Decoding the Language of Computers: Understanding Binary

Learning objective: I can explain how computers use binary to represent data and convert numbers between denary and binary.

About 15 minutes. Grown-up tip: Remind your child that binary is just a different way of counting using only two options: on or off.

Computers use the binary system, which only has two digits: 0 (off) and 1 (on). Each place value in binary is a power of two (128, 64, 32, 16, 8, 4, 2, 1). To convert the denary number 13 to binary, find the largest power of two that fits into 13 (8), leaving 5. Then find the next largest (4), leaving 1. Finally, take the 1. So, 13 = 8 + 4 + 1. In binary, this is 00001101.

Word bank: Bit · Byte · Denary · Binary · Power of two

1. Kit the fox wants to store the number 7 in binary. Write 7 as a binary number using 4 bits. (1 mark)

2. Convert the binary number 1010 into a denary number. Show your working by adding the place values together. (2 marks)

3. If a computer uses 8 bits to store a number, what is the largest denary number it can represent? Explain your reasoning. (2 marks)

4. Amira is creating a simple code where each letter matches a binary number. If A=0001 and B=0010, what would the binary code be for the number 5? (1 mark)

5. Compare denary and binary systems. Give one reason why computers use binary instead of our standard denary system. Use evidence about how electronic switches work. (2 marks)

Draw: Kit the fox wearing a small pair of glasses, looking at a digital screen showing columns of 1s and 0s, with an oak tree visible through the window.

Extension challenge: Try to write your age in 8-bit binary. Then, challenge a friend to convert it back to denary without telling them your age first!

I did it! Name: _____ Date: _____

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