

Nova's Electrifying Discovery

Learning objective: To understand the components of a simple series circuit and identify the function of key electrical symbols.

Read the passage below carefully. Use your scientific knowledge to answer the questions, ensuring you provide clear justifications for your reasoning.

Nova the barn owl spent her evening in the observatory examining a complex electrical circuit. She carefully connected a small cell to a bright bulb using copper wires. 'Electricity is a flow of energy,' Nova noted, observing how the electrons travelled through the closed loop. She explained to her friends that for a bulb to illuminate, the circuit must be complete; even a tiny gap would break the flow. To test her theory, Nova replaced the copper wire with a piece of plastic string. The bulb instantly dimmed and died, demonstrating that plastic acts as an insulator, preventing the electrical current from passing through. She then added a second bulb, noting how the brightness decreased because the voltage was shared between two components. Nova marvelled at how these invisible forces powered our modern world, from the torch she held to the lights in her cosy nest. By carefully arranging her switches and batteries, she mastered the art of controlling the flow, proving that even a simple circuit holds the secrets to understanding energy.

Word bank: circuit · component · conductor · insulator · voltage · filament

1. Identify two materials mentioned in the text and state whether they are conductors or insulators. (2 marks)

2. What happens to the brightness of the bulbs when Nova adds a second bulb to the series circuit? (1 mark)

3. Explain why the bulb stops working when Nova replaces the copper wire with plastic string. (2 marks)

4. Why is it important for a circuit to be a 'closed loop' for it to function correctly? (2 marks)

5. Nova believes that understanding simple circuits is the first step to becoming a great engineer. Do you agree? Justify your answer using evidence from the text. (3 marks)

Draw: Draw a scientific diagram of a simple series circuit. Include a cell, a switch, and a bulb, using the correct standard electrical symbols.



Extension challenge: Compare and contrast a series circuit with a parallel circuit. What might happen to the other bulbs in a parallel circuit if one bulb were to break? Justify your hypothesis using your knowledge of electrical flow.