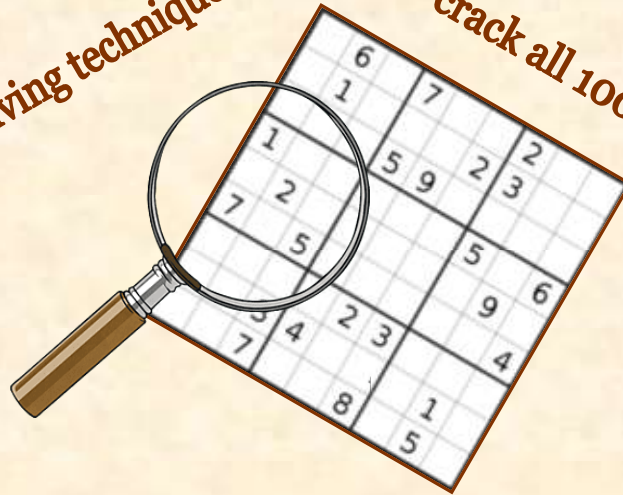


Awesome Sudoku For Supersleuth Solvers

10 solving techniques

crack all 100 puzzles



A teach yourself guide with illustrations and clues

Stuart Sherring

© Ideas Café Publishing

October 2022

Awesome Sudoku Supersleuth Solving Techniques

Introduction

This step by step guide enables supersleuths to solve 100 of the trickiest Sudoku puzzles. Each is solved by logic alone. None involve trial and error or two option testing. For ease of reference each square is shown using a notation system with letters A to I across the top and numbers 1-9 down the left side.

It is often thought that to be an expert Sudoku solver you need to be good at maths. A logical mind helps but as in life there are many vocations where numeracy is only one facet. So it was at Bletchley Park where linguists and those adept at cryptic crosswords, chess and puzzles of any type rubbed shoulders with scientists and mathematicians.

Trying to crack Enigma code combinations involved not only analytical capability but the ability to spot repetition, gaps, connections, inferences, exclusions and so on. Deductions could be made in reducing possible permutations that could be tested out.

A major attribute for any analyst was the ability to recognise patterns such as sequences, omission of a letter, or repetition of a word or phrase, as in weather forecasts. In isolation they may make little sense but did so in applying to the jigsaw of likely code combinations.

Rather than mathematical ability, mental agility counted more, especially lateral thinking. So it is with Sudoku! A toolkit of 10 techniques has been devised to provide a framework for analysis. They are used in various combinations, according to the puzzle construct. Apply the right tools in the right situation and you will crack every puzzle in the book.

100 Sudoku puzzles are divided into 4 categories with 25 puzzles in each, in ascending order of difficulty.

- **Challenging**
- **Daunting**
- **Baffling**
- **Excruciating**

The first 25 comprise Difficult, Hard, Fiendish and Tough. They soon graduate in steps to more complex, prefixed by Very, Super, Exceptional, Diabolical and even Extreme! There are variations within each which is why all 100 puzzles are graded and ranked, relative to the techniques applied.

Move Tracker & Clues

A move tracker plus clues for every puzzle is shown separately. Just highlight the specific puzzles you wish to download. A suggestion is to use the move tracker and compare with your own sequence. If stuck, you will soon spot the next square but not the number.

That may be sufficient to kick-start further progress. If a missing number remains elusive, then refer to the clues underneath.

As a dry run it is worth going through an example to see how the complete methodology works in practice. First off, read the rest of this guide as each technique in the toolkit is explained.

Using dots

These focus on what's important and not every combination. A 'gatling gun' approach is avoided. What we are looking for are patterns upon which all techniques are based.

Listing all possibilities is cumbersome and confusing in not seeing the wood for the trees. Even where say three numbers are known, but not the sequence, the temptation is to focus on these alone, rather than what they tell us. These clues help fill the gaps in one or more segments. Crucially, you know what's left.

