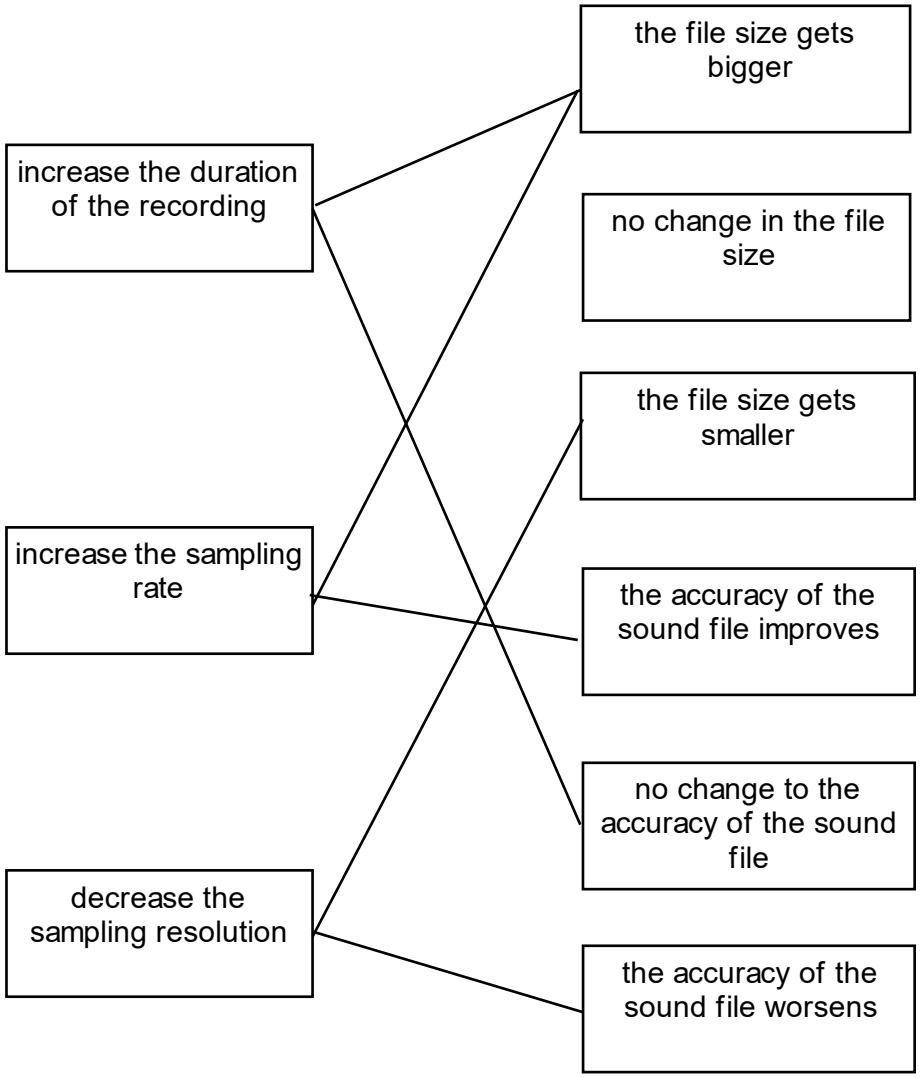
1(a)	**1 mark** for each correctly connected change box, **max 3** marks 
1(b)	**1 mark** per bullet point, **max 2** marks • Each character has a **unique** code • Each character in the text is replaced **sequentially / in order** by its code
1(c)	**1 mark** per bullet point, **max 2** marks • ASCII uses 7 / 8 bits Unicode can use many more / up to 32 bits • Unicode can represent a wider range of characters including different languages

7(a)	**1 mark** per point, **max 2** marks e.g. • The learning experience could be improved • … by identifying students who are struggling • …. and employing more personalised learning • There could be early Intervention • … to determine which students require extra support • • Teachers and students could understand the challenges better • …and identify optimal times for learning • There could be privacy concerns • …. students / teachers could be uncomfortable with constant surveillance • ... students might not want their data / actions passed to third parties • There could be Mental Health concerns • …. due to constant monitoring and pressure • …. contributing to student stress and anxiety
7(b)	**1 mark** for the working **1 mark** for the correct answer Working: (4000*3000*30*16) / (8*1000*1000*1000) //(4000*3000*30*2) / (1000*1000*1000) Answer: 0.72 gigabytes
7(c)	**1 mark** for the name **2 marks** for the matching description, **max 3** marks • Parity Byte Check • a parity bit is added to each byte to make the number of 1s match the parity, odd or even • each byte can be checked on receipt and request to be resent if the byte does not match parity • Parity Block Check • a bit is added to each byte, but a parity byte is also set for each block • the location of an error can be found using vertical and horizontal parity • Checksum • A calculation is made from the data and transmitted with the data • The receiver performs the same calculation and compares with received checksum to see if they match

7(d)	**1 mark** per reason, **1 mark** for corresponding justification **x2** **max 4** marks • Lower cost per unit of storage • ... so the high capacity of storage required for large number of video files will be less costly • A large number of read/write operations are being performed continuously • ... and magnetic storage is likely to have a longer life span compared with solid state
7(e)	**1 mark** for each validation check correctly identified, **max 3** marks Range Check Existence Check Format Check

