Decoding the Language of Computers: Understanding Binary

1. 0111 (1 mark)

Working: 4 + 2 + 1 = 7

Accept 0111.

2. 10 (2 marks)

Working: 1010 = (1x8) + (0x4) + (1x2) + (0x1) = 8 + 2 = 10

Accept 10. Working must show place values 8 and 2.

3. 255 (2 marks)

Working: 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 255

Accept 255. Reasoning must mention that all bits are 'on' (1).

4. 0101 (1 mark)

Working: 4 + 1 = 5

Accept 0101.

5. Computers use binary because electronic switches only have two states: on or off. (2 marks)

Look for: The link between binary digits and the physical state of electronic switches (on/off).

Good: Computers use binary because it only uses 0 and 1.

Better: Computers use binary because it is easier for electronic switches to be either on or off.

Best: Computers use binary because electronic switches inside the computer can only be in two states: 'on' (1) or 'off' (0), which matches the binary system perfectly.

What moves an answer up: Moving from a simple definition to explaining the physical mechanism of the hardware improves the answer.

What a secure answer looks like

A secure answer shows an understanding that binary is a base-2 system where each position represents a power of two. Pupils should be able to map these values to the physical 'on/off' state of computer hardware.

If your child is stuck

Ask the child to draw a table with the headings 8, 4, 2, 1 and place their 1s and 0s underneath to see which numbers add up to their target.

Common mistakes to watch for

Children often forget that the place values start from the right (1) and double as they move left. Another common error is adding the digits (1+0+1+0) instead of the place values (8+2).