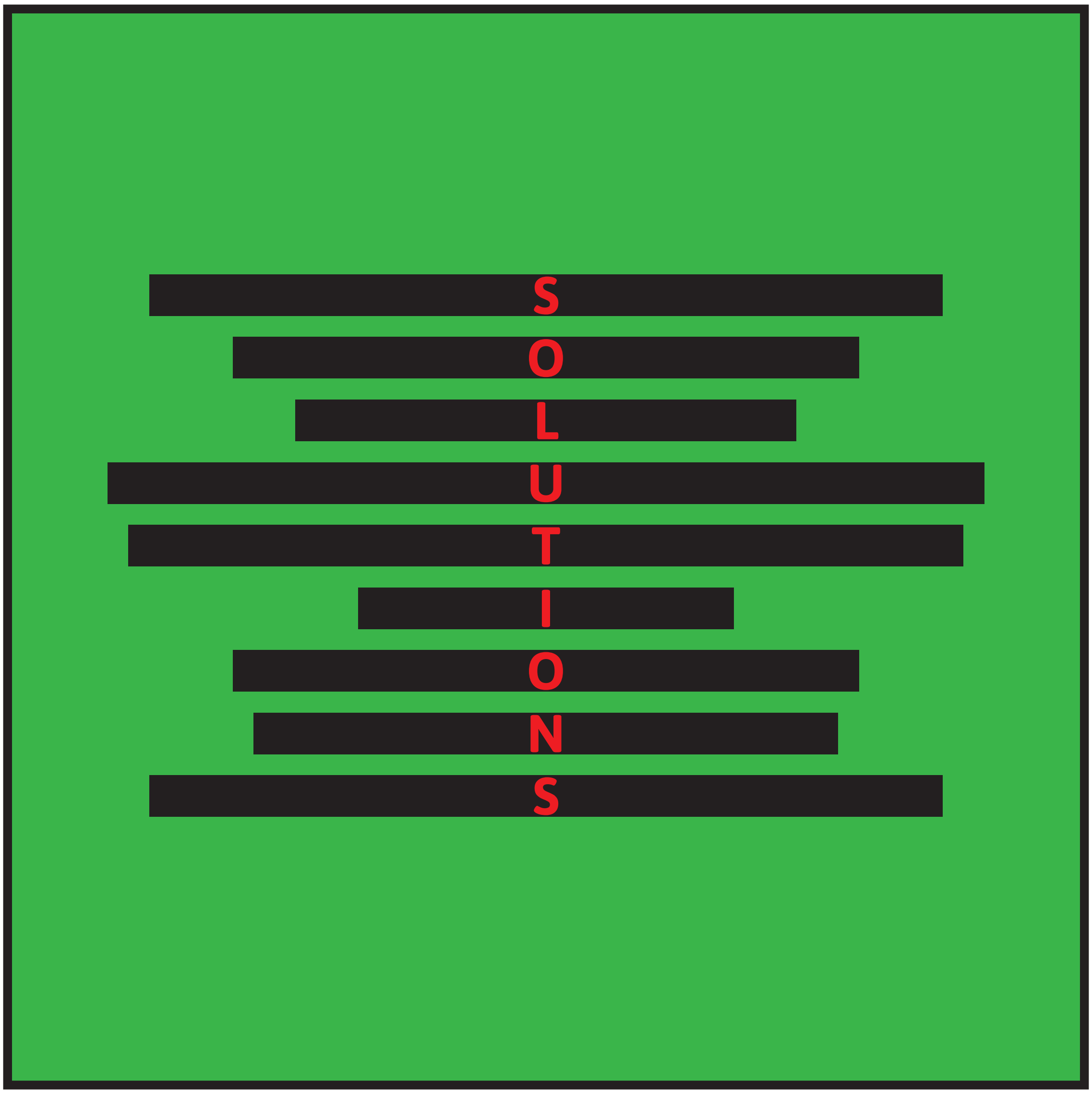
Christmas puzzle 2025



Dear puzzler

When I make a Christmas puzzle card, there are a few unwritten rules I follow. The right inside page is reserved for a general message in type, a handwritten personal message, and my name. The backside, ideally, only has a small block of information and a QR-code leading to my site. This leaves the front and left inside page for puzzles. The front needs to be ‘christmassy’, contain my usual holiday wish, and look interesting. The left inside page is usually where the simple, recognizable puzzles live. But that’s not all. I *also* want to connect the puzzles to each other, like a mini puzzle hunt.

On top of these self-imposed constraints, the small size of a card limits me further. Aside from the limited real estate to work with, there is also a limit to how small the elements can be. Not every puzzle, then, is suitable for use on the Christmas card, and the early phase of designing one often involves as much *discarding* of ideas as developing them, if not more.

These are often tough choices. I need to really restrain myself. This year I felt I didn’t quite manage that. When the cards came back from the printer my first impression was that the card was *too full*. If that was also your impression, I apologize - I guess I unconsciously compensated for the rather sober card the year before. In retrospect perhaps the Partridge Square on the back was too much. But it was SO PERFECT and it really was the last opportunity… So I hope you forgive me for indulging.

In this booklet I’m going to give some (hopefully interesting) background info on the Partridge Square puzzle, which was not designed by me, and detailed solutions to the other three puzzles, which I did design myself.

I hope you enjoyed them, I certainly enjoyed making them.

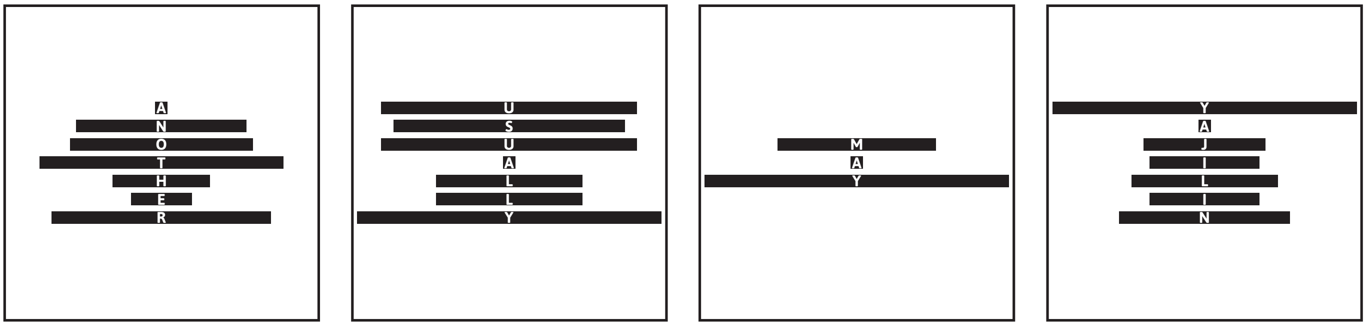
Here is one way to solve them.

