

Max's Mechanical Workshop: Levers and Pulleys

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

Max the monkey is designing a treehouse lift! Help him by completing the 'Mechanical Analysis' tasks. For the first section, decide if each mechanism is a 'Lever' or a 'Pulley'. Then, use your knowledge of physics to explain how these tools make work easier. Finally, use the drawing prompt to design your own invention.

Word bank: Fulcrum · Load · Effort · Pulley · Lever · Gravity · Pivot · Force

1. 1. Max uses a sturdy wooden plank over a stone to lift a heavy crate of bananas. Identify this mechanism and label the point where the plank rests on the stone as the _____. (2 marks)

2. 2. Explain why using a longer lever arm makes it easier to lift a heavy object. Justify your answer using the concept of 'effort'. (3 marks)

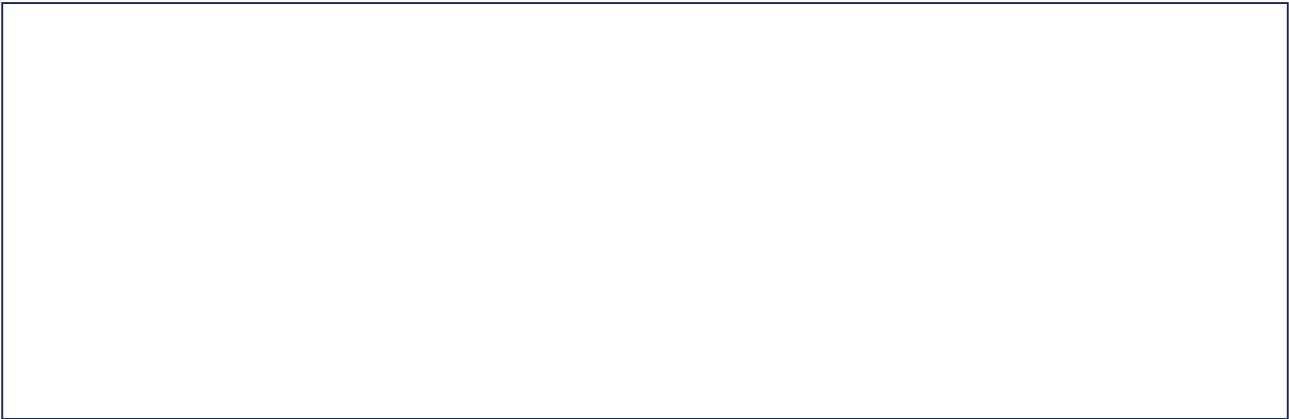
3. 3. Compare and contrast: How is a pulley different from a lever in the way it changes the direction of a force? (3 marks)

4. 4. What might happen if the pivot point (fulcrum) of a lever was placed very close to the load instead of the middle? Explain your reasoning. (3 marks)

5. 5. Max wants to lift a bucket of nuts weighing £5.00 worth of weight to his high branch. If he uses a single fixed pulley, describe how the direction of his 'effort' changes compared to lifting the bucket straight up by hand. (2 marks)

6. 6. Design Challenge: If you were building a bridge to cross a stream, would you choose a pulley system or a lever system to move heavy rocks into place? Explain why. (3 marks)

Draw: Draw a diagram of a pulley system attached to a tree branch. Label the 'Load' (the bucket of nuts), the 'Effort' (the rope being pulled down), and the 'Wheel' (the pulley).



Extension challenge: Research a real-life example of a lever used in a kitchen (such as a pair of nutcrackers or scissors). Create a labelled technical drawing of it, identifying the load, the effort, and the pivot point. Can you calculate the mechanical advantage if you moved your hand further away from the pivot?