

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE COMPUTER SCIENCE

Paper 2 Written Assessment

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.

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. 

For Examiner's Use	
Question	Mark
1–3	
4–5	
6–9	
10	
11	
12–13	
14–15	
16–17	
18–19	
20	
TOTAL	



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

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

0 1 . 1 Convert the decimal number 220 into binary.

[1 mark]

0 1 . 2 Convert the hexadecimal number AD into binary.

You should show your working.

[2 marks]

Answer _____

0 1 . 3 Convert the hexadecimal number 1A into decimal.

[1 mark]



0 1 . 4

What is the largest hexadecimal number that can be represented in binary using 8 bits?

[1 mark]

0 2

Which of the following is a reason why hexadecimal is used instead of binary?

Shade **one** lozenge.

[1 mark]

A Computers work in hexadecimal, not binary.

B Hexadecimal can be used to represent a wider range of numbers.

C Hexadecimal is a standard language and binary is not.

D Hexadecimal is more compact when displayed on screen.

0 3

Figure 1 shows a value represented as a bit pattern.

Figure 1

1 0 1 1 0 0 0 0

A binary shift can be used to divide the value in **Figure 1** by 4.

What is the result of this shift?

Your answer **must** be in binary.

[1 mark]

7

Turn over ►



0 4

Add the following binary numbers and give your answer in binary.

[2 marks]

$$\begin{array}{r}
 1\ 0\ 1\ 1\ 0\ 1\ 0\ 0 \\
 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0 \\
 +\ 0\ 0\ 0\ 1\ 0\ 1\ 0\ 1 \\
 \hline
 \\
 \hline
 \end{array}$$

0 5

Eight minutes of sound has been digitally recorded. The sampling rate used was 25 000 Hertz and the sample resolution used was 4 bits.

0 5 . 1Calculate the minimum file size for the recording. Give your answer in **megabytes**.

You should show your working.

[4 marks]

Answer _____



0 5 . 2

Explain what effects increasing the sampling rate would have on the recording.

[2 marks]

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

0 6

Shade **two** lozenges to show which of the following are functions of an operating system.

[2 marks]

- A** Address filtering
- B** Application management
- C** Clock speed management
- D** Data encryption
- E** Processor management

0 7 . 1

Define the term **application software**.

[1 mark]

0 7 . 2

Give **two** examples of application software. You must **not** use brand names in your answer.

[2 marks]

Example 1 _____

Example 2 _____



0 8

This description of how a magnetic hard disk drive works is partially correct but contains some errors:

'A magnetic hard disk spins very quickly. The surface of the disk has a groove on it where data is stored. There is a needle that runs along the groove and detects bumps. One of the components of the drive is a read/write head.'

0 8 . 1

Describe **three** factual errors in the description.

[3 marks]

1 _____

2 _____

3 _____

0 8 . 2

State **one** correct fact in the description.

[1 mark]

0 9

Shade the **two** lozenges that are correct statements about RAM.

[2 marks]

A It is only used in solid state storage devices.

B It is used for main memory.

C It is used for secondary storage.

D It is volatile memory.

E It never loses data.

F It permanently stores programs and files.

11

Turn over ►



1 0

Three factors that affect the performance of a CPU are:

- clock speed
- number of processor cores
- cache size.

Explain how each of these factors affects CPU performance.

[6 marks]

Clock speed _____

Number of processor cores _____

Cache size _____

6



Turn over for the next question

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Turn over ►



1 1

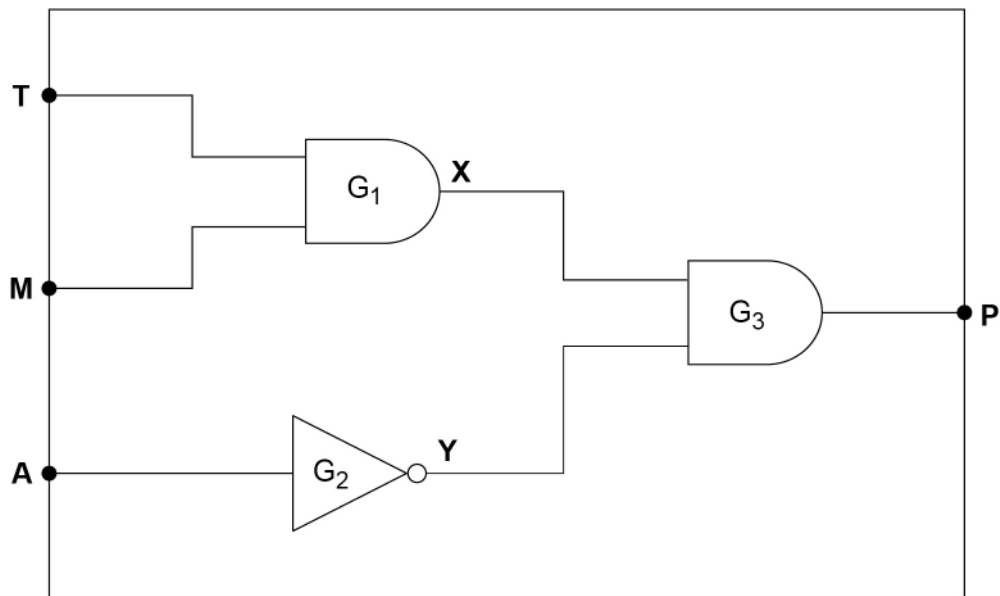
A farmer uses an automated system to indicate if soil conditions are right for planting.

