

Kit's Binary Code Challenge

Learning objective: To understand how computers use binary to represent data and to convert denary numbers into 4-bit binary code.

Kit the fox needs your help to send a secret message to the BookFlik forest! Computers use binary, which is a base-2 number system made only of 1s and 0s. In binary, each position represents a power of 2 (8, 4, 2, 1). To solve the puzzles below, calculate which combination of 8, 4, 2, and 1 adds up to your target number. If you need the value, put a 1 in that column; if you don't, put a 0.

Word bank: Binary · Bit · Denary · Base-2 · On · Off

1. Kit wants to send the number 5. Using the 4-bit grid (8, 4, 2, 1), write the binary code for 5. (Hint: $4 + 1 = 5$) (2 marks)

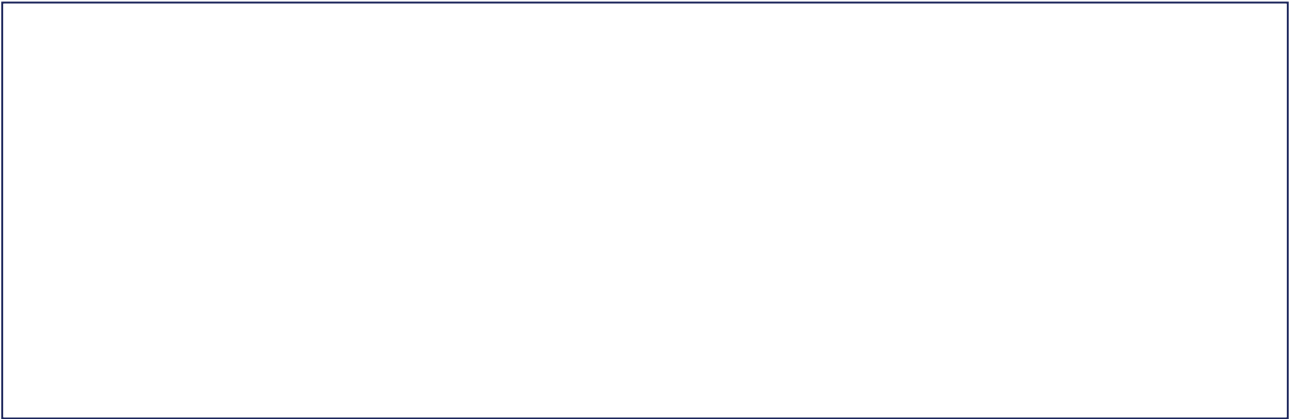
2. Convert the denary number 9 into 4-bit binary. (2 marks)

3. What is the largest number you can represent using only 4 bits? Explain your working out. (2 marks)

4. If a binary code is 0110, what is the denary number? (2 marks)

5. True or False: In binary, the digit '1' represents an 'off' signal. Explain why. (2 marks)

Draw: Draw a 'Binary Light Switch' panel. Show four light bulbs in a row, labelled 8, 4, 2, and 1. Color in the bulbs that would be 'ON' (1) to represent the number 13.



Extension challenge: Try to work out the 5-bit binary code for the number 20. Remember, your columns will be 16, 8, 4, 2, 1!