



Why Some Structures Are Stronger Than Others

KS2 DESIGN & TECHNOLOGY

KS3 SCIENCE

Ages 9-13



3 min read

What Makes a Structure Strong?

Have you ever wondered why a **bridge** doesn't collapse when thousands of cars drive across it, or why the **Eiffel Tower** can stand against strong winds? The answer lies in how structures are **designed**, what they're made from, and how they distribute **forces** like weight and pressure.

Strength isn't just about using hard materials. A structure needs to handle the **loads** (weights and forces) put on it without bending, breaking, or falling down. Engineers think carefully about shape, material choice, and how forces travel through a structure.

The Shape of Strength

The **shape** of a structure is incredibly important. Some shapes are naturally stronger than others because they spread forces more evenly.

Think of it like this: if you try to squash an empty tin can from the top, it collapses easily. But if you fill it with sand, it becomes much stronger because the material inside helps support the pressure. Structures work the same way—a hollow tower needs clever design, but a solid triangular frame distributes weight brilliantly.

Triangles are one of the strongest shapes in engineering. When force pushes on a triangle, it spreads that force to all three sides, making it very hard to collapse. That's why you see triangular supports in roof trusses, bridges, and towers.

Materials Matter

Different **materials** have different strengths. **Steel** is very strong and flexible, so it's perfect for tall buildings and bridges. **Concrete** is hard but can crack under certain pressures, so engineers often combine it with steel reinforcement. **Wood** is strong relative to its weight, which makes it excellent for many structures.

Think of it like choosing clothes: a thin silk shirt tears easily, a cotton t-shirt is tougher, and a leather jacket is strongest. Each material has the right job.

How Forces Travel

Every structure must safely carry **loads** to the ground. Engineers design structures so that weight travels down through the strongest parts. Wide foundations, deep footings, and strategic supports all help **distribute** forces evenly, preventing weak spots from failing.

Understanding why some structures are stronger helps engineers build safer buildings, bridges, and tunnels that protect us every day.