2 **(a)** Sound can be represented in a computer in a digital format.

(i) Give the definition of the term sampling.

....

....

....[1]

(ii) Give **one** reason why 16-bit sampling is used in an audio compact disc (CD).

....

....[1]

(iii) Explain what is meant by the term sampling resolution.

....

....

....

....[2]

(iv) Give **one** benefit and **one** drawback of using a higher sampling resolution.

Benefit ....

....

Drawback ....

....[2]

(b) Describe **two** typical features found in software for editing sound files.

1 ....

....

2 ....

....[2]

(c) Explain the difference between *lossless* and *lossy* data compression techniq

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....[3]

4 A group of students broadcast a school radio station on a website. They record (programmes) in advance and email them to the producer.

(a) Describe how sampling is used to record the sound clips.

....

....

....

....

....

....[3]

(b) The students use software to compress the sound clips before emailing them.

   (i) Circle your chosen method of compression and justify your choice.

<div align="center">Lossy / Lossless</div>

   Justification: ....

....

....

....[3]

Students also email images to the radio station for use on its website.

These are compressed before sending using run-length encoding (RLE).

  (ii) Explain what is meant by run-length encoding.

....

....

....

....

....

....[3]

(iii) The following diagrams show:

- the denary colour code that represents each colour
- the first three rows of a bitmap image

Colour symbol	Colour code (denary)
B	153
W	255

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	B	B	B	B	B	B	B	B	B	B	W	W	W	B	B	B
1	B	B	B	B	B	B	B	B	B	W	W	W	W	W	W	B
2	B	B	B	B	B	B	B	W	W	W	W	W	W	W	W	W
...																
95																

Show how RLE will compress the first three rows of this image.

Row 1: ....

Row 2: ....

Row 3: ....[2]

3 **(a)** A computer has a microphone and captures a voice recording using sound rec

Before making a recording, the user can select the sampling rate.

Define the term **sampling rate**. Explain how the sampling rate will influence the accur the digitised sound.

Sampling rate ....

....

....

Explanation ....

....

[2]

(b) The computer also has bitmap software.

(i) Define the terms **pixel** and **screen resolution**.

Pixel ....

....

Screen resolution ....

....

[2]

(ii) A picture has been drawn and is saved as a monochrome bitmap image.

State how many pixels are stored in one byte.

....[1]

(iii) A second picture has width 2048 pixels and height 512 pixels. It is saved as a 256-colour image.

Calculate the file size in kilobytes.

Show your working.

....

....

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....

....[3]

(iv) The actual bitmap file size will be larger than your calculated value.

State another data item that the bitmap file stores in addition to the pixel data.

....

....[1]

3 **(a)** A computer has a microphone and captures a voice recording using sound e

The user can select the sampling resolution before making a recording.

Define the term **sampling resolution**. Explain how the sampling resolution will affe
accuracy of the digitised sound.

Sampling resolution ....

....

....

Explanation ....

....
[3]

(b) The computer also has bitmap software.

(i) Define the term **image resolution**.

....

....[1]

(ii) A picture is drawn and is saved as a 16-colour bitmap image.

State how many bits are used to encode the data for one pixel.

....[1]

(iii) A second picture has width 8192 pixels and height 256 pixels. It is saved as a 256-colour bitmap.

Calculate the file size in kilobytes.

Show your working.

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....

....[3]

(iv) The actual bitmap file size will be larger than your calculated value as a bitmap file has a file header.

State **two** items of data that are stored in the file header.

1 ....

2 ....[2]

QUESTION 5.

1 A student is creating a short video and needs to record music to play in the backg

(a) The student uses a microphone to capture the music.

Explain how the microphone captures the music.

....

....

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....

....[3]

(b) An analogue-to-digital converter uses sampling to encode the sound.

Explain how different sampling resolutions affect the sound file and the sound it represents.

....

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....

....[3]

(c) The student needs to edit the sound file.

Describe **two** features of sound editing software that can be used to edit the sound file.

Feature 1 ....

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....

....

Feature 2 ....

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....

....[4]

(d) The video is recorded with a frame rate of 60 frames per second (fps) and u
encoding.

(i) Describe what is meant by **a frame rate of 60 fps**.

....

....[1]

(ii) Describe what is meant by **progressive encoding** in video recording.

....

....

....

....[2]

(e) MP4 multimedia container format is used to save the video.

State what is meant by **multimedia container format**.

....

....[1]

6 A student records a video using a digital camera.

(a) The recording uses interlaced encoding.

Describe **interlaced encoding**.

....

....

....

....

....

....

.... [3]

(b) State **one** benefit of using interlaced encoding compared to progressive encoding.

....

.... [1]

(c) A video can be compressed using spatial redundancy or temporal redundancy.

Explain how **temporal redundancy** compresses a video.

....

....

....

....

.... [2]

(d) A sound track is recorded for the video.

(i) Describe how a computer encodes the sound track.

....

....

....

....

....

.... [3]

(ii) Explain how the sampling rate and sampling resolution affect the file s. track.

Sampling rate ....

....

Sampling resolution ....

....

[2]

14

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2 Leonardo's mobile phone has an operating system (OS).

(a) Describe the following key management tasks that the mobile phone operating sys━
out.

Process management ....

....

....

....

....

Memory management ....

....

....

....

....

[6]

(b) Leonardo uses the mobile phone to record his voice.

(i) Describe how sound sampling is used by the mobile phone to encode the sound.

....

....

....

.... [2]

(ii) Leonardo records his voice twice. Each recording is the same length a... sampling resolution.

The first recording has a sampling rate of 44 100 Hz. The second recording ... sampling rate of 21 000 Hz.

Describe how the different sampling rates will affect the recording and the sound file.

....

....

....

.... [2]

(iii) Leonardo transfers the recordings to his laptop computer. He uses sound editing software to delete some sections of the recordings, and copy and paste to replicate other sections.

Describe **two** other features of sound editing software Leonardo can use to edit the recordings.

1 ....

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....

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2 ....

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[4]