

Grade 4 Design Technology: Introduction to Electronics

Learning objective: To demonstrate understanding of simple electrical circuits, components, and their functions in designing products.

Read each question carefully. Use your knowledge of circuits to answer. Ensure you use scientific vocabulary where appropriate. Write clearly and show your working for any calculations.

Max the monkey is building a secret alarm system for his treehouse to keep his favorite snacks safe. He is using a battery, a buzzer, and a switch. He needs to make sure his circuit is complete so that it works perfectly.

Word bank: Circuit · Component · Battery · Conductor · Insulator · Switch · Buzzer · Voltage · Closed · Energy

1. Identify two essential components Max needs to include in his circuit to make the buzzer sound. Explain why each is necessary. (2 marks)

2. What is the difference between a conductor and an insulator? Give one example of each material. (2 marks)

3. Explain why a circuit must be 'closed' for the buzzer to function. (2 marks)

4. Max buys a battery for £1.50 and a buzzer for £2.75. If he pays with a £5.00 note, how much change should he receive? Show your calculation. (2 marks)

5. If Max replaces the buzzer with a small light bulb, what will happen to the circuit when the switch is pressed? Describe the energy transfer. (3 marks)

6. Look at the circuit diagram. Why might the bulb fail to light up even when the switch is closed? Give two possible reasons. (4 marks)

7. Max wants to design a new electronic toy. Describe a product you could design using a battery-powered circuit. Include details on what the product does, which components you would use, and how the user operates it. (5 marks)

8. Total: /25. Extension: If you added a second battery to the circuit, what do you predict would happen to the brightness of the bulb? Explain your reasoning. (5 marks)

Draw: Draw a circuit diagram for Max's alarm system. Use standard scientific symbols for a battery, a switch, and a buzzer, connected by straight lines to represent wires.

Extension challenge: Total: /25