Dots are inserted where combinations are identified such as A3 and A4 that have to be 3 and 7. The hash symbol # preceding these denotes the converse too, or any combination if a triple. Which is which doesn't matter initially. Concentrate instead on what is revealed, especially vacant squares surrounding the dots as they invariably provide important clues.

Say in a column you have 4 numbers to start with and three that fit, in an unknown order. You now know the other two that may well connect elsewhere. Dots are a Trojan Horse.

The recording template

Top left shows the puzzle number. Refer to the letter reference first and then the number eg D5 to identify the specific square. The template is broken down into 3 x 3 segments that come in handy in explaining the techniques.

	A	B	C	D	E	F	G	H	I
1									
2		1			2			3	
3									
4									
5		4			5			6	
6									
7									
8		7			8			9	
9									

Sudoku toolkit

Use this teach yourself guide to tackle puzzles that might have seemed impossible to solve. Soon you will become an expert Sudoku solver! The methodology was designed a few years ago when running U3A courses in solving techniques. Since then it has been refined to cover every type of single solution puzzle.

The first three techniques are familiar to enthusiasts. Not so obvious is the use of Dots and techniques such as Niners and Pairs & Triples, the mysteries of Congruence and

Symmetry and intriguing Aladdin's Cave of Displacement. Each is explained using an illustration. Entries are in lighter text in italics. They are underlined where specific squares are referred to in supporting notes.

Clues involve techniques 4 -10 only as the presumption is being fully familiar with the first 3. All involve pattern recognition that is the cornerstone of this unique methodology. Once key squares and numbers have been identified, there are almost invariably a number of move choices.

1. Bingo
Fill in the blanks much like a bingo card if numbers appear to be obvious. This gets you off to a good start.
2. Tour
When filling in a number eg 5, take a tour round to see where else 5 may fit in as sometimes this triggers a domino effect.
3. Gaps
In a line where most numbers are filled in it pays explore these carefully as limited options may exist for remaining numbers.
4. Dots
It is appropriate to introduce dots at this point as they are vital in using all the techniques that follow.
5. Pairs & Triples
Pairs and triples are mirror images. We know the numbers, but not the sequence. Crucially we know what's around them.
6. Niners
Look vertically and horizontally to hone in on any square with 8 different numbers around it. The blank is the 9 th number.
7. Deduction
If this, then that. Only one number fits. Go hunting for these as early successes make life easier as a puzzle progresses.
8. Congruence
The same number may be in the same position within certain segments. You may then spot a number not fitting this pattern.
9. Symmetry
Numbers are aligned in a consistent formation and pattern, or even quadrangle, and may form multiple Pairs and Triples.
10. Displacement
These camouflaged numbers may not appear relevant. Once uncovered and in place they help reveal other numbers.

1. Bingo

Even with very tricky puzzles you often get 'sitters' to help you get going. It is clear that segments 6 and 8 stand out with six numbers in each. Let's see they help initially.

51	A	B	C	D	E	F	G	H	I
1		9						2	
2	4								
3					2	9	5		
4			<u>9</u>					1	2
5			4			2	8		3
6			3		1	5		6	7
7			5	<u>9</u>	8	<u>4</u>	1		
8	9			2	<u>5</u>	7			
9				6	3	1	<u>2</u>		

Taking segment 8 first, the only space for 9 is on D7. It follows that 5 has to be on E8 and 4 on F7. Turning to segment 6, a 5 must be on H5.

2. Taking a Tour

Having inserted a number, in this case 7, check the whole grid for other 7s.

9	A	B	C	D	E	F	G	H	I
1		<u>7</u>		6					3
2	2					1			<u>7</u>
3				<u>7</u>		5	6		4
4	<u>7</u>	5	9			2		3	8
5			1		7		4		
6	8	3		5			7	6	
7	9		7	1					
8				2				<u>7</u>	6
9	4					7			

The start point is H8 but could be A4. 7 fits on I2 and a 7 on D3. A 7 also goes on B1. It's easy to forget to take the Tour that is highly recommended. This may open up other solving opportunities as is the case here with a 6 on E4, the only option and 1 on G4, again the only option. For both these reasons a 4 has to be on D4. The row is complete. Although this puzzle was rated Difficult by the compiler it is relatively easy to solve - once all freebie opportunities have been taken.

