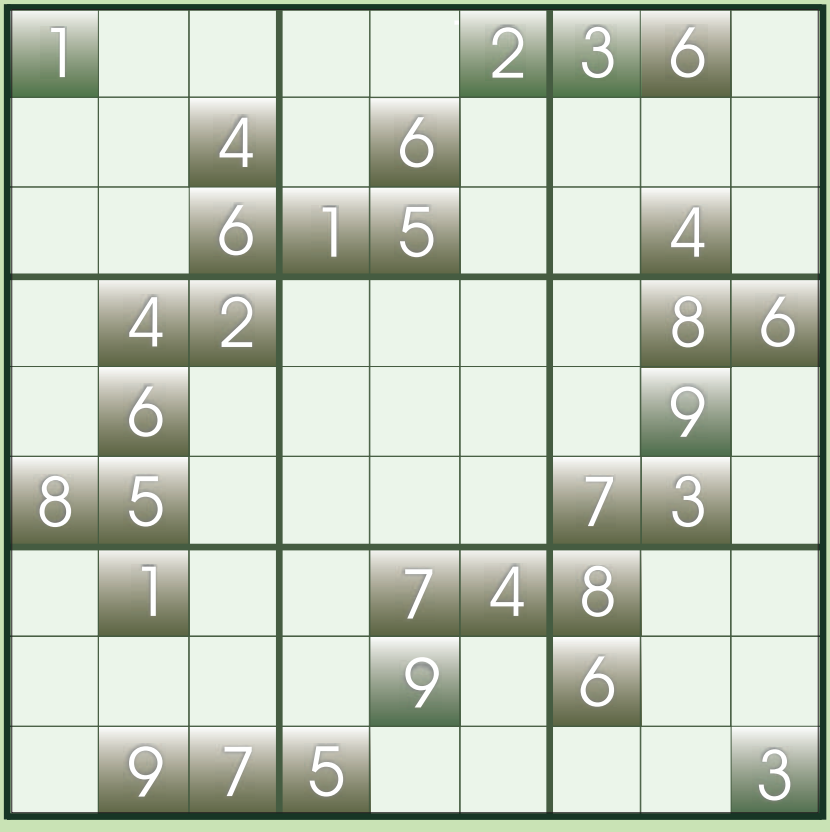
21 Quik Tips To Solve

SUDOKU



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By

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(Edited by Ganesan)

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From the Desk of Richard J. Runion Date: 30th Aug 2007
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Sudoku Village
http://www.SudokuVillage.com

Dear Sudoku Enthusiast,

Thank you for downloading this Sudoku eBook of Quik Tips.

Why should you solve Sudoku? The most common reasons given by people are:

- "It's a great way to start the day".
- "It boosts my self esteem; makes me confident about my mental abilities".
- "It helps me keep my faculties sharp, particularly as I grow older".
- "It's one of the best pastimes; it helps me relax when I'm tensed, at home/ office".
- "Sudoku comes up for discussion in social circles; I don't want to look like a dumb ass, keeping quiet when everyone else talks".

You may be pleased to know that Sudoku Village (in association with Geostar Publishing & Services LLC) has, in the last 2 years,

- Published 2 eBooks on Solving Sudoku,
- Published one eBook on Speedy solving of Sudoku,
- Hosted a free website from where you can send and receive Sudoku by email,
- Hosted a software to help make your online Sudoku solving experience easy,
- Published 70+ weekly issues of a Sudoku eMagazine of Sudoku puzzles and

games,

- Run a blog of the free version of this eMagazine for over a year,
- Sent, for almost a year, free Sudoku by email,
- Offered a free printable blank Sudoku sheet in PDF form,
- Sent by email, 2 free Sudoku Tips Newsletters (this eBook in your hands is its new avtar),
- Published Sudoku Puzzles in 'easy to carry and use' pad form,
- Run a Sudoku Online Contest for over a year carrying a Cash Prize of US$5 every day,

...and a lot more of Sudoku-related activities, and plans to do still more. (We welcome your ideas and suggestions!)

What you have in front of you, now, is a free eBook - I hope you got it free, too. You can distribute it freely to your friends and relatives (of course, without altering the contents). Or you can advice them to download it at: http://www.sudokuvillage.com/FreeSudokueBook.php. I didn't send it to your email id; I just let you download it. I needed your email id only to send you the daily Sudoku and weekly eMagazines (and you can unsubscribe from them anytime you like). So, I also don't need the names or email ids of the people to whom you send it. No strings attached, whatsoever!

This eBook will attempt to quickly teach you how to solve Sudoku puzzles. It contains the essence of the 2 eBooks Sudoku Village has published on 'How To

Solve Sudoku Puzzles', the best selling eBooks on this subject, two years running. This is the first and only eBook to this date (as far as I know) that attempts to teach everything there's for you to know about how to solve all Sudoku puzzles, whether you're a Sudoku beginner or a buff.

A small sampling of the 100's of testimonials received for our eBooks:

> When I bought your eBook, I didn't know anything about Sudoku puzzles and needed help on how to approach these puzzles. From the eBook, I learnt that I could solve any puzzle.
>
> Right now, I've completed medium level puzzles.
>
> Rosemarie Franco, of Mahopac, NY

> I can't think of any way that this ebook could be improved. I'm looking forward to lots of improvement in my speed in the next month. I think learning the new techniques to solve faster, and doing the exercises will definitely improve my speed. The numerous exercises, in this eBook, have surpassed my expectations; practice makes perfect.
>
> Dawn Hopkins
>
> Backus, MN

However, no 'Quik eBook' can be expected to teach you all there's to know ever on any subject. Nor does this eBook claim to do that. This eBook is enough to get you started, and know all there's for you to know broadly about how to solve

Sudoku puzzles.

If you develop deeper interest, and want to learn more,... if you feel like utilizing the many FREE services, or buy one or more of the paid Sudoku eBooks or other products of Sudoku Village, you're most welcome. But that's purely your choice. You're not in any way obligated to subscribe to any of Sudoku Village's free services, or to buy anything from Sudoku Village. Ever.

Of course, I'll be very happy to welcome you to be a part of Sudoku Village. Membership at Sudoku Village is free. You get many Sudoku products and services free here. There are a few paid products as well, and I'd welcome you to buy any of them if you like, as this will help us expand our free activities at Sudoku Village, to include more services and to reach more Sudoku enthusiasts.

I keenly look forward to meeting you at Sudoku Village, our free Sudoku community site (http://www.SudokuVillage.com)

Till then,

Rich. :~)

We will refer to each square by its (row number, column number). So, the Sudoku Puzzle's cell addresses are:

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)	(1,7)	(1,8)	(1,9)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)	(2,7)	(2,8)	(2,9)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)	(3,7)	(3,8)	(3,9)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)	(4,7)	(4,8)	(4,9)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)	(5,7)	(5,8)	(5,9)
(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)	(6,7)	(6,8)	(6,9)
(7,1)	(7,2)	(7,3)	(7,4)	(7,5)	(7,6)	(7,7)	(7,8)	(7,9)
(8,1)	(8,2)	(8,3)	(8,4)	(8,5)	(8,6)	(8,7)	(8,8)	(8,9)
(9,1)	(9,2)	(9,3)	(9,4)	(9,5)	(9,6)	(9,7)	(9,8)	(9,9)

There are 9 rows: Cells (1,1) to (1,9) are in row 1; Cells (4,1) to (4,9) are in row 4.

