

Max's Mechanical Workshop: The Power of Levers and Pulleys

Learning objective: To understand how levers and pulleys function as simple machines to increase force or change the direction of a pull.

Max the monkey is designing a series of pulley and lever systems to help his friends move heavy items around the forest. Look at the scenarios provided in the questions below. For each one, decide if the mechanism is a Lever or a Pulley, and explain the mechanical advantage it provides. Use the word bank to help you construct your answers.

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

1. Max needs to lift a heavy crate of bananas. He uses a long wooden plank resting on a rock to lift it. Identify the machine type. Explain why moving the rock (the fulcrum) closer to the crate makes the crate easier to lift. (3 marks)

2. Ellie the elephant needs to hoist a heavy bundle of books to her treehouse. She uses a single fixed pulley system. Describe how the pulley changes the direction of the force needed to lift the load. (2 marks)

3. Compare and contrast a first-class lever (like a seesaw) and a fixed pulley. How do they both help us perform tasks that would be difficult without them? (3 marks)

4. If Max uses a pulley system with multiple wheels (a block and tackle), explain why he needs to pull more rope to lift the load to the same height. (2 marks)

5. Justify your answer: If you were tasked with moving a giant boulder, would you choose a lever or a pulley? Explain the scientific reasoning behind your choice. (3 marks)

6. What might happen if the rope in a pulley system is not strong enough to withstand the tension? How does this relate to the concept of safety in design technology? (2 marks)

Draw: Draw a diagram of a lever system that Max could use to lift a heavy basket of fruit. Clearly label the 'Fulcrum', 'Load', and 'Effort'.



Extension challenge: Design a 'Simple Machine' contraption that combines both a lever and a pulley to help Kit the fox move his computer equipment up a hill. Write a paragraph explaining the sequence of movements and why your design is more efficient than using human strength alone.