

3(a)	Any three from: - A <u>character set</u> is used ... such as ASCII/Unicode - Each character has a unique binary value that it is converted to
3(b)(i)	4096
3(b)(ii)	0.004 // 0.0039(0625)
3(c)	Any three from: - To store data/instructions that are currently in use - To store software/programs that are currently in use - For volatile storage // to store data temporarily - To allow data to be accessed directly by the CPU/processor // To allow data to be stored closer to the CPU/processor
3(d)	- Authentication - Biometric - Input device

5(a)	One mark for each correct term or description <table border="1"> <thead> <tr> <th>Term</th><th>Description</th></tr> </thead> <tbody> <tr> <td>character set</td><td>This stores all the characters and their unique binary values</td></tr> <tr> <td>sample rate</td><td>This is the number of samples taken each second when recording sound.</td></tr> <tr> <td>pixel</td><td>This is the smallest unit/part of an image</td></tr> <tr> <td>resolution</td><td>This is the number of pixels that appear in an image/displayed on a screen // The number of pixels high by the number of pixels wide // the bit rate and sample rate of sound</td></tr> <tr> <td>colour depth // bit depth</td><td>This is the number of bits used to represent a colour in an image.</td></tr> </tbody> </table>	Term	Description	character set	This stores all the characters and their unique binary values	sample rate	This is the number of samples taken each second when recording sound.	pixel	This is the smallest unit/part of an image	resolution	This is the number of pixels that appear in an image/displayed on a screen // The number of pixels high by the number of pixels wide // the bit rate and sample rate of sound	colour depth // bit depth	This is the number of bits used to represent a colour in an image.
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5(b)	8000 (bits)												
5(c)	4 (GiB)												

3

One mark for each correct term or definition.

Term	Definition
pixel	It is the smallest component of an image.
resolution	The number of pixels high by the number of pixels wide // The number of pixels in an image
colour depth // bit depth	This is the number of bits that are used to create each colour in an image.
metadata // header	This is additional data that is stored with an image that can provide information such as the time and date the image was taken.

2(a)

A

2(b)(i)

3

2(b)(ii)

2

2(c)(i)

32 bits are used to represent **each/a/one** colour in the image // 2^{32} (approx. 4.3 billion) different colours can be used/are available for the image

2(c)(ii)

Any **two** from:

- The size of the image **file** increases.
- ... as the number of bits used to represent/store a colour has increased

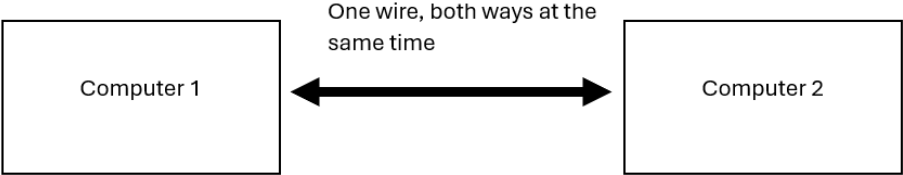
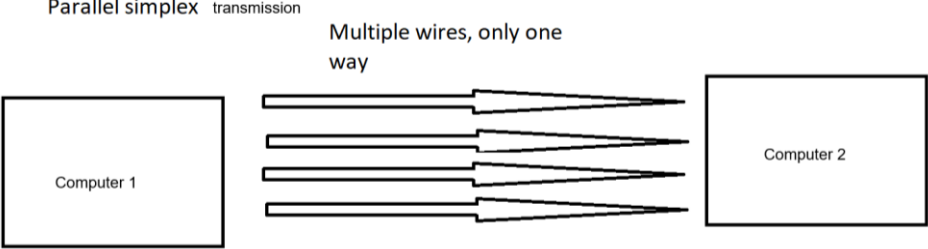
2(d)

Any **three** from:

- The size of the file is reduced without **permanently** removing any data.
- A compression algorithm is used.
- ... such as Run length encoding/RLE.
- Repeating **pixels** are grouped/identified ... // **Patterns** are identified ...
- ... and stored with the number of times they are repeated.
- ... and indexed