There are 9 columns: Cells (1,3) to (9,3) are in column 3; Cells (1,9) to (9,9) are in column 9.

There are 9 major squares: Cells (1,1) to 1,3), (2,1) to (2,3), and (3,1) to (3,3) are in the top left major square. Cells (4,4) to (4,6), (5,4) to (5,6), and (6,4) to (6,6) are in the middle major square. Cells (7,7) to (7,9), (8,7) to (8,9), and (9,7) to (9,9) are in the bottom right major square.

Each cell in a major square is of the same background color.

Some cells in the puzzle are filled with what appear to be a few random numbers in the range 1 to 9. You should fill the rest of the cells with the numbers, 1 to 9.

So, what's the challenge?

(1) The numbers 1 to 9 MUST occur once in each of the 9 rows, but not repeat.

(2) The numbers 1 to 9 MUST occur once in each of the 9 columns, but not repeat.

(3) The numbers 1 to 9 MUST occur in each of the 3X3 major squares, but not repeat

While we teach you how to solve Sudoku, When we say, for example, (3, 2) ->4, we mean that Cell (3, 2), (i.e., the cell in row 3 & column 2) takes the value '4'. A typical Sudoku puzzle will look like this:

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

And a typical solved Sudoku puzzle will look like this:

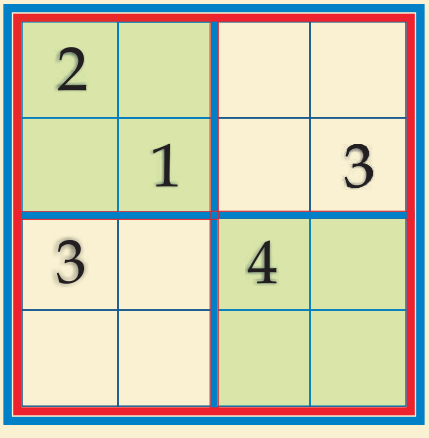
1	7	3	6	9	8	2	4	5
8	9	6	4	2	5	3	1	7
2	4	5	1	3	7	9	6	8
5	2	4	7	8	1	6	9	3
6	3	8	9	4	2	7	5	1
7	1	9	3	5	6	4	8	2
3	8	7	5	6	9	1	2	4
9	5	1	2	7	4	8	3	6
4	6	2	8	1	3	5	7	9

Let's quickly see the 21 Tips that will help us solve every Sudoku!

Tip #1: If you're very old, or very young, or find it difficult to learn to solve Sudoku, for some reason, then, first learn to solve a 2 X 2 X 2 Sudoku SAP (Simple As Possible) puzzle.

Sudoku has 3*3 (=9) major squares, each consisting of 3*3 (=9) minor squares, multiplying to a total of 81 squares, right? We call this Sudoku of Order 3 (viz., 3 rows, 3 columns, and 3 major squares of 3X3 cell groups), for simplicity of our understanding.

Let's see if we can create a simpler, yet practical Sudoku of a lower Order. Indeed, we can, and it is of Order 2 (2 rows, 2 columns, and 2*2 major squares). This has only 16 squares, with numbers from 1 to 4 to be filled in. Much simpler than having to fill 81 squares, isn't it?



(i) (3,2) -> '2' (Because Row 2 has the numbers '3' and '4', Column 2 has the number '1' already.)

(ii) (3,4) -> '1' (Because Row 3 has '3', '2' and '4' already.)

(iii) (2,1) -> '4' (Because Column 1 has '2' and '3', Row 2 has '1' and '3' already.)

(iv) (4,1) -> 1 (Because Column 1 has '2', '4' and '3' already.)

(v) (1,2) -> 3 …Can you figure out the reasons for this and the ones below?

(vi) (4,2) -> 4 …

(vii) (1,3) -> 1 …

(viii) (1,4) ->4 …

(ix) (2,3) -> 2 …

(x) (4,3) -> 3 …

(xi) (4,4) -> 2 …

2	3	1	4
4	1	2	3
3	2	4	1
1	4	3	2

Got the hang of it? This is the broad approach to solving Sudoku SAP, and regular Sudoku. Of course, when we proceed to solve the regular 3X3X3 Sudoku, it will get more difficult, and we'll see how to solve them.

Tip #2. There are 2 broad methods to solve Sudoku:

(i) The Conventional Method, and

(ii) The Possibility Matrix Method.

You can solve any given Sudoku by any method of your choice.

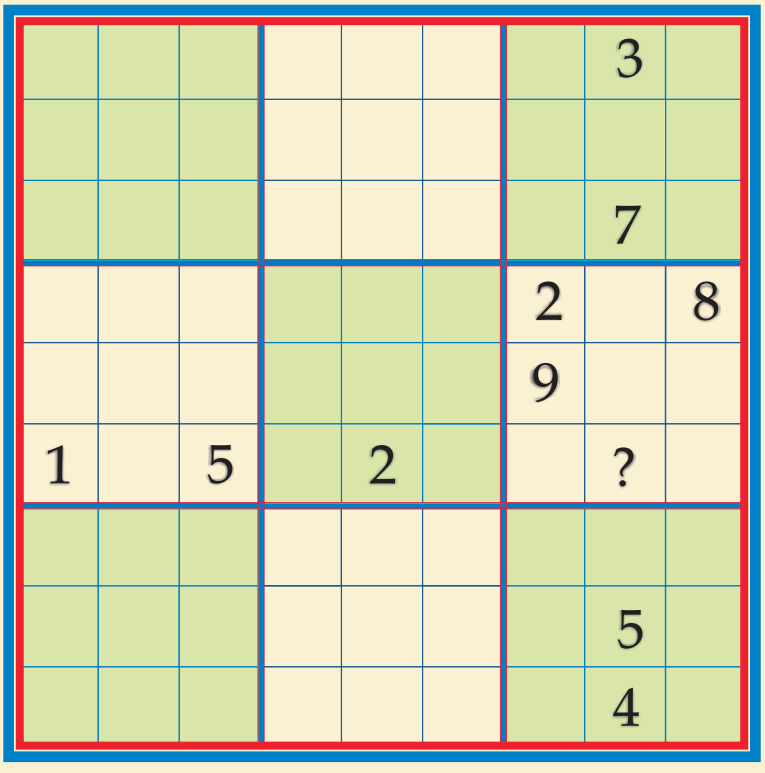
Each of these 2 methods has its relative merits and demerits (which are beyond the scope of this Quik Tips eBook). Learning both the methods will equip us better to solve ANY sudoku.

(To know more about the relative merits and demerits, you may have to refer to the first volume of the paid eBook. If you buy Volume 1 of the eBook, you'll get Volume 2 of the eBook as a free bonus, at http://www.SudokuVillage.com/bgn.php . The purchase also comes with a 90-day unconditional guarantee.)

While youth and challenge-seekers of all ages prefer the Conventional Method, senior citizens, and those who find it difficult to learn to solve Sudoku through the Conventional Method normally enjoy learning and solving, using the Possibility Matrix Method. If you belong to the second category, I recommend that you read Tips #16 to #19 first, then try Tips #3 to #15, and finally, Tips #20 and #21.

