A

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

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I declare this is my own work.

GCSE
COMPUTER SCIENCE

Paper 2 Written Assessment

8520/2

Thursday 14 May 2020 Afternoon

Time allowed: 1 hour 30 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]

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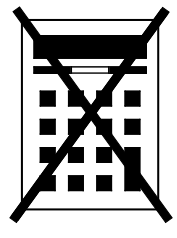
There are no additional materials required for this paper.



INSTRUCTIONS

- **Use black ink or black ball-point pen. Using 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.**

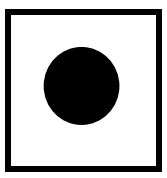
[Turn over]

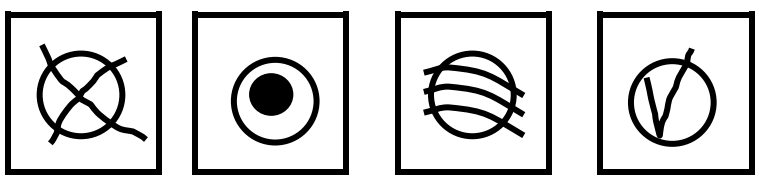
INFORMATION

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

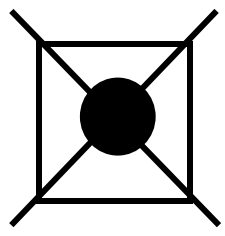
ADVICE

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

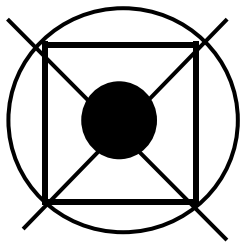
CORRECT METHOD 

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.

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 _____

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. [2 marks]

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

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

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**

[Turn over]

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 _____

_____

_____

[Turn over]

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]

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]

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 _____

_____

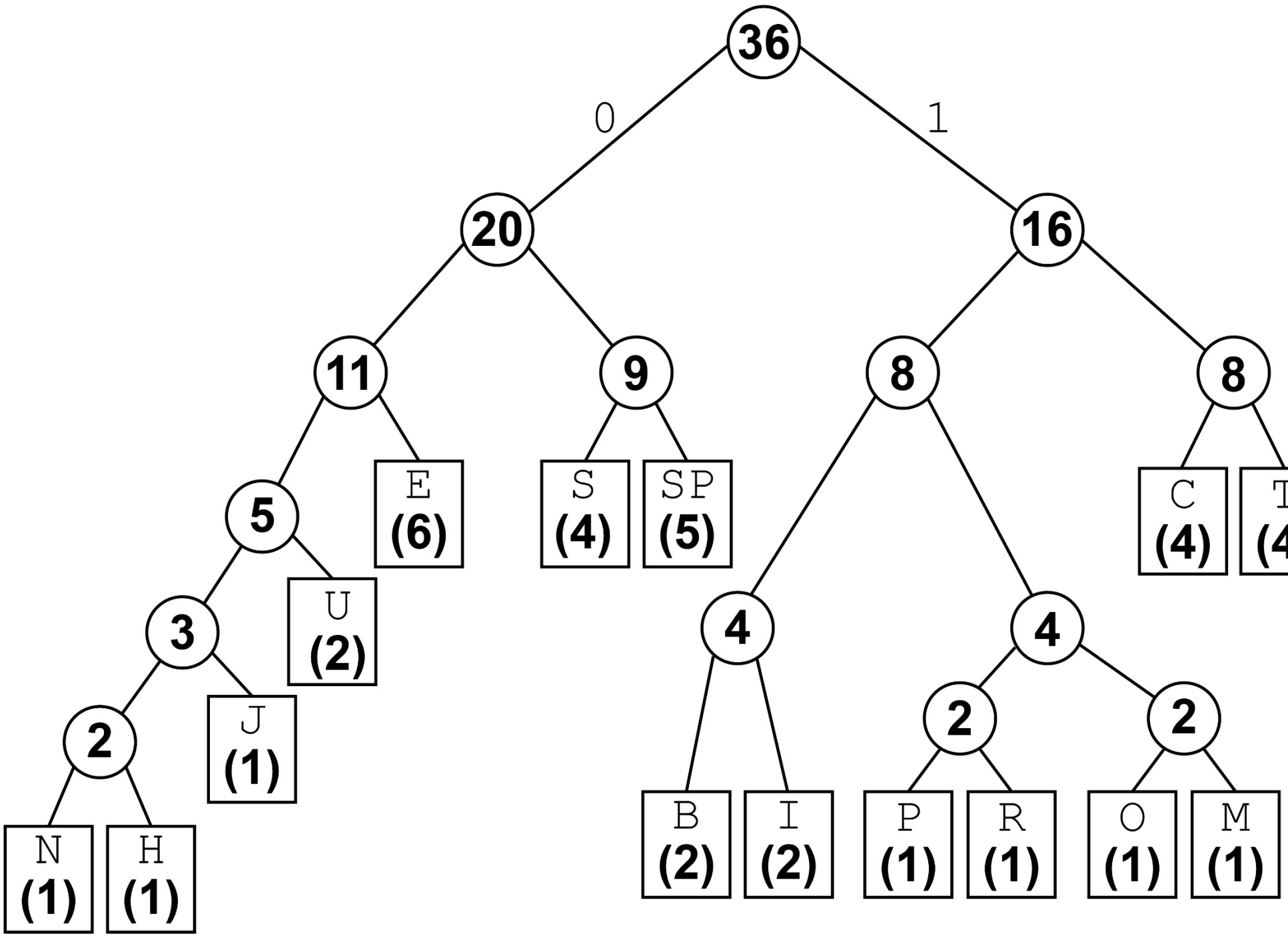
_____

10

0	9

FIGURE 1 shows a Huffman tree that has been created to represent the string shown in FIGURE 2, on page 23.

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

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

[Turn over]

0 9 . 3

When the Huffman tree in FIGURE 1, on page 22, is used, the string in FIGURE 2, on page 23, 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

1 0 . 1

Define the term ‘computer network’.
[2 marks]

[Turn over]

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]

[Turn over]

BLANK PAGE

[Turn over]

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, on the opposite page. [4 marks]

TABLE 1

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

[Turn over]

15

1 1 . 1

Define the term ‘cyber security’. [2 marks]

1 1 . 2

Define the term ‘malware’. [2 marks]

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]

[Turn over]

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.

[Turn over]

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

BLANK PAGE

[Turn over]

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]

[Turn over]

END OF QUESTIONS

4

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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Question	Mark
1–2	
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TOTAL	

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