Mark schemes

**Q1.**

(a)  **Mark is AO2 (Analyse)**

4 bits // nibble / half a byte;

**NE.** 4, 0.5

**1**

(b)  **Mark is AO2 (Apply)**

1000 // 1 × 103 // 103 (Hz / samples per second) // 1kHz;

**A.** 10 ÷ 0.01

**1**

(c)  **All marks AO1 (Understanding)**

**Significance:** It will not be possible to reproduce the original signal (completely) accurately // the recording is not (completely) accurate;

**NE.** “error” without explaining that this affects the quality of the recording/reproduction

**NE.** lower

**How reduced:** Increase the sample resolution // increase the number of bits used to record each sample;

**TO.** references to changing the sample rate (even if changing sample resolution also mentioned)

**2**

(d)  **Mark is AO2 (Apply)**

2400 (Hz) // 2.4kHz;

**A.** 1200 × 2

**1**

**[5]**

**Q2.**

(a)     **Mark is for AO2 (apply)**

Grey Pixel: 00

White Pixel: 11;

**Must have both correct to achieve mark**

**1**

(b)     **Mark is for AO2 (apply)**

**1 mark** for either:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |

or:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |

**1**

(c)     **All marks AO2 (apply)**

**Working 1 mark:**

20\*10 / / 2\*10\*10 / / 200;

Division of a number of bits by 8 to convert to bytes (even if number is not 200);

**1 mark:**

25 (bytes);

**2**

(d)     **Mark is for AO1 (understanding)**

**1 mark (Max)** for any of the items in this list, or a description of any of them:

•        image width

•        image height

•        colour (bit) depth / / bits per pixel

•        number of colour planes

•        colour table / palette

•        number of colours in palette

•        number of important colours

•        colour channel bitmasks

•        colour channel gamma correction

•        file size

•        image size

•        type of compression used

•        pixel density / / pixels per metre (**A** any other measurement unit)

•        offset to pixel data within file.

**A** Any other valid answer (there are many possibilities)

**1**

(e)     **2 marks for AO1 (knowledge) and 1 mark for AO1 (understanding)**

**AO1 (Knowledge): How it works (2 marks):**

**1 mark:** Identifies sequences of identical data values / colour pixels;

**1 mark:** Represents these as one data value / pixel colour together with a count of how many such values are in the sequence;

**AO1 (Understanding): Why suitable for icons (Max 1 mark):**

Images / icons often contain sequences of pixels that are the same colour;

RLE is a lossless compression method, so the quality of the image will not be affected (which is important for icons);

**3**

**[8]**

**Q3.**

(a)  **Marks for AO2 (apply)**

Identification of length (180 s/ 3 \* 60), sample resolution (16 bit) and sample rate (44,000 Hz) in working ; **A**. 44 (kHz) for sample rate but do not allow follow through.

Performing the correct calculation (3 \* 60 \* 16 \* 44,000 // 180 \* 16 \* 44,000) **or** showing correct intermediary value (126,720,000 bits / 1,584,000 Bytes) ;

**I**. Conversion

Final answer 15.84(MB) ;

**A**. to fewer significant places as long as 15.84 can be seen in working.

**Max 3**

(b)  **Marks are for AO1 (understanding)**

The ADC takes samples of the (analogue/continuous electrical) signal (at regular intervals); **R**. voltage for signal, soundwave, analogue data, sound, waveform for signal.

Samples are quantised // the amplitude/height of each sample is approximated to an integer value // the amplitude/height of samples are measured;

**A**. voltage for amplitude

**A**. digital, number, value for integer value

**A**. explanation of how the signal is quantised

Each sample is assigned a binary value/encoded as a binary value;

**R**. Digital value for binary value

**A**. Stored, converted so long as sample is stated

**3**

(c)  **1 mark for AO1 (knowledge) and 1 mark for AO1 (understanding)**

**Mark as follows:**

**AO1 (knowledge) – 1 mark:**

No/only redundant data is lost during the compression process (if using a lossless format);

Data is lost when storing using a lossy format;

**Max 1**

**AO1 (understanding)) – 1 mark:**

The song can be reproduced identically to the (recorded) original with no loss of quality (if using a lossless format);

If stored in a lossy format the quality may limit later editing possibilities;

**Max 1**

**A**. Recording will be of higher quality / quality of recording will be maintained.

**NE**. music will be of higher quality.

**[8]**