Max’s Structural Engineering Challenge

Learning objective: To understand how to strengthen structures using shapes, materials, and reinforcement techniques to improve stability.

Read each question carefully and use your knowledge of structures to provide detailed answers. Think about how Max the monkey might use geometry to build a stable treehouse!

N/A

Word bank: triangulation · compression · tension · stability · struts · reinforcement · load-bearing

1. Max is building a wooden frame for a new shelter. He notices the square frame wobbles. Explain why adding a diagonal brace (creating a triangle) helps to improve the stability of the structure. (2 marks)

2. Define the term 'load-bearing' in your own words and provide one example of a load-bearing part of a bridge. (2 marks)

3. If Max wants to build a tower that is 2 metres tall, why is it important for the base of the structure to be wider than the top? (2 marks)

4. Compare the strength of a cylinder to a cube. Which shape is generally better at supporting weight from above, and why? (2 marks)

5. You are given £10 to spend on materials for a model bridge. If wood costs £3 and cardboard costs £1, explain how you would use your budget to ensure the bridge is both cost-effective and strong. (2 marks)

Draw: Draw a diagram of a bridge design that uses at least three different structural reinforcements. Label your drawing with the materials you have used (e.g., card, tape, string).

Extension challenge: Research the 'Eiffel Tower' or a local bridge in your town. Write a short paragraph explaining how the architect used triangulation to prevent the structure from collapsing under its own weight.