

Nova's Magnetic Mysteries

Learning objective: To investigate magnetic materials, observe the forces of attraction and repulsion, and understand how magnetic fields function.

Read each question carefully. Use your scientific knowledge to explain your reasoning and ensure you use precise vocabulary.

Nova the barn owl is exploring the properties of magnetism. She has discovered that magnets interact with specific metals and possess invisible fields of force that influence objects even without physical contact.

Word bank: attract · repel · magnetic field · poles · ferromagnetic · force · permanent · prediction

1. Nova has a collection of items: a copper coin, a steel paperclip, a wooden pencil, and an iron nail. Which items will be attracted to her magnet? Explain why these items react differently. (3 marks)

2. If Nova brings the North pole of one magnet towards the North pole of another, describe the physical sensation she would observe. Use the term 'repel' in your answer. (2 marks)

3. Explain why magnetic force is considered a 'non-contact' force. Give an example of how this is useful in everyday life. (3 marks)

4. Nova wants to prove that a magnetic field exists around her bar magnet. Design a simple experiment using iron filings or a compass to demonstrate this. (4 marks)

5. Compare and contrast a permanent magnet with a temporary magnet. What might happen if you dropped a permanent magnet onto a hard floor repeatedly? (3 marks)

6. Justify this statement: 'All metals are magnetic.' Is this true or false? Provide evidence to support your argument. (3 marks)

Draw: Draw a diagram of two bar magnets placed end-to-end with their North poles facing each other. Use arrows to show the direction of the invisible force field and indicate where the force is strongest.



Extension challenge: Imagine you are an engineer designing a 'maglev' (magnetic levitation) train. Write a short paragraph explaining how you would use the principle of magnetic repulsion to make the train hover above the tracks to reduce friction. How would this improve the train's efficiency?