Sep 2001
Regulars

Puzzle page

Similar triangle puzzle

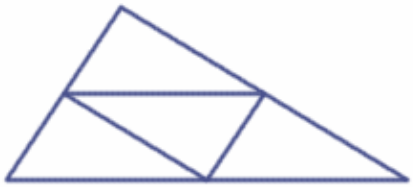
Here is a puzzle which in some ways is similar to last issue's mystery mix, though the solution is much simpler. In fact, you might want to have a look at that article first, to check that you understand the idea of "colouring the plane".

Suppose I colour every point on the plane with one of two colours, red and green, say, and I also give you a triangle. Then can you find a triangle in the plane, *similar* to the given triangle, whose 3 vertices are all the same colour? (Remember that similar triangles are the same shape, but not necessarily the same size.)

Can you prove that there is always a similar triangle with this property (or else find a counterexample, of course)?

Here is an elementary but useful piece of geometry that might help. Suppose you have a triangle:

You find the midpoints of all the edges, and join them up like this:



This divides the triangle into four smaller triangles, all of which are similar to the original triangle.

With this in mind, can you solve the puzzle? It's still fairly difficult, so there's a further hint in case you need it.

You can send your solution by e−mail to <plus@maths.cam.ac.uk>.

For some challenging mathematical puzzles, see the NRICH puzzles from this month or last month.

Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the NRICH and MOTIVATE sites.