

Nova's Material Investigation: The Great Stargazing Shelter Challenge

Learning objective: To identify, describe, and compare the suitability of a variety of everyday materials based on their properties, including hardness, solubility, transparency, conductivity, and response to magnets.

Nova the Owl is building a new observatory to watch the night sky. She needs your help to select the best materials. Look at the properties in the word bank and match them to the materials Nova is considering. Then, use your scientific knowledge to solve the 'Greater Depth' challenges below.

Word bank: Transparent · Thermal Insulator · Magnetic · Flexible · Waterproof · Conductive · Hard · Opaque

1. Nova needs a material for her telescope lens. It must be transparent so she can see the stars. Why would a piece of wood be a poor choice for this purpose? Explain your reasoning. (2 marks)

2. Nova wants to build a roof for her shelter that keeps the rain out. She is deciding between a piece of cotton fabric and a sheet of plastic. Justify which material she should choose and why. (2 marks)

3. If Nova decides to build a frame for her shelter using iron rods, what property should she be aware of if she plans to use a compass nearby? Explain the interaction. (2 marks)

4. Compare and contrast the properties of a metal spoon and a wooden spoon when used to stir a boiling hot cup of cocoa. Which is the better thermal insulator? (3 marks)

5. Nova has a budget of £10.00 to buy materials. If a sheet of plastic costs £2.50 and a sheet of metal costs £3.75, calculate the total cost for two sheets of plastic and one sheet of metal. Does she have enough money? (2 marks)

6. What might happen to the stability of Nova's shelter if she chose a material that was highly flexible rather than hard? Discuss the physical consequences. (2 marks)

Draw: Draw a blueprint for Nova's stargazing shelter. Label at least four different parts of your shelter and identify which material you have used for each (e.g., 'glass window', 'rubber seal') and the specific property that makes it suitable.



Extension challenge: Design a 'Material Swap' experiment. Imagine you are Nova and you must replace a common material in your house with one that has the opposite property (e.g., a window made of wool). Write a short paragraph explaining the chaotic results of this swap and why materials are chosen specifically for their properties.