

Max's Structural Design Challenge

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

Read each question carefully and use your knowledge of structures to explain your reasoning. Think like an engineer to solve these design problems.

Word bank: triangulation · reinforcement · compression · tension · struts · stability · rigid

1. Max is building a bridge for his toy cars using cardboard. He notices his first design wobbles when a car drives across. Explain why adding triangular shapes (triangulation) would make his bridge more stable. (2 marks)

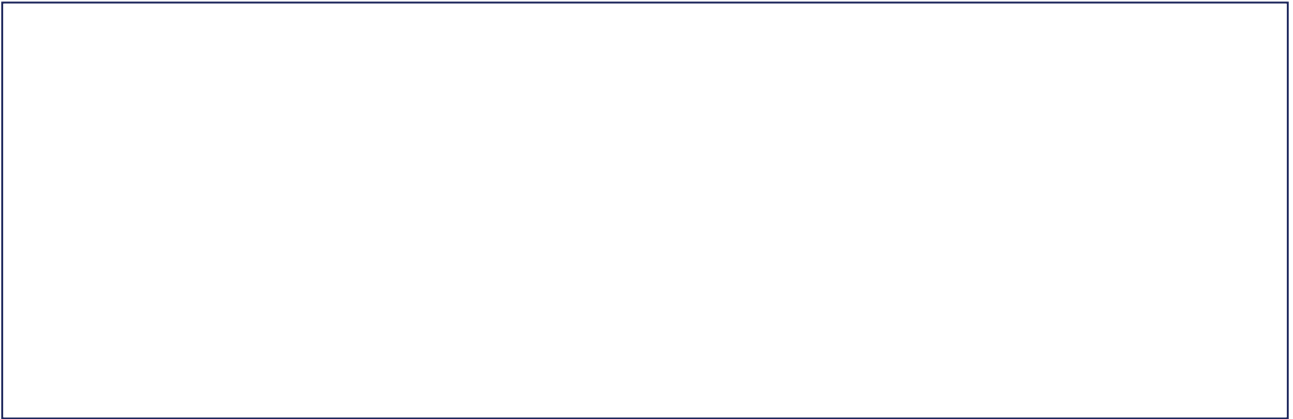
2. If you were building a tall tower out of drinking straws, why might you add 'struts' at an angle between the vertical pillars? (2 marks)

3. Identify two different materials that are strong under compression (being squashed) and explain why they are good for building foundations. (2 marks)

4. Max wants to buy some wooden dowels for a project. If each dowel costs 45p and he needs 6 of them, what is the total cost? Show your working out. (2 marks)

5. Compare a square frame and a triangle frame. Why does the square frame change shape when pushed, while the triangle frame stays rigid? (2 marks)

Draw: Draw a design for a shelter that could protect Max from the rain. Label your drawing to show where you have used reinforcement to make the roof structure strong.



Extension challenge: Research a famous landmark in the UK, such as the Forth Bridge or the London Eye. Write three sentences explaining how the architects used specific shapes to keep these structures from collapsing.