# Sixy SUDOKU

Dear puzzler,

Puzzles are a good way to take your mind off the outside world. And each puzzle solved, no matter how hard or easy, is a small source of satisfaction in these hard times.

So here is my small contribution. I hope these free puzzles will make a pleasant diversion to pass the time through the day.

Sixy Sudoku is a variation I developed last year, and it was first published in *The New York Times* on July 21, 2019. The rules: Insert the digits 1-6 just once in each a) row b) column c) bold outlined area AND d) white and gray areas.

Have fun and take care,

~Peter


Design: Ivo van IJzendoorn

# PUZZLE-SOLVING FIRST AID

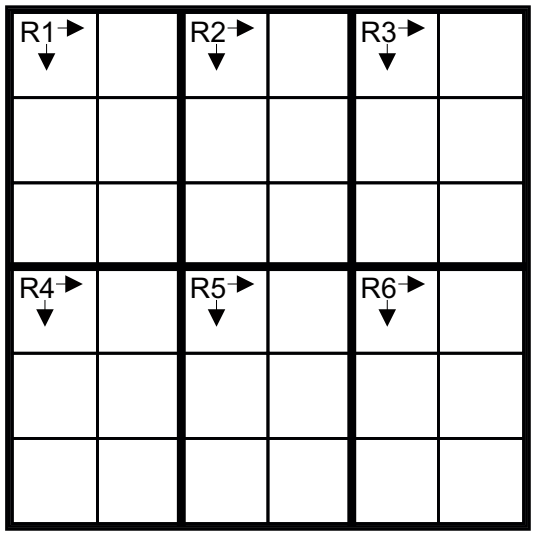
*The rules: insert the digits 1 to 6 in the grid in such a way that each digit occurs just once in each row, column or region.*

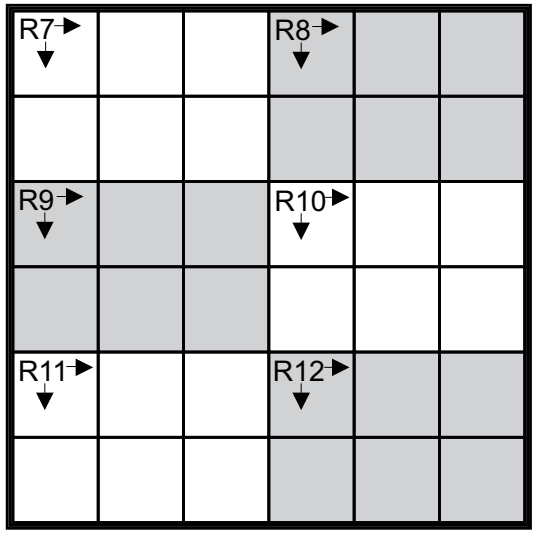
There are twelve regions: regions R1 to R6 are the vertical regions enclosed by a boldface border, regions R7 to R12 are the horizontal white and gray rectangles.

A number of puzzle-solving techniques are reviewed below. Some are simple and can be applied to any puzzle, but others are highly advanced and will only be needed for the most difficult 5 dot puzzles.

1 or 2 dot puzzles can be solved using methods A and B only. In principle the same applies to 3 dot puzzles, but as everyone occasionally misses a trick method C can be very handy. All 4 dot puzzles need trick C several times.

Most important of all: only insert a digit if you are 100% certain that no other digit is possible!



