

Max's Mechanical Masterpiece: Levers and Pulleys Investigation

Learning objective: To investigate, design, and evaluate how levers and pulleys can be used to lift objects with greater ease.

Max the monkey is obsessed with moving heavy tropical fruits to his treehouse. Use this investigation template to plan your own simple machine. First, identify the components of your mechanism, then describe how your design helps to lift a load. Finally, reflect on your success and suggest improvements for a more efficient system.

Word bank: pivot · fulcrum · load · effort · mechanism · friction · pulley · lever · tension · force

1. The Design Challenge: Describe the object you are trying to lift and explain why a lever or pulley system is necessary to help move it. (2 marks)

2. Identifying Components: If you are building a lever, label your fulcrum and the point of effort. If building a pulley, describe how your string and wheel arrangement will work. (3 marks)

3. Predicting Outcomes: Explain why moving the fulcrum closer to the load might make it easier to lift. Use your knowledge of forces to justify your answer. (3 marks)

4. Evaluating Performance: Compare and contrast the effort required to lift your load with your machine versus lifting it by hand. Was your design effective? (3 marks)

5. Troubleshooting: What might happen if the string on your pulley was too loose or the lever arm was too flexible? How would you resolve these issues? (2 marks)

6. Refined Design: If you had an unlimited budget of £50 to improve your materials, which parts would you upgrade and why? Justify your choices. (2 marks)

Draw: Draw a labelled diagram of your completed lever or pulley system. Include arrows to show the direction of the force (effort) and the direction the load moves.



Extension challenge: Imagine you are designing a complex machine for a construction site. How could you combine a lever and a pulley system together to create a compound machine? Write a paragraph explaining the sequence of movements required to lift a load from the ground to a high platform.