

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE

COMPUTER SCIENCE

Paper 2 Concepts and principles of computer science

Thursday 7 November 2024

07:00 GMT

Time allowed: 2 hours

Materials

You will need no other materials.

- Instructions
- Use black ink or black ball-point pen.
 - Fill in the boxes at the top of the page.
 - Answer **all** questions.
 - You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
 - 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 booklet. Cross through any work you do not want to be marked.
 - You are not allowed to use a calculator.

- Information
- The marks for questions are shown in brackets.
 - The maximum mark for this paper is 80.
 - You may use a bilingual dictionary.
 - You may **not** use an English dictionary.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
TOTAL	



Answer **all** questions in the spaces provided.

0 1 . 1 What is a computer network?

[1 mark]

0 1 . 2 What does WAN stand for?

[1 mark]

W _____ A _____ N _____

0 1 . 3 Tick (✓) **one** box to indicate which of the statements is true.

[1 mark]

	Statement	Tick (✓) one
A	A LAN usually carries more data than a WAN.	
B	A WAN can link together computers that are on more than one site.	
C	A WAN is usually a private network.	
D	A WAN is usually owned by a single person or organisation.	



0 1 . 4

Describe the layout of a network that uses a star topology.

[2 marks]

0 1 . 5

State **one** advantage of using a bus topology instead of a star topology.

[1 mark]

0 1 . 6

Devices connected to a network use protocols to communicate.

Define the term protocol.

[1 mark]

7

Turn over for the next question

Turn over ►



0	2
---	---

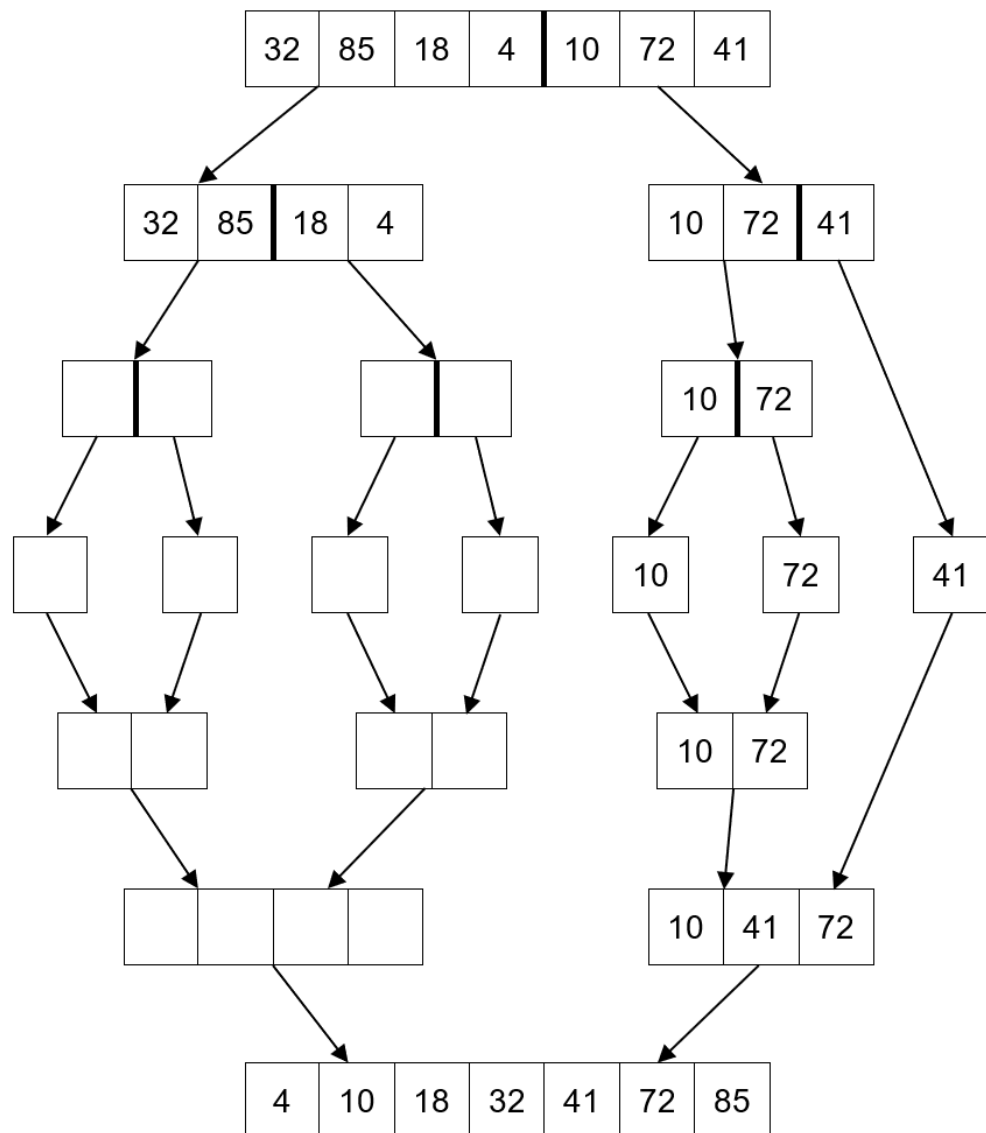
Figure 1 shows the list 32, 85, 18, 4, 10, 72, 41 being sorted using the merge sort algorithm.

