

Max's Mechanical Engineering Log: Levers and Pulleys

Learning objective: To investigate, design, and evaluate the function of mechanical systems using levers and pulleys to move or lift loads.

Max the monkey has been busy building prototypes to help his friends move heavy objects! Use this log to plan your own mechanical invention. Follow the steps to design your mechanism, consider the forces involved, and evaluate how it functions. Ensure you use precise terminology and justify your design choices.

Word bank: pivot · fulcrum · load · effort · mechanical advantage · pulley · force · tension · resistance · mechanism

1. Design Brief: Describe the problem your mechanism is trying to solve. What load are you trying to move, and why is a lever or pulley system the best solution? (3 marks)

2. Mechanism Selection: Will you use a lever or a pulley? Justify your choice by explaining how your chosen system will reduce the amount of effort required to move the load. (4 marks)

3. Component Analysis: Identify the key parts of your design. If using a lever, where will you place the fulcrum? If using a pulley, how will you arrange the rope to gain a mechanical advantage? (3 marks)

4. Predictive Testing: What might happen if you moved the fulcrum closer to the load? Explain the impact this would have on the effort required to lift the object. (4 marks)

5. Evaluation: After testing your prototype, compare your results to your initial prediction. Was the mechanism effective? If you could refine your design, what changes would you make and why? (5 marks)

6. Creative Extension: Imagine your mechanism is part of a larger construction project. If you were commissioned to build this on a larger scale for a cost of £500, how would you ensure the materials remain sturdy under heavy pressure? (6 marks)

Extension challenge: Challenge: Investigate the 'Law of the Lever'. Research how the distance of the effort from the fulcrum affects the force. Create a labelled diagram showing two different pulley systems and compare and contrast their efficiency in lifting a 1kg weight.