

Solutions

Each answer shows the steps, then the **result**.

2.1

- (i) $64 + 32 + 8 + 1 = \mathbf{105}$
- (ii) $3 \times 16 + 12 = \mathbf{60}$

2.2

- (i) $154 = 128 + 16 + 8 + 2$: **10011010**
- (ii) 1001 1010: **9A**

2.3

- $25 = 00011001$, flipped 11100110
- add 1: **11100111**

2.4

- **127** and -128

3.1 D

- $2^{10} = 1024$

3.2 A

- $1111 = \text{F}$, $0000 = 0$

3.3 B

- Chinese needs thousands of characters

3.4

(a)

- $\text{size} = \text{sample rate} \times \text{bit depth} \times \text{channels} \times \text{time}$
- $22\,050 \times 16 \times 2 \times 180 = 127\,008\,000$ bits
- $\div 8 = \mathbf{15\,876\,000}$ bytes

(b)

- lower the sample rate: less accurate sound, high notes lost
- lower the bit depth, or record in mono: less detail or no stereo

(c)

- $\text{size} = \text{width} \times \text{height} \times \text{colour depth}$
- $1200 \times 800 \times 24 = 23\,040\,000$ bits $= 2\,880\,000$ bytes
- **2.88 MB**

(d)

- 24 bits give 2^{24} , about 16.7 million colours
- 8 bits give only $2^8 = 256$ colours, so smooth shades look banded