The conditions are right for planting if the soil is:

- warm
- wet
- the correct acidity.

Figure 2 shows the logic circuit for this system.

Figure 2



The inputs to the system are:

Soil temperature (**T**):
0 if the soil is cold
1 if the soil is warm.

Soil moisture (**M**):
0 if the soil is dry
1 if the soil is wet.

Soil acidity (**A**):
0 if the soil is the correct acidity
1 if the soil acidity needs adjusting.

The output (**P**) is:
0 if the conditions for planting have not been met
1 if the conditions for planting have been met.



1 1 . 1

Complete the truth table for the circuit in **Figure 2**.

[3 marks]

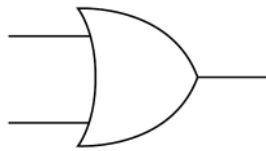
T	M	A	X	Y	P
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

1 1 . 2

State the type of logic gate shown in **Figure 3**.

[1 mark]

Figure 3



Answer _____

1 1 . 3

The farmer wants to modify the system so that it will indicate that the soil conditions are right for planting if **at least one** of the three conditions has been met.

Describe changes that could be made to the logic circuit in **Figure 2** to allow this to happen.

[2 marks]



1	2
---	---

Describe **two** differences between an embedded system and a non-embedded system.

[2 marks]

1 _____

2 _____

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

Define the term **computer network**.

[2 marks]

1	3	.	2
---	---	---	---

Explain how a firewall can be used to improve the security of a computer network.

[2 marks]



1 3 . 3 Authentication and MAC address filtering can be used to improve network security.

Explain how **one** of these security methods works.

[2 marks]

Ring your chosen security method:

Authentication

MAC address filtering

How it works _____

1 3 . 4 Shade the **two** lozenges that are correct statements about network protocols.

[2 marks]

A A protocol is a set of rules.

B All protocols only work with specific hardware.

C All protocols transmit data securely.

D Ethernet is a family of protocols.

E Wi-Fi is a single protocol.

10

Turn over for the next question

Turn over ►



1	5
---	---

Explain **one** data privacy concern an organisation would need to consider when setting up a wireless network.

[2 marks]

8

Turn over for the next question

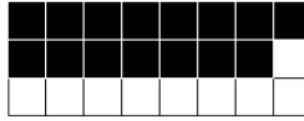
Turn over ►



1 6

Figure 4 shows a black and white image.

Figure 4

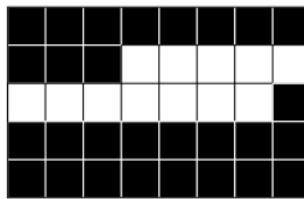


The image shown in **Figure 4** could be compressed using Run Length Encoding (RLE). The RLE for the image in **Figure 4** is B15 W9.

1 6 . 1

Figure 5 shows another black and white image.

Figure 5



Give the RLE for the image shown in **Figure 5**.

[1 mark]

1 6 . 2

The RLE will be represented using binary, with one bit representing the colour (W = 1, B = 0) followed by seven bits representing the frequency.

Give the binary representation of the RLE: B15 W9

[2 marks]



