How to Solve Sudoku

Rules

1. Place a number from 1 to 9 in each empty cell.
2. Each row, column, and 3x3 block bounded by a bold line (nine cells) contains all the numbers from 1 to 9.

Some Techniques for Higher Sudoku

The essence of solving difficult Sudoku comes down to knowing how to establish which numbers cannot be entered into a given cell. With the aid of examples, let me introduce some intermediate and advanced techniques for ferreting out these numbers. Let it serve as a warm-up.

1 Compound-A

Since a 3 must go into either of the gray cells in the top-center block, the crosses cannot be 3's.

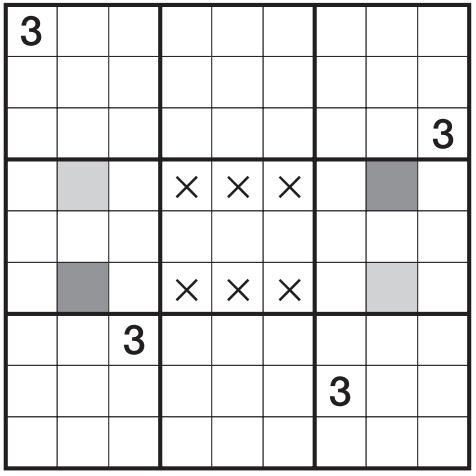
								3
×	×	×						
			1		2			
				3				

[Ex.] Since a 5 must go into either of the gray cells, the crosses cannot be 5's. This means the bold cross is a 9.

	5		6	4	8	3	7	2
8	4	7	×	3	2		1	6
		6	×				8	4
7		2	4			6	5	8
	1	4		8	6	2	3	7
6	8			2	7	1	4	9
4	6		×			8		
2	7		8	6		4	9	5
		8	2		4	7	6	

2 Compound-B

Since 3's must go into either the two light gray cells or the two dark gray cells, the crosses cannot be 3's.

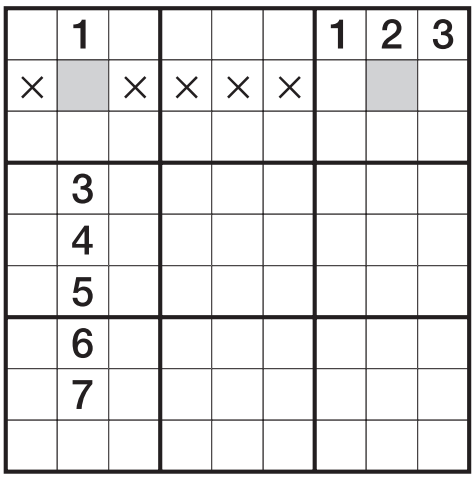


[Ex.] Since 4's must go into either the two light gray cells or the two dark gray cells, the crosses cannot be 4's. This means the bold cross is a 7.

4						9	2	8
6	9	3	1	8	2	5	7	4
8	7	2	9	4	5	3	1	6
	8		×	×	×	7		
1	3		8	×	**×**	6		2
		6				8	3	
3	4	8	6	2	9	1	5	7
			5	3	8	4	6	9
5	6	9				2	8	3

3 Full Capacity (two numbers, row)

When an X amount of cells must be filled with the same X amount of numbers, other numbers cannot be entered into those cells. An 8 and a 9, not necessarily in that order, must go into the two gray cells, so the crosses are neither an 8 or a 9.

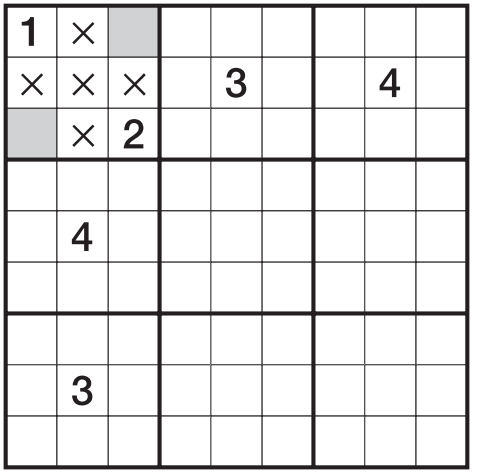


[Ex.] A 2 and a 6 (not necessarily in that order) must go into the two gray cells, so the crosses are neither of those numbers. This means the bold cross is a 1.

7	9	1		4		3		
	×	8	×	**×**	×	7	×	
	3			7			1	4
1		7		5				3
3	2		7	9	8	5	6	1
5		9				4	7	
8	1	6	9	3	7	2	4	5
4	7	3	5	2	1	6	8	9
9	5	2		8		1	3	7

4 Full Capacity (two numbers, block)

A 3 and a 4 (not necessarily in that order) must go into the two gray cells, so the crosses are numbers other than 3 and 4.

