AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

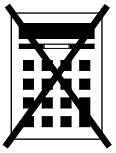
I declare this is my own work.

GCSE
COMPUTER SCIENCE

Paper 2 Written Assessment

Thursday 14 May 2020 Afternoon Time allowed: 1 hour 30 minutes

Materials
- There are no additional materials required for this paper.



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.
- You must **not** use a calculator.

Information
- The total number of marks available for this paper is 80.

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

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 write outside the box

Answer **all** questions.

0 1 . 1 State the **decimal** representation of the binary number `10010100`

[1 mark]

0 1 . 2 State the **hexadecimal** representation of the binary number `10010100`

[1 mark]

0 1 . 3 State the **hexadecimal** representation of the decimal number 143

You should show your working.

[2 marks]

Answer _____

0 1 . 4 State the **binary** representation of the hexadecimal number BE

You should show your working.

[2 marks]

Answer _____

Do not write outside the box

0 1 . 5 Give **two** reasons why hexadecimal is often used instead of binary in computer science.

[2 marks]

1 _____

_____

2 _____

_____

0 2 . 1 Add together the following three binary numbers and give your answer in binary.

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

_____

[2 marks]

0 2 . 2 State the result, in binary, of performing a binary shift two places to the left on the binary value `00111001`

[1 mark]

11

Turn over for the next question

Do not write outside the box

0 3 . 1 What is the largest decimal number that can be represented using 6 bits?

[1 mark]

0 3 . 2 How many bits are there in 5 kB?

You should show your working.

[2 marks]

Answer _____

0 4 . 1 Explain how a sound wave is converted so that it can be stored in a computer.

[3 marks]

0 4 . 2 A student has recorded a 30 second digital sound track using a sample rate of 44 000Hz. 8 bits have been used to store each sample taken.

Calculate the file size **in kilobytes** of the digital sound track.

You should show your working.

[2 marks]

Answer _____ kB

Do not write outside the box

0 5 . 1 Shade **one** lozenge to show which statement best describes data compression.

[1 mark]

A The process of calculating the file size of a saved file. ⬭

B The process of encoding characters into more than one language. ⬭

C The process of encoding information to try and use fewer bits than the original. ⬭

D The process of removing necessary data from a file. ⬭

0 5 . 2 Give **two** reasons why data compression is often used.

[2 marks]

1 _____

_____

2 _____

_____

Run length encoding (RLE) is one method of compressing data.

0 5 . 3 State the feature of data that allows it to be compressed effectively using RLE.

[1 mark]

_____

0 5 . 4 Describe how RLE works. In your answer you **must** use an example.

[2 marks]

_____

_____

_____

_____

14

Turn over for the next question

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0 6 Shade **three** lozenges to show which of the following are essential components of the Von Neumann architecture.

[3 marks]

A BIOS ⬭

B Control unit ⬭

C Keyboard ⬭

D Memory ⬭

E Movement sensor ⬭

F Multiple cores ⬭

G Network socket ⬭

H Shared bus ⬭

0 7 . 1 Main memory is any form of memory that is directly accessible by the CPU, except for cache and registers.

Explain how main memory is used.

[3 marks]

Do not write outside the box

0 7 . 2 The cost and physical size of RAM and secondary storage are normally different.

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

[2 marks]

1 _____

_____

2 _____

_____

0 8 An operating system manages the memory of a computer.

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

[2 marks]

