

A



Surname _____

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I declare this is my own work.

GCSE

COMPUTER SCIENCE

Paper 2 Computing Concepts

8525/2

Time allowed: 1 hour 45 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



J U N 2 2 8 5 2 5 2 0 1

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

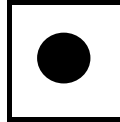
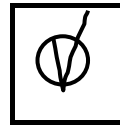
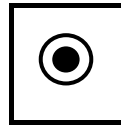
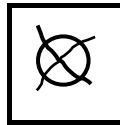
INFORMATION

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

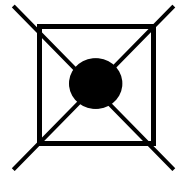


ADVICE

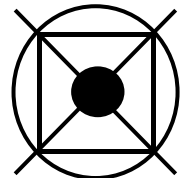
For the multiple-choice questions, completely fill in the lozenge alongside the appropriate answer.

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.

01.1

**Convert the binary number 11010100 into decimal.
[1 mark]**



01.2

Convert the binary number 10111001 into hexadecimal.

You should show your working. [2 marks]

01.3

State the largest decimal number that can be represented using 6 bits. [1 mark]

[Turn over]



02.1

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

$$\begin{array}{r}
 00110110 \\
 10010010 \\
 + 00100001 \\
 \hline \\
 \hline
 \end{array}$$

02.2

Apply a binary shift three places to the right on the bit pattern 10101000

Give the result using 8 bits. [1 mark]

--	--	--	--	--	--	--	--



The arithmetic effect of applying a left binary shift of two to a binary number is to multiply that number by four.

0 2 . 3

State the arithmetic effect of applying a left binary shift of four to a binary number. [1 mark]

0 2 . 4

State the arithmetic effect of applying a left binary shift of three followed by a right binary shift of five to a binary number. [1 mark]

[Turn over]

9



03.1

Complete the truth table for the XOR logic gate.

[1 mark]

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

03.2

A game uses three sensors.

A red light (R) in the game switches on if ALL of the following conditions are true:

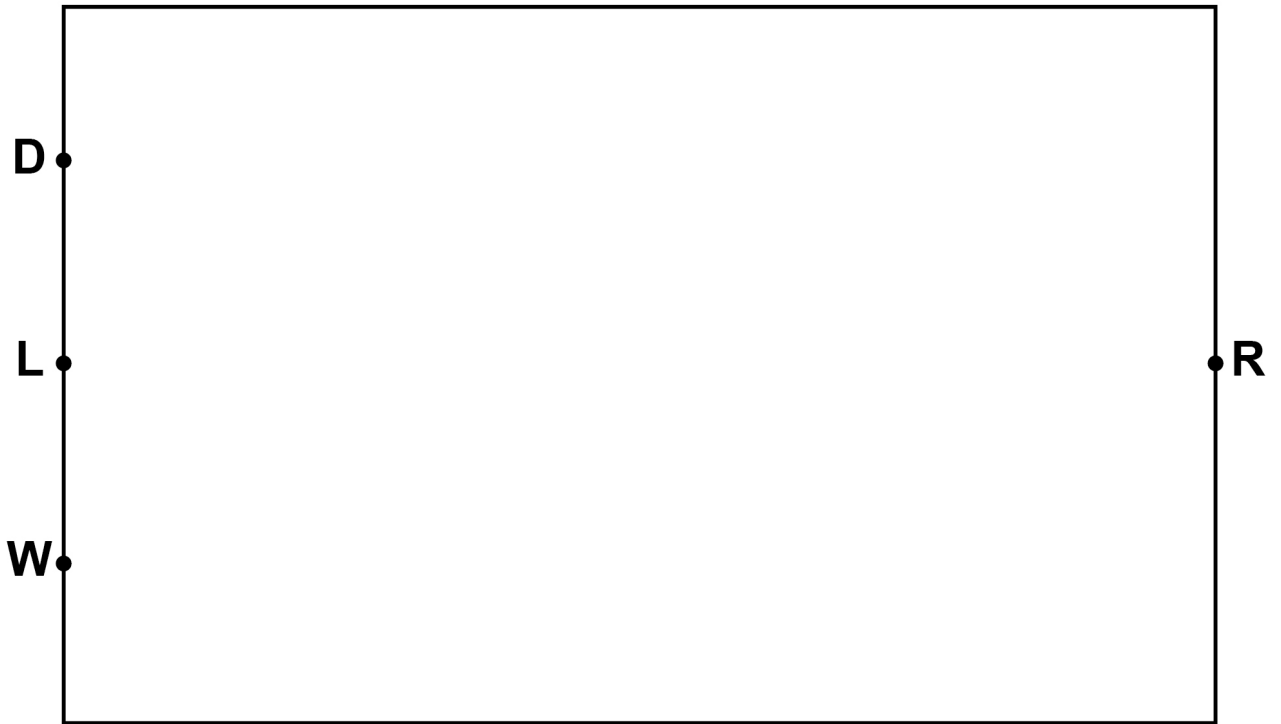
- sensor D is off
- sensor L is on
- sensor W is on.

