1. Information representation

Starter Quiz · 课前小测

A-Level Computer Science Name: _____ Score: _____

1. How many bits does one hexadecimal digit represent?

   ☐ 4

   ☐ 1

   ☐ 8

   ☐ 16

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

   _____

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

   _____

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

   ☐ the number of bits used to store each pixel

   ☐ the number of pixels across the image

   ☐ the physical size of the screen

   ☐ how much the file is compressed

5. The sampling rate of a digital sound is:

   ☐ the number of amplitude samples taken per second

   ☐ the number of bits per sample

   ☐ the loudness of the sound

   ☐ the length of the clip

6. Lossless compression means:

   ☐ the exact original data can be recovered

   ☐ some detail is permanently lost

   ☐ the file gets bigger

   ☐ the data is encrypted

7. How many bits are in one byte?

   _____ bits

8. Overflow in binary addition means:

☐ the result needs more bits than the register can hold

☐ the numbers were too small

☐ a bit was inverted by mistake

☐ the register was empty

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

   _____ bits

10. A 5-second mono clip is sampled at 8000 Hz with 8-bit resolution. What is its size in bits?

    _____ bits

1. Information representation

Answers · 答案

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. **128**

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

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. **the number of amplitude samples taken per second**

   Sampling rate = samples per second (hertz). The bits per sample is the sample resolution.

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. **the result needs more bits than the register can hold**

   Overflow occurs when the sum is too large to fit in the available bits; the carry out of the leftmost column is lost.

9. **8 bits**

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

10. **320000 bits**

    size = $8000 \times 8 \times 5 \times 1 = 320\,000$ bits.