

Design Technology Assessment: Mechanisms in Motion

Learning objective: To demonstrate understanding of mechanical systems, including levers, linkages, and cams, and to apply this knowledge to solve design problems.

Read each question carefully. Use your knowledge of mechanisms to explain how movement is transferred or changed. Write clearly and ensure you show your working for any calculations.

Max the monkey is building a new wooden toy for his friends. He wants to create a mechanical display where a lion leaps up and down. He is experimenting with different components to ensure the movement is smooth and reliable. Meanwhile, Kit the fox is designing a clever greeting card that uses a simple sliding mechanism to reveal a hidden message when a tab is pulled.

Word bank: pivot · fulcrum · cam · follower · linkage · load · effort · rotary · linear · mechanism

1. Max is using a lever to lift a heavy wooden block. Define what a 'fulcrum' is and explain its role in a lever mechanism. (2 marks)

2. Identify the type of motion produced by a cam and follower mechanism (e.g., changing rotary motion to linear motion). (2 marks)

3. Kit needs to buy materials for his card. He buys 3 packs of card at £1.50 each and 2 rolls of tape at £0.75 each. How much does he spend in total? Show your working. (3 marks)

4. Explain why a cam must be shaped in a specific way to create a smooth, rhythmic movement for a toy. (3 marks)

5. Compare a linkage mechanism to a pulley system. How does each system transfer movement differently? (4 marks)

6. If a mechanism is not working correctly, describe two steps you would take to test and evaluate the design to find the fault. (4 marks)

7. Design Task: Imagine you are helping Max build his 'Leaping Lion' toy. Describe your design for a cam-based mechanism. Explain what shape your cam would be, how the follower would move, and what materials you would use to ensure the mechanism is sturdy and long-lasting. (5 marks)

Draw: In the space below, draw a labelled diagram of a simple lever. Clearly label the 'effort', 'load', and 'fulcrum'.



Extension challenge: Total: /25