On the opposite page, complete the logic circuit for this game.

You **MUST** use the correct symbols for the logic gates.

[3 marks]





[Turn over]



03.3

Another circuit in the game will output True if any two sensors are activated or if all three sensors are activated. This has been represented as the Boolean expression:

$$(W \cdot D) + (D \cdot L) \cdot (W \cdot L)$$

The expression contains an error.

Shade ONE lozenge that shows the expression with the error corrected. [1 mark]

A $(W \cdot D) \cdot (D \cdot L) \cdot (W \cdot L)$

B $(\overline{W} \cdot D) \cdot (D \cdot L) + (W \cdot L)$

C $(W \cdot D) + (D \cdot L) + (W \cdot L)$

D $(\overline{W} \cdot D) + (D + L) \cdot (W \cdot L)$



03.4

A green light (G) in the game switches on if ALL of the following conditions are true:

- sensor D is off
- sensor L is off
- sensor W is on.

Write a Boolean expression for this logic circuit.

You MUST use Boolean expression operators in your answer. [3 marks]

G = _____

[Turn over]

8



04.1

Describe what is meant by the terms system software and application software. [2 marks]

System software _____

Application software _____

04.2

**State FOUR functions of an operating system.
[4 marks]**

1 _____

2 _____

3 _____

4 _____

[Turn over]



0	6
---	---

Programming languages can be classified as low-level or high-level.

Shade TWO lozenges to show the statements that are true about code written using a low-level language instead of a high-level language. [2 marks]

A The code more closely resembles English.

B The code is easier to write.

C The code is not translated using a compiler.

D The code is quicker to write.

E The code can directly manipulate computer registers.

F The code never needs to be translated before being executed.

[Turn over]



07

Assemblers and interpreters are two types of program translator.

07.1

State the purpose of an assembler. [1 mark]

07.2

Explain how an interpreter works. [4 marks]

08

State TWO reasons why computers have more RAM than cache memory. [2 marks]

1

2

09.1

Data is increasingly being stored 'in the cloud'.

State TWO advantages of using cloud storage instead of local storage. [2 marks]

1



2

09.2

Many new computers use solid-state storage for secondary storage rather than magnetic storage.

Explain why solid-state storage is NOT fitted to every new computer. [2 marks]

[Turn over]



1	0
---	---

How many bits are there in two kilobytes?

Show your working. [2 marks]

Answer _____ bits



11

The ASCII value for the character x is the decimal number 120

Complete TABLE 1 with the missing ASCII and Unicode values. [2 marks]

TABLE 1

Character	ASCII value	Unicode value
w		
x	120	
y		
z		

[Turn over]

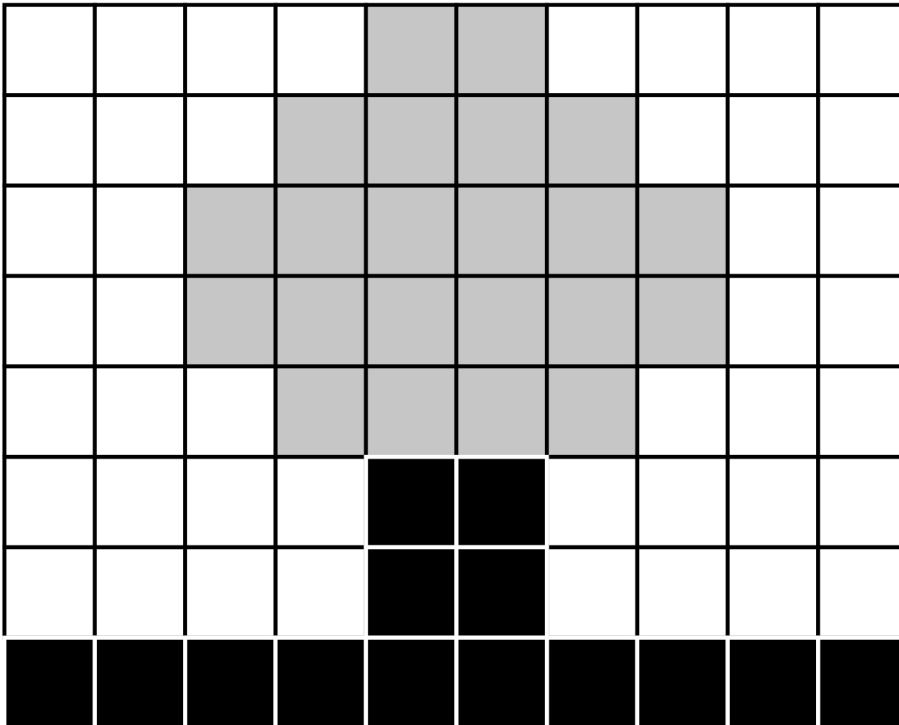
<hr style="width: 50%; margin: 0 auto;"/> 10
--



1	2
---	---

FIGURE 1 shows a 10 x 8 bitmap image that uses three colours.