Tip #3. Naked Singles Approach

Let's start with the obvious. If there's a Cell that can obviously take one and only one value, we could fill it with that value.

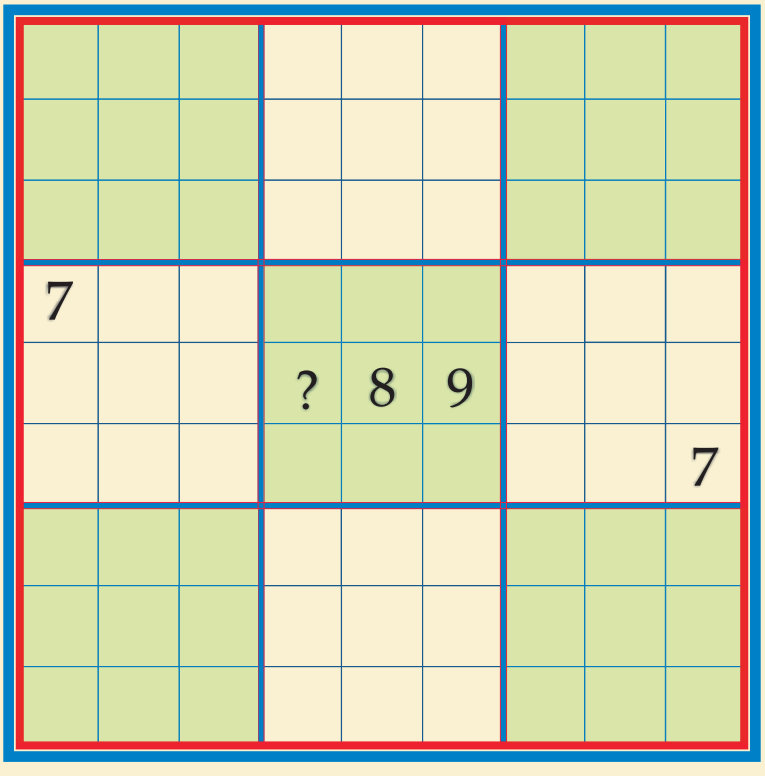


What values can Cell (6,8), marked '?' in black take? Obviously nothing other than '6'. So you can fill it with the value '6'. This is called the 'Singles' or 'Naked Singles' Approach.

> Pattern to look for: Intersection of well-populated "Row - Column - Major Square".

Tip #4. Hidden Singles Approach

If a certain value is required in a Row/ Column/ Major Square, but except for one Cell the other Cells in that Row or Column or Major Square can either not take the value because of the occurrence of the value in the respective 'other Rows/ Columns/ Major Squares' or if the other prospective Cells are already filled with other values, we could fill that particular Cell with that value.



Rows 4 and 6 already have '7's. Row 5 doesn't yet have one. The '7' in Row 5 can't be in the Mid Left or Mid Right Major Squares as there are '7's in them already. This leaves us with only 3 candidate squares, viz., Cells (5, 4), (5, 5) and (5, 6). However, (5, 5) and (5, 6) are already

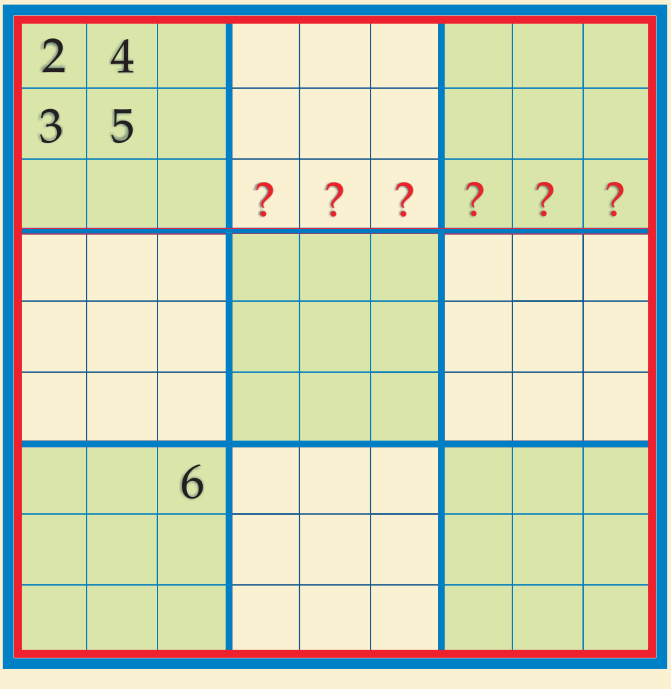
filled with other values. So, the value '7' for Row can only be placed in Cell (5, 4) marked '?' in black. This is called the 'Hidden Singles' Approach.

Pattern to look for : Occurrence of a value in 1 or 2 Major Square(s) and its non-occurrence in another Major Square that doesn't have that value yet, all these Major Squares being placed vertically/ horizontally in one set of Rows/ Columns.

Tip #5. Direct Interaction Approach

Sometimes, even if a certain value is not yet there in a Row (or Column), you can still eliminate that value as a possibility from a set of Cells in that Row (or Column). This is because we may not yet have reached the stage where we can assign that value to any specific Cell in that Row (or Column), but yet, from the interactions with a Major Square, and from the occupied values in other Cells in the Row (or Column), it is clear that soon a Cell in that Row (or Column) would definitely take that value. So, you can rule out the chances of other Cells in that Row (or Column) taking the same value.

Let's learn this thru an example:



Cells (3,4), (3,5), (3,6), (3,7), (3,8) and (3,9), marked '?' in red, can't take the value '6'.

Why? Because, the Top Major Square still needs a '6'; and leaving out the already occupied Cells and the Cells in column 3 (because Column 3 already has a '6') in the Top Major Square, the only 2 possible positions for the value '6' are Cells (3, 1) and (3, 2). In either case, no other Cell in Row 3 can take the value '6'.

This is called 'Direct Interaction' or 'Row/Column-Major Square Interaction' or 'Row/Column-Block Interaction' Approach.

Pattern to look for: A Rectangular pattern of Cells filled up in a Major Square; a particular value not yet filled up in the above Major Square being found on one side of it horizontally or vertically, in the Row/ Column that has Cells to be filled in.

