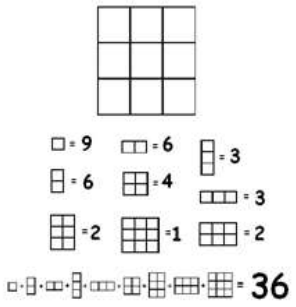
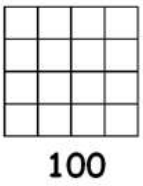
WITHOUT WORDS

Mathematical Puzzles to Confound and Delight

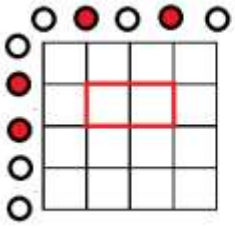
WW 22: SOLUTION

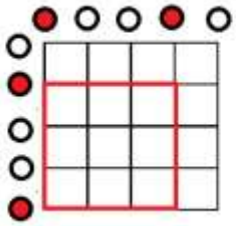
This question is counting the total number of rectangles (including squares) one can find in a grid. There are 36 rectangles to be found in a three-by-three grid, and 100 to be found in a four-by-four grid.

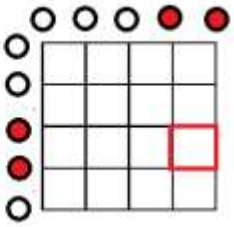




Each rectangle is given by a choice of two vertical lines and a choice of two horizontal lines in the grid.







In WW20 we saw that there are 10 ways to select two objects in a row of five, and so there are $10\times 10=100$ rectangles in this grid. In general, following WW20 solution, we see that there are $\left(\frac{(N+1)^2+(N+1)}{2}\right)^2=\frac{N^2(N+1)^2}{4}$ rectangles in an $N\times N$ grid of squares.