

Design Technology Assessment: Strong and Stable Structures

Learning objective: To evaluate understanding of structural design, materials, and reinforcement techniques for stability and strength.

Read each question carefully. Use your knowledge of structures, shapes, and materials to answer. Max, our math-loving monkey, suggests you check your measurements twice!

Max the monkey is helping his friends build a new observation tower in the forest so Nova can watch the stars. They need to make sure the structure is strong enough to hold weight and stable enough not to wobble when the wind blows.

Word bank: triangulation · stability · reinforcement · compression · tension · strut · base · rigid

1. Max wants to use triangles in his tower design. Explain why adding triangles to a structure makes it more rigid. (2 marks)

2. Identify two different materials that would be suitable for building a model tower and explain why each material is a good choice. (4 marks)

3. What is meant by the term 'stability'? How does a wide base help a tall structure stay upright? (3 marks)

4. If a structure starts to bend under a heavy load, what is one way you could reinforce it to make it stronger? (2 marks)

5. Max is planning to buy wooden dowels for the frame. Each dowel costs £0.45. If he buys 10 dowels, how much will he spend in total? Show your calculation. (2 marks)

6. Explain the difference between a shell structure and a frame structure. Give one example of each that you might find in a park. (4 marks)

7. Design a bridge to span a small stream for Pip the caterpillar. In your response, explain which materials you would choose, how you would ensure the bridge is stable, and how you would test its strength to ensure it is safe for the forest animals to cross. (5 marks)

Draw: In the space provided below, sketch a design for a strong tower. Label at least three features you have included to ensure it is stable and strong (e.g., struts, wide base, cross-bracing).



Extension challenge: Total: /25. Think about the environment: If you were building this tower in a place with very strong winds, what changes would you make to your design to ensure it does not fall over?