3. Mind the Gaps

Our starting point is G7 that has to be a 6 given H6 is a 6. It follows that G8 is a 2 being the only space. We then take a little Tour having spotted I5 which must be 2.

35	A	B	C	D	E	F	G	H	I
1		9			8			2	<u>6</u>
2	8					6			<u>4</u>
3		<u>6</u>		4			7	<u>8</u>	<u>9</u>
4			6	2			5	3	<u>7</u>
5	3								<u>2</u>
6		1				3		6	8
7			1	8			<u>6</u>		3
8	6			5		7	<u>2</u>		1
9						4	8	7	5

The I file is filling up, with a 7 on I4 too. Switch to the H file with an 8 on H3. The same applies to B3 which is 6 as is I1. Back to the I file and a 4 on I2 and a 9 completes this.

4. Join the Dots

The dot system shows squares where we know what numbers they represent but not the sequence. For clarity, an X represents each dot.

35	A	B	C	D	E	F	G	H	I
1		9			8		x	2	6
2	8					6	x	5	4
3		6		4			7	8	9
4			6	2			5	3	7
5	3						x	1	2
6		1				3	x	6	8
7			1	8			6	x	3
8	6			5		7	2	x	1
9						4	8	7	5

In segment 9 we have only two numbers remaining, # 4 and 9. Whilst not immediately helpful for segments to the left, they are for segments above.

With a 4 and 9 in segment 3 this has to be a # 4 and 9 on G5 and G6. This leave a 1 on H5. A 5 in H2 was overlooked so that can go in, completing the H file.

5. Pairs & Triples

Pairs often occur and sometimes Triples. They may appear in subtle forms and are not always obvious, especially if along different axes.

72	A	B	C	D	E	F	G	H	I
1			9			8	<u>6</u>	X	<u>3</u>
2			3				7	5	<u>X</u>
3				6			<u>X</u>	X	4
4		7		1	9			3	5
5	2							6	
6		3		5	6			9	
7				8				<u>7</u>	2
8			4				3	8	
9			7			5		<u>4</u>	

The intersection of row 1 and H file show 9 and 8 are common. The only spaces are G3 and I2. We now know the remaining numbers, but not the sequence. Taking segment 3, the only space for a 3 is I1 and G1 is 6. This then reveals # 1 or 2 on H and H3. This is a great help as 7 must go on H7 with a 4 on H9.

6. Niners

3 in I2 can only go on A1 or A3. Dropping down to A4 we have a Niner as 9 is the only number missing. Similarly, A6 must be a 2 thanks to having a nine in place

10	A	B	C	D	E	F	G	H	I
1		5	2		8		<u>7</u>	<u>X</u>	<u>X</u>
2					<u>7</u>	5	<u>1</u>	2	3
3		7	<u>1</u>				8	5	4
4	<u>9</u>	1	7		6		2		
5	5							7	<u>1</u>
6	<u>2</u>	8	4		1		6		
7		4			5		9	1	7
8	7					1	5		2
9	<u>1</u>		5		9				

The prize is not the 2 on B9 but that B4 and C5 are 'occupied.' Switch to the E and F files. Neither an 8 or 9 can fit on E5. You are now well on the way to completing the puzzle.

7. Deduction

This does not comprise a single technique. There is a link to Congruence in spotting variations, Symmetry in spotting matches and Displacement where numbers in other segments appear not to be relevant.

