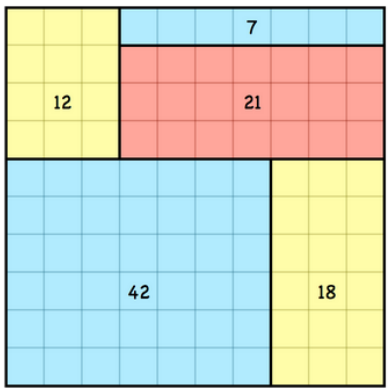
Mondrian Art Puzzles

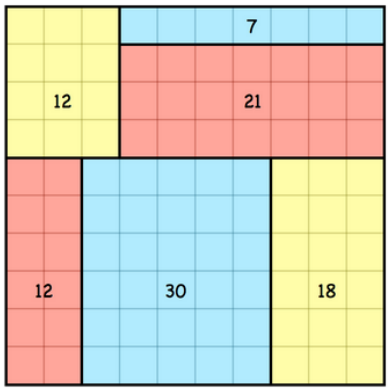
By Gordon Hamilton, Math Pickle

For these puzzles, you must cover the canvas with rectangles. The rectangles can have the same areas, but they must all have different dimensions. After the rectangles are drawn, the design should be colored using the smallest possible number of different colors so that no rectangles with the same color meet along an edge or at a vertex.

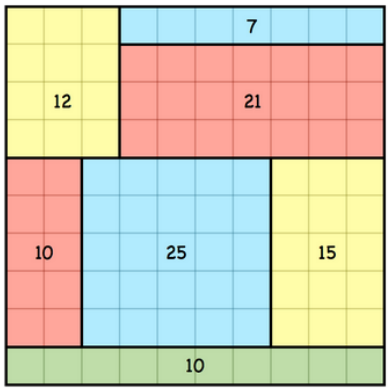
The score for each solution is equal to the area of the largest rectangle minus the area of the smallest rectangle. The goal is to make this score as small as possible.



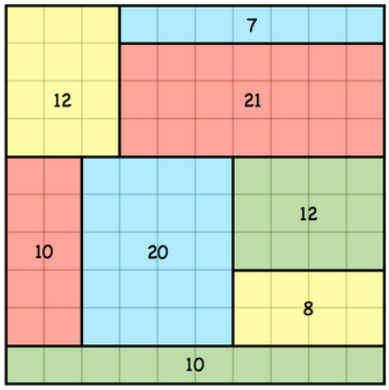
In this design, the difference between the areas of the largest and smallest rectangles is $42 - 7 = 35$. This is not a very good score.



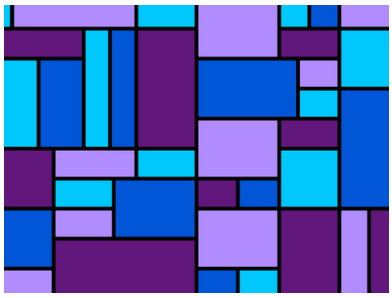
Here is a better solution. The score now is $30 - 7 = 23$. This is still not great, but it is better than before.



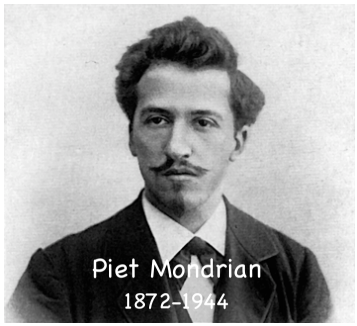
This is an even better solution. The score now is $25 - 7 = 18$. Is that the best possible score for a 10×10 grid?



This might seem to be the best solution so far since $21 - 7 = 14$. However, it is not a solution – two of the rectangles have the same dimensions. There is a 3×4 rectangle and a 4×3 rectangle. That is a disaster.
However, the fact that the 5×2 rectangle and the 1×10 rectangle have the same area is not a problem – the dimensions of those rectangles are different.



The final step of any puzzle is to color it with the smallest number of colors possible so that no two rectangles of the same color meet along an edge or at a vertex. Do you see where this picture violates the coloring rule?



