

Tuesday and Wednesday Maths 3 Star

This is a Maths investigation which can be found at <https://nrich.maths.org/32>

Aunt Jane had been to a jumble sale and bought a whole lot of cups and saucers - she's having many visitors these days and felt that she needed some more. You are staying with her and when she arrives home you help her to unpack the cups and saucers.

There are four sets: a set of white, a set of red, a set of blue and a set of green. In each set there are four cups and four saucers. So there are sixteen cups and sixteen saucers altogether.

Just for the fun of it, you decide to mix them around a bit so that there are sixteen different-looking cup/saucer combinations laid out on the table in a very long line.

So, for example:

- a) there is a red cup on a green saucer but not another the same, although there is a green cup on a red saucer;
- b) there is a red cup on a red saucer but that's the only one like it.

There are these sixteen different cup/saucer combinations on the table and you think about arranging them in a big square. Because there are sixteen, you realise that there are going to be four rows with four in each row (or if you like, four rows and four columns).

x	x	x	x
x	x	x	x
x	x	x	x
x	x	x	x

So here is the challenge to start off this investigation:

Place these sixteen different combinations of cup/saucer in this four by four arrangement with the following rules:-

- 1) In any row there must only be one cup of each colour;
- 2) In any row there must only be one saucer of each colour;
- 3) In any column there must only be one cup of each colour;
- 4) In any column there must be only one saucer of each colour.

Remember that these sixteen cup/saucers are all different so, for example, you CANNOT have a red cup on a green saucer somewhere and another red cup on a green saucer somewhere else.

There are a lot of different ways of approaching this challenge.

Some ideas for presenting your working out are below:

- You can complete this practically with say Lego (2 sizes in 4 different colours to represent each cup and saucer - remember to have 16 pieces altogether.)
- You can use colouring pencils to represent the colours and say C for cup and S for saucer.
- Split your page into 4 columns and 4 rows so you have the 16 squares. This will help you work out all the possibilities.

When you think you have completed it, check it through very carefully.

