

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE COMPUTER SCIENCE

PAPER 2 CONCEPTS AND PRINCIPLES OF COMPUTER SCIENCE

Date of Exam

Session

Time allowed: 2 hours

Materials

You will need no other materials.

Instructions

- Use black ink or black ballpoint pen.
- Fill in the boxes at the top of this 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.
- Do all rough work in this book. 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.

Advice

Only **one** answer per question is allowed.

For each answer completely fill in the circle 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.



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

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

0 1 . 1

Convert the decimal number 107 to binary.

[1 mark]

Final Answer: _____

0 1 . 2

Convert the binary number 10011100 to hexadecimal.

[1 mark]

Final Answer: _____

0 1 . 3

State **two** reasons why programmers often use hexadecimal instead of binary.

[2 mark]

0 1 . 4

What is the largest **decimal number** that can be represented using 6 bits?

[1 mark]

Final Answer: _____

0 1 . 5

Using binary arithmetic, add together the binary numbers 00111001 and 01010010, giving your **answer in binary**.

Show your working.

[2 marks]

Final Answer: _____

0 1 . 6

ASCII uses 7 bits to represent a character. How many different characters can be represented using ASCII?

[1 mark]

Final Answer: _____

0 1 . 7

How many **extra** bits would be needed to represent twice as many characters as ASCII can represent?

[1 mark]

Final Answer: _____

0	2	.	1
---	---	---	---

State the name of a high-level programming language.

[1 mark]

0	2	.	2
---	---	---	---

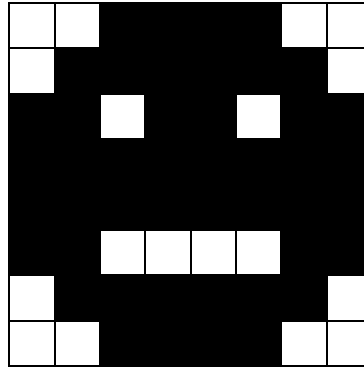
Explain the main differences between high-level and low-level programming languages.

[3 marks]

0 3

Figure 1 shows a black and white icon that is stored as a bitmap image.

Figure 1



In the bitmap, a white pixel is represented by the value 0 and a black pixel by the value 1.

0 3 . 1

Calculate the minimum amount of memory, in bytes, that will be required to store the image in **Figure 1**.

[2 marks]

Final Answer: _____

0 3 . 2

The image in **Figure 1** is changed so that the eyes are coloured blue and the mouth is coloured red.

Calculate the minimum amount of memory, in bytes, that will be required to store the new image.

[1 mark]

Final Answer: _____

0 3 . 3

Run length encoding can be used to compress files like images.

Show how the top row of pixels from the image in **Figure 1** could be compressed using run length encoding.

[1 mark]

0	3	.	4
---	---	---	---

Explain why run length encoding is good at compressing some images but would not work well for compressing a file of text.

[2 marks]

0	4
---	---

Figure 2 shows a truth table for a logic gate.

Figure 2

Inputs		Output
A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

0	4	.	1
---	---	---	---

Shade in **one** box to indicate which logic gate the truth table in **Figure 2** represents.

[1 mark]

AND	<input type="radio"/>
-----	-----------------------

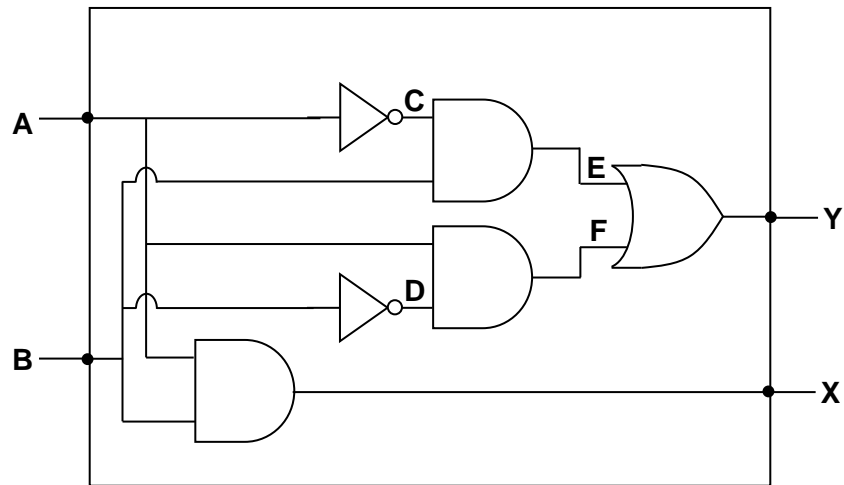
OR	<input type="radio"/>
----	-----------------------

NOT	<input type="radio"/>
-----	-----------------------

Figure 3 shows a logic circuit.

