# The Prototype Project: Engineering with Kit the Fox

*Learning objective: To understand the iterative design process by justifying the use of low-fidelity prototypes in product development.*

Kit the Fox is designing an innovative, eco-friendly school bag. He has created a 'low-fidelity prototype' using cardboard, string, and tape before using expensive materials. Review the stages of Kit's design process below and use your engineering knowledge to complete the analysis.

*Word bank: Iterative · Functionality · Ergonomics · Modification · Aesthetics · Feasibility*

**1. Kit decides to use cardboard instead of high-quality fabric for his first model. Explain why this 'low-fidelity' approach is a more efficient use of resources for a designer. (2 marks)**

**2. If a user finds the bag strap uncomfortable during testing, which term from the word bank describes the necessary change to the design? Justify your choice. (2 marks)**

**3. Compare and contrast the importance of 'aesthetics' versus 'functionality' when prototyping a product for the first time. Which should take priority? (3 marks)**

**4. What might happen if a designer skips the prototyping stage and goes straight to manufacturing using expensive final materials? (2 marks)**

**5. Kit's prototype costs £2.50 in cardboard and tape. The final bag will cost £25.00 to produce. Calculate the percentage of the budget saved by avoiding one failed final-material prototype. (2 marks)**

**6. Justify your answer: Is a prototype that fails during testing considered a 'bad' design, or a 'successful' step in the design process? (2 marks)**

**Draw: Sketch a labelled diagram of an improvement you would make to Kit's cardboard prototype to make it more ergonomic for a Year 5 student carrying heavy textbooks.**

*Extension challenge: Imagine you are pitching Kit's bag to a group of investors. Write a persuasive paragraph explaining how the 'iterative' nature of your design process ensures the final product will be both durable and high-quality.*