3(a)	**1 mark** for each correct answer

Statement	Answer
The term for the smallest element that makes up an image.	**pixel**
The largest number of different colours that can be represented with a bit depth of 8 bits.	**256 // 2^8**
The term for the dots per inch (dpi) when an image is displayed.	**Screen resolution**

3(b)(i)	**1 mark** each to **max 2** • A wider range of characters can be represented • so characters from more languages can be represented • and symbols such as emojis can be used
3(b)(ii)	**1 mark** for: 10,094
3(b)(iii)	**1 mark** for: 8,512

<table>
<tr><td>1(a)(i)</td><td>1 mark for correct working:

e.g.
2000000 * 16 / (8 * 1000 * 1000)

1 mark for answer:

4MB</td></tr>
<tr><td>1(a)(ii)</td><td>1 mark each

Image:
• There will be fewer shades of colour available
• so the image does not match the original as detail is lost

Image file:
• Fewer bits are used to store each pixel
• so less data is stored, therefore the file size is reduced</td></tr>
<tr><td>1(b)</td><td>1 mark for each correct term:

<table><tr><th>Description</th><th>Sound term</th></tr><tr><td>the number of times the amplitude is measured per time interval</td><td>Sampling rate</td></tr><tr><td>the number of bits used to store each amplitude measurement</td><td>Sampling resolution</td></tr><tr><td>the type of sound wave before it is recorded by a computer</td><td>Analogue</td></tr></table></td></tr>
<tr><td>1(c)(i)</td><td>1 mark each to max 2

• 8 / 16 / 32 / bits per character
• Represents 2^8 / 2^{16} / etc. characters
• Represents every language and other characters such as emojis</td></tr>
<tr><td>1(c)(ii)</td><td>1 mark for each correctly completed space

<table><tr><th>Character</th><th>Denary</th><th>8–bit Binary</th><th>Hexadecimal</th></tr><tr><td>!</td><td>33</td><td>0010 0001</td><td>21</td></tr><tr><td>L</td><td>76</td><td>0100 1100</td><td>4C</td></tr><tr><td>ü</td><td>252</td><td>1111 1100</td><td>FC</td></tr></table></td></tr>
</table>

7(a)(i)	**1 mark** for each correct definition Colour depth: • the number of bits used to represent a colour // the number of colours that can be represented in an image File header: • stores data about the image file / metadata
7(a)(ii)	**1 mark** for each correct explanation Image quality: • Decreasing resolution means details within the image are lost because there are fewer pixels // Increasing resolution means the image is more detailed because there are more pixels File size: • Decreasing the resolution will decrease the file size because there are fewer pixels therefore less data // Increasing the resolution will increase the file size because there are more pixels therefore more data
7(a)(iii)	**1 mark** for correct method For example: • Run-Length Encoding
7(b)	**1 mark** for each correct definition Property: • an attribute of a drawing object // data about a shape // defines one aspect of the appearance of a drawing object Drawing list: • all the drawing objects/shapes in an image // stores the commands/descriptions / mathematical equations required to draw each object

2(a)	**1 mark** for each correctly completed statement: • **(**LCD) displays/screens/lenses • gyroscope/accelerometer • direction/speed • digital cameras A headset can have one or two **(LCD) displays/screens/lenses** that output the image to the user. The headset has speakers that output surround sound to give a realistic experience. The user's head movements are detected using a sensor. This sensor is a **gyroscope/accelerometer**. The data is transmitted to a microprocessor that analyses the data to identify the **direction/speed** of movement. Some headsets use **digital cameras** that record the user's eye movements for analysis.
2(b)	**1 mark** each to **max 3**: • The buffer is used as a **temporary** store for data going to the headset • Data is **transferred** into the buffer by the computer • Data is **retrieved** from the buffer by the headset • When the buffer is empty/full an interrupt is sent to the computer requesting more data/stopping further data being sent • When the headset has enough data/needs more data, an interrupt is sent by the headset to the computer to stop sending data from buffer
2(c)	**1 mark** each to **max 3**: • EEPROM allows **frequent/multiple** read/write/erase operations • … so the headset can take advantage of new features • … without fully erasing the contents of the firmware in the headset first // can erase a particular byte or the whole EEPROM • … without removing the chip(s)/firmware from the headset • ... the contents of the firmware in the headset can be changed by the user without technical expertise • Cheaper to manufacture so headset will be cheaper to purchase
2(d)(i)	**1 mark** each: • Image is made of pixels and each pixel has one colour • Each colour has a **unique** binary code • **Code for the colour** of each pixel is stored in **sequence**
2(d)(ii)	**1 mark** each to **max 2**: • List of objects in the drawing • A list that stores the command/description/equation required to draw each object • Properties of each object e.g. the fill colour, line weight/colour
2(d)(iii)	**1 mark** each to **max 2**: • Dedicated connection to the headset // not sharing bandwidth • Already fast connection that can transmit the data without slowing • Video may already be a small file size and does not need further reduction • Video is not saved so storage is not an issue in the headset