Some of the boxes have been left empty.

Complete the empty boxes in **Figure 1** to show how the merge sort algorithm would be applied to the list.

[2 marks]

Figure 1



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

Turn over ►



0 5

0 3 . 1 State what compression is.

[1 mark]

0 3 . 2 State **one** reason why data is compressed.

[1 mark]



0	3	.	3
---	---	---	---

The word SELFLESSNESS is to be represented using Huffman coding.

Draw a Huffman tree that could be used to encode the word SELFLESSNESS.

[4 marks]

Working:

Final answer (Huffman tree):

6

Turn over ►



0 4 . 1 State an example of an embedded system.

[1 mark]

0 4 . 2 Describe **three** common differences between embedded systems and desktop computers.

[3 marks]

Difference 1

Difference 2

Difference 3

4



Turn over for the next question

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0 5

A relational database has been created to store data about the dishes that are served on different days in a school and the ingredients that are used to make them.

There are three tables in the database: **Menu**, **Dish** and **Ingredient**.

Figure 2 shows **some of the data** in the three tables.

Figure 2

Menu

Day	DishID
Monday	1
Monday	2
Monday	3
Monday	4
Monday	5
Tuesday	6
Tuesday	4
Wednesday	7

Dish

DishID	DishName	Course
1	Vegetarian lasagne	Main
2	Chicken salad	Main
3	Chicken burger	Main
4	Chocolate brownie	Dessert
5	Flapjack	Dessert
6	Lamb kofta	Main
7	Doughnut	Dessert

Ingredient

DishID	IngredientName	Quantity	Category
1	Butternut squash	1	Vegetable
1	Red pepper	3	Vegetable
2	Chicken breast	0.5	Meat
3	Burger bun	1	Bread
3	Chicken breast	1	Meat
5	Oats	200	Cereal
6	Minced lamb	500	Meat

0 5

. 1

State a suitable data type for the **Quantity** field in the **Ingredient** table.

[1 mark]



0 5 . 2

Write an SQL query that lists the ingredient names and quantities of all the vegetables that are needed to make the dishes that the canteen serves on a Monday.

[4 marks]

0 5 . 3

Flapjacks are now made using chocolate chips, which are a new ingredient. Chocolate chips are in the category Confectionery and 100 chocolate chips are used to make flapjacks.

Complete the SQL code to add the new ingredient to the **Ingredient** table.

[2 marks]

INSERT _____ Ingredient
VALUES (_____)

0 5 . 4

The database design could be improved as the **Ingredient** table includes redundant data.

Describe an example of redundant data in the **Ingredient** table.

[1 mark]

8

Turn over ►



0 6

Two methods that can be used to improve the security of a network are a firewall and MAC address filtering.

0 6 . 1

Describe how a firewall works to keep a computer network secure.

[2 marks]

0 6 . 2

Describe how MAC address filtering works to keep a computer network secure.

[2 marks]

4

07.1

Explain the difference between the purpose of a compiler and the purpose of an assembler.

[1 mark]

07.2

Describe how an interpreter is used to execute a program written in a high-level language.

[2 marks]

07.3

Describe **two** differences between low-level and high-level languages.

[2 marks]

Difference 1 _____

Difference 2 _____



0 8

Figure 3 shows pseudocode for a search algorithm. The lines of the pseudocode are numbered.