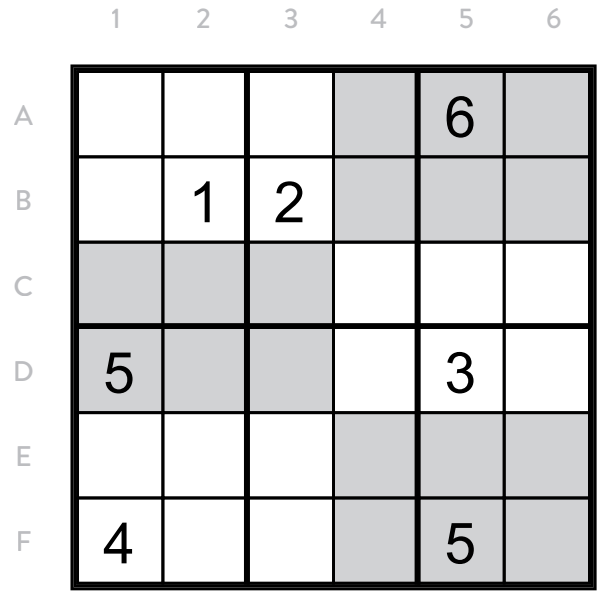
# METHOD A

*The only possibility in a space*

If there is only one remaining possibility for a space, that digit can be inserted immediately. In that case all the other digits must already have been inserted in the row, column or region, or already been eliminated using another technique.

In the puzzle below for example, this applies to the a1 space. In the white region R7 there is already a 1 and a 2, in column 1 a 4 and a 5, and a 6 in row a. Leaving a 3 as the only possibility for a1.

In spite of the simplicity of this method it is easily missed. This particular puzzle can in fact be solved using method A only. Try it for yourself, without using Methods B to E!



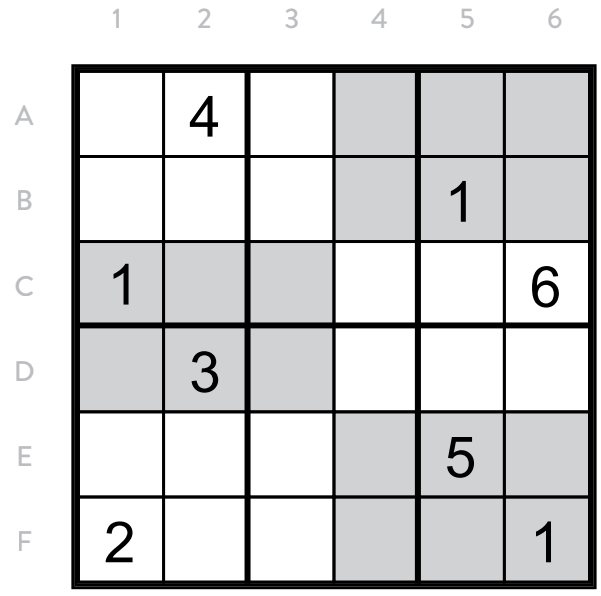
# METHOD B

*No other place for the digit*

One method which can often be applied is to check whether there is perhaps only one space left in a particular row, column or region in which a particular digit can be inserted. This method works in row a for example, where the only space left for a 1 is a3.

Another example: the only space left for a 6 in column 5 is f5, because the 6 in c6 is located in both R3 as R10.

Method B can be applied to regions as well: the only space for a 3 in region R6 is e6 (there is a 6 in f5). After which there is only one space left for a 2 in R12...



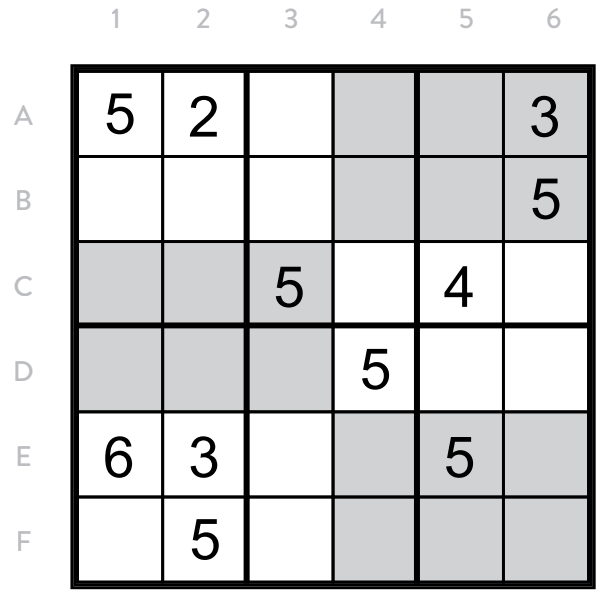
# METHOD C

*Certain uncertainties*

Sometimes it helps if you know approximately where a digit should be inserted.

