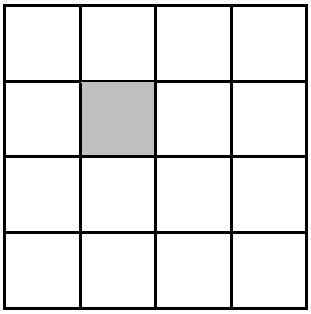
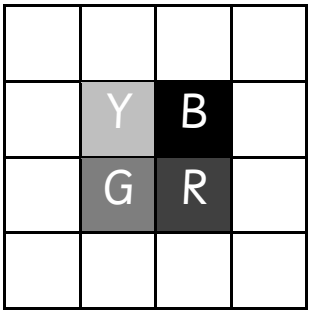
How Many Solutions Are There?

One approach is to consider the centre squares:



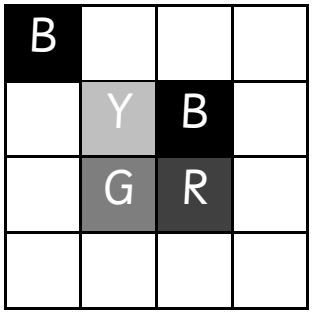
Whichever tile is placed here the other three (of the central four) must be different because they are linked by either the horizontal, or the vertical, or the main diagonal.

So a starting point for building a successful 4x4 grid might be:

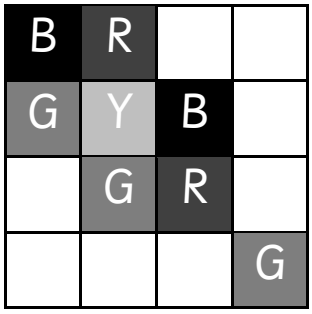


Consider the top left cell. It is on one of the main diagonals and two colours have already been used in that diagonal. So the top left cell can only be Blue or Green.

Choose one of these and explore the consequences:



- The bottom right must be green.
- The two missing tiles in the block of four at the top left must be green and red and they can only be arranged one way.



- Similar reasoning completes the four tiles in the bottom right.
- Once this corner is completed, the other main diagonal can be unambiguously defined.
- Finally there will be only one empty space on each outer edge and only one tile will be able to go in each position.

Therefore, obtaining a successful solution depends on only two decisions:

- Which tiles are chosen for the central four.
- Which tile is chosen for one of the four corner squares.

But there is more work to do yet before the questions:

- *How many solutions are there?*
- *How do you know you have found them all?*

can be answered.

- There are 24 ways to arrange 4 colours into 4 cells in a straight line. But how many ways in a square?
- Once the central four are set, do the two choices for the corner cell lead to unique solutions?
- Once the central four are set, does starting with different corner cells lead to different solutions?