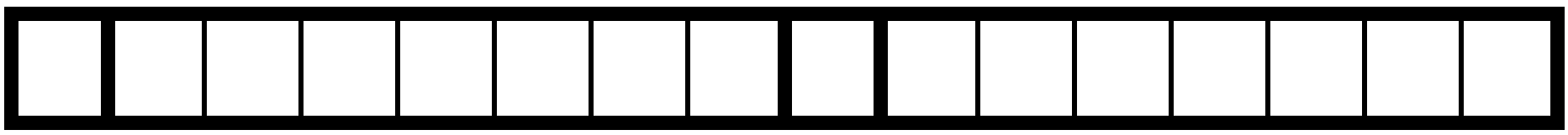
FIGURE 2



Using the same RLE method, give the bit pattern for a black and white image that has a run of 64 white pixels followed by a run of 15 black pixels.

Write your answer in TABLE 1. [2 marks]

TABLE 1



0 8 . 1

Define the term HARDWARE. [1 mark]

0 8 . 2

Describe the role of each of the following components of a CPU: [3 marks]

Clock

Control unit

Register

[Turn over]

0 8 . 3

Give ONE reason why a CPU with TWO cores might perform faster than an equivalent CPU with only one core. [1 mark]

0 8 . 4

Define the term NON-VOLATILE MEMORY. [1 mark]

0 8 . 5

Give ONE example of a type of VOLATILE memory in a computer system. [1 mark]

0 8 . 6

Explain why secondary storage is required in a computer system.
[2 marks]

9

0 9 . 1

Define the term SOFTWARE. [1 mark]

0 9 . 2

Define the term SYSTEM SOFTWARE. [1 mark]

[Turn over]

0 9 . 3

Define the term APPLICATION SOFTWARE. [1 mark]

1 0 . 1

Explain the role of main memory in the EXECUTE stage of the Fetch-Execute cycle. [2 marks]

1 0 . 2

Describe the other TWO stages of the Fetch-Execute cycle. [2 marks]

