

Grade 4 Computing: Understanding Binary Basics

Learning objective: To understand how computers use binary digits (bits) to represent data, including numbers and text.

Read each question carefully. Show your working out for calculation questions. Remember to use British English spelling.

Computers do not understand our alphabet or our number system. Instead, they use a system called binary. A binary system only uses two digits: 0 and 1. Inside a computer, tiny electronic components act like light switches. When a switch is 'on', it represents 1. When a switch is 'off', it represents 0. By using long sequences of these 1s and 0s, computers can store everything from photos to your favorite stories.

Word bank: Binary · Bit · Denary · Switch · Data · Sequence · Code · On · Off

1. Explain what the word 'Binary' means in the context of computing. Why do computers use it instead of the number system we use in math? (2 marks)

2. If a computer switch is in the 'off' position, what binary digit does it represent? (1 mark)

3. Kit the fox is trying to convert the denary number 5 into binary. Using the place values 4, 2, and 1, show how 5 is written in binary. (3 marks)

4. Convert the binary number 1011 into a denary (base 10) number. Show your working out. (3 marks)

5. Why is a 'bit' considered the smallest unit of data in a computer? (3 marks)

6. Imagine a computer is storing a simple black and white image. Explain how binary could be used to represent which pixels are black and which pixels are white. (4 marks)

7. Extended Writing: Max the monkey wants to explain binary to a friend. Write a short explanation describing how a sequence of 0s and 1s can be used to represent a letter of the alphabet. Include why it is important that the computer and the person reading the code agree on the same system (a code). (5 marks)

8. Convert the binary number 1110 into denary. (4 marks)

Draw: Draw a diagram showing a row of four light bulbs. Label them with their binary place values (8, 4, 2, 1). Color the bulbs 'on' or 'off' to represent the number 13.

Extension challenge: Total: /25