Figure 3

```

1  SearchName ← USERINPUT
2  Start ← 0
3  End ← LEN(Names) - 1
4  Found ← False
5  WHILE Start ≤ End AND Found = False
6      MidPoint ← (Start + End) DIV 2
7      IF SearchName > Names[MidPoint] THEN
8          Start ← MidPoint + 1
9      ELSE IF SearchName < Names[MidPoint] THEN
10         End ← MidPoint - 1
11     ELSE IF SearchName = Names[MidPoint] THEN
12         OUTPUT "Name found at position:"
13         OUTPUT MidPoint
14         Found ← True
15     ENDIF
16 ENDWHILE

```

Figure 4 shows the contents of the `Names` array.

Figure 4

[0]	[1]	[2]	[3]	[4]	[5]	[6]
Ali	Farhan	Fendi	Kathy	Maryam	Snehil	Ruby

0 8 . 1

Complete the trace table below to show the algorithm in **Figure 3** being carried out on the array in **Figure 4** when the user enters the name `Fendi` to search for.

You may not need to use all of the rows.

[4 marks]

SearchName	Start	End	Found	MidPoint	Names[MidPoint]



0 8 . 2

State the name of the search algorithm that the pseudocode in **Figure 3** implements.**[1 mark]**

0 8 . 3

It is proposed that the code on **line 11** in **Figure 3** is changed from:

```
ELSE IF SearchName = Names[MidPoint] THEN
```

to:

```
ELSE
```

State whether or not editing this line of the algorithm would affect whether the algorithm works as it should **and** explain why this is the case.**[1 mark]**

6

Turn over for the next question**Turn over ►**

0 9

Figure 5 shows an incomplete flowchart.

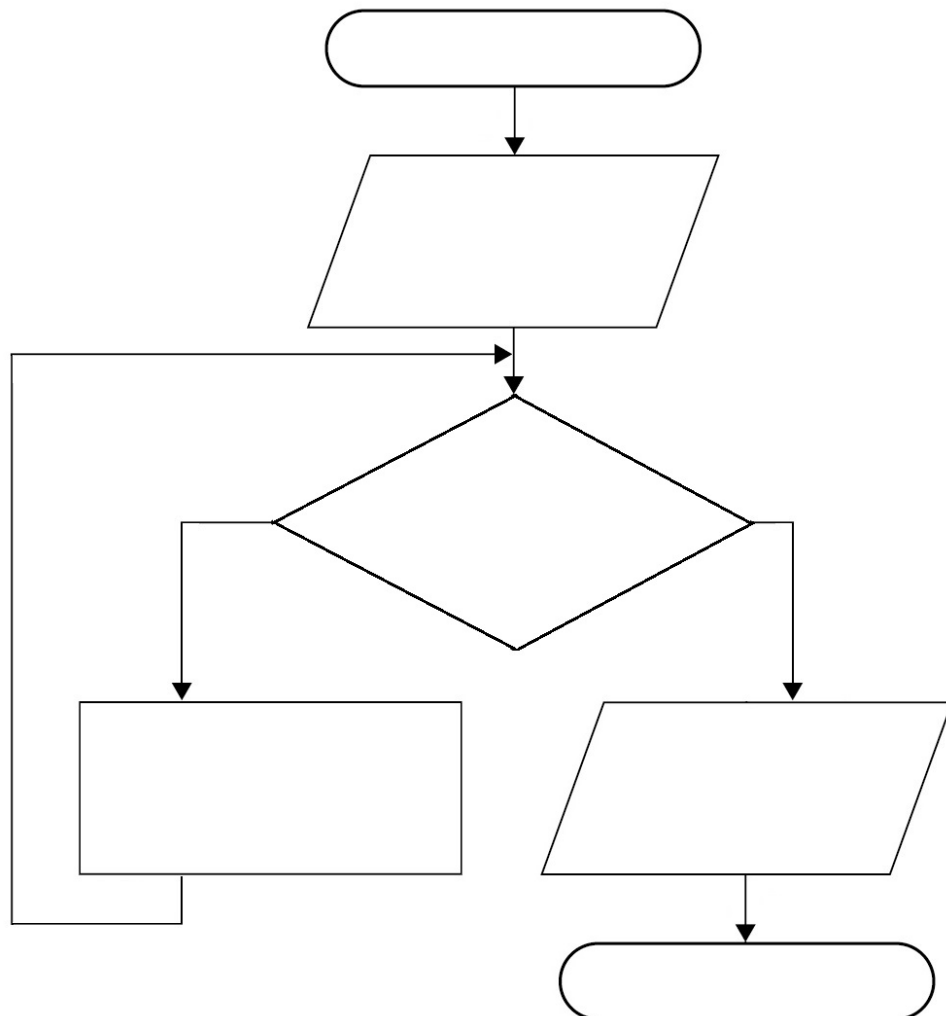
When completed, the flowchart is supposed to represent an algorithm that:

- Gets the user to enter a number
- Repeatedly doubles that number until it is greater than 100
- Outputs the resulting number.