Fetch stage _____

_____

_____

Decode stage _____

_____

_____

_____

_____

7

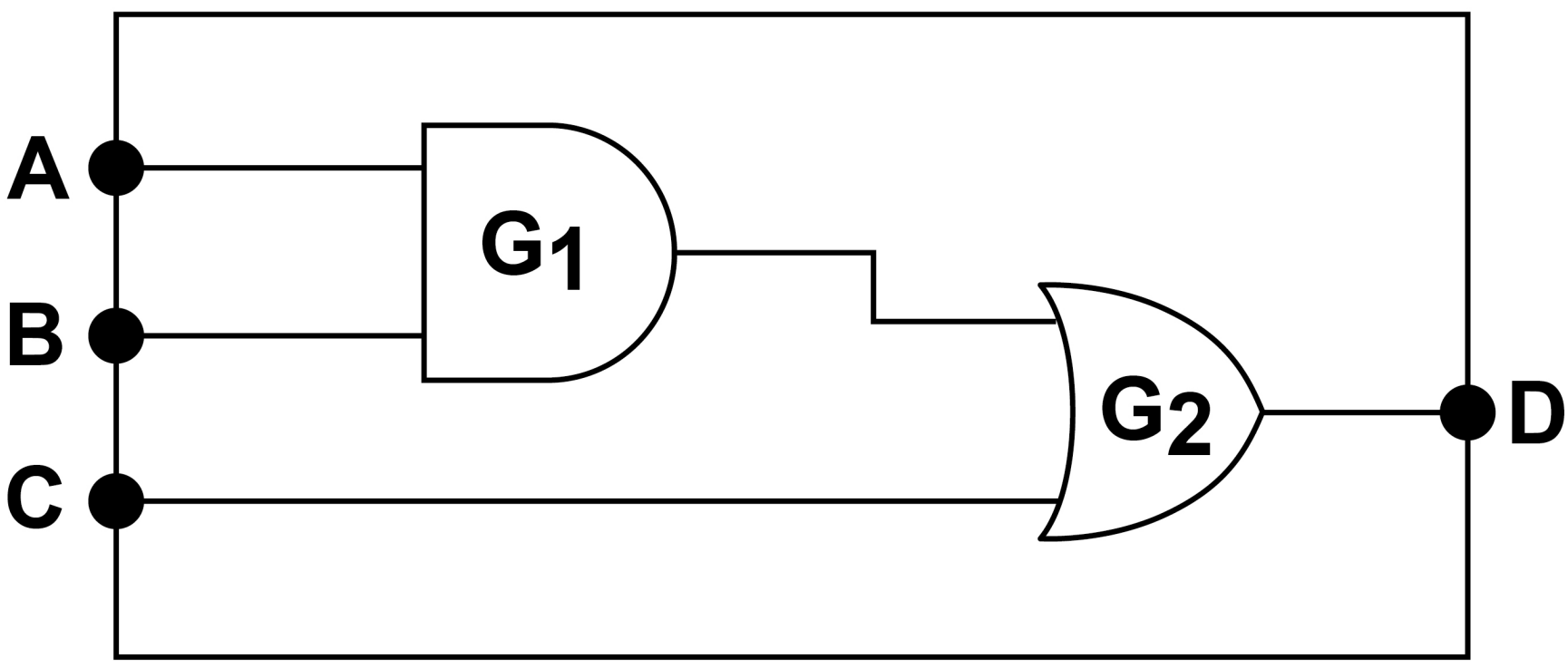
1 1 . 1

Complete the truth table for the XOR logic gate. [1 mark]

A	B	A XOR B
0	0	
0	1	
1	0	
1	1	

FIGURE 3 shows a logic circuit.

FIGURE 3



1 1 . 2

State the type of logic gate labelled G_1 in FIGURE 3. [1 mark]

1 1 . 3

Write a Boolean expression to show how the output D is calculated from the inputs A, B and C in FIGURE 3.

You MUST use the correct symbols for the Boolean operators in your expression. [2 marks]

D = _____

[Turn over]

4

1 2 . 1

FIGURE 4 shows three programs (A, B, C) that add two numbers and output the result. The programs are written in different programming languages.

FIGURE 4

A	B	C

x = 14
y = 3
z = x + y
OUTPUT(z)
	LDR R0, #14
	LDR R1, #3
	ADD R2, R0, R1
	STR R2, 63
	OUT R2
		0000 00001110
		0001 00000011
		0110 00010000
		1010 10111111
		1110 00000000

Identify the type of programming language used for each program shown in FIGURE 4 by writing A, B or C in the correct row of TABLE 2.

You MUST only use each letter once. [2 marks]

TABLE 2

	A, B or C
Assembly language	
High-level language	
Machine code	

1 2 . 2

State ONE advantage of writing programs in assembly language instead of a high-level language. [1 mark]

1 2 . 3

Shade ONE lozenge to show which statement is true about program translators. [1 mark]

○ **A** **A compiler translates all the original program code before execution.**

○ **B** **Compiled code still needs the original program code to execute.**

○ **C** **Compiled code executes more slowly than code that is being interpreted.**

○ **D** **Interpreters generate machine code directly.**

4

1 3 . 1

Describe TWO differences between a PAN and a WAN. [2 marks]

Difference 1 _____

_____

Difference 2 _____

_____

_____

1 3 . 2

Shade TWO lozenges to show which statements are true about LANs.
[2 marks]

- ○ **A** LANs always use the Ethernet protocol.
- ○ **B** LANs always use wireless technology.
- ○ **C** LANs are usually controlled or owned by a single organisation.
- ○ **D** LANs connect a maximum of 150 devices.
- ○ **E** LANs cover one room, building or site.