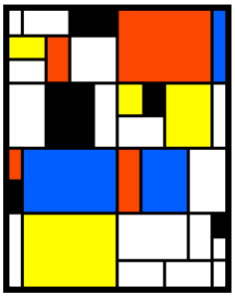
4x4

5x5

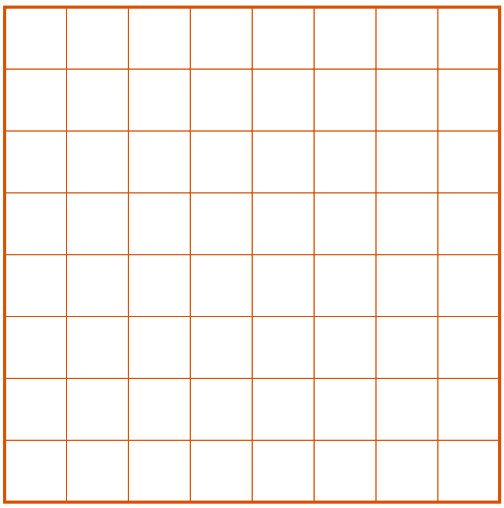
6x6

7x7

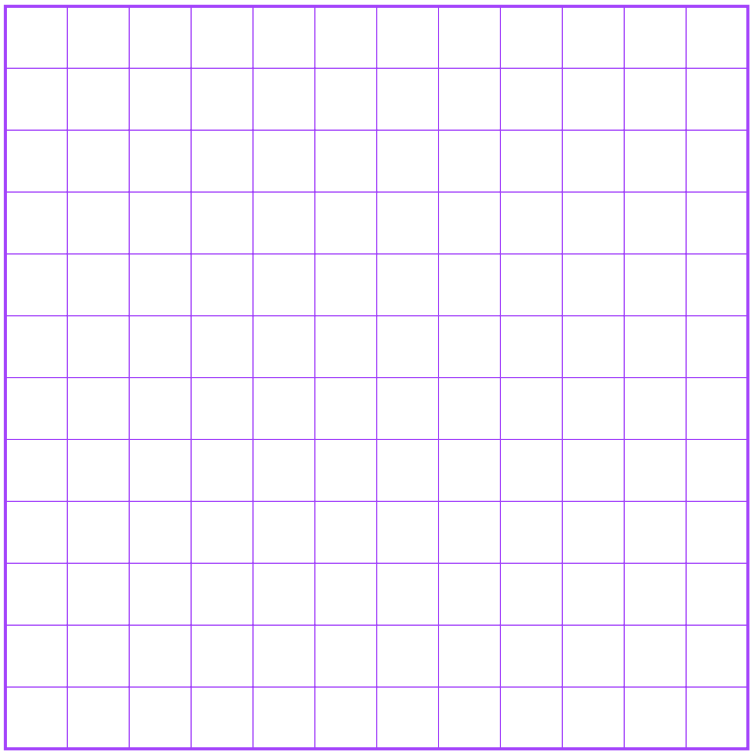
8x8



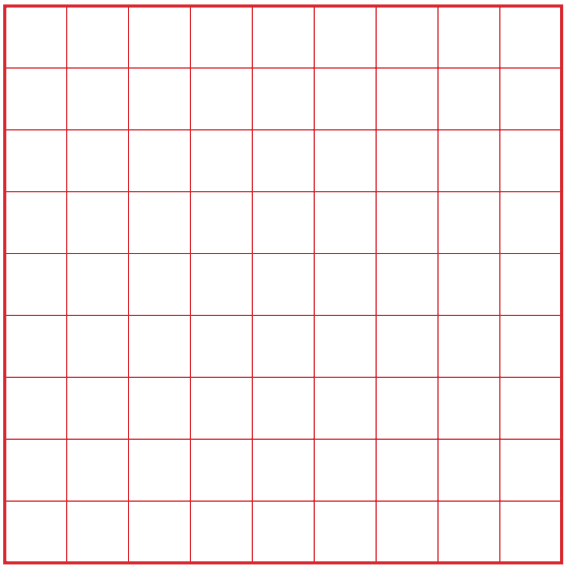
Piet Mondrian
1872-1944



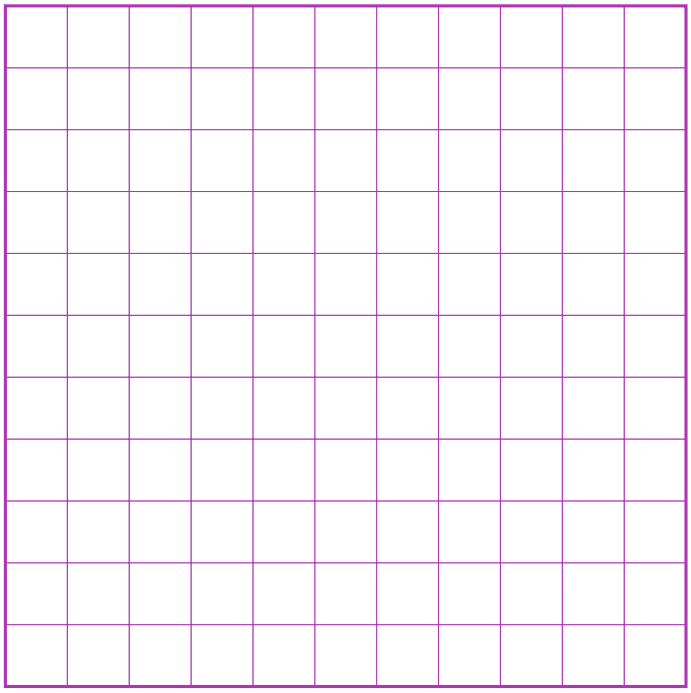
8x8



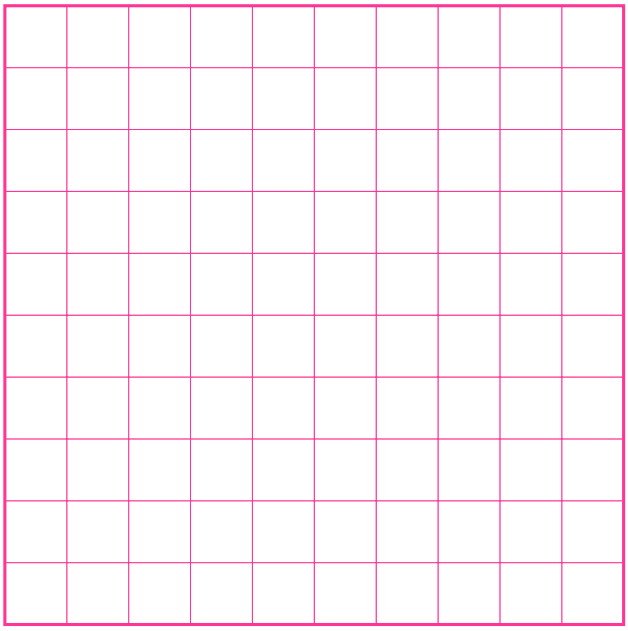
12x12



9x9



11x11



10x10