Christmas puzzle 2024

Solution booklet

Dear puzzler

I usually start thinking about the next card as soon as the new year arrives. Writing these solution booklets helps put me in the mood for a new one, that's part of it, but it's also the knowledge that I usually need that much time to 'get a good one'.

And for this card I originally had quite elaborate ideas surrounding the theme of "squares" - as a math nerd I'd been looking forward to the only square year in my lifetime (realistically speaking; 46 squared is 2116 and I should hope to live that long!) and that had to be celebrated. But then, just as I was making hard choices about the card, a bad thing happened in september, and I suddenly had a hard time finishing things to my satisfaction. It felt inappropriate (though tempting) to sink most of my time into this while something much more important was in play. But I also didn't want to stop. So I ended up simplifying everything, and making the card partly about that thing.

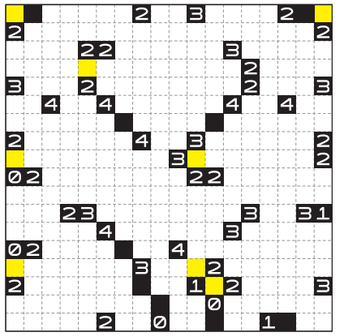
Even after finishing it and sending it off to you all, I worried if that was a mistake. By then of course it was out of my hands. And in all honesty, I couldn't not do it.

It's still not over. I hope there will be a card this Christmas, but I genuinely don't know yet. Imagine you took a bite that's just a tad too big to chew. You can still talk, kinda, you can still drink, kinda, it's just in the way all the time. You have to spit it out, or swallow it whole, or you'll be stuck with it. The aftermath of my father's death is like that, except it's in my life. And all I can do is swallow it whole. It hasn't happened yet...

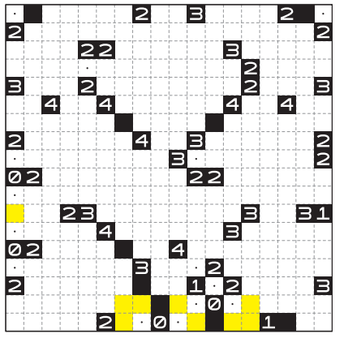
But at least this solution booklet is done now. I'm sorry I'm a bit late but I'm sure you'll understand.

How to solve the Sha(r)kaSha(r)ka.

I love ShakaShaka puzzles almost as much as Slitherlink. They take a little less time to create but are equally fun to solve, and in a similar way. You can apply 'local logic' for almost the entire solution, and often only need to take a more global look once or twice for a breakthrough. And I really like the end result, it's a bit like abstract art.

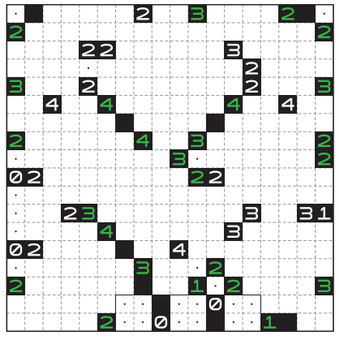


Before we look at the clues we can already identify a few spots that have to be empty, marked in yellow. If we put a triangle in any of these spots, there would be no room to make a full rectangle with it.



Traditionally, empty spots are marked with a dot, so that is what we will do. We'll also put dots on all sides of the 0 clues.

Now we can see new spots that must be empty, marked in yellow. At this point we are merely hunting for places where there is not enough room for a rectangle anymore. By repeated application we can 'flood fill' some areas. Remember, open spaces **must** form rectangles, so we can also expand any L-shapes into rectangles!



We put dots in the yellow spots as before; we can also see that the three areas at the bottom can't be expanded further. We can mark this with lines, showing that the spots next to them must be triangles. The other empty spots could still expand into larger rectangles (1xN for example) so we put no lines around them.

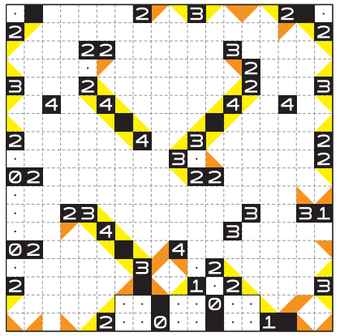
Now let's take a closer look at the clues. Marked in green are some clues that are equal to the number of 'undecided' spots around them. All of those spots must also be triangles.