1(a)	Microphone								
1(b)	A								
1(c)(i)	• 25 • 180								
1(c)(ii)	• 19 • B4								
1(c)(iii)	00101001								
1(d)	One mark for correct method of working e.g. flip and add 1 One mark for correct answer –55								
1(e)	One mark for each correct missing term or definition. <table border="1"> <thead> <tr> <th>Term</th><th>Description</th></tr> </thead> <tbody> <tr> <td>(sound) sampling/sample</td><td>This is the measurement of the height (amplitude) of a sound wave at regular time intervals.</td></tr> <tr> <td>sample rate</td><td>The number of samples recorded each second</td></tr> <tr> <td>sample resolution</td><td>The number of bits that are used to record each sample</td></tr> </tbody> </table>	Term	Description	(sound) sampling/sample	This is the measurement of the height (amplitude) of a sound wave at regular time intervals.	sample rate	The number of samples recorded each second	sample resolution	The number of bits that are used to record each sample
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sample resolution	The number of bits that are used to record each sample								

2(a)	Any one from: • Number of bits used to represent each/a/one colour • Number of colours that can be represented
2(b)	Any two from: • The higher the resolution the more pixels • The higher the resolution the more bits to store • The higher the resolution the larger the file size
2(c)(i)	Any three from: Examples: • Lossless will retain all parts of the image // lossless does not delete any data // The artist does not want any of the image to be lost when downloaded • Lossy will reduce the quality • ... because the artist wants to provide the detailed image • Image may be small in file size anyway • ... server has enough space to store the image • ... download time is not excessive
2(c)(ii)	1 mark for naming, max 2 for describing, for example: • Run-length encoding • Repeating pixels of one colour are identified // <u>patterns</u> are identified • ... and indexed // put into a table // assigned a value • ... as the number of repetitions and the colour code

2(d)(i)	Max 5 overall Any three from: • Data is split into fixed size packets • The data is the payload • Each packet is given a header • ... example of header data e.g. Destination IP, packet number, hop number • Each packet has a trailer • ... example of trailer data e.g. error checking method Any three from: • Router directs each packet towards its destination • Router selects the most efficient path • Each packet can take a different path • Packets can arrive out of order • ... after the last packet has arrived, they are reordered
2(d)(ii)	The completed diagram showing: • Parallel simplex having multiple wires and serial having one wire • Serial full-duplex going both ways at the same time • Parallel simplex only going one way For example: Serial full-duplex transmission  Parallel simplex transmission 

3(a)	Unicode
3(b)(i)	• (0)1000001 • (0)1101101
3(b)(ii)	• 41 • 6D
3(c)(i)	121
3(c)(ii)	79
3(c)(iii)	00011110
3(d)	One mark for correct working, for example: carries One mark for each correct nibble. <pre> 1 1 1 1 0 1 0 1 0 1 0 0 <u>0 1 1 1 0 1 0 0</u> 1 1 0 0 1 0 0 0 </pre>

5(a)	Any five from: – (The analogue sound is) recorded using a microphone – The sound wave is sampled – ... measuring the height/amplitude – Each amplitude has a unique binary value – The sample rate is set – ... that is the number of samples taken per second – The sample resolution is set – ... that is the number of bits used for each sample – Each sample taken is converted to binary
5(b)	Two from: – Increase the sample rate – Increase the sample resolution
5(c)	Any three from: – They want to be able to edit the original sound file – They want the highest sound quality for the file // They want the sound to be closest to the original recording – ... using lossy would reduce the sound quality – ... using lossy will permanently remove some of the data // no data will be permanently removed with lossless
5(d)	Any four from (MAX 3 for ASCII/Unicode alone): – ASCII has limited/fewer characters // Unicode has a more characters – ASCII covers a limited set of languages/fewer languages – Unicode includes many/more languages/emojis – ASCII requires 7/8 bits per character – Unicode requires up to 16/32 bits per character – ASCII has 128/256 characters – Unicode has 65 536/4 294 967 296 characters // approx. 60/70 thousand/4 billion characters

5(a)	Any one from: – The recording of the song is more accurate/closer to original
5(b)	Any one from: – The file size will be increased – The file will require more storage space
5(c)	Any two from: – The number of <u>bits</u> that are used per sample – ... that provides the variation in amplitude that can be stored for each sample // defines the number of different amplitudes that can be recorded – ... that determines how quiet/loud the sounds are that can be recorded – Example e.g. 16-bit
5(d)	– Lossless

3(a)	Any three from: • A character set is used • ... such as Unicode/ASCII • Each character has a unique binary value
3(b)(i)	• It reduces the file size
3(b)(ii)	Any four from: • A compression algorithm is used • ... such as RLE/run length encoding • Repeating words/characters/phrases are identified // <u>Patterns</u> are identified • ... and indexed • ... with number of occurrences • ... with their position
3(b)(iii)	Any two from: e.g. • To save storage space • To make it quicker to transmit • To make it small enough to attach to an email • To reduce the bandwidth needed to transmit