

Nova's Nocturnal Sound Investigation

Learning objective: To understand how sound is created through vibrations and how these vibrations travel through a medium to the ear.

Nova the barn owl is conducting a night-time study on acoustics. Look at the scenarios below, which describe different sounds Nova hears in the forest. For each scenario, identify the source of the vibration, the medium the sound travels through, and explain how the sound changes as it moves away from the source. Use the word bank to assist your scientific explanations.

Word bank: vibration · medium · particles · amplitude · frequency · decibels · oscillation · longitudinal wave

1. Scenario 1: A dry leaf snaps under a badger's paw. Describe the initial vibration and identify the medium the sound travels through to reach Nova's ears. (2 marks)

2. Scenario 2: A stream flows over smooth pebbles. If the stream increases in speed, how does this affect the frequency and pitch of the sound produced? Justify your answer. (2 marks)

3. Scenario 3: Nova hoots from a high branch. Explain why the sound of her hoot becomes quieter as it travels further away from her. What happens to the energy of the sound wave? (2 marks)

4. Compare and contrast: How does the sound of a drum beat differ when heard through the air versus when heard through a solid wooden table? Explain the impact of the medium on the vibration. (3 marks)

5. Justify your answer: If Nova were in a vacuum (an area with no particles), would she be able to hear the forest sounds? Explain the scientific reasoning behind your conclusion. (2 marks)

6. What might happen if the air temperature in the forest dropped significantly? Predict how this might change the speed at which the sound waves travel to Nova. (2 marks)

Draw: Draw a scientific diagram showing a sound wave travelling from a source (like a bell) to an ear. Use labels to show the 'vibrating particles' and indicate the direction of the wave travel.



Extension challenge: Design an experiment to test how different materials (e.g., fabric, metal, wood, plastic) absorb or reflect sound. Write a hypothesis predicting which material will best 'muffle' the sound of a ticking timer and explain your reasoning using the concept of vibration absorption.