AQA

GCSE
COMPUTER SCIENCE
8520/2

Paper 2

Specimen 2015   am/pm   Time allowed: 1hr 30mins

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.
* Some questions will require you to shade a lozenge. If you make a mistake cross through the incorrect answer.
* Do all rough work in this book. Cross through any work that you do not want to be marked.
* You must not use a calculator.

Information
* The marks for questions are shown in brackets.
* The maximum mark for this paper is 80
* You are reminded of the need for good English and clear presentation in your answers.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

8520/2

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

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0 1   A bit pattern is shown in **Figure 1**.

Figure 1

01001110

0 1 . 1   Convert the bit pattern in **Figure 1** into decimal.

[1 mark]

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0 1 . 2   Convert the bit pattern in **Figure 1** into hexadecimal.

[2 marks]

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0 1 . 3   A student's answer to the question "Why is hexadecimal often used instead of binary?" is shown in **Figure 2**.

Figure 2

Because it uses fewer digits it will take up less space in a computer's memory.

Explain why the student's answer is incorrect.

[2 marks]

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0 1 . **4** Explain how a binary number can be multiplied by 8 by shifting bits.

[2 marks]

ASCII (American Standard Code for Information Interchange) is a coding system that can be used to represent characters. In ASCII the character A is represented by the numeric code 65.

0 1 . **5** Shade **one** lozenge to indicate which character is represented by the numeric code 70.

[1 mark]

A E $\bigcirc$

B F $\bigcirc$

C f $\bigcirc$

D 6 $\bigcirc$

E e $\bigcirc$

0 1 . **6** Unicode is an alternative to the ASCII coding system.

Describe **one** advantage and **one** disadvantage of using Unicode to represent characters instead of using ASCII.

[2 marks]

Question 1 continues on the next page

Turn over ▶

When data is stored in a computer it is often compressed. One method that can be used to compress text data is Huffman coding. To produce a Huffman code each character in a piece of text is placed in a tree, with its position in the tree determined by how often the character was used in the piece of text.

A Huffman tree for the text ZOE SAW A ZEBRA AT THE ZOO is shown in **Figure 3**.

Figure 3

Using this Huffman tree the Huffman coding for the character E would be the bit pattern 110 because from the top of the tree E is to the right, then right again and then left.

The character Z is represented by the bit pattern 010 because from the top of the tree Z is to the left, then right and then left.

0 1 . 7 Using the Huffman code in **Figure 3**, complete the table to show the Huffman coding for the characters O, SPACE and B.

[3 marks]

Character	Huffman coding
O	
SPACE	
B	

0 1 . 8 Using Huffman coding the text ZOE SAW A ZEBRA AT THE ZOO can be stored in 83 bits.

Calculate how many additional bits are needed to store the same piece of text using ASCII. Show your working.

[3 marks]

16

Turn over for Question 2

Turn over ▶

0 2 The Central Processing Unit (CPU) is one of the hardware components of a computer system.

0 2 . 1 Define the term hardware.

[1 mark]

0 2 . 2 "Used to connect different components in the CPU" is a description of which of the following? Shade **one** lozenge to show the correct answer.

[1 mark]

A Control Unit ◯

B Bus ◯

C Arithmetic Logic Unit ◯

D Clock ◯

E Ethernet ◯

0 2 . 3 Explain how main memory is used during the fetch-execute cycle.

[4 marks]

| 0 | 2 | . | 4 | Increasing the amount of cache memory and changing the type of cache memory can improve the performance of a CPU.

State **two** other ways of improving the performance of a CPU.

[2 marks]

8

Turn over for Question 3

Turn over ▶

0 3 Most computer systems have a main memory that consists of both RAM and ROM.

0 3 . 1 For each of the **two** statements below shade **one** lozenge to indicate if the statement is true or false.

[2 marks]

ROM is volatile memory.

A True ⬭

B False ⬭

In most desktop computers there is more ROM than RAM.

A True ⬭

B False ⬭

0 3 . 2 Most modern washing machines are embedded systems. Embedded systems normally have less main memory than non-embedded systems.

Describe **two** other likely differences between the main memory for a washing machine and the main memory for a non-embedded system.

[2 marks]

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0 4 **Figure 4** contains a black and white image consisting of 36 pixels.

