0 1 . 1 What is the largest decimal number that can be represented using 5 bits?

[1 mark]

0 1 . 2 How many bits are there in 3 MB?

Show your working.

[2 marks]

Answer _____

0 2 . 1 What is the largest decimal number that can be represented using 6 bits?

[1 mark]

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

You should show your working.

[2 marks]

Answer _____

0 3 . 1 The number base 2 is called **binary**.

Shade **one** lozenge to show which number base is called **hexadecimal**.

[1 mark]

A 6 ⬭

B 8 ⬭

C 10 ⬭

D 16 ⬭

0 3 . 2 Shade **two** lozenges to show the statements that are true about hexadecimal.

[2 marks]

A Hexadecimal can represent a greater range of numbers than binary. ⬭

B Hexadecimal is easier for people to read than binary. ⬭

C Hexadecimal is faster for a computer to process than binary. ⬭

D Hexadecimal is more accurate than binary. ⬭

E Hexadecimal takes less space in RAM than binary. ⬭

F Hexadecimal takes less time to type than binary. ⬭

0 4 A bit pattern is shown in **Figure 1**.

Figure 1

01001110

0 4 . 1 Convert the bit pattern shown in **Figure 1** into decimal.

[1 mark]

0 4 . 2 Convert the bit pattern shown in **Figure 1** into hexadecimal.

[2 marks]

Answer:

0 4 . 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]

0 4 . 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 4 . 5 Shade **one** lozenge to indicate which character is represented by the numeric code 70.

[1 mark]

A E ⬭

B F ⬭

C f ⬭

D 6 ⬭

E e ⬭

0 4 . 6 Unicode is an alternative to the ASCII coding system.

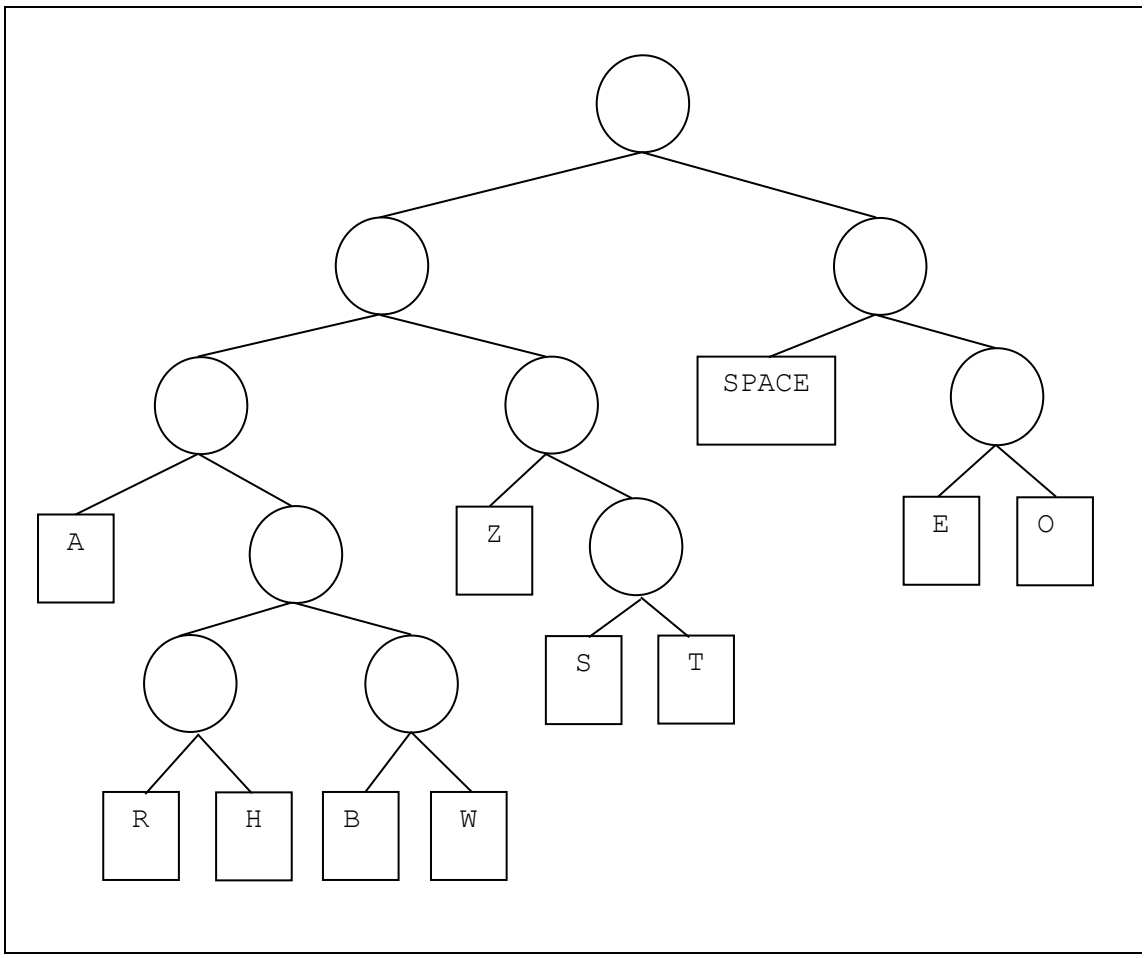
State **two** advantages of using Unicode to represent characters instead of using ASCII.

[2 marks]

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 4 . 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 4 . 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]**

0 5 Which statement best describes what computers represent using binary?

Shade **one** lozenge.

[1 mark]

A All data are represented using binary. ⬭

B All data and instructions are represented using binary. ⬭

C Some data and instructions are represented using binary. ⬭

D Some instructions are represented using binary. ⬭