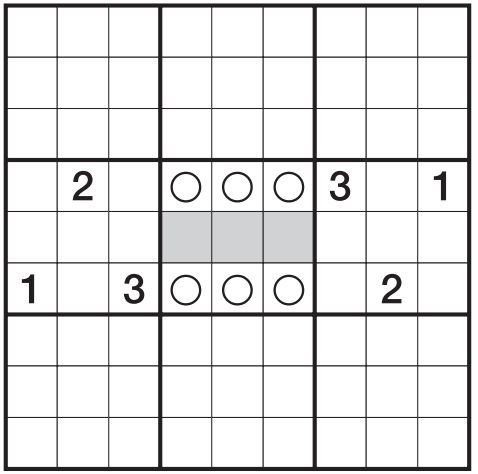


[Ex.] A 5 and an 8 (not necessarily in that order) must go into the gray cells, so the crosses are a 1 and a 2 (not necessarily in that order). This means the circle is a 2.

		9	7	5	8	6	4	2
7	8	5	4	2	6	3	1	9
2	6	4		1		8	5	7
		3		9	×		7	6
6	7			4	×		9	3
9	5	2	6	3	7	4	8	1
		6	○	8		7	3	
		7		6		1	2	
	2			7	5	9	6	

5 Full Capacity (three numbers)

Same principle, but Full Capacity involving three numbers is easy to miss and merits special mention. Below, the numbers 1 to 3 (not necessarily in that order) will go into the gray cells. This means the circles are other numbers.



[Ex.] Since the top-left block and the bottom-most row each contain the numbers 2, 3, and 9, the three gray cells will be filled with the numbers 2, 3, and 9 (not necessarily in that order). This means the circle is a 6.

		2	7	4				
	9				3		2	
	3							1
	○	7	4					5
				6				
5					8	6		
1							8	
	5		8				6	
				2	9	3		

6 Diagonals

9's must take the place of either the two white stars or the two black stars. Either way, there will be a 9 in each row so the crosses cannot be 9's.

		1				8		
		2				7		
×	×	☆	×	×	×	★	×	×
		3				6		
		4				5		
×	×	★	×	×	×	☆	×	×
		5				4		
		6				3		
		7				2		

7 Tight Couple

The gray cells must be filled with 8's and 9's. If the white stars are the 8's, then the black stars are the 9's, and vice versa. Either way, the cross shares a row with a white star and a column with a black star, so it is neither an 8 nor a 9.

	1							
	2							
	3							
	4							
	☆						×	
	5							
	★							
	6							
1	7	☆	5	4	3	2	★	6

[Ex.] In the fourth row from the top and the bottom-most, 4's can only go into the gray cells. Since 4's must replace either the two white stars or the two black stars, the crosses are not 4's. This means the circle is the 4 in the top-most row.

○	×	3	×	2		7		9
	×		×				4	
	5		×		4			
9	☆	6	★	1		2		
	×		×					
	×	2	×	6		9		4
	×		3				8	
	8		×				9	
7	★	1	☆	9		6		

[Ex.] The white stars and the black stars must each be a 4 or a 5. Due to their relative positions, if the white stars are the 4's, then the black stars are the 5's, and vice versa. Either way, the circle is neither a 4 nor a 5. This means it's an 8.

8	7	6	2	1	☆	★	9	3
1	2	3	6	★	9		○	7
9	5	4	7	3	8	6	1	2
6	3	8	5	7	1	9	2	4
7	9	5	4	8	2	1	3	6
4	1	2	9	6	3		7	
3		9	1	☆	7	2	6	
5		1	3	2	6	7		9
2	6	7	8	9	★	3	☆	1

8 Hamada Logic

Named after Mr. Tsuyoshi Hamada, originator of this logic. The gray cells must be filled with a 1 or a 9. Due to their relative positions, the white stars will be the same number. But since a 9 will take the place of one of the circles, the white stars cannot be 9's and are therefore 1's.

	1							2
	○							☆
	2							3
	3							4
	4							5
	5							6
	6					2	3	★
	○					☆	4	7
	7					5	6	8

[Ex.] The gray cells must be filled with a 1 or a 7. If the white stars are 1's, then the black stars are 7's, and vice versa. Since a 7 will take the place of one of the circles, the white stars cannot be 7's and are therefore 1's. The black stars are the 7's.

○	5	6	9	4	8		2	☆
4	9	1	2	5				8
○	2	8	☆	6		9	4	5
5	1	7	6	3	4	2	8	9
6	4	9	8	1	2	7	5	3
8	3	2	5	7	9			4
1	7	4	3	8	6	5	9	2
2	8	3	★	9	5	4	☆	6
9	6	5	4	2	☆	8	3	★