

Design Technology Assessment: Levers and Pulleys

Learning objective: To evaluate understanding of mechanical systems, including the function of fulcrums, loads, efforts, and the mechanical advantage of pulleys.

Read each question carefully. Use your knowledge of mechanical systems to explain how forces move objects. Write your answers clearly in the spaces provided.

Max the monkey is building a machine in the forest to lift heavy baskets of fruit. He has been experimenting with different levers and pulley systems to see which requires the least amount of effort to lift the heaviest loads. Meanwhile, Kit the fox is analysing how the position of the pivot affects the balance of the lever.

Word bank: Fulcrum · Load · Effort · Pivot · Mechanical advantage · Resistance · Pulley · Force

1. In a lever system, what is the specific name for the point on which the lever rests or turns? (1 mark)

2. Explain the difference between the 'load' and the 'effort' in a mechanical system. (2 marks)

3. Max is using a lever to lift a heavy stone. If he moves the fulcrum closer to the load, does he need to use more or less force to lift it? Justify your answer. (3 marks)

4. Describe how a single fixed pulley system helps a person lift an object. Does it reduce the weight of the object, or simply change the direction of the force? (3 marks)

5. Compare and contrast a Class 1 lever (like a seesaw) and a pulley system. What are the advantages of using each in a construction project? (4 marks)

6. Kit has designed a pulley system that uses two wheels instead of one. Explain why adding a second wheel might provide a mechanical advantage. (3 marks)

7. Design Task: Max needs to lift a basket weighing 5kg to a high tree branch. Describe a system (using either levers or pulleys) that would make this task easier for him. Explain the placement of your components and why your design is effective. (5 marks)

8. What might happen if the rope in a pulley system were replaced with a material that stretches, such as elastic? Explain the impact on the efficiency of the lift. (4 marks)

Draw: Draw a labelled diagram of a Class 1 lever. Clearly label the position of the effort, the load, and the fulcrum.



Extension challenge: Total: /25. Extension Task: Imagine you are tasked with building a bridge. Research and explain how engineers use the principles of levers and pulleys to construct massive structures. If you could improve a common playground swing using these principles, what changes would you make to ensure it is easier to move?