

Nova's Circuit Challenge: Investigating Components

Learning objective: To identify, construct, and troubleshoot simple series circuits, explaining the function of various components and the effect of adding cells or bulbs.

Nova the Owl is setting up a stargazing lamp! Look at the components below. You must act as the lead engineer to match the component to its scientific function, then solve Nova's troubleshooting puzzles to ensure her lamp shines brightly.

Word bank: Cell · Bulb · Switch · Wire · Buzzer · Conductivity · Voltage · Short circuit

1. Nova has connected a circuit with one cell and one bulb. If she adds a second cell in the same direction, what will happen to the brightness of the bulb? Explain why this occurs using your knowledge of energy. (2 marks)

2. Compare and contrast a switch and a wire. Why is a switch essential for a controlled circuit, whereas a wire is merely a path for current? (2 marks)

3. Nova's lamp has stopped working. She checks the bulb and it is not broken. Identify two other possible reasons why the circuit is incomplete. (2 marks)

4. Justify your answer: If Nova replaces the metal wire with a piece of cotton thread, will the bulb light up? Explain your reasoning referring to the properties of materials. (2 marks)

5. What might happen if Nova creates a 'short circuit' by connecting a wire directly from one end of the cell to the other, bypassing the bulb? (2 marks)

6. If Nova wants to build a circuit that powers both a bulb and a buzzer at the same time, should she arrange them in a single loop or use a more complex setup? Explain your choice. (2 marks)

Draw: Draw a scientific circuit diagram for Nova. Include a cell, a switch, and a bulb using the correct standard scientific symbols. Label each part clearly.



Extension challenge: Design an experiment to test which household objects are conductors and which are insulators. Create a table to record your predictions and actual results. If you were designing a safety device for a home, how would you use your knowledge of insulators to protect people from electricity?