Nova’s Material Investigation

Learning objective: To identify and explain the properties of materials and their suitability for specific purposes.

Read the text carefully and answer the questions below. Use your scientific knowledge to justify your answers.

Nova the barn owl was preparing for a night of stargazing. She needed to build a sturdy shelter to protect her telescope from the chilly evening dew. Nova gathered several materials: a sheet of clear plastic, a thick woollen blanket, a piece of galvanised steel, and a porous sponge. She knew that steel was a durable metal and a good thermal conductor, which would keep the structure rigid. However, she worried it might become too cold to touch. The clear plastic was perfect for a window because it was transparent, allowing her to view the constellations clearly while keeping the damp air out. Nova decided the woollen blanket was the best choice for insulation, as its fibres trapped air to keep the warmth inside. Finally, she discarded the sponge. Although it was soft, it was highly permeable and would soak up the damp mist, making the shelter soggy. By choosing materials with the correct properties, Nova ensured her equipment stayed dry and her stargazing session remained comfortable throughout the night.

Word bank: thermal conductor · insulator · transparent · opaque · permeable · durable

1. Identify two materials Nova considered for her shelter and state one property of each mentioned in the text. (2 marks)

2. Why did Nova choose to use clear plastic for her window instead of the galvanised steel? (2 marks)

3. Explain why the sponge was unsuitable for protecting the telescope from the damp mist. (2 marks)

4. What does the author mean when they describe the woollen blanket as an 'insulator'? (2 marks)

5. If you were building the same shelter, which material would you swap and why? Give a scientific reason for your choice. (2 marks)

Draw: Draw a sketch of Nova's shelter, labelling which parts are made of plastic, steel, and wool, and explain why those materials were chosen for those specific parts.

Extension challenge: Research three different materials used in your own home. Create a table to categorize them as either thermal conductors or thermal insulators and explain why they are used in that way.