The symbols

Originally these were conceived as 'weird christmas trees' but feedback has convinced me they are more similar to 'sound waves' (when rotated 90°). Yeah, I can kinda see that. Either way they are very simple visual representations of the A=1, B=2, ... code. I liked that they were square so I could easily fit them into other designs, and they were compact - one box has room for a 17-letter word, so most words can be encoded in a single box. I did worry that they would be too ambiguous, until I realised that made it more of a puzzle. You can sorta see the general 'vicinity' of the letter - like, a C could be a B or D, but it's definitely not a K, you know?

To reinforce that these things represented words, which is not readily apparent from the front of the card, I decided to also use them as 'drop caps' in the main text of the card, and for the name of the internal puzzle. Hopefully potential solvers would start there, and then realize how to use them in the maze. As a hint, I used a comma after the second symbol to indicate the sentence started before the first readable word (another clue is that none of these words are capitalized).

These are the four words used -



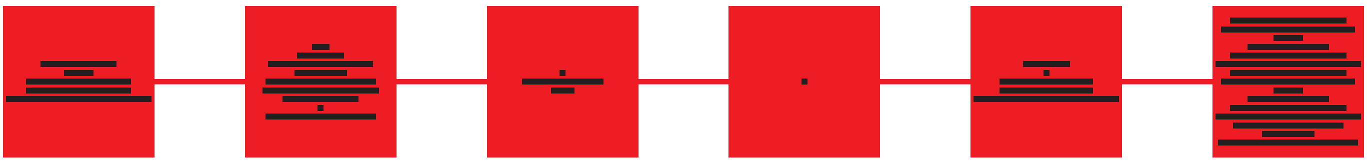
So the paragraphs on the right inside of the card start as "Another year has passed...", then "Usually, I also use", and finally "May you find wisdom". Makes a lot more sense that way! And the puzzle explanation on the left inside now reads "This is a yajilin puzzle". Armed with the knowledge that these symbols are words, let's turn our attention to the maze.

The maze

On the next page you can see the solved maze. It turns out, there are mutiple paths between the symbols, and considering every box has two entrances into the maze and there are paths running around each box, that shouldn't be entirely unexpected. I've color coded them for clarity.

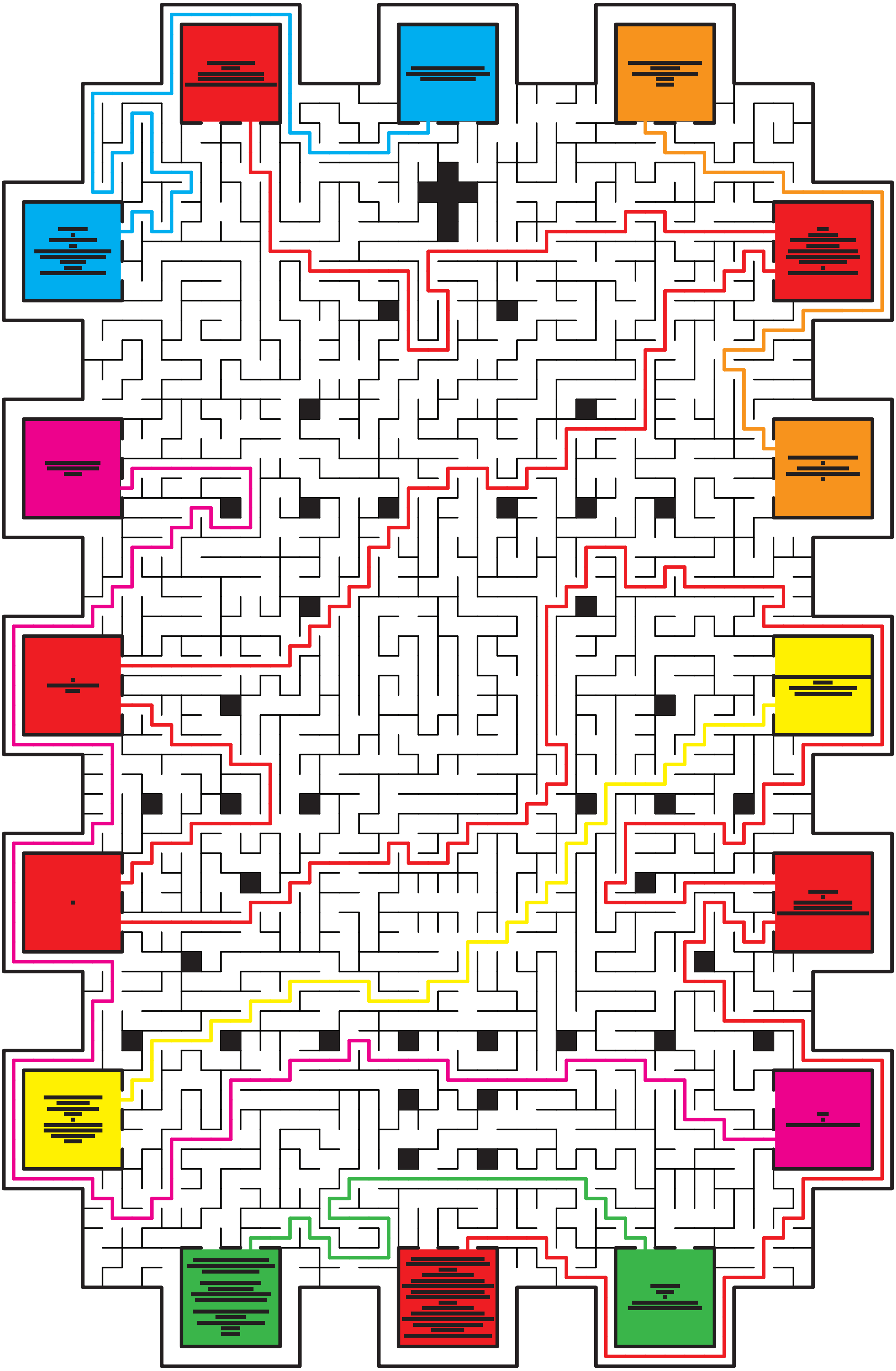
There are five paths linking just two symbols, and one path runs between six of them...

