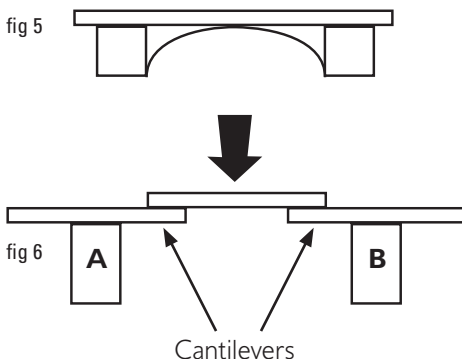
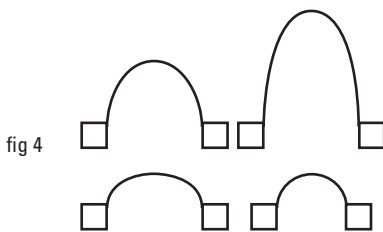
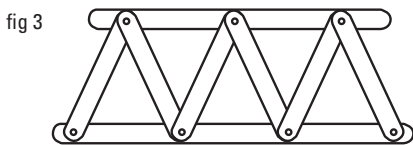
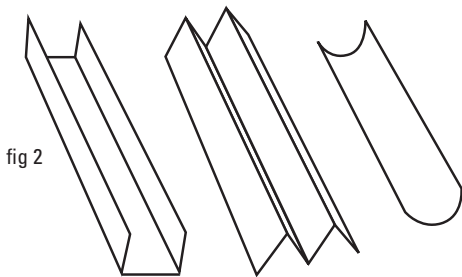
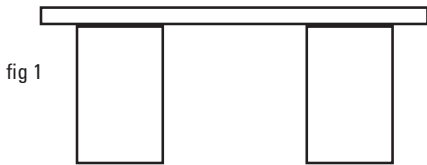


# Teachers' notes

## Bridging the gap

Explore different techniques for creating stable structures with these fun bridge-building activities



### Getting started

Use videos, books, posters, photographs and pictures to show children the most common types of bridges, especially beam, arch and cantilever. Consider each example of a bridge in its context and environment.

- What materials have been used to build it?
- How have these materials been used?
- What does the bridge span?
- Who and what would need to use the bridge?

### Beam bridges

Start with a simple beam bridge across two pillars (fig 1). Fold lengths of card to make different shaped girders for the beam (fig 2). Test their strength with coins and small weights. Does folding and bending the girders make them stronger? Does the width of the beam make a difference to the strength? Make the test fair by using the same length and type of card and the same gap between the pillars each time.

### Trusses

Many of Brunel's beam bridges are supported by metal trusses on each side (fig 3). What shape are the trusses? These can be made from pipe-cleaners, straws or strips of card joined with paper fasteners. How many different ways are there for putting the shapes together?

### Arches

Try some arch designs (fig 4). Test different spans with weights. How does changing the span alter the strength of the arch? What happens if the span is kept constant but the height of the arch is varied? Does using an arch and a beam together make a stronger bridge? (fig 5)

### Cantilevers

Investigate cantilever bridges. These are most commonly seen on motorways today. They have a long beam that rests on a pier, each end called 'cantilevers'. Each cantilever acts, in effect, like a strong shelf bracket. If the same loads are put at A and B, what is the greatest load that can be put at the centre? (fig 6). Children should find that as the central load is increased, so the loads at A and B also need to be increased. Test to find the best viable length of the central span while keeping the length of the side pieces constant. Then vary the length of the side pieces while the length of the central span remains unchanged.