Tip #6. Indirect Interaction Approach

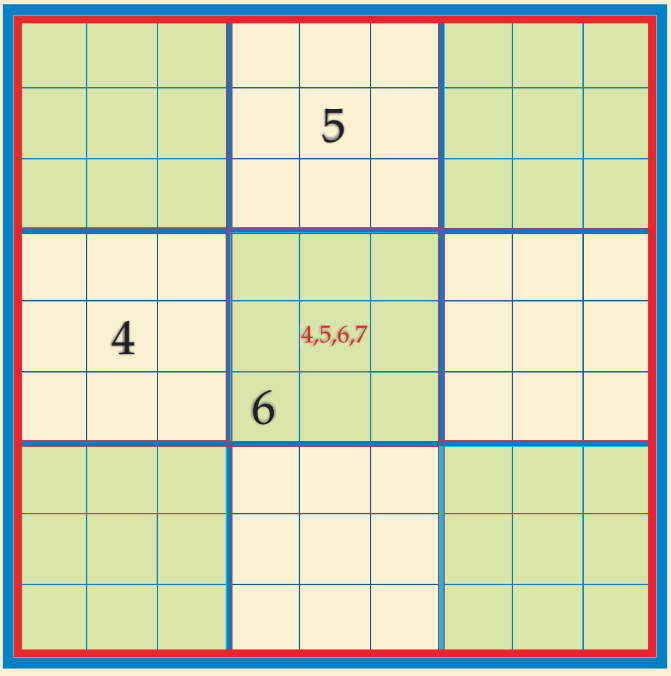
						2	9	8
		5						
						1	?	?
						?	?	?
						?	?	?
						?	?	?
						7	8	?
						4	?	3
5								

Here, both the Top Right and Bottom Right Major Squares still need a '5'. Given the puzzle above, the only candidate Cells for '5' in the Top Right Major Square are Cells (3, 8) and (3, 9). And the only candidate Cells for '5' in the Bottom Right Major Square are Cells (7, 9) and (8, 8). Whichever of these Cells takes the value '5' in these 2 Major Squares, it is clear that there's no place for another '5' in these 2 Columns in the Mid Right Major Square. So, we can eliminate the possibility of value '5' from being allotted to Cells (4, 8), (4, 9), (5, 8), (5, 9), (6, 8), and (6, 9), all marked '?' in red. And '5' in this Major Square can only appear in one of the 3 Cells (4,7), (5,7) and (6,7), marked '?' in black.

This is called 'Indirect Interaction' or 'Major Square-Major Square Interaction' or 'Block-Block Interaction' Approach.

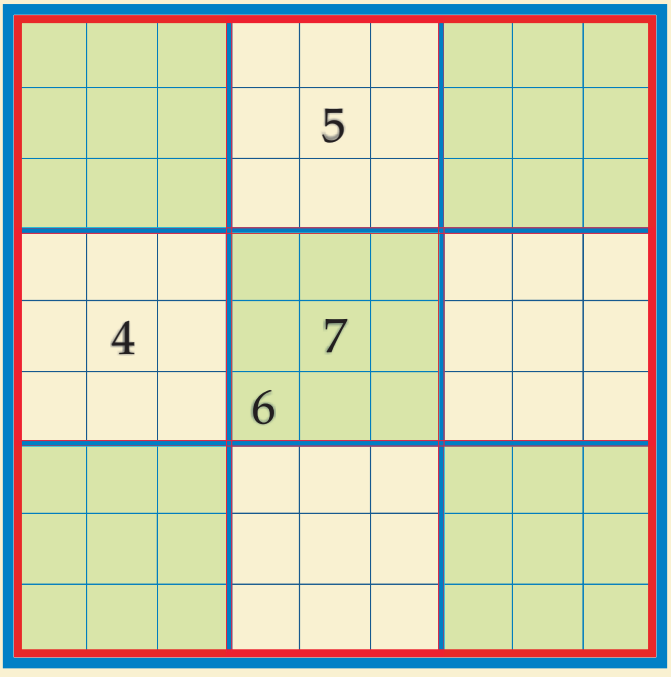
Pattern to look for: There are 3 Major Squares, all at the Top/ Middle/ Bottom/ Left/ Centre/ Right. All these 3 Major Squares still need a certain value, which is actually present in a Major Square perpendicular to (i.e., by the side of) two of them.

Tip #7. Reduction Approach



Let's say that through inference we know that Cell (5,5) can only take the values {4,5,6,7}, and the values '4, '5', '6' were obtained subsequently

Now, Cell (5,5) can take only the value '7', as below.



This is called the 'Reduction' Approach.

Pattern to look for: When any values have been arrived at just now, all the unfilled Cells in the Row, the Column and the Major Square that the newly arrived at value is in are potential candidates for Reduction..

Tip #8. Naked Groups Approach

If, among the possible set of values that certain Cells can take, a certain subset of values will necessarily have to be shared only among certain Cells, then, you can rule out these values from the other Cells.

Let's see this thru an example:

In a Row, there are 4 Cells yet to be filled in. And the possible values in these Cells are:

{1,2}, {1,2}, {1,2,3,4}, and {1,2,3,4}.

Whereas the Cells with the possible values {1,2,3,4}can take any one of the 4 values, there are 2 Cells that can only take one of 2 values '1' or '2'. Either of the Cells can take the value '1' and the other can take the value '2'. This means that, in either case, the other 2 Cells cannot take the values '1' and '2'. So, you can eliminate these values from the possibilities for these Cells and so, the set of possible values reduces to:

{1,2}, {1,2}, {3,4}, and {3,4}.

In a slightly more complex form, a similar situation could be as below:

{1,2,3}, {1,2,3,4,5}, {1,2,3}, {1,2,3,6,7}, {1,2,3,4,6}, {1,2,3,5,7}, and {1,2,3}.

And this will reduce to:

{1,2,3}, {4,5}, {1,2,3}, {6,7}, {4,6}, {5,7}, and {1,2,3}.

This is called the 'Naked Groups' or 'Naked Subsets' Approach. This approach can be applied to Rows, Columns as well as Major Squares.

Pattern to look for: There are 3 or more unfilled Cells in a Row/ Column/ Major Square, and they share 3 or more possible values among themselves. Of these, 2 or more Cells can take exactly the same set of values.

Tip #9. Hidden Groups Approach

This is very similar to the previous Approach. Here, among the possible values that a certain set of Cells can take, the subset of values that will necessarily have to be shared only among certain Cells is not apparent but has to be deduced. Here again, you can rule out these values from the other Cells.

Let's slightly modify the example above and see how and when to apply this:

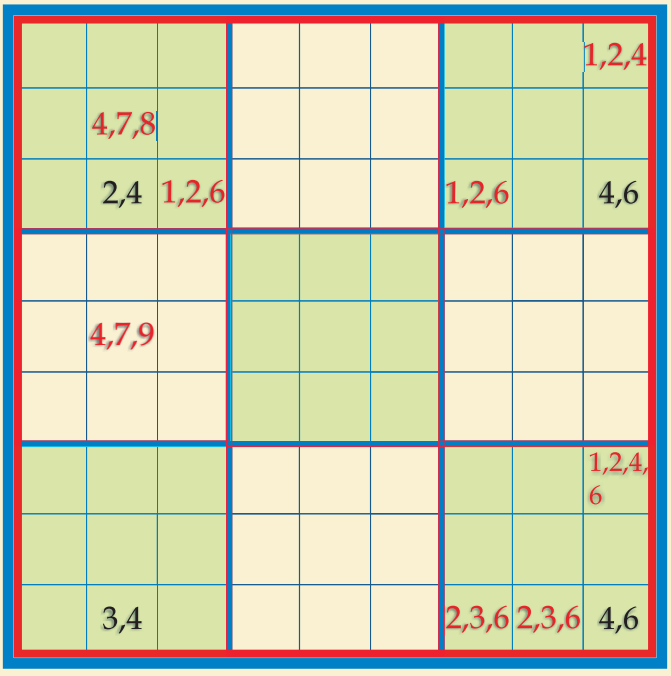
Let's say 7 Cells can take the following possible values:
{1,3}, {1,2,3,4,5}, {2,3}, {1,2,3,6,7}, {1,2,3,4,6}, {1,2,3,5,7}, and {1,2}.
We can see that still, the red-colored Cell-values means that these 3 Cells can take no value other than '1', '2' and '3' among them. This means that these values are not available to the other Cells. So, you can reduce this also to:

{1,3}, {4,5}, {2,3}, {6,7}, {4,6}, {5,7}, and {1,2}.