Now what six word phrase has appeared on every Christmas card so far? "Merry Christmas and a happy 20XX" of course! Go ahead and verify that's what the red symbols say - 2026 is written as twentytwentysix.



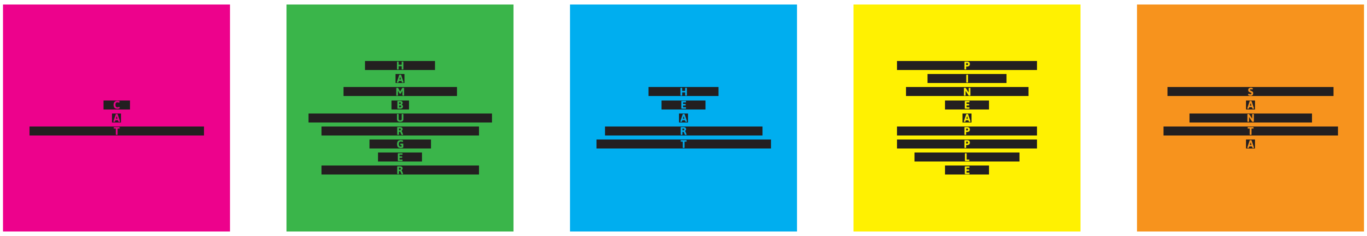
And where else on this card do we see five things? The yajilin puzzle has five emoji that we need to translate into clues. That might be a good place to start...

We could try and translate all the symbols directly, but the other way around is actually easier, and we do have a few obvious things that might work - most obviously the five emoji in the other puzzle. Let's see how those work out first.



The following words seem reasonable enough descriptions of the emoji, don't they?

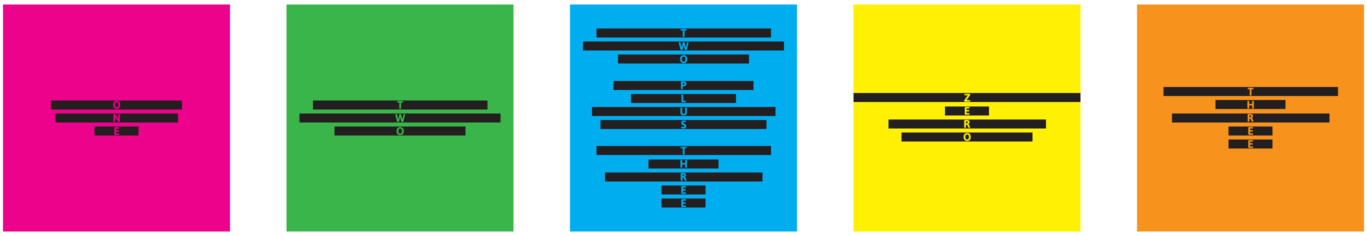
CAT, HAMBURGER, HEART, PINEAPPLE and SANTA (CLAUS). As symbols[1], that looks like this:



These symbols do indeed appear in each of the five remaining pairs (see previous page - in order: **bottommost on the right**, **rightmost at the bottom**, **topmost on the left**, **bottommost on the left**, and **second from the top on the right**), so that's a promising start!

Each of the symbols paired with these is most likely a (small) number - they represent clues after all - which should help with their translation. The yellow one for example starts with a Z, and turns out to indeed be zero.

With a bit of trial and error the others can also be figured out, the blue one being the trickiest[2]:



This gives us the missing information we need to be able to solve the yajilin puzzle on the inside of the card:

CAT = one

HAMBURGER = two

HEART = two plus three (so five)

PINEAPPLE = zero

SANTA = three

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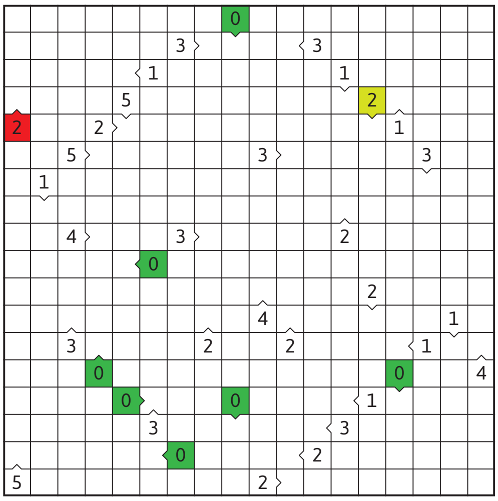
[1] I considered using less direct translations (for instance 'love' rather than 'heart') but there's a point where things become too convoluted (Yes, I am well aware that for some of you we are well past that point already, thank you). Also, I think a puzzle should give you quick feedback when your theory is wrong, and straightforward translations are more fair.

[2] I expressed 'five' as a sum because all the numbers turned out to be really small words, and that made them stand out too much.

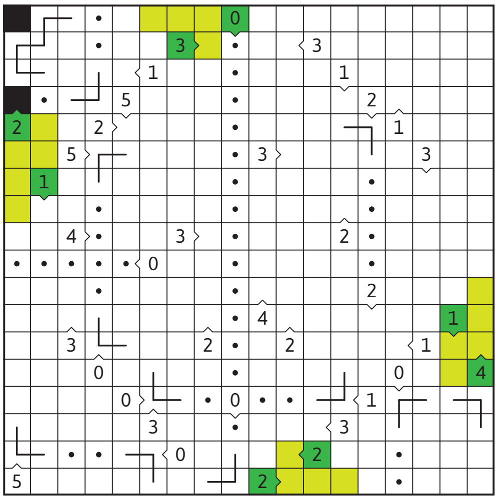
The yajilin

If we ignore the bonus partridge square on the back, which is extremely hard to solve manually, the yajilin is the hardest puzzle on the card. Hopefully it was not *too* hard; I felt entitled to make it challenging because the maze is relatively straightforward (by my standards anyway). Let's replace the emoji with the numbers they represent and get to solving.