ShakaShaka was not central to the original card concept and chosen primarily for the (vague) similarity between shark teeth fossils and the black triangles you need to place. What remains of the original theme is that the 'rectangles' in the solution are squares, but this fact is not necessary knowledge for solving the puzzle.

ShakaShaka is an original pencil puzzle from Nikoli, the famous puzzle company from Japan. You used to be able to play all their puzzles on their web site but that is no longer possible. They do, however, sell their puzzle books directly from **https://nikolidirectshop.stores.jp**

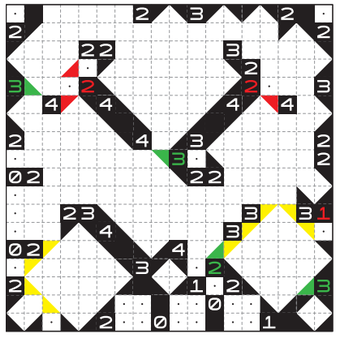
Before we continue, a few general observations.

First, triangles in corner spots can have only one orientation, so those can be filled in. Second, if a diagonal edge of a rectangle hits an obstacle (eg. the edge of the puzzle or another rectangle), it must 'bounce off' and make a corner, so we can fill in the adjacent triangle. Third, if we find some triangles on opposite sides of the same rectangle, we can often fill in extra triangles because these edges must be of equal length: each triangle must be opposed by one.

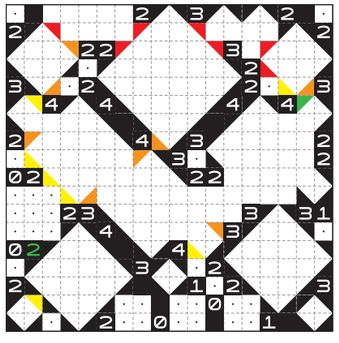


Ok, let's apply this. It so happens that the marked clues all have one or more spots around them that are corner spots. All of these can be filled in with a triangle. The new triangles are shown in yellow.

If we then use the 'bounce' rule a few times, we can also place the orange triangles.



The red clues are now complete so we can put a dot on their remaining neighbour(s). This in turn leads to the placement of the red triangles (both by the bounce and the corner rules). Similarly it is obvious how to complete the green clues because there is only one option for the (green) triangle. Applying the opposite sides rule yields the yellow triangles - this completes two big squares at the bottom (we typically don't put dots in diagonal rectangles).

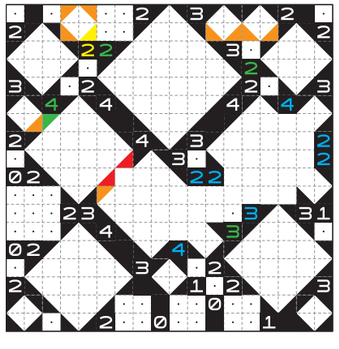


One newly completed clue (green) yields a new dot which in turn gives us a 3x3 rectangle; the green triangle is the only option.

We can then apply the corner (yellow) and bounce (orange) rules to this as well as the newly added triangles.

These in turn let us use the opposite side rule again (red).

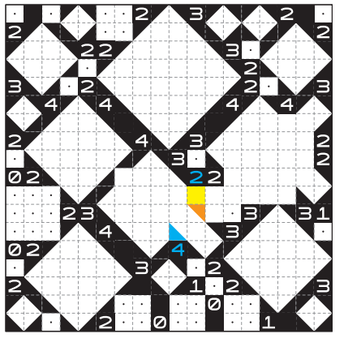
This is starting to come together!



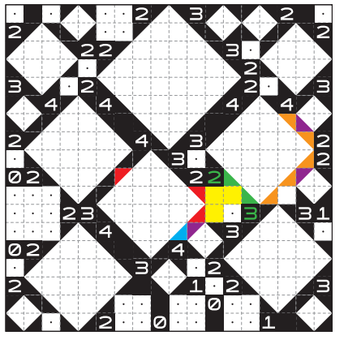
The green clues can now be completed, this yields mostly dots and a single (green) triangle. This in turn lets us complete the yellow clue.