FIGURE 1



Calculate the minimum file size that would be required to store the bitmap image in FIGURE 1.

Give your answer in BYTES.

Show your working. [3 marks]



Answer _____ **bytes**

[Turn over]



1 3

Analogue sound must be converted to a digital form for storage and processing in a computer.

1 3 . 1

Define the term SAMPLE RESOLUTION. [1 mark]

1 3 . 2

State ONE disadvantage of a high sample resolution. [1 mark]



1	3	.	3
---	---	---	---

A 50-second sound has been recorded at a sample rate of 40 000 Hz.

Two bytes have been used to store each sample of the sound.

Calculate the file size of the sound file in MEGABYTES.

Show your working. [2 marks]

Answer _____ megabytes

[Turn over]

—
7



1 4

Computer networks can be installed using wired or wireless technology.

1 4 . 1

State ONE wireless method used to connect devices on a Personal Area Network (PAN). [1 mark]



14.2

**Describe TWO differences between a Local Area Network (LAN) and a Wide Area Network (WAN).
[2 marks]**

1

2

[Turn over]



14.3

Give THREE advantages of using a wireless network instead of a wired network. [3 marks]

1

2

3



14.4

Shade ONE lozenge to indicate the application layer protocol used for sending emails from a client device to a mail server. [1 mark]

A FTP**B HTTP****C SMTP****D UDP****14.5**

Explain the purpose of the HTTPS protocol. [2 marks]

[Turn over]

9



15.1

State TWO issues with only using usernames and passwords in an authentication system. [2 marks]

1

2



15.2

Describe ONE security measure that could be used, in addition to a password, to make sure that a user is who they are claiming to be. [2 marks]

[Turn over]



15.3

State TWO reasons why automatic software updates provide better security than manual software updates. [2 marks]

1 _____

2 _____

16.1

Explain what penetration testing is. [2 marks]



16.2

**Describe the aim of a white-box penetration test.
[2 marks]**

[Turn over]

10



17.1

**State TWO reasons why data are compressed.
[2 marks]**

1

2

17.2**FIGURE 2** shows a string.**FIGURE 2**

MISSISSIPPI

One method for compressing data is run length encoding (RLE).**When using RLE, the data in FIGURE 2 become:**

1M 1I 2S 1I 2S 1I 2P 1I

Explain why RLE is NOT a suitable method for compressing the data in FIGURE 2. [2 marks]

[Turn over]