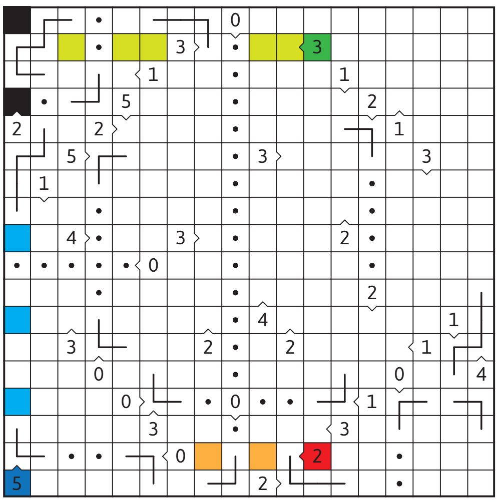
First we focus on the easy clues, that is, **(hidden)**[1] **zeroes**, as well as **any clue** that has just enough room[2] behind it to be fulfilled.

It's not a whole lot yet, but it *is* our way in.



We mark cells that the loop certainly passes through, but we don't know how yet, with a dot. The 2 clue on the left edge even gives us our first two black squares. A dot in a corner (formed by black cells and/or clues) will always contain a corner of the loop, so we can fill in those.

Now look at the top-left and bottom-right areas of the grid, formed by the diagonal lines of clues. If the loop reaches them (which it does: we have dots) it MUST pass through the narrow gaps at either end, between the marked clues, through the highlighted cells. Unfortunately the other two corner regions have just enough gap for the loop to do a u-turn, so we don't know for sure (yet) what happens there.



Now that we have found more loop cells, a few more clues have become (partially) solvable. For the **red 2**, only **two places** remain where black squares could go. This confirms that the loop passes out of the bottom left area there.

The remaining black squares for the **blue 5** are now also **determined**, yielding a lot of loop segments on the edge.

However for the **green 3**, while we can identify three areas where only one black cell can go[3], only one of them seems fully determined. Luckily we can do more, because putting the black cell in the left cell of either 2x1 would create a dead end - we get all three black squares!

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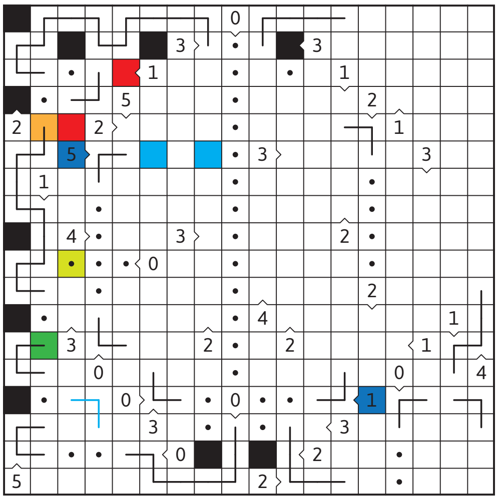
[1] If two clues are in line with each other and point the same way, the number of black squares between them is equal to their difference. If the clues are equal, there are zero black squares between them: a hidden zero.

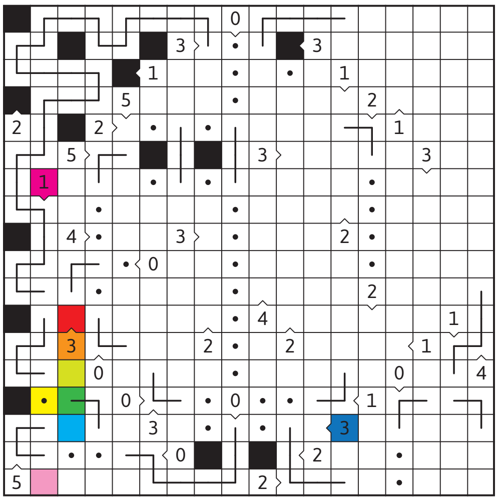
[2] Since black squares must be at least one cell apart - two black squares must span at least three cells, three must span five or more, etc. But on the edge of the puzzle black squares must be at least two cells apart to avoid dead ends!

[3] Useful to know: any 2x1 rectangle can only contain a single black cell.



Every black square that we identify gives us up to four dots as well (in the adjacent cells). Then, for any dot that sits between two impassable cells[1] we know the loop path must pass between those cells. This leads to the diagram on the left.

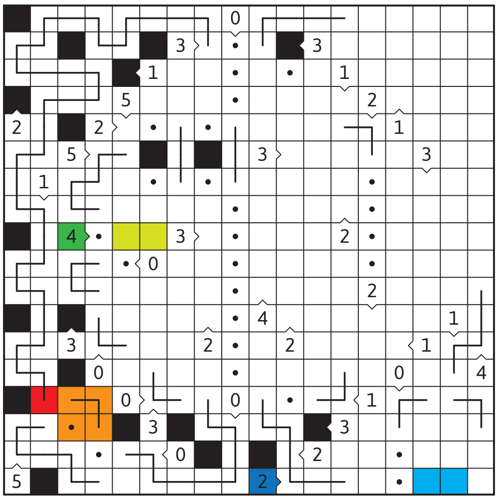
Now look at the **orange** cell. If the path continues to the right, the cell above it will become a dead end, so the path must continue upwards, the **red** cells become black cells, and the corner resolves. The path must also continue upwards in the **green** cell (to avoid a small loop), and the **lime** cell is a loop corner. Finally, now the **1** clue is **fully** and the **5** clue **partially** resolved[2].



Now we turn to the bottom left corner. There is only **one valid location** for the remaining black square above the **3 clue**[3], this also resolves the path to the left and top of this new black square.

The path can't continue upwards from the **green** cell or we would create a dead end **to its left**, so we get a black square **above** it. Also, we can't put a black square **below** it or we would create a T-split[3] **to its left**; this leaves exactly three spaces for the **3 clue**, which resolves.

There is also only **one space** left for the **1 clue**.



We can now finish the bottom left corner by looking at the **red** cell. Suppose we continued the path down from here, that would force the four **orange** cells to become a small loop, and that's not allowed - the path must therefore continue to the right, and the entire corner resolves.