- The circuit has two inputs, **A** and **B**.
- The circuit has two outputs, **X** and **Y**.

Figure 3



0 4 . 2

Complete the truth table below for the logic circuit in **Figure 3**.

[5 marks]

Inputs						Outputs	
A	B	C	D	E	F	X	Y
0	0						
0	1						
1	0						
1	1						

0 4 . 3

The logic circuit in **Figure 3** performs a useful operation in binary.

Look at the values of the circuit outputs **X** and **Y** for the different values of the inputs **A** and **B**. Explain the purpose of the circuit.

[1 mark]

0	5	.	1
---	---	---	---

Explain how a magnetic hard disk drive stores data.

[6 marks]

0	5	.	2
---	---	---	---

Many modern laptop computers use a solid state disk for secondary storage instead of a magnetic hard disk drive.

State **two** reasons why a solid state disk is more suitable for use in a laptop computer than a magnetic hard disk drive.

[2 marks]

Reason 1: _____

Reason 2: _____

0	6
---	---

A student is going to set up a computer network at home.

The computer network will be used to connect together a range of devices including a desktop computer, laptops, a printer and a TV with internet connection.

0	6	.	1
---	---	---	---

Explain **two** advantages of setting the network up as a **wireless** network.

[2 marks]

0	6	.	2
---	---	---	---

Explain **two** advantages of setting the network up as a **wired** network.

[2 marks]

0	7
---	---

Two factors that can affect the performance of a processor are:

- number of cores
- size of cache memory.

0	7	.	1
---	---	---	---

Explain how the number of cores affects processor performance.

[2 marks]

0	7	.	2
---	---	---	---

Explain how the size of cache memory affects processor performance.

[2 marks]

0	7	.	3
---	---	---	---

State **one** other factor that can affect processor performance.

[1 mark]

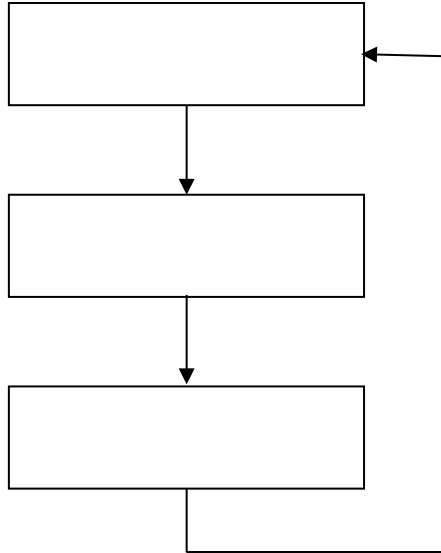
0 7 . 4

Processors follow a three-stage cycle to carry out an instruction.

Complete **Figure 4** by writing the names of each of the stages of this cycle, in the correct order, in to the correct boxes on the figure.

[2 marks]

Figure 4

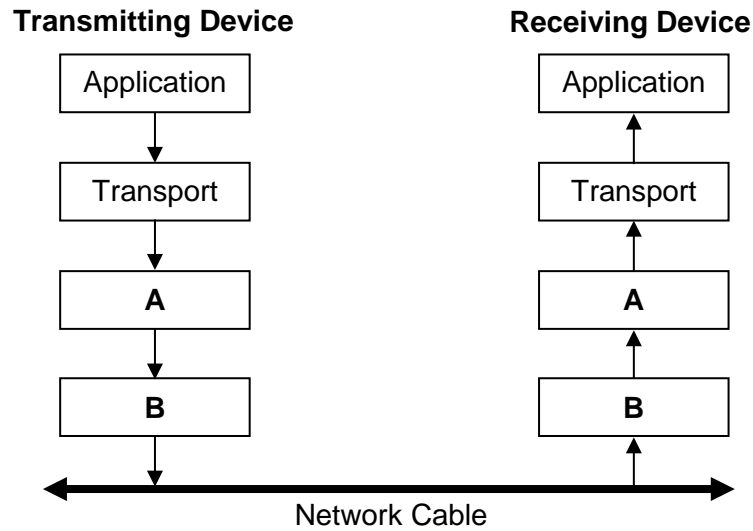


0 8

Figure 5 shows the TCP/IP stack that will be used by the network to send data from a transmitting device to a receiving device.

The names of two of the layers of the stack have been replaced by the letters **A** and **B**.

Figure 5



0 8 . 1

What is the name of the layer that has the label **A**?

[1 mark]

0 8 . 2

What is the name of the layer that has the label **B**?

[1 mark]

0 8 . 3

Many different network protocols can be used at the application layer.

Explain what a protocol is.