17.3

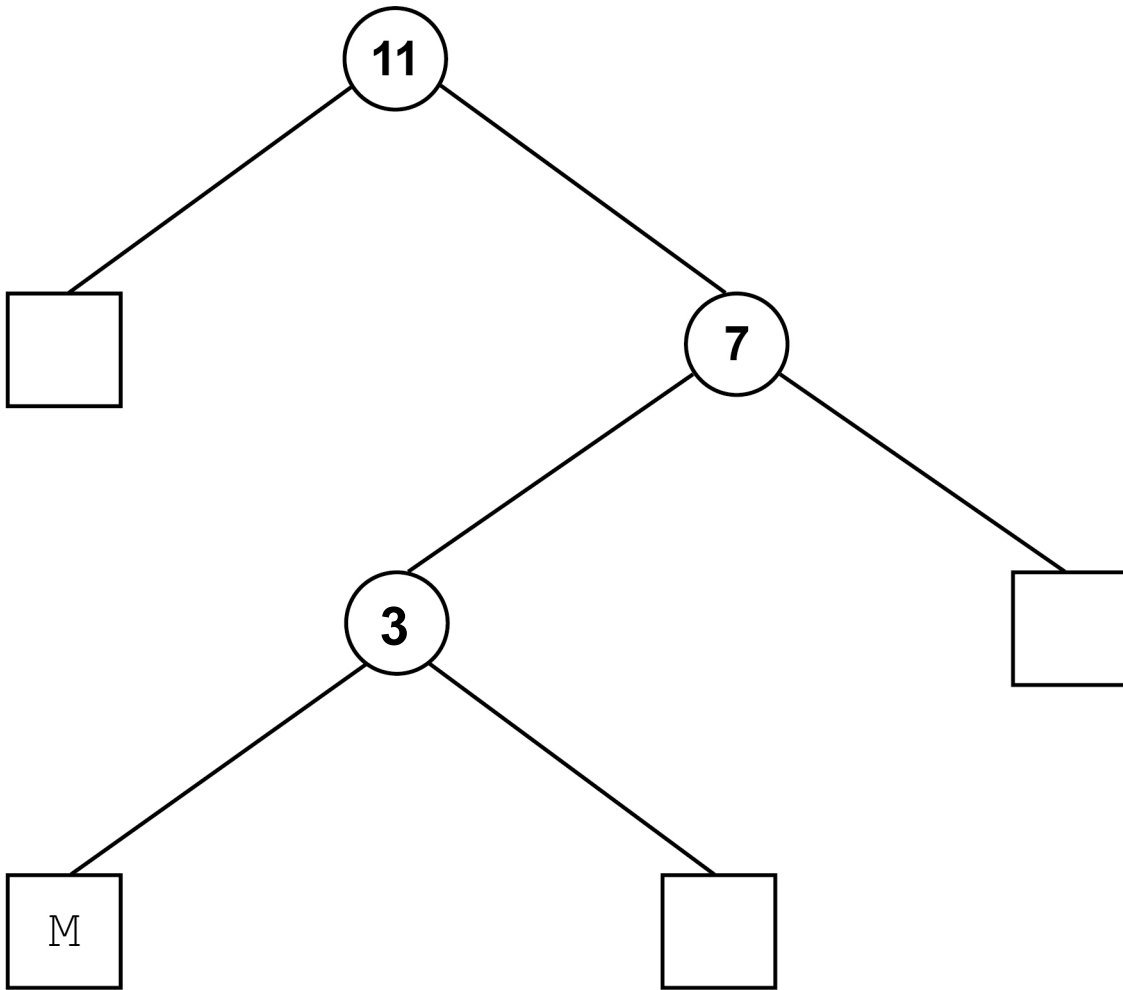
Another method for compressing data is Huffman coding. In Huffman coding, the codes for the characters can be created based on their position in a tree.

FIGURE 3 shows a Huffman code for each different character in the string in **FIGURE 2**.

FIGURE 3

Character	Binary code
M	100
I	0
S	11
P	101

Complete the Huffman tree, on the opposite page, to show the position of the characters I, S and P using the codes from FIGURE 3. [1 mark]



[Turn over]

5



18

A relational database has been developed for a youth club to store information about their members and the awards they are given.

The database contains two tables: **MEMBER** and **AWARD**

FIGURE 4 shows some data from the tables.

FIGURE 4

MEMBER

MemberID	FirstName	LastName	DateJoined
1	Zarah	Tariq	2020-01-05
2	Penny	Hill	2020-01-05
3	Peter	Boyes	2020-02-14
4	Reuben	Bailey	2020-10-20



AWARD

AwardID	MemberID	DatePresented	AwardName
1	1	2020-09-10	Teamwork
2	1	2020-10-13	Outdoors
3	3	2020-06-19	Challenge
4	2	2020-11-11	Leader

18.1**Define the term RELATIONAL DATABASE. [2 marks]**

[Turn over]

1	8	.	2
---	---	---	---

**State ONE benefit of using relational databases.
[1 mark]**



18.3

State the name of the field from the MEMBER table that is the most suitable to use as the primary key. [1 mark]

18.4

State the name of the field from the AWARD table that is a foreign key. [1 mark]

[Turn over]



FIGURE 4 has been included again below.

FIGURE 4

MEMBER

MemberID	FirstName	LastName	DateJoined
1	Zarah	Tariq	2020-01-05
2	Penny	Hill	2020-01-05
3	Peter	Boyes	2020-02-14
4	Reuben	Bailey	2020-10-20

AWARD

AwardID	MemberID	DatePresented	AwardName
1	1	2020-09-10	Teamwork
2	1	2020-10-13	Outdoors
3	3	2020-06-19	Challenge
4	2	2020-11-11	Leader





18.6

A new member joins the youth club. The following SQL is run to add their details to the database:

```
INSERT INTO A  
B(5, 'Alina', 'Ahmed', '2020-11-30')
```

Some of the SQL has been replaced by labels.

State the SQL that should have been written in place of the labels **A** and **B**. [2 marks]

A

B

END OF QUESTIONS

13



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For Examiner's Use	
Question	Mark
1–2	
3	
4–5	
6–7	
8–11	
12–13	
14	
15–16	
17	
18	
TOTAL	

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