1 _____

_____

2 _____

_____

10

Turn over for the next question

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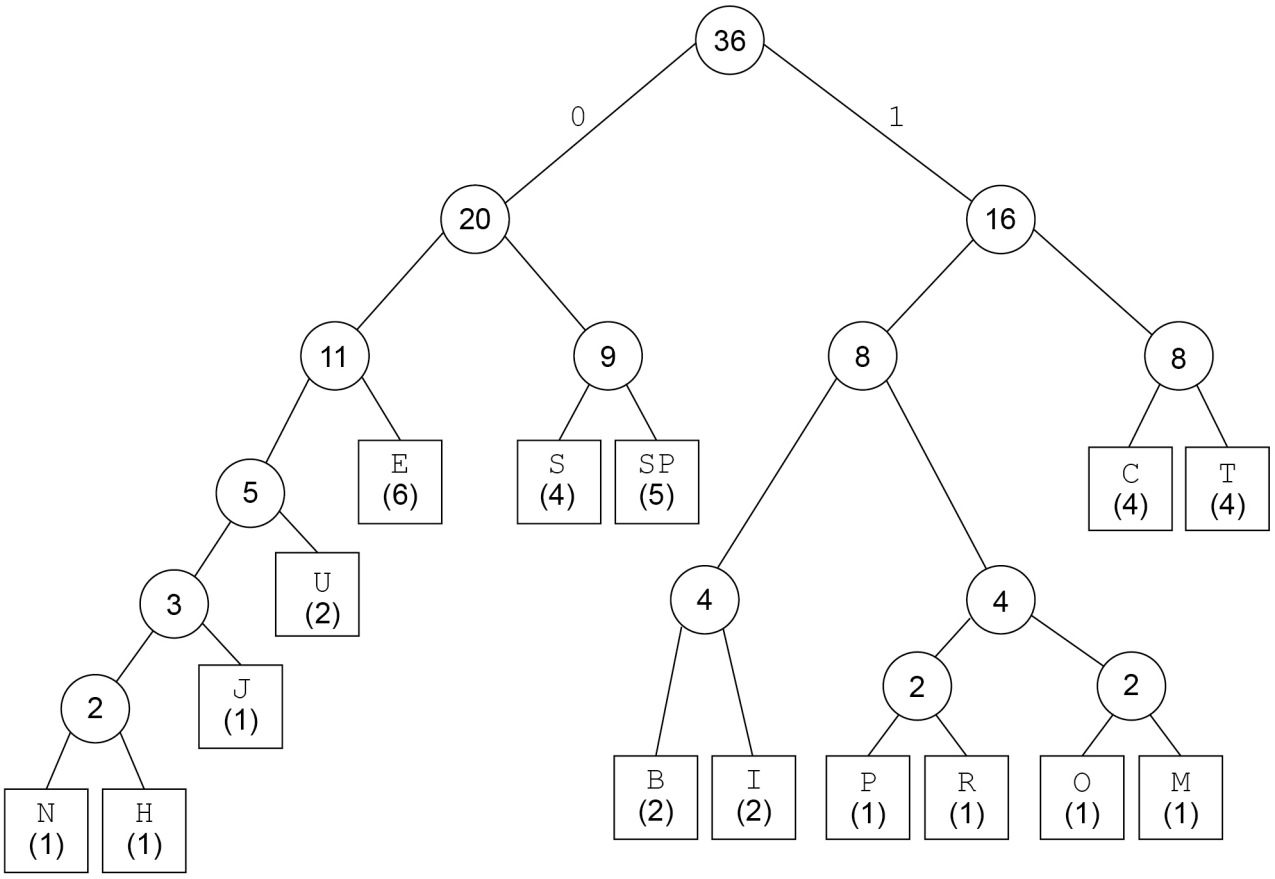
0 9 **Figure 1** shows a Huffman tree that has been created to represent the string shown in **Figure 2**.

Figure 1



SP represents a space character

Figure 2

COMPUTER SCIENCE IS THE BEST SUBJECT

0 9 . 1 Use the Huffman tree in **Figure 1** to state the Huffman encoding for the string MOST

[3 marks]

M	O	S	T

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0 9 . 2 A student was asked to describe how a Huffman tree could be created for the string in **Figure 2**. Her response was:

"I would count the number of times each character appears in the string and create a frequency table sorted alphabetically. For example, the letter S has the highest frequency in **Figure 2**. Next I would take the two characters with the largest frequencies and combine them into a new node. The new node would be added to the end of the frequency table. The two characters with the lowest remaining frequencies are now combined into a new node and the process is repeated until all the characters have been added to nodes and the tree created."

State **four** mistakes the student has made in her response.

[4 marks]

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

0 9 . 3 When the Huffman tree in **Figure 1** is used, the string in **Figure 2** can be represented using 130 bits.

The 36-character string shown in **Figure 2** could also be encoded using ASCII.

How many bits are **saved** when Huffman coding is used rather than ASCII to represent the string shown in **Figure 2**?

You **must** show your working.

[2 marks]

_____

_____

_____

_____

Answer _____

9

Turn over ►

Do not write outside the box

1 0 . 1 Define the term 'computer network'.

[2 marks]

1 0 . 2 Computer networks can be wired or wireless.

Discuss the advantages **and** disadvantages of wired and wireless networks.

In your answer you should:

- discuss the advantages **and** disadvantages of each network type
- compare the security of wired and wireless networks.

[9 marks]

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Turn over ►

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1 0 . 3 State which layer of the TCP/IP model each of the network protocols operates at by ticking **one** box in **each** row of **Table 1**.

[4 marks]

Table 1

Network Protocol	Application layer	Transport layer	Internet layer	Link layer
HTTP				
UDP				
IP				
IMAP				

15

1 1 . 1 Define the term 'cyber security'.

[2 marks]

1 1 . 2 Define the term 'malware'.

[2 marks]

Do not write outside the box

1 1 . 3 Explain how **each** of the following cyber security threats could be used by a student to gain unauthorised access to a school network:

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

In your answer you should also describe some possible consequences of these threats.

[8 marks]

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Do not write outside the box

1 1 . 4 Shade **one** lozenge to show which statement best describes the definition of the term 'social engineering'.

[1 mark]

A The art of hacking a network to access confidential information. ⬭

B The art of hacking a network to access public information. ⬭

C The art of manipulating people so they give up confidential information. ⬭

D The art of manipulating people so they give up public information. ⬭

1 1 . 5 Phishing is a form of social engineering.

Describe **two** methods a school could use to protect its staff and students from phishing.

[4 marks]

1 _____

_____

_____

_____

2 _____

_____

_____

_____

17

Turn over for the next question

1 2 A healthcare publication contains the following article.

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Explain **two** potential legal **and/or** ethical impacts of using implanted microchips in healthcare.

[4 marks]

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4

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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