This is called the 'Hidden Groups' or 'Hidden Subsets' Approach. This approach can also be applied to Rows, Columns as well as Major Squares.

Pattern to look for: There are 4 or more unfilled Cells in a Row/Column/ Major Square, and they share 3 or more possible values among themselves, though in the form of subsets.

Tip #10. X-Wing Approach



In this case, if Cell (3, 2) takes the value '4', then, Cell (3, 9) can't take the value '4'. And Cell (9, 2) can't take the value '4' either. This leaves us with Cell (9,9) taking the value '4'.

Likewise, if Cell (3,9) takes the value '4', then, Cell (9,2) will also take the value '4'.

So, either Cells (3, 2) and (9, 9) or Cells (3, 9) and (9,2) take the value '4'.

In either case, no other Cell in these 2 Columns can take the value '4'.

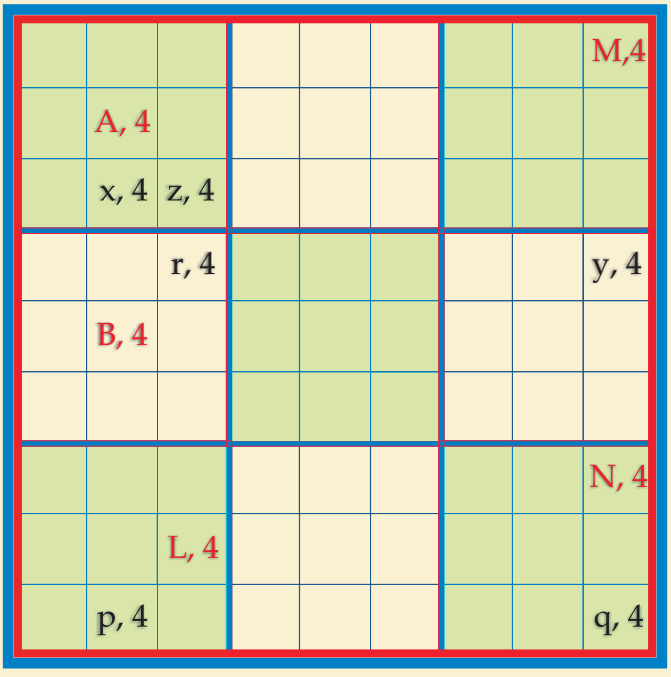
You can eliminate the value '4' from the possible sets of values {4,7,8} and {4,7,9} in Column 2 and {1,2,4} and {1,2,4,6} in Column 9 respectively. This reduces them to {7,8} and {7,9} in Column 2 and {1,2}

and {1,2,6} in Column 9 respectively. (i.e., More generically, {A, 4}, {B, 4}, {M, 4} and {N, 4} reduce to: ({A}, {B}, {M} and {N}).

This is called the X-Wing' You can have the Rows and Columns interchanged here, and this approach is still applicable.

Pattern to look for: A certain value that can be taken by only one of 2 Cells in a certain Row, and the same value can be taken by only one of 2 Cells in the same Columns in another Row. That is, four Cells falling in 2 identical Rows and Columns share a prospective value. (This is also true of Four Cells falling in 2 identical Rows and Major Squares, OR, in 2 identical Columns and Major Squares).

Tip #11. Sword Fish Approach



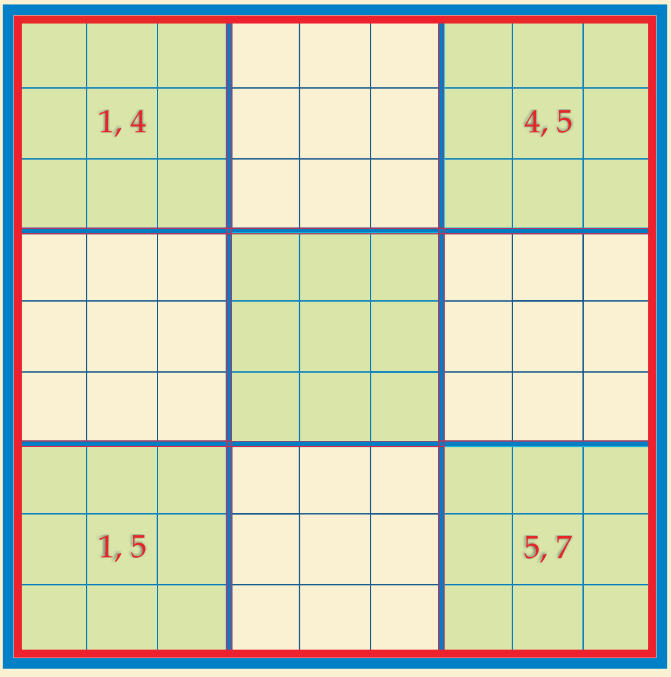
Where 'x', 'y', 'z', 'p" 'q', and 'r' are any values (and 'A', 'B', 'M', 'N', and 'L') are any sets of values, and '4' is not a possible value in any other Cell in these Rows (3, 4 and 9), you can eliminate the value '4' from the possible sets of values ({A,4}, {B,4}, {M,4}, {N,4}, and{L,4}) in all other cells in these Columns.

So, ({A,4}, {B,4}, {M,4}, {N,4}, and{L,4}) will reduce to ({A}, {B}, {M}, {N}, and{L}).

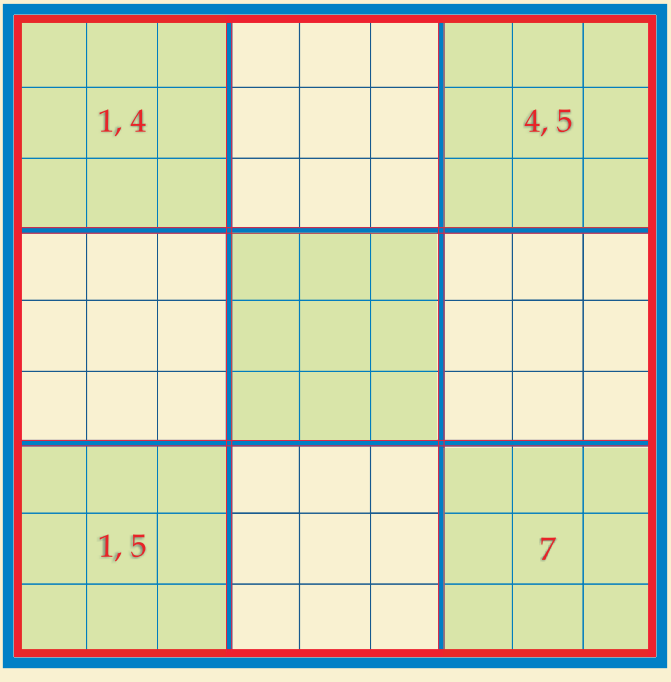
This is called the 'Sword-Fish' Approach. You can have the Rows and Columns interchanged here, and this approach is still applicable.