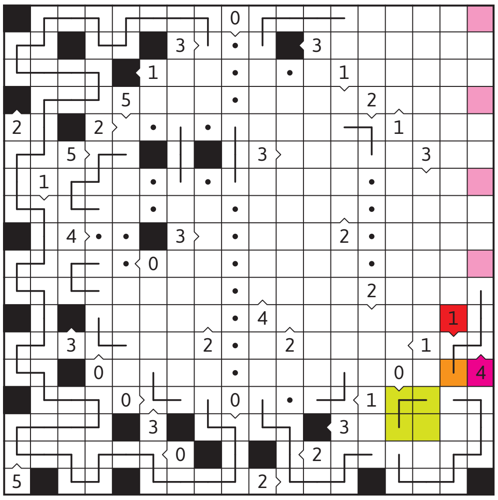
Next we look at the **blue** 2 clue. We can actually eliminate a few options for the black squares - the **rightmost** highlighted option would create a dead end in the corner, and the **leftmost** would not leave any room for the second black square. Now there are only two cells left to turn black.

Finally, we look at the **green** 4 clue. Only one of the two **highlighted** options does not create a dead end (the right one), so we get another black square. However, even though we get a couple extra dots, we can't determine the loop path here yet.

[1] To be precise, a black square, a clue, a crossing loop line, or the edge of the puzzle are all impassable.

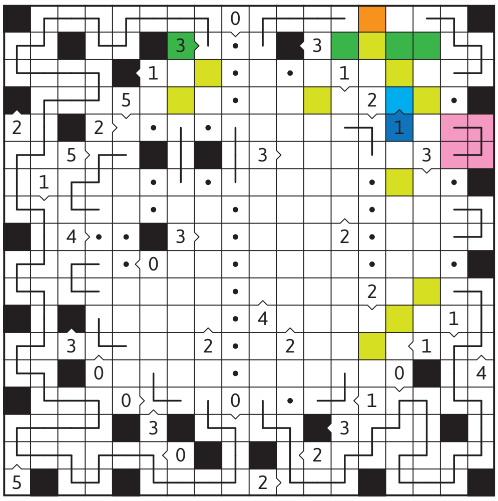
[2] We could have done that partial 5 earlier, but I'm trying to stick to a path.

[3] The other two pathing options, that would avoid a T-split, would each instead create a dead end.



With the new path segments, the **red** 1 clue resolves; we get a crucial black square: it's now no longer possible to continue left from the **orange** cell, or the cell below it would become a dead end. So we must continue down, and we get a second black square to its left. We must now avoid making a small loop in the **lime** cells and the entire corner resolves.

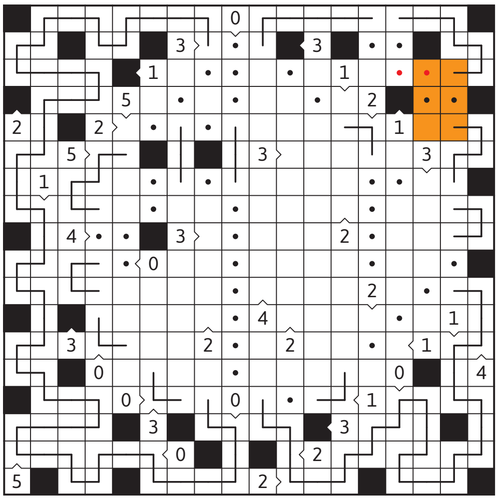
Now at last we turn to the **4 clue**[1]. There is exactly enough room for 4 black squares in the indicated spaces. This gives us a lot of path segments, hopefully that is enough information to finish the last corner.



First, we avoid making a small loop in the indicated cells and continue the path down out of the corner area.

Now here's a neat trick. Since we can't make dead ends, and the clues are organized in diagonals, there are **quite a few cells** that can't be black[2]. Only one really matters, because it let's us fill in a **single** black square for the **3 clue**. After that we look at the **2x1**, which must also have a black square. We can't put it on the left side, this would create a T-split in the orange cell[3]. Filling in all path segments we can, this in turn leaves only **one option** for the black square for the **1 clue**.

With these three black squares found, the area will resolve.



Take a look at the two **red dots**. Can the loop connect these? No, because then we would not be able to solve the **2x3 orange section** - it will have 3 loose ends and we can't connect an odd number of loose ends, nor bring an additional loose end into the area[4].

This means both dots are loop corners, and everything falls into place.

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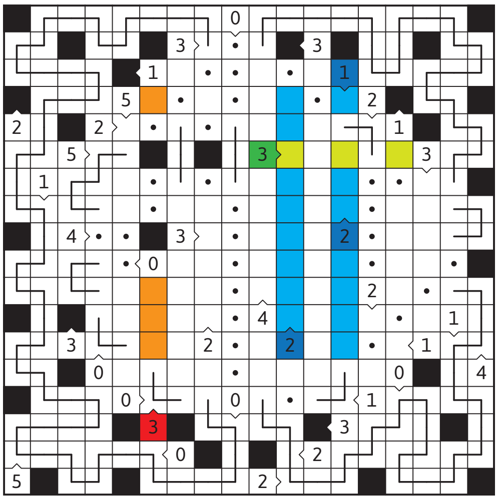
[1] This has been resolvable for some time now; it just felt easier to follow if I went around solving the corners one by one. If you spotted this, well done, and I hope you weren't too annoyed.

[2] We haven't needed this yet, so I avoided the clutter, but now we do. Again, if you spotted this...

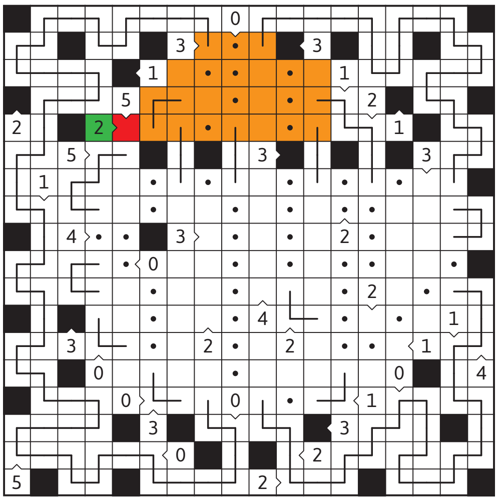
[3] The path must always pass between two black squares or between a black square and the edge, so three paths will meet.

[4] This is a trait that all loop puzzles share, like for instance the slitherlink from 2023.



