

# Jane Street Puzzles: Knight Moves 6

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Site: <https://www.janestreet.com/puzzles/knight-moves-6-index/>

Code:

## 1 Solution

The puzzle is solved via DFS:

- First, we observe that **when we stop at a grid, the current value is always divisible by the number of the grid**. In fact, suppose the number of the grid is  $x$ , then the current value is always in the form of  $(\dots) \times x + x + \dots + x$ , depending on how many grids of the same number are there in succession.
- Secondly, we run DFS to find out the paths with the smallest  $A+B+C$ . Starting with a board with numbers unassigned, if the current grid number is not assigned, then attempt to assign it with the remaining target's factor (starting from  $2024 = 2^3 \times 11 \times 23$ ), and try all possible previous grids; if the previous grid number should be equal to the current grid number, we divide the remaining target by it, otherwise we minus it. If the current grid number is assigned, then we directly try previous grids and operate on the remaining target as above.
- Finally, stop if we hit the start grid and the remaining target becomes zero.

There are many solutions where  $\{A, B, C\} = \{1, 2, 3\}$ , achieving the minimum value of  $A + B + C = 6$ . Below is a solution with  $A = 1, B = 3, C = 2$ .

$$((((((1 + 1) * 2 + 2 + 2) * 3 + 3) * 2 + 2) * 3 * 2 * 3 + 3) * 2 + 2 = 2024.$$