[2 marks]

0	8	.	4
---	---	---	---

Two protocols used at the application layer are HTTP and IMAP.

Explain what HTTP is used for.

[1 mark]

0	8	.	5
---	---	---	---

Explain what IMAP is used for.

[1 mark]

0 9

Figure 6 shows an algorithm expressed using pseudo-code.

Figure 6

```

A ← 99
FOR P ← 0 TO Length - 1
  IF List[P] < A THEN
    A ← List[P]
    B ← P
  ENDIF
ENDFOR
IF B < Length THEN
  FOR P ← B TO Length - 2
    List[P] ← List[P+1]
  ENDFOR
ENDIF
Length ← Length - 1
List[Length] ← NULL

```

The algorithm operates on an array called *List*. The current contents of array *List* are shown in **Figure 7**.

Figure 7

Index	[0]	[1]	[2]	[3]	[4]
Contents	92	50	26	82	73

The variable *Length* contains the value 5, which is the number of items stored in array *List*.

09.1

Complete the trace table below to show the execution of the algorithm in **Figure 6** on the array contents in **Figure 7**.

The initial values of the variables, before the start of the FOR loop, have been written into the table to help you.

You may not need to write in all of the rows of the table.

[6 marks]

A	B	P	Length	List				
				[0]	[1]	[2]	[3]	[4]
99	-	-	5	92	50	26	82	73

09.2

Explain the purpose of the algorithm in **Figure 6**.

[1 mark]

09.3

The algorithm makes an assumption about the data in the array `List`. If this assumption is not met the algorithm will not work.

Explain what this assumption is.

[1 mark]

1 | 0

Figure 8 shows a list of names stored in an array called Names.

Figure 8

Names	
[0]	Alex
[1]	Cixin
[2]	Jonathan
[3]	Judith
[4]	Katherine
[5]	Orson
[6]	Ray
[7]	Susan
[8]	Tokyo

1 | 0 . 1

If a **linear search** is being used to try and find the name "Ray" in the Names array how many comparisons will be made?

[1 mark]

1 | 0 . 2

If a **binary search** is being used to try and find the name "Ray" in the Names array how many comparisons will be made?

[1 mark]

1 | 0 . 3

For each statement shade in a box to show if the statement is true or false.

Statement

A binary search will always make fewer comparisons than a linear search when searching for a name in the Names array.

True

False

A linear search will make eight comparisons if it is searching for a name that is not in the Names array.

True

False

A binary search will make at most four comparisons if it is searching for a name that is not in the Names array.

True

False

A binary search is the most suitable search algorithm to use with an unordered list.

True

False

[4 marks]

1 1

The following tables form a relational database used by a veterinarian's surgery about appointments and pets.

Appointment

AppointmentID	VetName	Date	Time	PetID
1	Dr Marks	19/11/2016	9:00	1
2	Dr Silverberg	19/11/2016	10:00	2
3	Dr Marks	20/11/2016	9:00	4
4	Dr Mieville	20/11/2016	9:00	4
5	Dr Silverberg	20/11/2016	12:00	1

Pet

PetID	TypeOfAnimal	Name	OwnerName
1	Horse	Casein	Kress
2	Cat	Lola	Sturgeon
3	Cat	Charlie	Singh
4	Gerbil	Renegade	Lynch
5	Bird	Sammy	Lynch
6	Cat	Timmy	Dalrymple

1 1 . 1

How many records are there in the **Pet** table?

[1 mark]

1 1 . 2

Which field is the primary key for the **Appointment** table?

[1 mark]

1 1 . 3

Which field is the foreign key in the **Appointment** table?

[1 mark]

1 1 . 4

List the results of executing the following SQL query on this relational database.

```
SELECT Date, OwnerName, TypeOfAnimal
FROM Appointment, Pet
WHERE Pet.PetID = Appointment.PetID
AND VetName = 'Dr Marks'
ORDER BY Date DESC
```

[4 marks]

1 1 . 5

Complete the following SQL query so that it will find the names of all the cats and birds in this relational database.

```
SELECT Name
FROM Pet
WHERE TypeOfAnimal _____
```

[3 marks]

1 2

Figure 9 shows code used to create a simple web page.

Figure 9

```
<html>
  <head>
    <title>A web page</title>
  </head>
  <body>
    <p>Hello</p>
    <p>Bye</p>
  </body>
</html>
```

1 2 . 1

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

[3 marks]

A style rule is going to be added to the web page to change the colour of the text in paragraphs to red, but there are mistakes in the style rule that has been written.

```
paragraphs {colour = red}
```

1 2 . 2

Describe **two** errors that have been made in the style rule.

[2 marks]

END OF QUESTIONS

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and Oxford International AQA Examinations will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.