1. Convert the following 8-bit binary values into their denary (base 10) equivalent. (3 marks)
   1. 00110111

|  |
| --- |
| 51 |

* 1. 10101111

|  |
| --- |
| 175 |

* 1. 11010110

|  |
| --- |
| 214 |

1. Convert the following denary (base 10) values into their 8-bit binary equivalent. (3 marks)
   1. 31

|  |
| --- |
| 0001 1111 |

* 1. 104

|  |
| --- |
| 0110 1000 |

* 1. 210

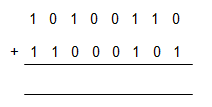
|  |
| --- |
| 1101 0010 |

* 1. Add the following two 8-bit binary values. ( 1 mark)



1100 0011

* 1. Add the following two 8-bit binary values. (1 mark)



* 1. Place the quantities of memory into order by writing the numbers 1 to 5 in the Position column of Table , with 1 representing the smallest quantity and 5 representing the largest quantity. [2 marks]

|  |  |
| --- | --- |
| Quantity | Position |
| 3 kilobytes | 3 |
| 2 mebibytes | 4 |
| 2 bytes | 2 |
| 2 megabytes | 5 |
| 20 bits | 1 |

* 1. Convert the hexadecimal numbers 27 and C9 into binary. Then, in binary, add them together to work out the total. Finally, convert the total back into hexadecimal to give the answer. You must show your working. [2 marks]

2716 = 0010 01112

C916 = 10010012

00100111 + 1001001

= 1111 0000

1111 00002

= **F016**

* 1. Describe the difference between analogue and digital data. [2 marks]

Analogue data is continuous data while digital data is discrete..

4. An image is 1722 pixels high and 5028 pixels wide.

The image is stored with a 32-bit colour depth.

The metadata for the image is 1094 bytes.

Construct an expression to show how the file size, in megabytes, is calculated.

You do **not** need to do the calculation. [3 marks]

((1722 \* 5028 \* 32) + 1094) / (8 \* 1000 \* 1000)

5. Explain with examples how sound is stored on the computers. List all the parts used to calculate the file size of a recording. [3 marks]

Samples of sound are taken every second by a device such as a microphone. The samples of sound taken per second is called the sampling rate, measured in Hz. This makes the data discrete and be able to be encoded by computers. Each sample of sound is stored in binary values and this is carried out by an analogue to digital converter (ADC).

The bit rate is how many bits are used to represent each sample of sound. The higher the bit rate, the higher the quality of the sound. This is also true with sampling rates.

The sound may also be stored in multiple channels which can allow a computer to output sound separately to each audio channel. For example, different sounds can be outputted to each of the two speakers in a laptop. This can give a more natural experience of listening to the user.

The amount of data used up by an audio file is measured using the formula:  
size (bits) = bit rate \* sampling rate \* length (seconds) \* number of channels

Total marks 20.