

Computing Assessment: The Language of Computers

Learning objective: To understand the binary system, how computers represent data using bits, and the relationship between denary and binary numbers.

Read each question carefully. Show your working out for all calculations. Ensure your explanations are clear and use accurate computing terminology. You have 45 minutes to complete this assessment.

Kit the fox is building a new computer programme to organise his collection of woodland maps. He explains to his friends that inside every computer, there are millions of tiny electronic switches. These switches can only ever be in one of two states: 'on' or 'off'. To represent these states, computers use the binary system, which only uses two digits: 0 and 1. By combining these digits into sequences, the computer can store everything from text to complex images.

Word bank: Binary · Denary · Bit · Byte · Base-2 · Base-10 · Switch · Data · Sequence

1. Explain what the term 'binary' means and why computers use it instead of our standard number system (denary). (3 marks)

2. If a single 'bit' represents either a 0 or a 1, how many bits are required to make one 'byte'? (1 mark)

3. Convert the denary number 13 into an 8-bit binary number. (2 marks)

4. Convert the binary number 1011 into its denary equivalent. Show your working clearly. (2 marks)

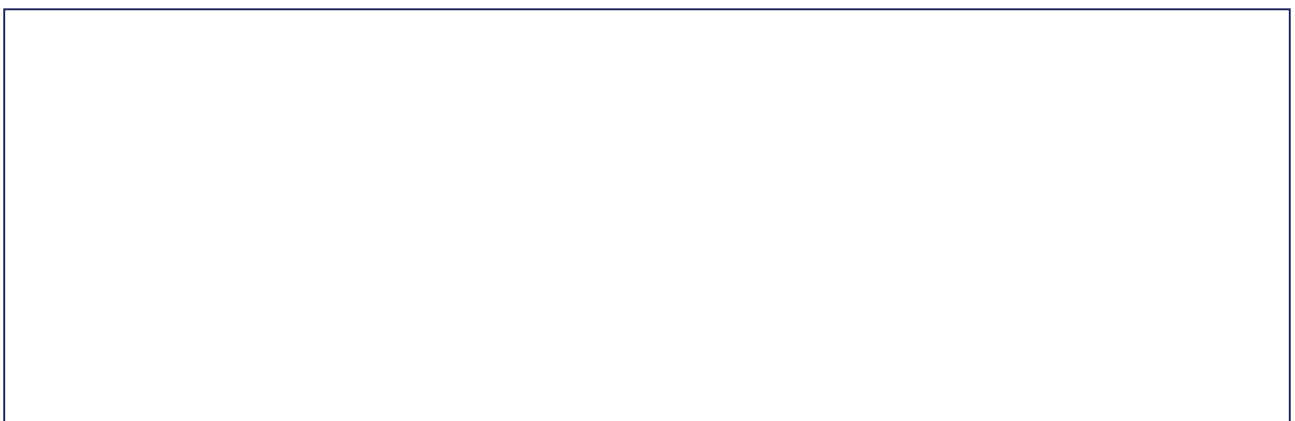
5. Compare and contrast the denary system (base-10) with the binary system (base-2). How do the place values change as you move from right to left? (4 marks)

6. Kit wants to represent the letter 'A' using binary code. If he uses a specific 8-bit sequence to represent each letter, justify why it is important that computers follow a standardised code for these sequences. (4 marks)

7. What might happen if a computer's memory became corrupted and a '1' was accidentally changed to a '0' in a sequence representing a digital image? Explain the potential impact on the data. (4 marks)

8. Extended Writing Task: Imagine you are explaining binary to a friend who has never heard of it before. Write a short guide (approx. 100 words) describing how a simple 'on/off' switch can eventually be used to store a high-resolution photograph. Include the concepts of bits, bytes, and sequences in your explanation. (5 marks)

Draw: Draw a diagram showing how the number 7 would be represented using a row of four lightbulbs, where an 'on' bulb represents a 1 and an 'off' bulb represents a 0.



Extension challenge: Total: /25. Challenge: If you have extra time, write down the binary sequence for the number 255. Explain why 255 is the maximum value that can be represented by a single byte (8 bits).