Nova’s Starlight Investigation: The Science of Light

Learning objective: To understand that light travels in straight lines, how shadows are formed, and how light reflects off surfaces.

Read each question carefully. Use your scientific knowledge of light to provide detailed explanations for Nova’s observations.

Nova the owl is stargazing from her favourite high branch. She notices that the moon shines brightly, yet it does not produce its own light. She also observes how her own shadow changes shape as the sun moves across the sky, and how the light from her torch reflects off the shiny surface of a nearby stream.

Word bank: rectilinear propagation · opaque · translucent · transparent · reflection · incident ray · reflected ray · shadow · spectrum

1. Nova notices that light from her torch travels in straight lines. Explain why shadows change size and shape throughout the day, referencing the position of the light source. (3 marks)

2. Compare and contrast opaque, translucent, and transparent materials. How does each type of material interact with a beam of light? (3 marks)

3. Nova shines her torch onto a smooth, still pond. Draw a simple diagram or describe what happens to the light rays when they hit the surface. Use the term 'reflection' in your explanation. (2 marks)

4. Justify this statement: 'We can only see objects because light enters our eyes.' Explain the process of light reflecting off an object to reach our vision. (3 marks)

5. What might happen if light were able to bend around corners instead of travelling in straight lines? Consider the impact this would have on the shadows you see in everyday life. (2 marks)

Draw: Draw a diagram showing a light source (the sun), a solid tree trunk (an opaque object), and the resulting shadow cast on the ground. Use arrows to show the path of the light rays.

Extension challenge: Design a scientific experiment to test which materials in your classroom are opaque, translucent, or transparent. Predict your results before you begin and justify your reasoning based on the properties of the materials.