Engineering Marvels: Designing Stable Structures

Learning objective: To understand how to improve the structural integrity of a building by incorporating features that provide strength, stiffness, and stability.

Use your knowledge of structural engineering to design a community centre. Ensure your design incorporates at least three reinforcing features from the word bank to make the structure stable and capable of withstanding external forces.

Draw: Create a detailed technical sketch of a community centre building. Use a 'cut-away' style to show the internal skeleton of the building. Include visible triangular trusses in the roof, sturdy columns supporting the weight, and cross-bracing on the walls. Use a ruler for straight lines and add arrows to indicate where weight is being pushed down into the ground.

Label words: Truss · Foundation · Bracing · Beam · Column · Arch · Tension · Compression · Stability

Steps:

1. Label your drawing to show where the 'compression' forces are acting on your columns.
2. Explain why adding diagonal 'bracing' prevents the structure from distorting or collapsing under a heavy load.
3. Compare and contrast the function of a foundation with the function of a roof beam in your design.

4. Justify your choice of material for the main support columns. Why would this material be more effective than a flexible one?

5. What might happen to your structure if you removed all the diagonal bracing during a strong windstorm?

6. If the building cost £50,000 to construct, and the steel beams cost £12,500, calculate the percentage of the budget spent on steel.