Now the bounce rule gives us the orange triangles; finally, we can use the opposite side rule again for the red triangles.

We're now left with 7 incomplete clues (blue) and a bit of a tricky situation.

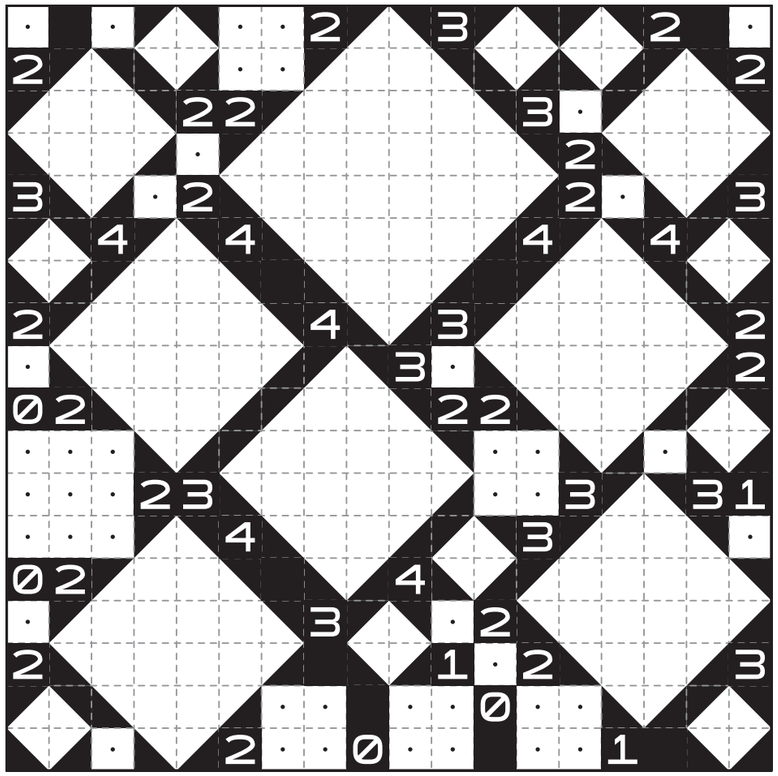


Let's focus on the blue 4 and 2 clues. We know the two adjacent spots must both be triangles. Suppose the triangle above the 4 was as shown. The opposite edge rule would then imply the orange triangle, and this in turn would force the yellow spot under the 2 to be empty, which it can't be. It follows that the blue triangle must slant the other way.



Now everything falls into place. We can first apply the opposite side rule to complete the rectangle (in red). This gives us dots in the yellow spots, which in turn allows us to complete the green clue and the green triangles. We can now complete the rectangle they are a part of with the bounce and opposite edge rules (orange), and the rest (purple) is pretty trivial.

the completed puzzle is shown below.



Conclusion

With this solution booklet I tried to find a balance between explaining enough of the logic while avoiding a tediously long series of steps. I found the colors to be very helpful. I would love to hear your feedback on this.

Just like with sudokus, shakashaka puzzles can require some pretty complex deductions, but this one only needed one moderate deduction at the very end, which was by design - it's easy to get lost in ever more complicated puzzle designs but it has to remain fun and not become a chore to solve. I hope it whetted your appetite and you will try a few more; there are some pretty hard ones out there.

In order to save some time in creating a puzzle that both fit my criteria and had a unique solution, I wrote a program to help me test it. Unfortunately I made a teeny tiny error and my program ended up happily nesting rectangles (this is not allowed!). For a large enough rectangle there are always multiple ways to nest more inside of them, so no wonder it kept telling me there was no unique solution. Luckily I figured that one out before I ran out of time!

As always, do not hesitate to send me feedback - I promise you won't hurt my feelings if you give me pointers to improve things.

Remember, every Christmas card and solution booklet in the series can be found on my website - www.stack.nl/~angelo/