

Kit's Computing Challenge: Unlocking Binary

Learning objective: To understand that computers use binary (base 2) to represent data, and to practise converting numbers between denary and binary.

Help Kit the fox solve these digital puzzles. Remember that binary uses only two digits: 0 and 1. Use the place value columns (8, 4, 2, 1) to help you convert these numbers.

Word bank: binary · denary · bit · switch · base-two · value · placeholder

1. Kit explains that a computer is like a series of tiny light switches. If a switch is 'on', it represents 1. If it is 'off', it represents 0. If a 4-bit sequence is 0101, what is the denary (base 10) value? (2 marks)

2. Convert the denary number 7 into a 4-bit binary sequence. Explain how you worked it out using the place value columns 8, 4, 2, and 1. (3 marks)

3. If a computer is processing the binary code 1111, what is the total denary value? Show your calculation. (2 marks)

4. Kit wants to store the number 12 in binary. Write down the correct 4-bit sequence (Hint: you will need to think about the 8 and 4 columns). (2 marks)

5. Why do you think computers use binary code instead of our normal number system (0-9) to store information? (2 marks)

Draw: Draw a 'Binary Robot' for Kit. On the robot's chest, draw four light bulbs. Colour the bulbs that would be 'on' (1) to represent the number 10, and leave the bulbs that are 'off' (0) blank.



Extension challenge: Try to work out the binary sequence for the number 20. How many bits (columns) do you need to represent this number, and why can't you fit it into just 4 bits?