Design Technology Assessment: Levers and Pulleys

Learning objective: To demonstrate an understanding of mechanical systems by identifying, explaining, and applying the principles of levers and pulleys.

Read each question carefully. Use your knowledge of forces and mechanical advantage to provide clear, scientific answers. Ensure you use the correct technical vocabulary.

Max the monkey is building a vegetable garden. He needs to lift heavy baskets of carrots to the top of his treehouse. He is experimenting with different tools to make the work easier. Pip the caterpillar is helping him by recording how much force is needed for each attempt.

Word bank: fulcrum · load · effort · mechanical advantage · pivot · fixed pulley · movable pulley · resistance

1. Define the term 'fulcrum' in relation to a lever. How does its position affect the amount of effort required to lift a load? (3 marks)

2. Max is using a long wooden plank as a lever to lift a heavy crate. Label the three main components of this lever system: the Load, the Effort, and the Fulcrum. (3 marks)

3. Explain the difference between a fixed pulley and a movable pulley. Which one changes the direction of the force applied? (4 marks)

4. If Max wants to lift a load that costs £5.00 in total weight (in a theoretical model), how does using a pulley system help him spend less 'energy' or force to move it? (3 marks)

5. Identify one real-life example of a lever you might find in a kitchen and describe how it functions using the terms 'load' and 'effort'. (3 marks)

6. Extended Writing Task: Max needs to design a system to lift his £12.00 basket of produce to his treehouse. Design a system using either a lever or a pulley. Explain why you chose your specific system, how it makes the task easier, and where you would place the pivot or the wheel to gain the most mechanical advantage. (9 marks)

Draw: In the space below, draw a simple diagram of a first-class lever. Clearly label the fulcrum, the load, and the position where the effort is applied.

Extension challenge: Total: /25