Your notes

GCSE Computer Science: revision notes

Representing text, images and sound

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Characters

- A **character set** gives each character a binary code. **ASCII** uses 7 bits, giving 128 characters (extended **ASCII** uses 8 bits for 256). Unicode uses up to 32 bits, so it can represent characters from every language, and emoji.
- The codes are in order: if 'A' is 65, then 'C' is 67. The lower-case letters come later ('a' is 97).

Images

- A bitmap image is made of **pixels**. Each **pixel**'s colour is stored as a binary code.
- **Colour depth** is the number of bits per **pixel**. n bits give 2^n colours: 1 bit gives 2 colours, and 8 bits give 256.
- **Resolution** is the number of **pixels** in the image (width × height). More **pixels** or a greater colour depth give better quality, but a bigger file.
- File size in bits = width × height × **colour depth**. A 100 × 50 image with 8-bit colour is 100 × 50 × 8 = 40 000 bits = 5000 bytes. The file also stores **metadata**, such as the width, height and **colour depth**.

Sound

- Sound is sampled: the amplitude of the sound wave is measured at regular intervals and each measurement is stored in binary.
- The **sample rate** is the number of samples per second, in hertz (Hz). The **bit depth** (sample **resolution**) is the number of bits per sample.
- File size in bits = **sample rate** × **bit depth** × length in seconds. 10 seconds at 44 100 Hz and 16 bits is 7 056 000 bits = 882 000 bytes.
- A higher **sample rate** or **bit depth** makes the recording closer to the original sound, but the file is bigger.

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Key terms

Character set	A list of characters and the binary code that represents each one.
ASCII	A character set that uses 7 bits to represent 128 characters.
Unicode	A character set that uses more bits, so it can represent characters from every language.
Pixel	A single dot of colour in a bitmap image.
Colour depth	The number of bits used to store the colour of each pixel.
Resolution	The number of pixels in an image.
Metadata	Data about a file, such as an image's width, height and colour depth.
Sample rate	The number of sound samples taken per second.
Bit depth	The number of bits used to store each sound sample.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. How many characters can 7-bit ASCII represent?
2. Why was Unicode introduced?
3. In ASCII, 'A' is 65. What is 'D'?
4. What is a pixel?
5. How many colours can a colour depth of 4 bits show?
6. What is colour depth?
7. What is the file size of a 100 × 50 pixel image with a colour depth of 8 bits?
8. What happens when the resolution of an image is increased?

Answers

1. 128
2. To represent characters from all the world's languages
3. 68
4. A single dot of colour in a bitmap image
5. 16
6. The number of bits used for each pixel
7. 5000 bytes
8. It has more pixels, so more detail and a bigger file

What to do next

Practise 13 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

Your notes

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