

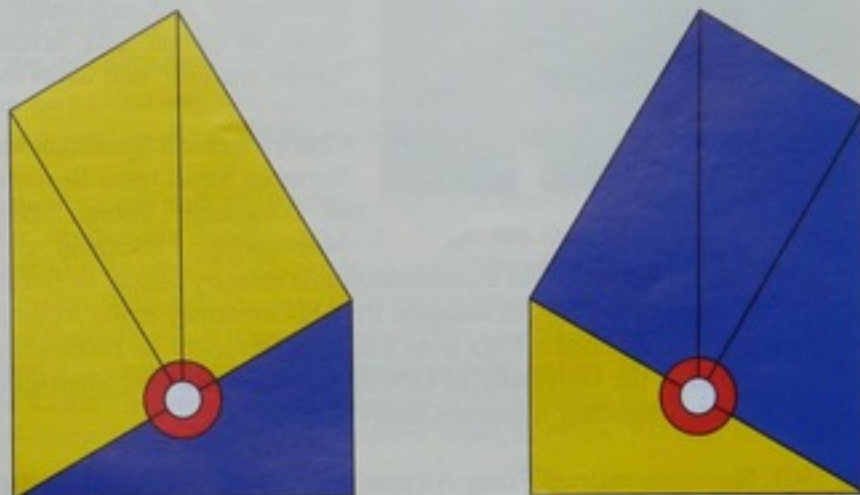
9 SET SQUARES AND A CIRCLE

There are two set squares in the standard geometry set. The right-angled isosceles is the basis of the most famous dissection set, the tangram, but the $30^\circ - 60^\circ - 90^\circ$ triangle has properties which allow it just as many disguises. If you make and try the following puzzle you should discover most of them.

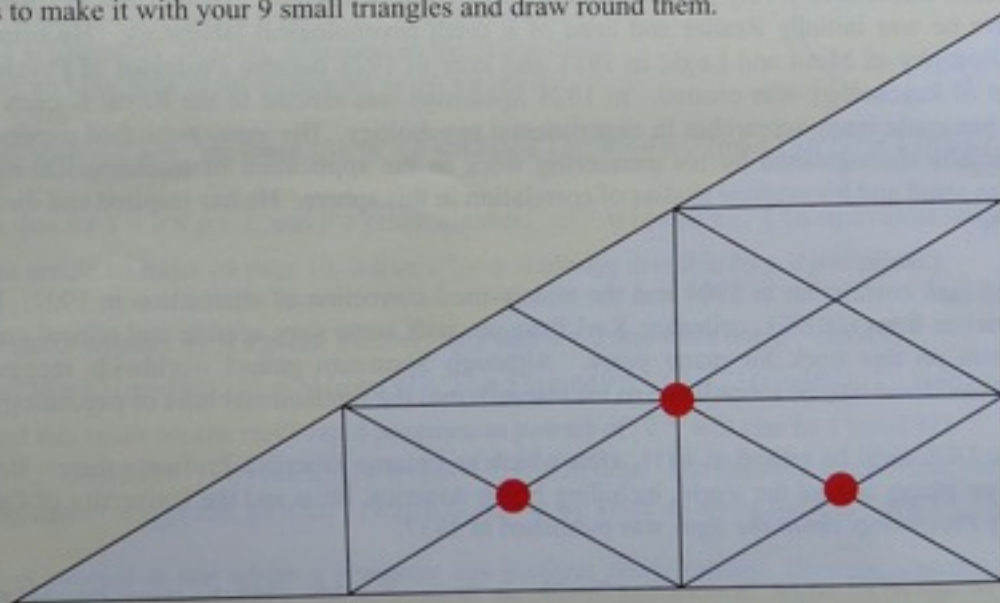
- Using your set square as a template, cut out 9 triangles in blue card and 9 in yellow.
- Stick a blue to a yellow so that you have a double thickness triangle whose faces are colour-coded for orientation. Be consistent: set the yellow triangle with the 30° vertex to the left, the 90° vertex to the right and the 60° vertex away from you and stick a blue triangle on top.

- Arrange 4 pieces like this, draw a red circle where shown and cut a small hole at the centre.

Then turn the assembly over and draw an identical red circle in the corresponding position on the other side.



- Take a sheet of white A3 card or paper and draw in black your triangle scaled $\times 3$. The simplest way to do this is to make it with your 9 small triangles and draw round them.



The challenge is to arrange your 9 small triangles within the large one so that the red circles you have drawn are complete. You should find centres in the positions marked with the red dots.

And here's a second challenge. Ignoring the 'make-a-circle' condition, you can fill the big triangle in many ways using the triangles, some blue-up, some yellow-up. You should be able to find arrangements corresponding to these (blue, yellow) colour mixtures: (9, 0), *, (7, 2), (6, 3), (5, 4), (4, 5), (3, 6), *, *, *. Can you explain the gaps?

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