For instance in row a the 4 has to be inserted in a3 or a4. Since both spaces are in region R2, the 4 can no longer be inserted in the other spaces of that region. If a 4 is inserted in b4 for example, it will no longer be possible to insert a 4 anywhere in row a. It follows from this that the only space in which a 4 can be inserted in gray region R8 is a4.

Another example: in column 3 a 2 has to be inserted in d3, e3, or f3. Since all three spaces are located in region R5, it is no longer possible to insert a 2 in e4. Leaving a 1 as the only possibility for e4 (we entered a 4 in a4).



# METHOD D

*Digit groups*

In the puzzle below, only the 1, 4 and 6 can still be inserted in b3 and b5 using method A. And in b4 only the 1 and 6. They cannot therefore be inserted in the remaining spaces of that row. Which means that in column 1 the 1 has to be inserted in a1.

Here it was a matter of three digits in three spaces, but the same reasoning applies to two digits and two spaces or four digits and four spaces.

Suppose in another puzzle that it is only possible to insert a 2 or a 3 in a1, a 3 or a 4 in a2, a 3 or 5 in a3 and in a4 a 2, 4 or 5. This means that for those four spaces (a1, a2, a3, a4) there are only four possible digits available (2, 3, 4, 5). Which means it is no longer possible to insert a 2, 3, 4 or 5 in a5 or a6!

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | | | | 5 | 3 | |
| B | | | 146 | 16 | 146 | 2 |
| C | 4 | | | 3 | | 5 |
| D | | | | 4 | 2 | |
| E | 2 | 4 | | | | 3 |
| F | | 1 | 3 | 2 | | |

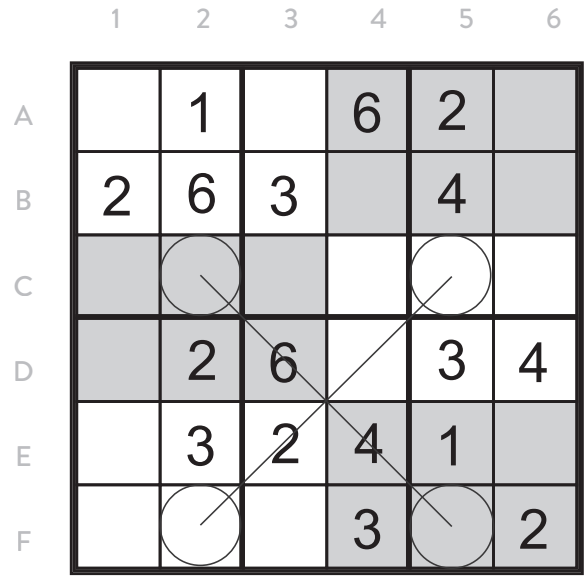
# METHOD E

*X-wing*

One advanced method is referred to as the 'X-wing'. In the following puzzle the 5 can only be inserted in column 2 in c2 or f2. In column 5 the 5 can only be inserted in c5 or f5. If a 5 is inserted in column 2 in c2, it follows that the 5 in column 5 goes to f5. And if it is inserted in f2, the 5 in column 5 is inserted in c5. Connecting the combinations by a line produces an X, hence the name X-wing.

Now that a 5 has been inserted in either f2 or f5, it is no longer possible to insert a 5 in any of the remaining spaces of row f (or row c). Which means that the only possibility for f3 is a 1!

X-wings occur far more frequently in Sixys than in standard 9x9 sudoku.



# IN CONCLUSION

The methods described here are sufficient to solve all the puzzles in these free booklets. Most puzzles can be solved with less. Having said that however, discovering an X-wing in a simple puzzle can be a lot of fun, even if you do not need it.

There are other methods out there. Most are variations on the ones described above. But we prefer to let you discover them for yourself!