

# Mechanical Marvels: Levers and Pulleys with Max and Kit

*Learning objective: To understand how levers and pulleys function as simple machines to help move or lift heavy objects with less effort.*

Use your knowledge of mechanics to solve these problems. Read each question carefully and think about how effort, load, and the pivot point work together.

Max the monkey is designing a system to lift heavy fruit baskets up to his treehouse, while Kit the fox is experimenting with levers to move large rocks in the garden. They need your help to refine their designs using the principles of simple machines.

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

**1. Max is using a single pulley to lift a basket of apples weighing 5kg. Explain why adding a second pulley to his system might make the task feel easier, even though the weight of the apples remains the same. (2 marks)**

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**2. Kit is using a long wooden plank as a lever to move a heavy stone. If the stone (the load) is very close to the pivot, what happens to the amount of effort Kit needs to push down on the other end of the plank? (2 marks)**

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**3. Define the term 'fulcrum' in the context of a lever. How does the position of the fulcrum change the efficiency of the lever? (2 marks)**

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**4. Compare and contrast a pulley system and a lever. How do they both help us achieve the same goal of moving heavy objects? (3 marks)**

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**5. Max finds that his rope is stretching and snapping under the tension of the heavy baskets. Justify why he should choose a different material for his pulley system. (2 marks)**

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**6. What might happen if the fulcrum on a seesaw (a type of lever) was moved directly to the end of the board instead of the middle? Explain your reasoning. (2 marks)**

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**Draw: Draw a diagram of a lever being used to lift a heavy box. Clearly label the 'load', the 'effort', and the 'fulcrum'. Use arrows to show the direction of the force.**



*Extension challenge: Design a 'Super-Lifter' machine that combines both a lever and a pulley system. Write a short paragraph explaining how your machine would help a farmer lift a crate of vegetables worth £15 onto a high shelf. Evaluate the limitations of your design: what materials would be most durable, and why?*