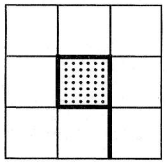
# IDEA 82

## AN ALTERNATIVE 'NET' OF A CUBE

Sometimes I want to provide a class with a 'closed' puzzle designed to grab interest and give them something to think about. The following is one such problem and is no more than a one-off type idea.

1 Divide a square piece of card equally into nine small squares arranged in a 3-by-3 square.
2 Cut through from any one of the lines that go from the edge towards the middle.
3 Continue the cut made in 2) and cut out the centre square.
4 Throw this centre square away.
5 You now have a shape with eight squares in a 'ring' separated by one cut.
6 Score all the remaining seven joins between the eight remaining squares.



The challenge is to form a cube by folding up the eight squares.

There is more than one solution.

A more complex task is for students to explain verbally or diagrammatically how the problem can be solved. To record different solutions students might code all the squares on one side as 1, 2, . . . 8 and all the squares on the other side as A, B, . . . H.

Asking students to explain to someone at home how the puzzle can be solved would be a worthy challenge and a useful homework task.



# IDEA 83

## CUBE DISSECTION 1

This idea is to dissect a cube into four congruent equilateral triangular-based pyramids and a tetrahedron.

To follow the instructions it may be useful to have a cube placed in front of you with the eight corners labelled 1 (top left-hand corner), 2, 3 and 4 moving anti-clockwise around the top face, then 5, 6, 7, 8 moving anti-clockwise around the bottom face. This means corner 1 is above corner 5, corner 2 is above corner 6, etc.

The apexes of the four pyramids are going to be four of the eight corners of the cube, for example corners 1, 3, 6 and 8.

Each pyramid is similarly constructed. As an example, the pyramid whose apex is at corner 1 is formed as follows: draw a line, diagonally from corner 4 to 2 and from 2 to 5 (and then back to corner 4). These three lines sketch out an equilateral triangle and form the base of one of the pyramids.

The idea is for students to construct four such pyramids and one tetrahedron so the bases of the (four) pyramids become the four faces of the tetrahedron.

The pyramids and the tetrahedron can now be put together to form a cube.

Two other cube dissections are described in *Getting the Buggers to Add Up* (Continuum, 2004, pp. 29–30).