81	A	B	C	D	E	F	G	H	I
1	7	3	5		8				
2			9		<u>X</u>	3			5
3			8	2	<u>X</u>			3	
4	5		7	6	3			9	
5	6		3		<u>X</u>		7		4
6		9			7	1	5	6	3
7		5				6	9		
8	9			5					
9					4			5	8

Look at the E file and segment 8. # 5, 6 and 9 have to occupy the three spaces above. E2 must be 6 as a 9 and 5 are either side on row 2. So are E7 and E8, being 1 or 2.

8. Congruence

Congruence applies where the same two numbers, or three, appear in two rows or files. These two numbers must appear in the third row.

25	A	B	C	D	E	F	G	H	I
1			5	6					
2		4		5				9	
3					2			5	1
4						4			5
5	5		3				8	<u>X</u>	<u>X</u>
6	6		4	7	5				
7	9	5			3				
8	3	7					5	6	
9	4					5	3		

In file B a 7 has to go on row 4 in segment 4 with a reversal of 7 and 4 in segments 4 and 5 on rows 4 and 6. # 7 or 4 is on H5 and I5 with 6 on G4. Only on moves 62 and 63 were H5 and i5 unlocked! It is a fine example of the importance of using the Dot System,

9. Symmetry

This is a configuration of two Pairs or even Triples on different axes with numbers fitting in elsewhere. To help get started, a 3 has to fit on # A1 or C1. By virtue of this a Niner is on H1. Now focus on the D file and segment 5.

94	A	B	C	D	E	F	G	H	I
1		8			X			X	
2	7		4	5	X				
3		5		3	X			1	
4		3	9		5		1	2	7
5					1		X	6	X
6					3		9	5	8
7				2	9	6			1
8			8	1	7	5		4	9
9				4	8	3	2	7	

On both rows 1 and 6 it is not possible to place 9 or 8. The only vacant spaces are D4 and 5 which means a 9 on D5 and 8 on D4. D6 must be a 6 as it cannot go on the F file.

10. Displacement

The roadblock is removed by Displacement where numbers of seemingly no relevance, help identify a missing number - or several in other segments.

58	A	B	C	D	E	F	G	H	I
1	5						X		2
2		1					9		3
3	X	X	2	8	X	4	7	X	X
4		8		9	6	X	3	1	5
5				X	X	X	6	9	8
6	X	6	X	5	8	3	4	2	7
7			3	6		1	2		4
8		7					5		X
9	6						X		9

In row 3, the 5 and 1 in segment 1 have to fit. So does a 6 either in # H3 or I3. The logic is explained in row 3 as they are the only gaps for a 6. These three fit in the squares E3, H3 and I3 which then leaves A3 and B3 occupied by a # 9 and 3. We know that A6 and C6 must be 9 and 1, or converse. A9 must fit on # A3 or A6 and A7 has to be a Niner.

The 100 Puzzles

Solutions are provided in a separate document. You may not need to refer to these - but it is wise to do so as a check. Answers may appear correct and all is going well until a blip. A number that does not fit means one thing only. You have gone wrong somewhere!

I am often asked do you complete a puzzle in pencil or ink? It is entirely your choice. Having very poor eyesight I prefer to use a black pen. Using Dots helps in not having a cluttered puzzle but mistakes can still be made, such as when filling in 'Bingo blanks.' More haste less speed is a sound motto.

Now, what to do if you have messed up a puzzle, or scratched out answers so you can hardly read the original? Make a blank template and copy this, or reproduce it in computer format and complete the puzzle that way. This method helps if you wish to get a fresh angle where a solution appears elusive.

Getting Started

Just to recap each section contains 25 puzzles that get harder as you go along. The following is a broad guide:

- **Challenging** - Difficult, Hard and Fiendish
- **Daunting** - Very Hard, Very Difficult and Super Fiendish
- **Baffling** - More complex versions of all of these
- **Excruciating** - From Diabolical to Extreme

It is tempting to say good luck but solving these is not down to luck but your skill as an Sudoku puzzle solver. Instead, I will simply say:

Enjoy!