Latin squares (also known as "magic colour squares")

The puzzles:

Make a square grid of *n* x *n* boxes (for example, 3x3, 4x4, or 5x5).
You'll need *n* different colours of pieces and *n* of each colour: to start with, try 3 different colours with 3 of each colour. Then try 4 different colours, with 4 of each.

level 1 (K/1): Arrange the pieces so that each row is all one colour, or each column is.

level 2 : Arrange the pieces so that each colour turns up <u>once only</u> in each row and in each column. *We want four colours in each row and in each column.*

level 3 : Arrange the pieces so that each colour turns up once only in each row, each column, <u>and</u> on the two main diagonals. (not always possible – see below)

level 4: As for level 3, but also once only on <u>all</u> diagonals!   (not always possible)

You can use shapes instead of colours. If you use numbers instead of colours and don't worry about diagonals, you get Sudoku.

Which ones work? We can <u>always</u> get the rows and columns.

3x3   It is <u>not</u> possible to get the diagonals to work.
4x4   It is possible to get the two main diagonals but not the other diagonals.
5x5   It is possible to get <u>all</u> diagonals to work.
6x6   It is <u>not</u> possible to get all the diagonals to work.

In general, complete magic colour squares (ie with diagonals) are possible only when the order (n) is not divisible by 2 or 3. Look at a completed square: same-coloured pieces are a knight's move apart.

An example of a solution
to the 4x4 Latin square puzzle
(not worrying about diagonals):

R	B	Y	G
B	R	G	Y
Y	G	R	B
G	Y	B	R

Here is the beginning of a solution to the
4x4 puzzle with the two big diagonals:

R			B
	B	R	
	Y	G	
G			Y