

Grade 4 Design Technology: Structural Integrity Assessment

Learning objective: To understand, identify, and apply knowledge of forces and structural stability in design.

Read each question carefully. Use the word bank to help you with technical vocabulary. Max and Kit are counting on you to show your knowledge of how structures stay strong!

Max the monkey is building a new treetop viewing platform for the BookFlik friends to watch the stars. Kit the fox is helping him design a frame that can support the weight of the platform without collapsing. They need to ensure the structure can withstand different forces, such as the weight of the friends standing on it and the pressure of strong winds.

Word bank: Compression · Tension · Strut · Tie · Triangulation · Stability · Reinforcement · Load

1. Define the term 'compression' and give one example of where you might see this force acting on a bridge. (2 marks)

2. Explain why 'triangulation' is used in the construction of roofs and towers. Why are triangles stronger than squares in a frame? (3 marks)

3. Max wants to use a 'tie' to hold two beams together. How does a tie differ from a strut in terms of the force it resists? (2 marks)

4. If Max and his friends spend £45.50 on wood and £12.75 on metal brackets, what is the total cost of the materials? Show your working. (3 marks)

5. Identify two potential 'loads' that might affect the stability of the treetop platform and explain how a designer could prepare for them. (4 marks)

6. Kit suggests adding 'reinforcement' to the base of the structure. Describe what reinforcement is and how adding it would improve the structural integrity of a tall building. (3 marks)

7. Extended Task: You have been asked to help Max and Kit design a bridge to cross a small stream. Write a paragraph explaining your design choices. You must include how you will use shapes, materials, and specific structural features to ensure the bridge is stable, safe, and cost-effective. (5 marks)

Draw: In the space below, draw a simple frame structure. Label one 'strut' and one 'tie'. Use a triangle in your design to show how you have used triangulation for stability.



Extension challenge: Total: /25. Challenge: Research the 'Forth Bridge' in Scotland. How do the designers use cantilever structures to support weight? Write one sentence explaining this.