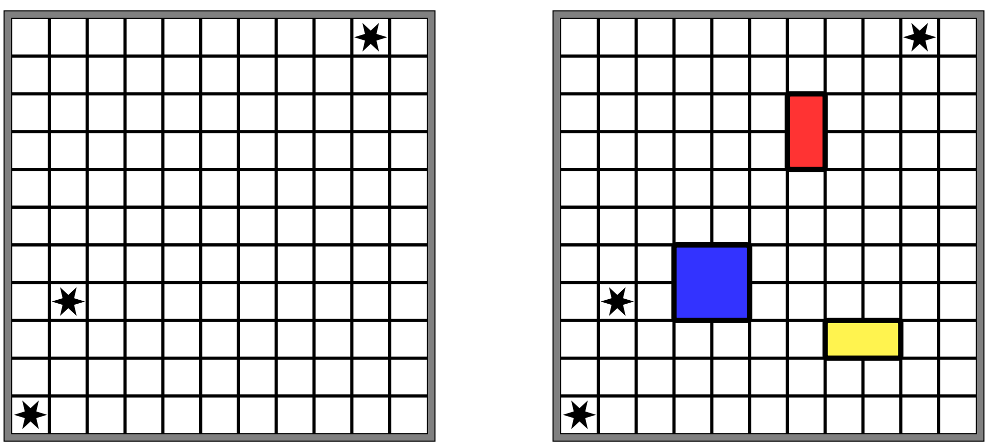
13 Mondrian

Author: Cor Hurkens (TU Eindhoven)
Project: 4TU.AMI

Challenge

Mondrian, the painter-elf, has designed a square-shaped Christmas card and has divided it into 121 square-shaped cells in an 11×11 pattern (see Fig. 1a). Mondrian paints little stars into three of the cells *exactly* as shown in Figure 1a.



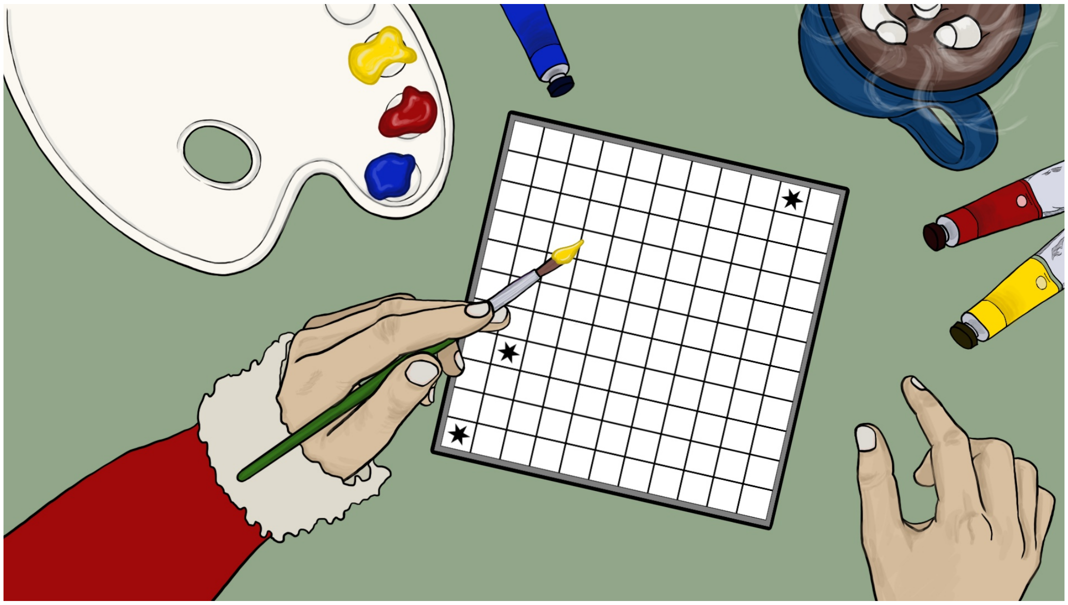
(a) Mondrian's Christmas card with the three little stars.

(b) Example: Mondrian's Christmas card with two rectangles and one square.

Figure 1: Mondrian's Christmas card.

Then, Mondrian partitions the remaining grid of 118 cells into several 1×2 and 2×1 rectangles (each containing 2 cells), and 2×2 squares (each containing 4 cells) that he paints with bright colors (see Fig. 1b). In the end, *each* of the 118 cells belongs to *exactly one* such rectangle or square. The three cells with the little stars are not covered.

What is the largest possible number of 2×2 squares that Mondrian can paint onto his Christmas card?



Artwork: Frauke Jansen

Possible answers:

1. The largest possible number of 2×2 squares is 14.
2. The largest possible number of 2×2 squares is 15.
3. The largest possible number of 2×2 squares is 16.
4. The largest possible number of 2×2 squares is 17.
5. The largest possible number of 2×2 squares is 18.
6. The largest possible number of 2×2 squares is 19.
7. The largest possible number of 2×2 squares is 20.
8. The largest possible number of 2×2 squares is 21.
9. The largest possible number of 2×2 squares is 22.
10. The largest possible number of 2×2 squares is 23.