

Material Properties: The Great Investigation with Nova and Kit

Learning objective: To identify, compare, and justify the suitability of materials based on their specific physical properties, including conductivity, transparency, and solubility.

Read each question carefully and use your scientific knowledge of materials to provide detailed explanations. Remember to use technical vocabulary where appropriate.

Nova the owl is designing a new stargazing hut, while Kit the fox is building a toolkit to organise her computing wires and gadgets. They must choose their materials wisely to ensure their projects are durable, safe, and fit for purpose.

Word bank: thermal conductor · thermal insulator · solubility · transparent · opaque · permeable · flexible · electrical conductor

1. Nova needs to build a cover for her telescope lens that allows light to pass through but keeps dust out. Which property should this material have? Explain why a material like wood would be unsuitable for this task. (2 marks)

2. Kit is designing a handle for a metal cooking pot used on camping trips. Should she choose a thermal conductor or a thermal insulator? Justify your choice by describing how heat energy behaves in your chosen material. (3 marks)

3. Compare and contrast the properties of a rubber band and a glass marble. Use the terms 'flexible' and 'rigid' in your answer. (2 marks)

4. If Kit accidentally spills water on her workbench, she needs to wipe it up quickly. Suggest a material that would be effective for this, and explain what we call a material that allows liquids to pass through it. (2 marks)

5. Explain why it is important that the electrical wires in Kit's computing projects are coated in plastic rather than being left as bare metal. (2 marks)

6. Nova has a container of sugar cubes and a container of pebbles. If she accidentally drops both into a bowl of water, describe what will happen to each material and name the scientific process involved. (2 marks)

Draw: Draw a diagram of a 'Super-Safe Lunchbox' designed by Kit. Label the materials used for the lid, the base, and the handle, and explain one property for each that makes it a good choice for keeping food fresh and safe.



Extension challenge: Nova wants to build an outdoor shelter that is both waterproof and strong. Research three different materials (e.g., plastic, metal, wood). Create a table to compare their properties and write a short paragraph justifying which material you would choose for the roof and why. What might happen if you chose a material that was permeable instead?