IDEA 51

A CLOSED PROBLEM TO INVOKE 'STUCKNESS'

Teaching students that *stuckness* is a state we all get into at times, and it should not be seen as a failure or shortcoming but instead as a positive state, is very important (Mason, Burton and Stacey, *Thinking Mathematically*, 1984). This is particularly the case if we are able to recognize our state of stuckness and look for alternative ways of working to become unstuck.

The following problem is one I have used to actively cause stuckness, which I tell students at the outset to encourage them to think of ways of getting unstuck rather than feeling there is no solution and, therefore, giving in.

The problem statement is:

'Dissect an obtuse-angled isosceles triangle into a finite number of acute-angled triangles using straight lines only.'
(Ascertaining that a 90° is neither acute nor obtuse is likely to be important information.)

There is no 'trickery' involved and the number of acute-angled triangles is finite and there is a rather neat geometrical solution.

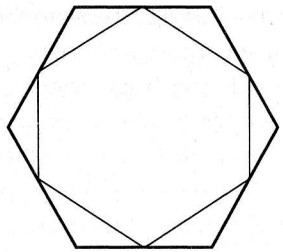
IDEA 52

SHAPES IN SHAPES

This problem becomes very difficult very quickly and is, therefore, appropriate for higher attaining students in KS4 or for use in a KS5 classroom.

The problem is easy to pose yet not easy to solve and goes as follows:

- Draw a regular polygon.
- Mark the mid-point of each edge.
- Join adjacent pairs of points together to form a smaller regular polygon inside the original.



The problem is to find the area of the smaller polygon as a function of the area of the larger polygon.

With an equilateral triangle, the inner triangle will be ¼ of the area of the original. With a square, the inner square will be ½ the area of the original . . . with a pentagon . . .