Figure 4
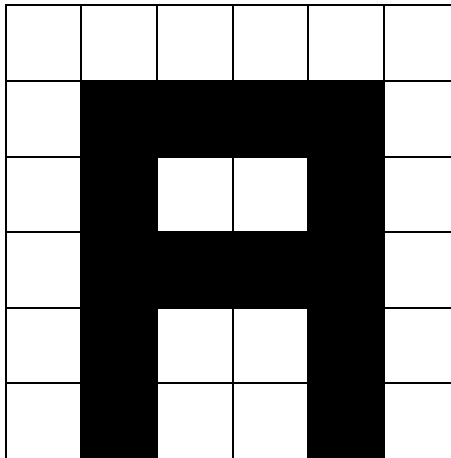
0 4 . 1 Explain why 36 bits are needed to represent the pixels in the image shown in **Figure 4**.

[2 marks]

0 4 . 2 How many bits per pixel would need to be used if the image shown in **Figure 4** used 4 colours instead of 2?

[1 mark]

0 4 . 3 Define the term **pixel**.

[1 mark]

4

| 0 | 5 | | Most schools have a computer network.

| 0 | 5 | . | 1 | Some schools allow teachers to access the school network from their home computers.

Give **one** reason why some schools allow this and **one** reason why some schools do not allow this.

[2 marks]

Reason for:

Reason against:

PANs and LANs are two different types of network.

| 0 | 5 | . | 2 | Describe **one** difference between a PAN and a LAN.

[1 mark]

| 0 | 5 | . | 3 | Give **one** example of where a PAN could be used.

[1 mark]

| 0 | 5 | . | 4 | "Schools should use a wireless network instead of a wired network".

Discuss this statement.

[6 marks]

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Question 5 continues on the next page

Turn over ▶

0 5 . 5 When two computers on a network communicate with each other they need to use the same protocol.

Define the term protocol.

[2 marks]

For questions **0 5 . 6** to **0 5 . 8**, shade **one** lozenge to indicate the most suitable protocol to use in the situation described.

0 5 . 6 Used to retrieve email stored on a server.

[1 mark]

A	HTTP	⬭
B	HTTPS	⬭
C	FTP	⬭
D	SMTP	⬭
E	IMAP	⬭

0 5 . 7 Used to make a payment securely when purchasing goods from a website.

[1 mark]

A	HTTP	⬭
B	HTTPS	⬭
C	FTP	⬭
D	SMTP	⬭
E	IMAP	⬭

0 5 . 8 Used to send an email from a client machine to an email server.

[1 mark]

A	HTTP	⬭
B	HTTPS	⬭
C	FTP	⬭
D	SMTP	⬭
E	IMAP	⬭

0 5 . 9 TCP/IP is a protocol stack used in networking. There are four layers in the TCP/IP stack.

Complete the table by placing the four layers of the TCP/IP stack into order (1 – 4), where 1 is the top layer and 4 is the bottom layer).

[3 marks]

Layer	Order (1-4)
Transport	
Data Link	
Network	
Application	

18

Turn over for Question 6

Turn over ▶

0	6

Explain the purpose of an operating system.

[4 marks]

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0 7 Organisations often spend a lot of money on cyber security.

0 7 . 1 Penetration testing is an attack on its own computer system by an organisation to try and identify security weaknesses.

Describe **one** difference between black-box and white-box penetration testing.

[1 mark]

0 7 . 2 Social engineering is often used to try to gain unauthorised access to a computer system. Phishing is a commonly used social engineering technique where emails are sent that pretend to be from a reputable organisation/company to try and obtain personal details.

Describe another **two** social engineering techniques. You should also explain measures that an organisation can take to try to reduce the security risks from phishing and the two other social engineering techniques you have described.

[6 marks]

Turn over ▶

0 8   Bob purchases a 4GB SD card for use as secondary storage in his phone.

0 8 . 1   Calculate how many megabytes there are in 4GB. Show your working.

[2 marks]

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0 8 . 2   An SD card is a type of solid state storage.

State **two** advantages of solid state storage compared to magnetic storage.

[2 marks]

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0 8 . 3   Many modern desktop computers have both solid state drives and magnetic hard disk drives.

Give **two** reasons why desktop computers have a magnetic hard disk drive and a solid state drive instead of having just a solid state drive.

[2 marks]

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0 8 . 4 Describe how data is stored on, and read from, a magnetic hard disk.

[4 marks]

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Question 8 continues on the next page

Turn over ▶

| 0 | 8 | . | 5 |

In recent years, there has been a large growth in the use of cloud storage.

Discuss the advantages and disadvantages of using cloud storage.

In your answer you should include an explanation of the reasons for the large growth in recent years and consider any legal, ethical and environmental issues related to the use of cloud storage.

[9 marks]

END OF QUESTIONS

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