

Nova's Structural Science: Skeletons and Muscles

Learning objective: To identify and explain the functions of the human skeleton, including protection, support and movement, and how muscles work in antagonistic pairs.

Read each question carefully and use your scientific knowledge to provide detailed explanations. Use the word bank to help you construct your answers.

Word bank: antagonistic · contraction · femur · cranium · support · protection · bicep · tricep · ligament · tendon

1. Nova the owl is fascinated by how our bodies stay upright. Explain why the human skeleton is essential for both support and protection. Give one specific example of a bone that protects a vital organ. (3 marks)

2. Compare and contrast the function of a tendon with that of a ligament. Why are both necessary for a healthy, moving body? (3 marks)

3. When you bend your arm to lift a heavy book, your bicep and tricep work together. Justify the term 'antagonistic pair' when describing these two muscles. (3 marks)

4. What might happen to a human's ability to move or stand if their skeleton were made of soft cartilage instead of rigid bone? Explain your reasoning. (3 marks)

5. Identify which type of movement is required for the tricep to contract: flexion or extension? Explain your answer. (2 marks)

6. If a scientist were designing a robot mimicking a human arm, why would they need to include two separate motors to replicate the action of the bicep and tricep? (3 marks)

Draw: Draw a clear, labelled diagram of the human arm showing the bicep and tricep. Use arrows to indicate which muscle is contracting and which is relaxing when the arm is bent at the elbow.



Extension challenge: Research the condition 'osteoporosis'. Write a short, persuasive paragraph explaining why calcium-rich foods and weight-bearing exercise are crucial for maintaining skeletal health throughout one's life.