Pattern to look for: Six Cells falling in 3 identical Rows and Columns share a prospective value.

Tip #12. XY-Wing Approach



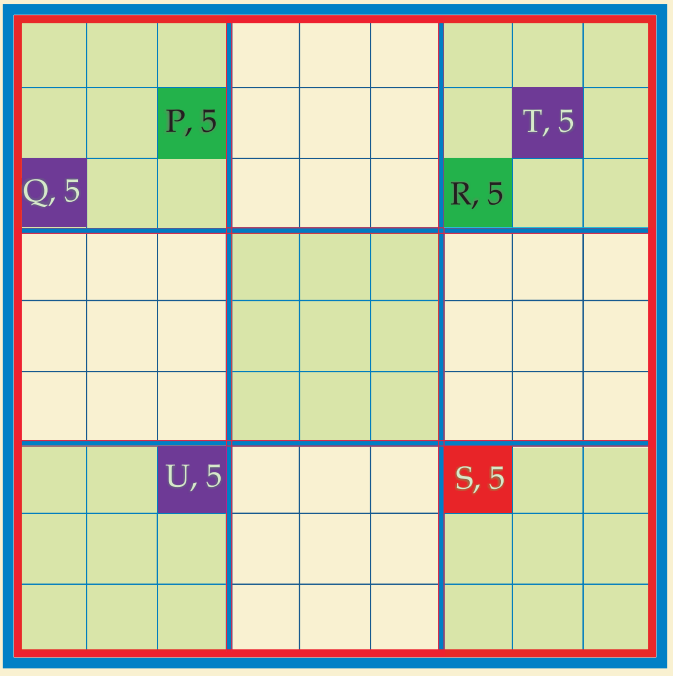
Reduces to



This is called the 'X-Y Wing' Approach. We have seen only the case of row-column interaction. The same obviously holds true for row-major square interaction and column-major square interaction.

Pattern to look for: Four Cells falling in 2 identical Rows and Columns need 3 prospective values (x, y and z), with the possibilities being {x,y}, {x,z}, {y,z}, and {p,z},. (This is also true of Four Cells falling in 2 identical Rows and Major Squares, OR, in 2 identical Columns and Major Squares).

Tip #13. Coloring Approach



Here, we can see that if Cell (2, 3) takes the value '5', Cell (3, 1) can't; but Cell (3, 7) can, and Cell (2, 8) can't; and nor can Cell (7, 3). And we have a conflict in Cell (7, 7); while it is an alternative to Cell (3, 7) and so it should take a color different from it, it should also take the color alternative to Cell (3, 7) and so it should take a color different from it too. So, we see that Row 7 cannot have a '5' which we need. So, this cannot be the solution.

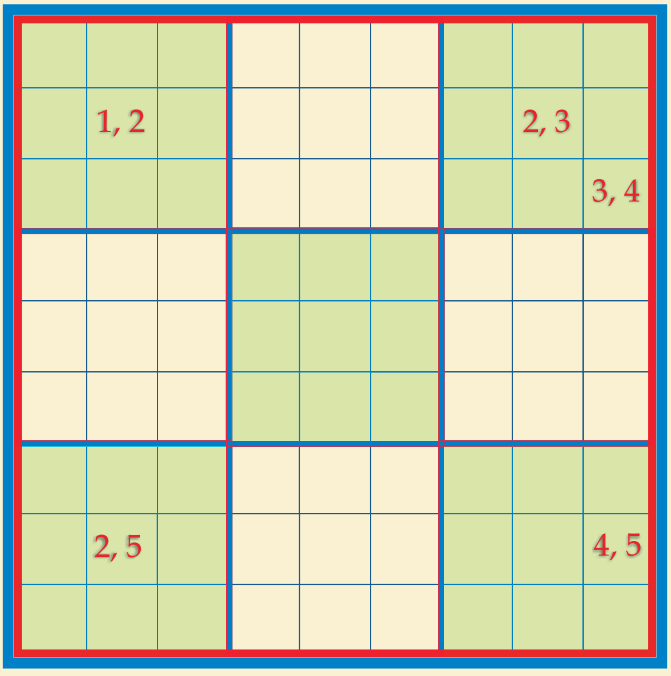
Let's look at the alternative solution. If Cell (3, 1) takes the value '5', Cell (2, 8) and Cell (7, 3) can take the value '5' too, and our requirements are completely met.

So, we can see how coloring has helped us resolve this conflict. Sometimes, we may not be able to completely resolve such conflicts with this Approach, but we may only be able to eliminate the possibility of some values in certain Cells as we have seen with the previous approaches.

This is called the 'Coloring Approach'

Pattern to look for: A single value yet to be found following a chain of possibilities across the Table, going thru Rows, Columns and Major Squares in any order, such that some of these possibilities would become impossible in case some of the other possibilities are true.

Tip #14. Forcing Chains Approach



If Cell (2, 2) takes the value '1', Cell (2,8) will take '2', Cell (3, 9) will take '3', Cell (8, 9) will take '4' and Cell (8, 2) will take '5'. And there are no conflicts.

However, if Cell (2, 2) takes the value '2', Cell (2,8) will take '3', Cell (3, 9) will take '4', Cell (8, 9) will take '5' and Cell (8, 2) will take '2'. Now there is a conflict. So, this set of values is not right.

So, we are able to deduce that we should go with the assumption that Cell (2, 2) takes the value '1', and fill up the rest of the Cells on this basis.

This is called the 'Forcing Chains' Approach

Pattern to look for: A set of values yet to be found following a chain of possibilities across the Table, going thru Rows, Columns and Major Squares in any order. Typically it is possible to resolve only when we go through chains of Cells with 2 possible values in each Cell, as with more possibilities in some Cells, it will be too complex.

Tip #15. Trial & Error Approach

When all the approaches we've learnt fail, use the Tie Breaker Approach we'd learnt in the Possibility Matrix Method (let's call it the The 'Trial And Error' Approach here). 'Trial And Error' Approach also helps determine if a puzzle has multiple solutions or any solution at all. This Approach is not an inherent part of the Conventional Method, and that's why this is not included formally as part of the Method. Most purists call it the 'Sledge Hammer' Approach, and refuse to accept it. However, since the Conventional Method doesn't guarantee results for every Sudoku, you may be forced to borrow this 'Tie Breaker' Approach from the Possibility Matrix Method. This Approach also comes in handy when you are unable to proceed (though there may well be a solution without having to resort to this Approach, but you are unable to find it).

In a way, you could say 'Forcing Chains' is also part of the 'Trial And Error' Approach, because you realize whether a chain forces values or not only thru 'Trial And Error'. However, in the case of 'Trial And Error' Approach, you continue with the trial regardless of whether trials result in resolution or not, whereas the 'Forcing Chains' Approach actually helps resolve conflicts successfully without having to try to solve the puzzle completely.

Tip #16. Possibility Matrix Method: Constructing the Possibility Matrix (PM)

Let's take a typical Sudoku, like this one:

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

Let's try to fill in all the possible values that the blank Cells can take. Do you want to go from left to right, top to bottom? (You can go in any order you like.)