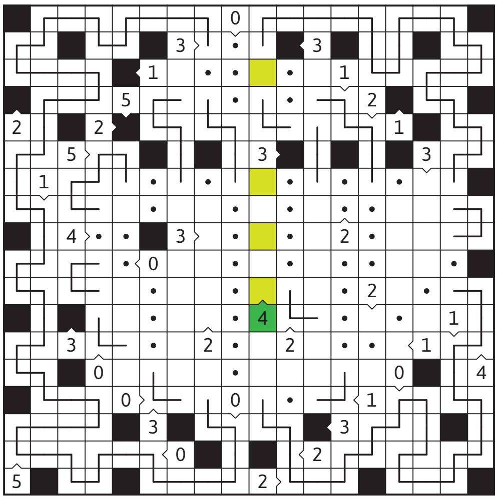
Now we resolve the **3 clue** - there is just enough space left for the **black squares** (this too was possible for a long time already, but... you know... one thing at a time); because of these new black squares the **1 and 2 clues** are completed which gives us **many new dots**.

And while we're at it, let's now complete another **3 clue** and get **even more dots**.

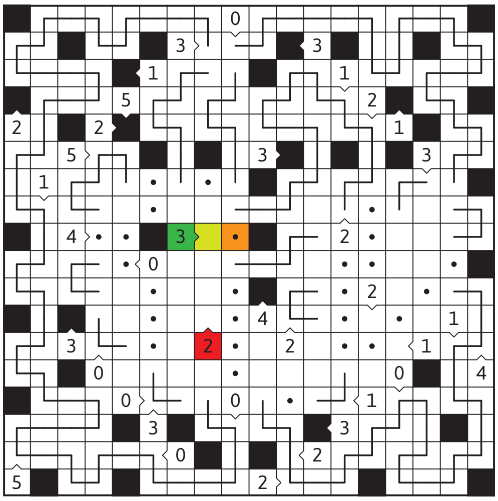


The diagram on the left shows all the path segments we get from this. The puzzle is becoming cluttered with dots but it's going to be ok. Let's focus on the **orange area**. Note that it is almost entirely closed off with paths going in and out of it, with the exception of the **red cell**.

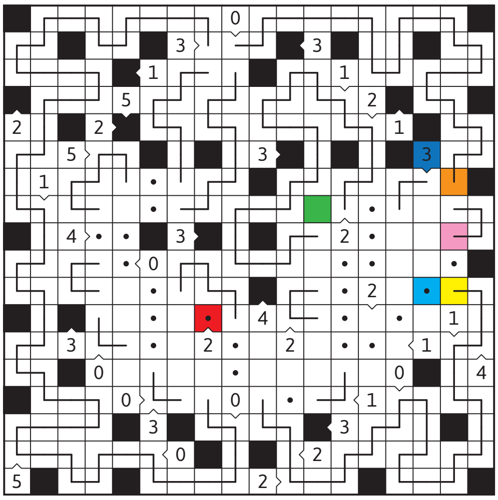
Counting the loose ends in the orange area we get 8, which is even; in other words, if the red cell is not black, we would end up with one too many loose ends in the orange area. This black square completes the **2 clue**; now, by repeatedly identifying corners and filling in loop segments we can progress a lot further.



What now? Well, now the 4 clue can be completed. This one completed clue allows us to almost completely finish the top part, and it yields a lot of loop segments in the center!



Would you look at that! The **next clue** to help us progress can only be partially completed, but that one **black cell** is just enough to complete the **2 clue** as well. Meanwhile the **marked cell** must now connect the cells above and below it, yielding a whole slew of additonal corners.

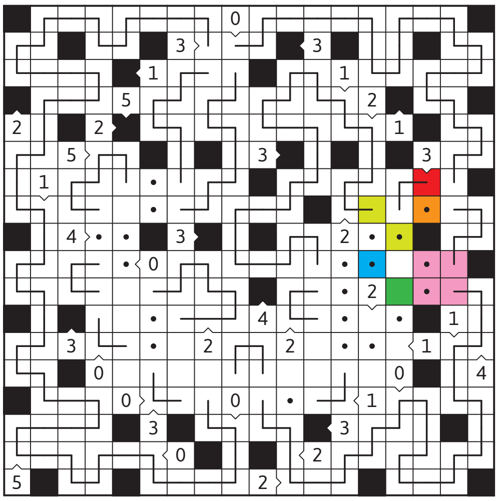


We can make three interesting deductions from here. First, the path must run horizontally through the **red cell**.

Second, the loop can't pass through the **green cell**, or we would make a small loop.

Third, look at the **3 clue**. Could both black squares be *above* **the dot**? No: we would split the path to the left and down in the **pink cell**. So we must have a black square *below* the dot.

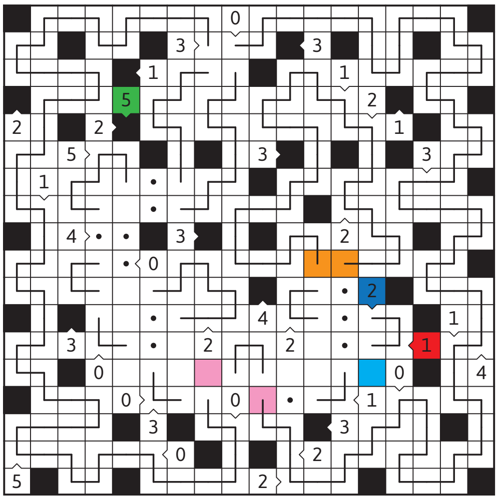
Of the remaining three cells, the top one can't be black or we would split the path in the **orange cell**, and the bottom one can't be black or we would do so in the **yellow cell**.



This leaves only the middle cell (see diagram to the left).

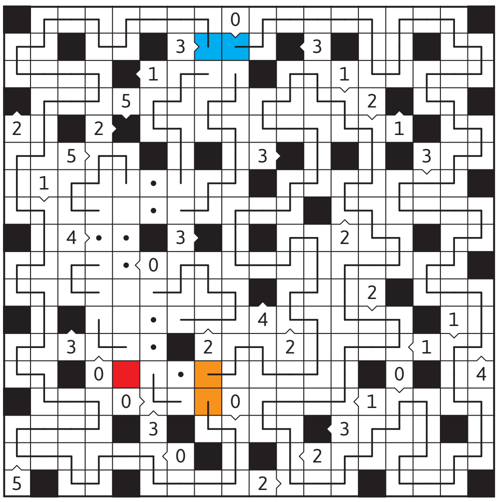
Now the path can't run from the **red** to the **orange** cell because it would then have to continue to the left and make a small loop (or to the right and create a dead end).