[Turn over]

1 3 . 3

State TWO differences between a bus topology and a star topology. [2 marks]

Difference 1 _____

_____

Difference 2 _____

_____

_____

1 3 . 4

HTTP is an example of a network protocol.

Define the term NETWORK PROTOCOL. [2 marks]

1 3 . 5

The application layer and the transport layer are two of the layers within the TCP/IP model.

What are the names of the other TWO layers of the TCP/IP model? [2 marks]

1 _____

_____

_____

2 _____

_____

10

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[Turn over]

1 4

A teacher keeps a record of books loaned to students.

The teacher uses a relational database containing three tables, BOOKCOPY, STUDENT and LOAN. FIGURE 5, below and on pages 43 and 44, shows some data from the tables.

FIGURE 5

BOOKCOPY

CopyID	BookTitle
HT001	HTML 4 Fun
PB002	Python Basics
GC001	GCSE Computing
GC002	GCSE Computing
GC003	GCSE Computing
GC004	GCSE Computing
RG001	GCSE Revision Guide

STUDENT

StudentID	FirstName	LastName	YearGroup
TUC004	Barry	Tucker	8
WAY002	Shania	Wayneton	10
KOW001	Bartek	Kowalski	11
AZE001	Faisal	Azeez	9
BAK007	Jolene	Baker	11
ANA002	Aisha	Anand	11
OKA003	Sani	Okafor	10

[Turn over]

LOAN

LoanID	StudentID	CopyID	DepositPaid
L0001	TUC004	HT001	0.50
L0002	WAY002	GC004	2.00
L0003	KOW001	GC001	2.00
L0004	TUC004	PB002	0.75
L0005	BAK007	RG001	2.50
L0006	BAK007	GC002	2.00
L0007	OKA003	GC003	2.00

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[Turn over]

1 4 . 1

Shade TWO lozenges to show which of the following statements are benefits of relational databases. [2 marks]

○ **A All the information can be stored in one table.**

○ **B Redundant data is less likely to be stored.**

○ **C Tables don't need primary keys.**

○ **D There are less likely to be data inconsistencies.**

1 4 . 2

State ONE field in the LOAN table that is a foreign key. [1 mark]

1 4 . 3

State the most suitable data type for the DepositPaid field in the LOAN table.
[1 mark]

1 4 . 4

Year 11 students must return their books after they have finished their GCSE exams.

Using the database shown in FIGURE 5, on pages 42 to 44, write an SQL query that lists all the loans for students who are in Year 11.

The query must ONLY return:

- **both names of the student**
- **the ID of the book borrowed**
- **the deposit paid.**

The results must be in ascending order of the students' last names. [6 marks]

[Turn over]

1 4 . 5

Barry Tucker has returned their copy of the book Python Basics.

Complete the SQL to delete the loan record for the book PB002. [2 marks]

```
DELETE FROM _____

WHERE _____
```

12

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[Turn over]

1	5

Wearable devices, such as smartwatches and fitness trackers, have become more popular in recent years. This has led to an increase in the amount of personal, health-related data being collected by technology companies.

Discuss the:

- **benefits of collecting personal, health-related data using wearable devices**
- **data privacy issues related to the collection of personal, health-related data**
- **legal issues related to the collection of personal, health-related data.**

[9 marks]

[Turn over]

9

5 4

1 6 . 1

Define the term CYBER SECURITY.
[2 marks]

1 6 . 2

State ONE type of malware. [1 mark]

1 6 . 3

The network manager of a new computer games company, AQAware, is configuring the network. They are concerned about potential cyber security threats that could affect the company's systems.

Discuss the potential impact of the following threats on AQAware:

- **weak and default passwords**
- **misconfigured access rights**
- **unpatched and/or outdated software.**

In your response you should include:

- **how these threats could be exploited by an attacker**
- **how AQAware could protect themselves against these threats.**

[9 marks]

[Turn over]

END OF QUESTIONS

12

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Question	Mark
1–6	
7	
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TOTAL	