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

Some cells may get completely resolved along the way. This is the initial PM.

Simple, isn't it?

If you keep repeating the process, you'll find that some more cells may get resolved, completely or partially, based on some cells that may have got resolved in the previous round. This way, you may either solve the given Sudoku completely, or a few cells may remain unresolved, and any number of iterations of the PM may not help solve them. Thus, you arrive at the final PM.

Tip #17. Possibility Matrix Method: Reduction Rule

The Reduction Rule of the Possibility Matrix Method is the same as the combination of:

'Tip #7. Reduction Approach' of the Conventional Method.

Let's try to see how far we're able to solve the puzzle we saw last, using the Reduction Rule.

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

1. (1,1) -> {7,9}; (1,3) -> {3,4,9}; (1,7}-> {3,7}; (1,9) -> {4,7}

Can you try the rest of it? It's all so simple, though you have to go through many steps.

Check if you get this answer?

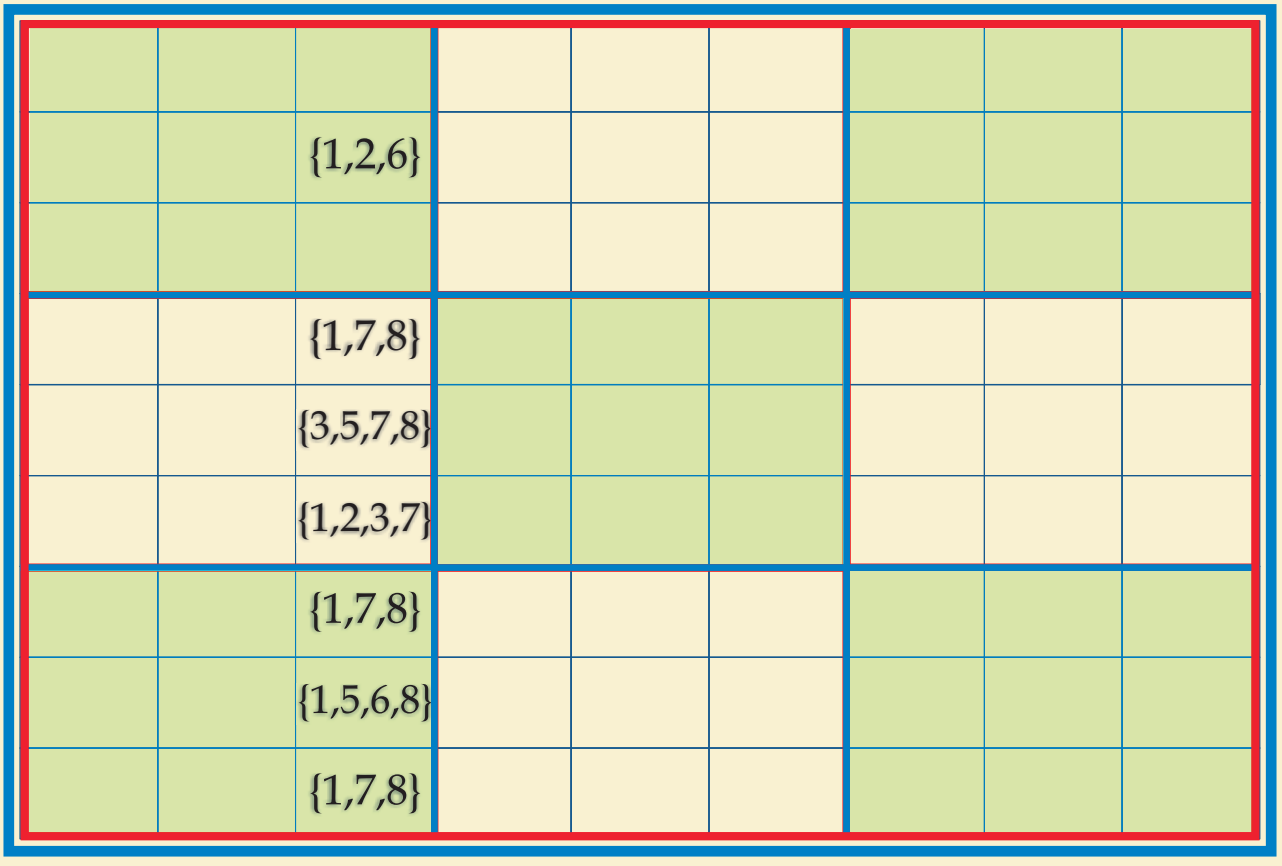
9	1	3	2	8	6	7	5	4
7	8	5	4	3	9	1	2	6
6	4	2	5	7	1	3	8	9
4	7	9	8	2	5	6	1	3
2	6	8	1	4	3	5	9	7
5	3	1	6	9	7	8	4	2
3	5	4	7	1	2	9	6	8
1	2	7	9	6	8	4	3	5
8	9	6	3	5	4	2	7	1

Tip 18. Possibility Matrix Method: Group Reduction Rule

The Reduction Rule of the Possibility Matrix Method is the same as:

'Tip #9. Hidden Groups Approach' of the Conventional Method.

Let's see a simple cexample:



The values 1, 7, and 8 must be shared between the 3 Cells (4,3), (7,3) and (9,3) only. So, eliminating these values from the other Cells, we now have:

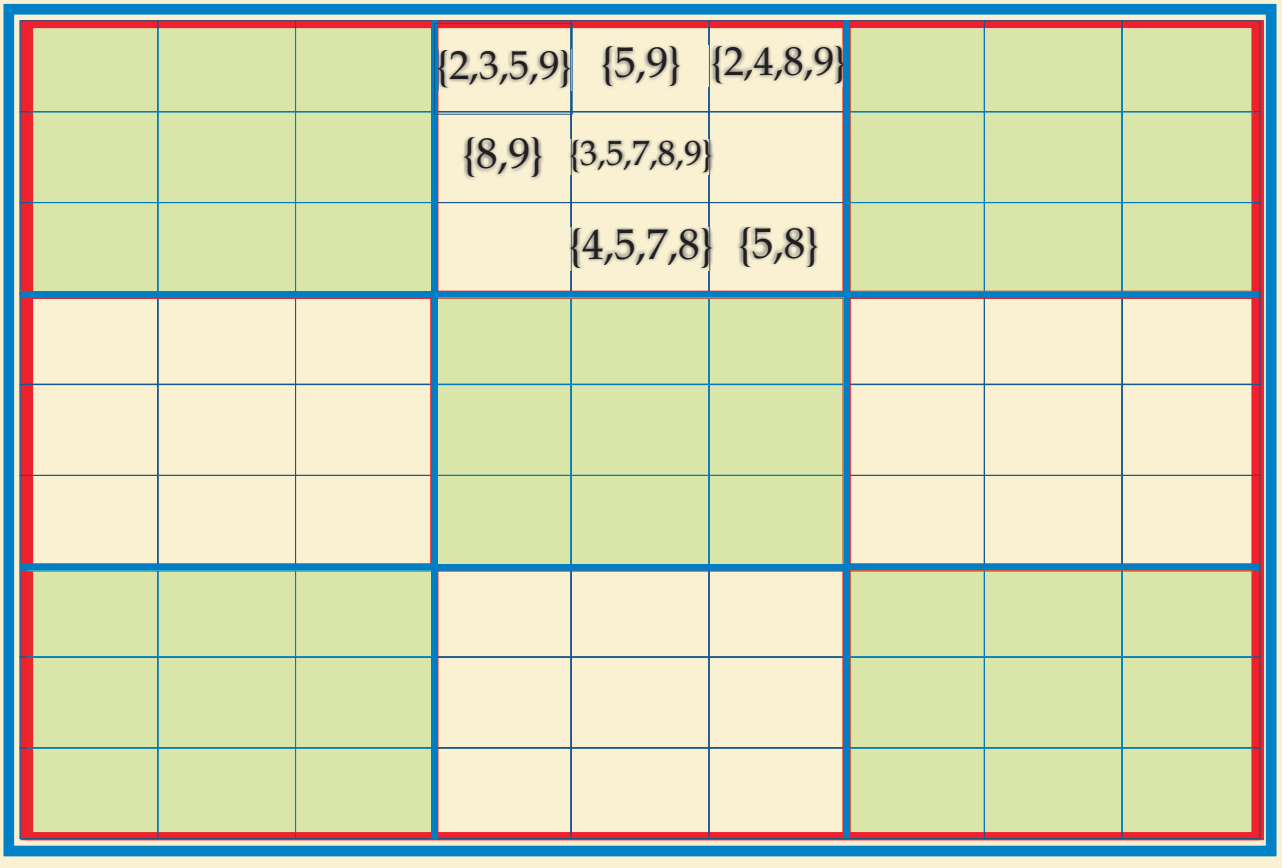
(2,3) -> {2,6}

(5,3) -> {3,5}

(6,3) -> {2,3}

(8,3) -> {5,6}

Let's now see a more difficult example:



Now, don't focus on the values, which are so many, but on a few specific Cells that can't take any values other than a small set.

(2,1) -> {1,5}

(2,3) -> {4,5}

(3,3) -> {1,4}

We see that the values 1, 4 and 5 MUST BE shared ONLY within these 3 Cells.

So, remove these 3 values from the other Cells.

We have

(1,1) -> (2,6)

(1,2) -> (2,3)

(2,2) -> (6,7)

(3,1) -> (3,7)

Tip #19. Possibility Matrix Method: Iterative application of Reduction and Group Reduction Rules

This involves just repetitive application of Tips #17 and #18, one after the other. That is, when you're no longer able to apply Tip #17, try applying Tip #18; you may be able to resolve some Cells, or you may at least eliminate a few possibilities in the Possibility Matrix. Now, if you try applying Tip #17, you may be able to resolve some Cells, or you may at least eliminate a few possibilities in the Possibility Matrix.

Keep applying these two rules till you solve the puzzle completely. If the puzzle doesn't get solved still, at least reach the point where any more application of these two rules does not resolve any more Cells, nor eliminates any few possibilities in the Possibility Matrix.

Tip 20. Possibility Matrix Method: Tie Breaker Rule

This is a rule you can apply when you're no longer able to apply any of the other rules. This rule is sure to solve any Sudoku for you, however difficult. However, applying this rule could be cumbersome, in very difficult cases.

Let's say this is the Sudoku we want to solve:

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

We've reached the following position, after creating the Possibility Matrix, and applying the PM rules iteratively, and applying Reduction and Group Reduction, iteratively.:

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

At this stage, any application of any of the rules doesn't solve the puzzle any more.

Now, we apply the Tie Breaker Rule.

Let's assume (1,5) -> 7.

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

This resolves to give a wrong solution; e.g., Column 5 has two '8's and no two. So, we need to discard this possibility of (1,5) -> 7.]

Let's now assume (1,5) -> 8, the only other possible value for this cell.

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

We check and see that we get the right solution, by checking to see if it obeys the rules of the game we'd mentioned initially. (i.e., we should have 1 to 9 in each row, column, and major square, with no repetitions.)

This is how we apply the Tie Breaker Rule to solve any puzzle.

If after an assumption, we are not able to resolve the given puzzle completely, we may have to superimpose another similar assumption. If that doesn't work, one more, and so on, till we get a solution. Normally, such situations don't arise.

Generally, it will be a good idea to apply the Tie Breaker to a Cell where there are fewer possible values (2 possible values, to begin with, as we have, in the above case).

Tip #21. Solving Sudoku faster is a different ball game. More advanced techniques or more practice won't help much. But with specific strategies and workouts, it is possible for most of the average Sudoku players to double (or even triple or multiple) their Sudoku solving speed, or even solve most Sudoku in 5 minutes!

There are thousands of Sudoku puzzle books available in the market. There are also quite a few on how to solve Sudoku. But there's NONE on how to solve Sudoku faster. Solving more and more Sudokus every day may improve your Sudoku solving speed marginally, but it won't help you improve your speed significantly.

Sudoku Village has done extensive research on this subject and identified 22 Laws that govern speedy solving of Sudoku. These law center around Mindsets, Reflexes, Simplicity, Patterns, Prioritization, Pedagogy, Tools, Mistakes, Frequencies, Chain Solutions, the Big Picture, Photographic Memory, Diminishing Returns, Intuition, Intelligent Guesswork, Method, Selective Possibility Matrix, The Last Resort, Interruption, Customization of the Laws, Practice, and the Golden Law. These have been published in the form of an eBook titled, "How To Double Your Sudoku Speed", available for you to buy at:

http://www.sudokuvillage.com/speed.htm

Though this eBook runs to almost 400 pages, about 300 of these pages have simple, yet powerful exercises, and so this eBook is eminently and easily readable.

This is the first ever book or eBook on such a subject, anywhere in the world; in fact, this books promises much more – it promises to help every Sudoku player to double one's Sudoku solving speed (excluding, of course, top players who solve them very fast already, anyway). What is more, it follows a step-by-step approach which takes the readers by the hand and helps them improve their Sudoku solving speed. So, this book is for beginners and buffs alike.

This book also makes it possible for every reader to verify her/ his improvement in Sudoku solving speed. There are 4 set of Sudoku puzzles of Easy, Moderate and Difficult levels at the start of the book, midway through the book, and at the end of the book, and one to be solved 3 months after completing the book. And all the 4 sets of puzzles are of an identical level of difficulty (scientifically proved to be so). By solving these puzzles at the designated time-periods, every reader can verify the actual improvement in Sudoku solving speed she/ he has accomplished.

This eBook should help just about everyone increase one's Sudoku solving speed 2, 3, 5, 10 times, or even more, (depending on one's current speed).

The book also presents a 30-day time table to double one's Sudoku solving speed. It also explains how almost everyone can learn to solve most Sudoku in around 5 minutes flat.

The scope of this current eBook doesn't permit dwelling on how to double your Sudoku speed more, as it is a very involved subject. If you're interested in solving Sudoku faster, this is a 'must read'. Yes, it comes with an unconditional 90-day guarantee. Don't miss it if you'd like to learn to solve Sudoku very fast.

Sudoku Village resources you may not want to miss:

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2. Daily Contest for $5 Cash Prize:

http://www.sudokuvillage.com/sudoku/todayspuzzle

3. Top 10 Sudoku Resources:

http://www.sudokuvillage.com/Top10SudokuResources.htm

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