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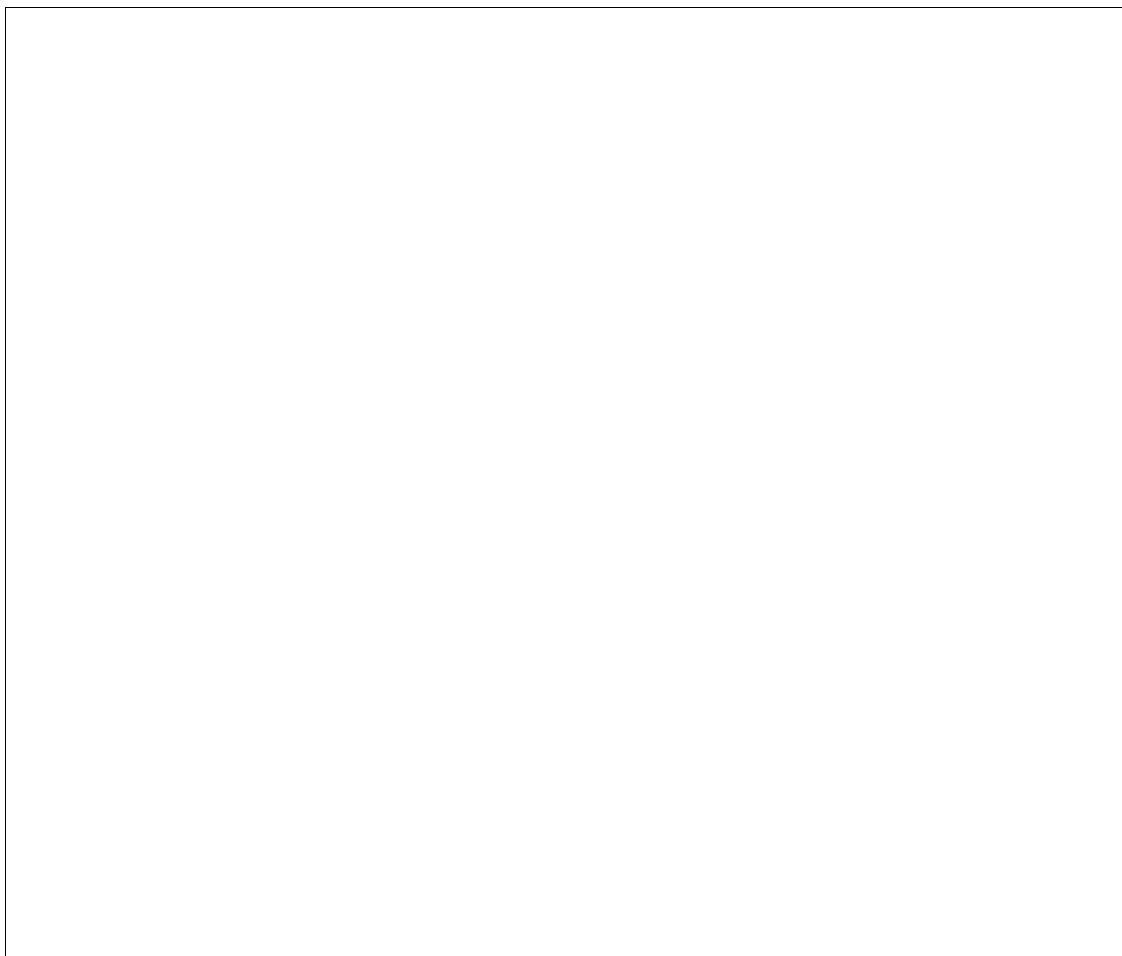
1 7 . 1 **Table 1** is a frequency table that contains the frequency of characters in a string.

Table 1

A	6
B	2
C	3

Use the frequencies given in **Table 1** to draw a Huffman tree that represents the string.

[3 marks]



1 7 . 2

Table 2 shows the Huffman codes for the characters used in the string PIEDPIPER

Table 2

Character	Character frequency	Huffman code
P	3	10
I	2	11
E	2	01
D	1	000
R	1	001

Calculate how many bits would be saved if the phrase PIEDPIPER was encoded using the Huffman codes shown in **Table 2**, rather than using ASCII.

You should show your working.

[3 marks]

Number of bits saved _____

9

Turn over ►


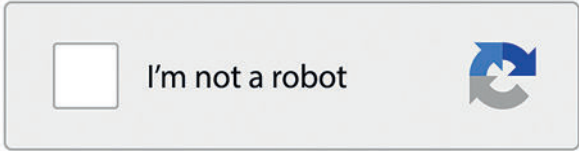
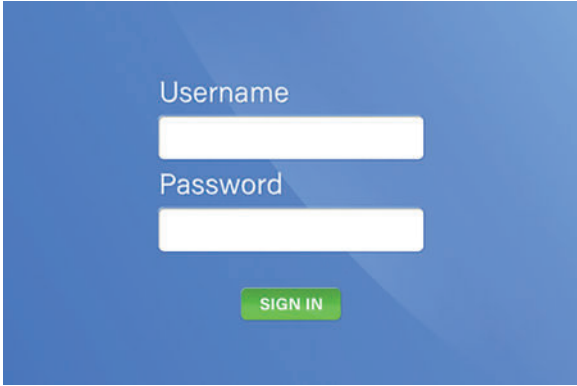


1 8 . 1 Table 3 shows screenshots of three different security measures.

Tick the box next to the CAPTCHA screenshot.

[1 mark]

Table 3

Security measure	Tick one box
	
	
	



1 8 . 2Give **three** examples of when it would be suitable to use a CAPTCHA system.**[3 marks]**

1 _____

2 _____

3 _____

1 9Shade the **two** lozenges that are examples of social engineering.**[2 marks]**

A Blagging

B Blogging

C Faking

D Phishing

E Porting

F Smashing

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

2 0

Table 4 shows three layers of the TCP/IP model and some protocols that operate at each of these layers.

Table 4

Layer	Protocol
Application layer	HTTP HTTPS SMTP IMAP FTP
Transport layer	TCP UDP
Internet layer	IP

Describe the role of **one** protocol from **each** layer in **Table 4**. You **must** state which protocol you are describing.

[9 marks]

Application layer protocol _____

Transport layer protocol _____



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Internet layer protocol _____

9

END OF QUESTIONS



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2 8



2 1 6 G 8 5 2 0 / 2

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