1. Information representation

Starter Quiz ·

A-Level Computer Science Name: _____ Score: _____

1. How many bits does one hexadecimal digit represent?

   ☐ 16

   ☐ 1

   ☐ 4

   ☐ 8

2. Add the binary numbers ‘0101‘ + ‘0011‘. Give the 4-bit result.

   _____

3. A character set such as ASCII defines:

   ☐ a numeric code point for each character

   ☐ the speed of the processor

   ☐ how files are compressed

   ☐ the colour of each pixel

4. The colour depth (bit depth) of a bitmap image is:

   ☐ how much the file is compressed

   ☐ the number of pixels across the image

   ☐ the physical size of the screen

   ☐ the number of bits used to store each pixel

5. What does sampling do?

   ☐ makes the sound louder

   ☐ converts digital data into analogue data

   ☐ removes frequencies the ear cannot hear

   ☐ measures the amplitude of an analogue wave at regular intervals and stores each as a binary number

6. Lossless compression means:

   ☐ the data is encrypted

   ☐ some detail is permanently lost

   ☐ the file gets bigger

   ☐ the exact original data can be recovered

7. How many bits are in one byte?

   _____ bits

8. What is the 4-bit two's complement of '0011'? (invert, then add 1)

   _____

9. How many different code points does 7-bit ASCII have?

   _____

10. How many bits of colour depth are needed to store 256 different colours?

    _____ bits

1. Information representation

Answers ·

A-Level Computer Science

1. **4**

   One hex digit (0–F) covers 16 values = 2^4, so it maps to exactly 4 bits (a nibble).

2. **1000**

   $5 + 3 = 8$, which is ‘1000‘ in binary.

3. **a numeric code point for each character**

   A character set maps each character to a number (its code point), which is what the computer actually stores.

4. **the number of bits used to store each pixel**

   Colour depth is bits per pixel – more bits means more possible colours (8 bits → 256, 24 bits → 16.7 million).

5. **measures the amplitude of an analogue wave at regular intervals and stores each as a binary number**

   Sampling turns a continuous analogue wave into discrete digital values. Removing inaudible frequencies is lossy compression, a different step.

6. **the exact original data can be recovered**

   Lossless compression lets you rebuild the original data exactly – essential for text, programs and ZIP/PNG.

7. **8 bits**

   A byte is 8 bits (and a nibble is 4 bits).

8. **1101**

   Invert ‘0011‘ → ‘1100‘, then add 1 → ‘1101‘ (which represents −3).

9. **128**

   7 bits give $2^7 = 128$ code points.

10. **8 bits**

    $2^8 = 256$, so 8 bits per pixel give 256 colours.