So the path must run horizontally through the **red** cell, as well as the **orange** cell. If we resolve resulting **corners** we find that the path must also run horizontally through the **blue** cell. This in turn forces a path through the **pink** cells, and the **green** cell must be a black square.



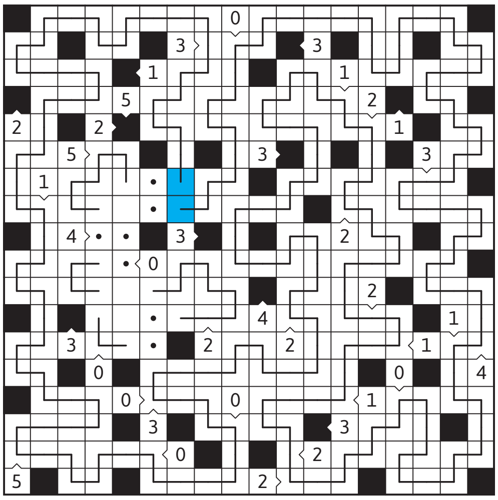
The **2 clue** is now **completed**. Also, we have to avoid making a loop in the two **orange cells**, and we can reuse that logic several times to extend the paths all the way around to the **pink** cells. Along the way we pick up three C-shaped paths that would otherwise become small loops.

This, coincidentally, also completes the **1 clue**. Only **one clue** left after this!

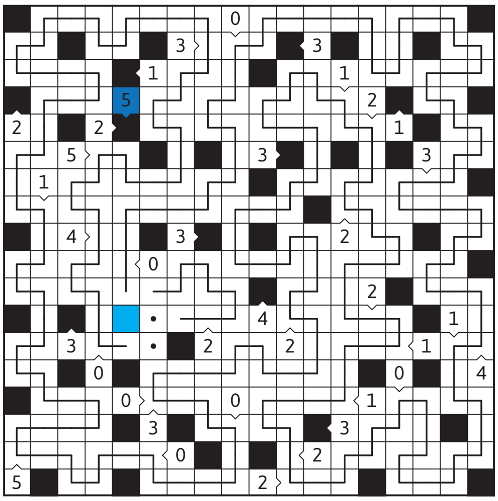


Because of that extra black square from completing the 1 clue, it should be obvious we can't connect the loose ends in the two **orange** cells - it would force a small loop to their left. However, if we continue them to the left, they do eventually connect. This makes the **red** cell a cul-de-sac and it must be a black square.

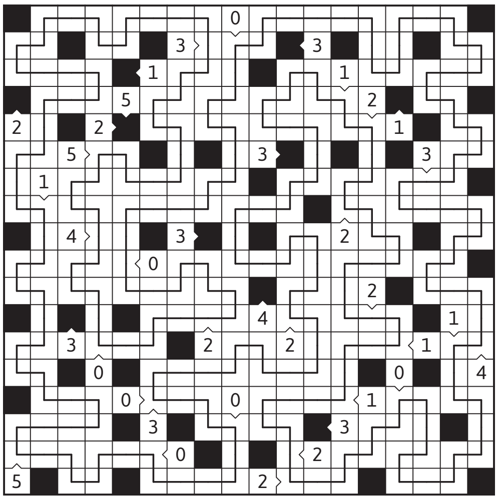
The two **blue** cells are now the end points of a path that goes all the way around the puzzle, and they can't be connected, or the remainder of the puzzle would not be part of the final loop. Each end point connects downward.



Now, starting from the **blue** cells, we keep applying the same logic from the previous step and we can progress almost to the end.



Now we can complete the **final clue** and put the last **black square** in the puzzle, and the rest of the solution follows.



And there we are, the loop is completed. If you used a different route, or maybe even used fewer steps, that is awesome! If you didn't manage it, don't feel bad, this puzzle was pretty tough.

Let me know how it went.

Partridge Squares

Square tiling problems - fill a big square with a bunch of differently sized smaller squares - have been around for a long time. You can find many examples if you google for them.

The Partridge Puzzle is a subclass of these. It was first presented at the Second Gathering for Gardner conference in 1996, by Robert T. Rainwright. It is an entire class of puzzles based on the following beautiful mathematical equation:

$$\text{sum}(i=1..N : i^3) = \text{sum}(i=1..N : i)^2$$

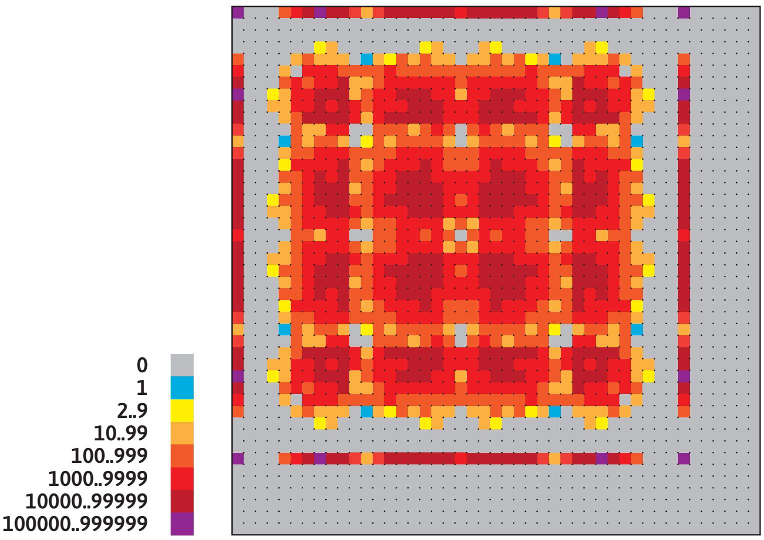
In other words - the sum of the first N cubes is equal to the square of the sum of the first N numbers.

This leads to the Partridge Puzzle as follows: a cube with a side of 8 can be divided into 8 squares with a side of 8. The seven smaller cubes can be similarly divided into a stack of squares. Now the question is, could we fit all of these 1+2+...+8 = 36 squares together in a square with a side of 36? This is called the order 8 Partridge Puzzle. For order 9, we would start with a cube with side 9, and try to fit all 45 resulting squares into a 45x45 square.

At the Second Gathering for Gardner a solution for order 12 was given and it was not known yet if solutions for other numbers existed. We now know that there are no solutions up to order 7 (well, order 1 has a rather trivial solution), but for any size after that, there IS a solution.

