

Max's Musical Pitch Investigation

Learning objective: To understand, identify, and describe changes in pitch, and to investigate how the length and tension of an object affect the sound it produces.

Max the monkey is setting up a musical experiment using different lengths of string and various household objects. Your task is to act as Max's research assistant. For each scenario below, determine whether the pitch will be 'high' or 'low', and provide a scientific justification based on your knowledge of vibrations. Use the word bank to help you construct your explanations.

Word bank: vibration · frequency · tension · long · short · pitch · sound waves · oscillation

1. Max plucks a very long, thick rubber band. Explain why the resulting sound has a low pitch. (2 marks)

2. Compare and contrast the pitch produced by a short, tight violin string versus a long, loose string. Justify your answer using the term 'frequency'. (3 marks)

3. If Max hits a large, hollow metal drum compared to a small, thin metal bell, which will produce a higher pitch? Explain your reasoning. (2 marks)

4. What might happen to the pitch of a guitar string if you increase the tension by tightening the tuning peg? Explain the change in the vibration. (2 marks)

5. Explain why a xylophone has bars of different lengths. How does this design allow a musician to play a melody? (2 marks)

6. If you were designing a 'water glass organ' using five identical glasses, how would you change the amount of water in each to create a scale from low to high pitch? (3 marks)

Draw: Draw a diagram of a 'string instrument' you have invented. Label which parts would produce high-pitched sounds and which parts would produce low-pitched sounds, including arrows to show where the vibration occurs.



Extension challenge: Max wants to buy new equipment for his music lab. If a set of 4 tuning forks costs £12.50 and a high-quality resonator box costs £8.75, calculate the total cost. If Max has £25.00, how much change will he receive, and could he afford a second set of tuning forks if he wanted to experiment with harmony?