

Nova's Material Investigation

Learning objective: To identify and compare the properties of everyday materials based on their uses.

Read the passage below carefully. Use your scientific knowledge to answer the questions, ensuring you use full sentences and precise vocabulary.

Nova the barn owl is busy refurbishing her woodland observatory. To ensure she stays warm during her nocturnal stargazing, she must select the perfect materials for her nest. Nova understands that properties, such as thermal conductivity and transparency, are vital. She rejects a sheet of clear, thin plastic for her window because it is translucent, meaning it distorts her view of the constellations. Instead, she chooses glass, which is transparent and durable. For her insulation, Nova considers sheep's wool. As a thermal insulator, it traps heat effectively, keeping her cosy. She also tests a piece of cotton fabric for its permeability; she discovers that water passes through it easily, making it unsuitable for an outdoor roof. Nova realises that selecting materials is a scientific process. She must balance strength, flexibility, and durability to create a functional home. By observing how materials interact with light, heat, and water, she ensures her observatory is fit for purpose. Nova records all her findings in a notebook, noting that choosing the right material can make an enormous difference to her comfort and her ability to study the night sky.

Word bank: thermal conductor · opaque · translucent · permeable · insulator · reversible change

1. Identify two properties of materials mentioned in the passage that Nova considers when choosing her nest supplies. (2 marks)

2. According to the text, why does Nova decide that cotton fabric is not the best choice for her roof? (2 marks)

3. Explain why Nova prefers glass over plastic for her observatory window. (2 marks)

4. What might happen if Nova used a material that was a thermal conductor for her nest lining during the winter? (2 marks)

5. Justify Nova's decision to test the permeability of the materials she uses for her roof. Why is this a crucial step in her design process? (3 marks)

Draw: Draw a diagram of Nova's woodland observatory, labelling at least three different materials used and explaining the property that makes each material suitable for its specific part of the structure.



Extension challenge: Compare and contrast the properties of metal and wood. If you were building a bridge across a stream, which material would you choose and why? Justify your answer using scientific vocabulary such as 'strength', 'durability', and 'waterproof'.