It so happens that 2025 = 45x45, so the order 9 Partridge Puzzle was very appropriate. Generally speaking there are 1730280 solutions, but even then it is quite hard to come up with just one of them. I wrote a program, of course, to generate these solutions. My first idea was to find a solution that had a smaller square exactly in the center. It turns out no such solution exists.

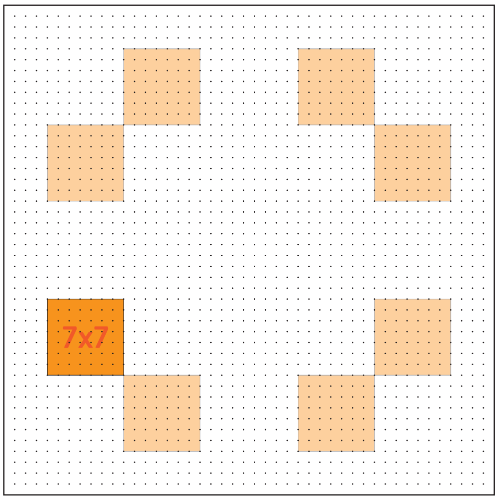
My main tool were generated 'heat maps' that would show how often the top left corner of a NxN tile occurred in any positions in all of the solutions. Here is the heat map for 7x7 tiles:



The pattern is shifted to the top and left because we are looking at top-left corners - a 7x7 can't have its top-left corner all the way in the bottom right, of course. It's also symmetrical, because we can rotate and reflect the solutions.

We can immediately notice two things. One, there is a grey cell in the center of the pattern, meaning a 7x7 never occurs in the center of a solution. Two, there are eight blue cells in the pattern, these are locations where a 7x7 occurs in exactly ONE solution.

This is what I needed for the card!



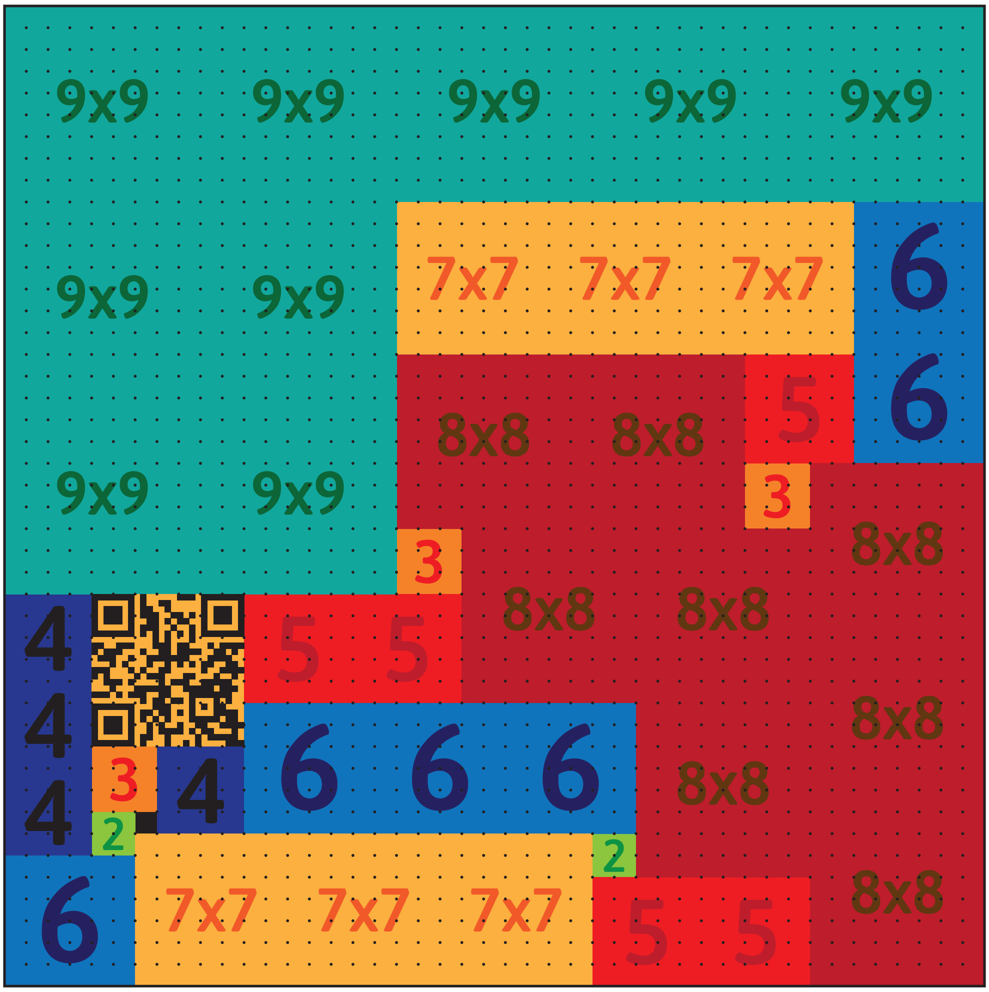
If I preplaced a single tile in any of the eight locations shown at the left, the puzzle would only have a single solution. One even I didn't know, because my program had found it for me. I tried for a whole week to solve it by hand and then gave up.

Yeah, this one is very hard. So don't feel bad if you couldn't solve it, that was not the point anyway.

Just appreciate the beauty of the math!

Oh, I almost forgot, the name of the puzzle comes from the traditional Christmas song The Twelve Days of Christmas - you know, the one that goes "and a partridge in a pear tree"!

That leaves only one thing - the final solution of this particular Partridge Square.



Conclusion

This is by far the longest solution booklet I've written yet. I don't plan to overstuff the card with puzzles again, although... the tenth edition is coming up in a few years.... Well, we'll see.

As always I hope the explanations were clear enough and the steps were not too hard to follow. Since I designed the puzzles, the logic seems obvious to me, and it's hard to judge if I take too big of a leap sometimes.

I'm toying with the idea of making explanatory videos to accompany these booklets. A video would capture the solution path better than these freeze frames... Let me know what you think of that.

As I write this, late january 2026, I'm already thinking about the next card, and I think I landed on a pretty nifty idea this time. Now to see if it is actually doable...

But that is a story for another time ;)

Finally, thank you for playing, and taking the time to read this thing.