Complete the flowchart shown in **Figure 5** by adding **all** the missing labels so it represents the algorithm described.

[4 marks]

Figure 5



4



1 0

Figure 6 shows a logic circuit represented as a Boolean expression.

Figure 6

$$Q = \overline{\overline{A} + \overline{B}}$$

1 0

1

Draw a logic circuit diagram in the space below for the Boolean expression in **Figure 6**. Your logic circuit diagram must use exactly four logic gates.



[4 marks]

Figure 7 shows the truth table for the Boolean expression in **Figure 6**.

Figure 7

A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

1 0

2

The Boolean expression in **Figure 6** and the truth table in **Figure 7** produce the same output as a logic gate.

State the name of this logic gate.

[1 mark]

5

Turn over ►



1	1
---	---

Weak passwords and default passwords are threats to cyber security.

1	1	.	1
---	---	---	---

State **two** reasons why a password could be a weak password.

[2 marks]

Reason 1 _____

Reason 2 _____

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

When you get a new wireless router, it sometimes has a default password which you should change.

Explain why default passwords are a threat to cyber security.

[2 marks]



1 1 . 3

Social engineering can be used to find out a computer user's password.

State **two** social engineering techniques and for each describe how they could be used to find out a computer user's password.

[2 marks]

Technique _____

How it could be used _____

Technique _____

How it could be used _____

6

Turn over for the next question

Turn over ►



1 2 . 1 Convert the binary number 10011100 to hexadecimal.

[2 marks]

Answer _____

1 2 . 2 Convert the hexadecimal number 84 to decimal.

[2 marks]

Answer _____

1 2 . 3 Add together the two binary numbers shown in **Figure 8**.

Your answer must be in binary.

Figure 8

	1	0	0	1	1	1	1	0
+	0	1	0	0	1	1	0	0

Answer _____

[2 marks]

1 2 . 4 State the name of the component inside a CPU that is used to carry out the addition of two binary numbers.

[1 mark]



1 2 . 5

State the name of the component inside a CPU that sends out a regular electronic pulse.

[1 mark]

1 2 . 6

Explain the role of the control unit.

[2 marks]

1 2 . 7

Computer A has four cores. **Computer B** has two cores. Each core can execute one instruction at a time.

Describe **two** reasons why the CPU in **Computer A** might not be twice as fast as the CPU in **Computer B**.

[2 marks]

Reason 1 _____

Reason 2 _____

Question 12 continues on the next page

Turn over ►



1 2 . 8 RAM and secondary storage have different capacities and access speeds.

Describe **two** other differences between RAM and secondary storage.

[2 marks]

Difference 1 _____

Difference 2 _____

1 2 . 9 One resource managed by the operating system is memory.

State **two** other resources that are managed by the operating system.

[2 marks]

Resource 1 _____

Resource 2 _____



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1 3

Figure 9 shows the HTML used to create a web page.

Figure 9

```
<html>
  <head>
    <title>Suffolk towns</title>
  </head>
  <body>
    <p>Biggest towns in Suffolk</p>
    <ol>
      <li>Ipswich</li>
      <li>Lowestoft</li>
    </ol>
  </body>
</html>
```

1 3**1**

Sketch what the web page in **Figure 9** will look like when displayed in a web browser.

You may use labels to make your layout clearer, if necessary.



[3 marks]



1 3 . 2 The `<ol></ol>` tags are replaced with the `<ul></ul>` tags.

What is the impact on the web page?

[1 mark]

1 3 . 3 The `<p></p>` tags are removed from `Biggest towns in Suffolk`.

What is the impact on the web page?

[1 mark]

1 3 . 4 The following style rule is applied to the web page:

```
ol {color: red}
```

What could `ol` be replaced with to achieve the same change in the appearance of the web page?

[1 mark]

Question 13 continues on the next page

Turn over ►



1 3 . 5

Tick (✓) **two** boxes to indicate which of the tags are available in HTML5 but not available in earlier versions of HTML.

[1 mark]

	Tag	Tick (✓) two
A	 	
B	<div>	
C	<header>	
D	<video>	

 7

END OF QUESTIONS



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