Chapter 1

Simplifying Su Doku

This part covers a few of the su doku-solving ground rules, giving you all the tools you need to approach each puzzle with the best strategy.

Understanding the Rules

A blank su doku grid like the one in Figure 1-1 consists of a grid of nine rows and nine columns subdivided into nine 3×3 subgrids. Throughout this book we refer to a *square* by its coordinates – row first, then column: 1,3 is the top row, third square from the left and 9,8 the bottom row, 8 squares from the left. We refer to a 3×3 subgrid as a *box*, numbered as shown in Figure 1-1.

Su doku has two simple rules:

- **Each column, each row, and each box must contain each of the numbers 1 to 9.**
- **Therefore, no column, row, or box can contain two squares with the same number.**

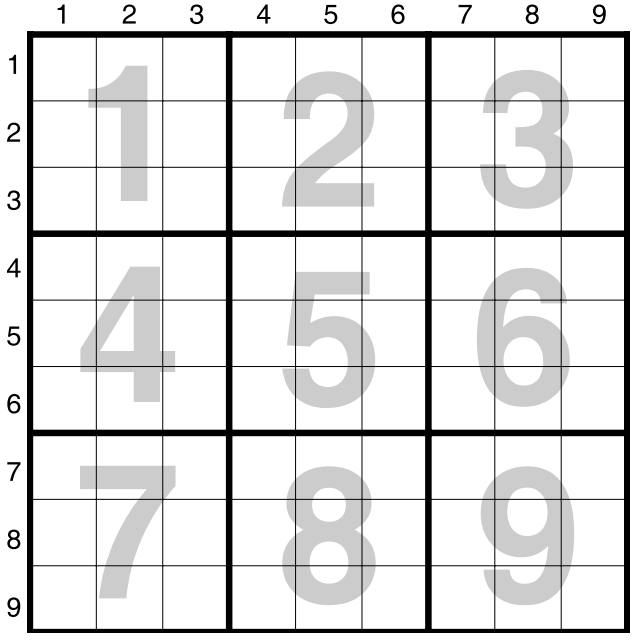

Figure 1-1: A blank su doku showing grid coordinates and box numbers.

Getting Down to Basics

Each puzzle starts with a set of clue numbers placed on the grid as shown in Figure 1-2.

Logic is all you need to solve a su doku. No addition, subtraction, division, or multiplication is required. However, you do need to ask yourself questions like 'If so-and-so number is in this column, will such-and-such number go

in this other box?' Your answer to these questions will always be either 'yes', 'no', or 'maybe'. When the going gets a little tougher – if you're working on a more difficult puzzle – you may find yourself asking more complex logic questions, but for now let's just stick to the basics.

Use a pencil and eraser. Solving su doku, especially the more difficult puzzles, requires you to make notes of optional numbers. These notes change as the puzzle progresses, so you need to rub them out where you've solved – or partially solved – any numbers.

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

Figure 1-2: A moderately difficult su doku. Tempted?

Taking the puzzle in pieces

Your first tip to getting started with a su doku: Don't try to look at the whole grid at first. Take the puzzle in sections, as we've done in Figure 1-3. You could try using a sheet of paper to help blank off the part of the grid you aren't looking at.

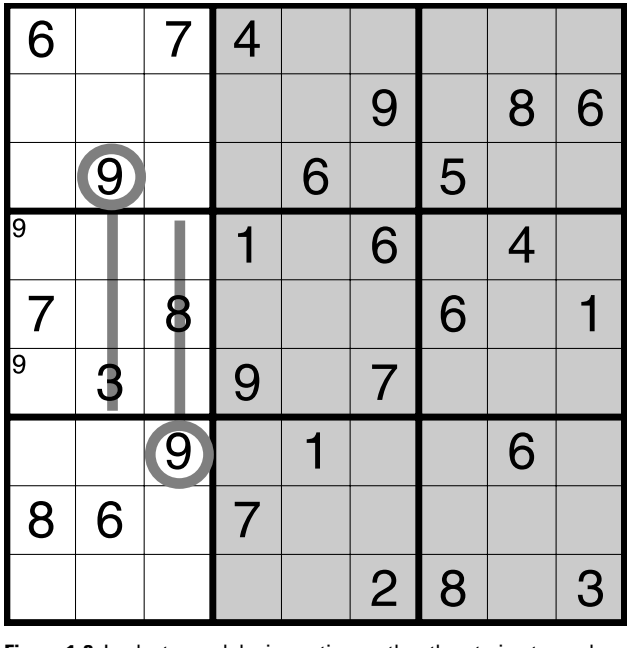

Figure 1-3: Look at a su doku in sections rather than trying to work out the whole puzzle at first glance.

As you can see in the first three columns, you have a 9 in box 1 and a 9 in box 7, but no 9 in box 4. The 9 in column 2 precludes any 9 appearing in column 2 of box 4, and the 9 in column 3 stops a 9 being placed at column 3 of box 4. That means that the 9 of box 4 has to be in column 1, but could appear in either of two squares. We've shown these options as small numbers in the corner of the squares. Throughout this tutorial we indicate these *options* in the same way – as small numbers in the corner of the squares.

Looking at the (slightly) bigger picture

'Well,' you might say, 'looking at one column solves nothing.' But wait . . . By revealing the next column, as in Figure 1-4, you expose a 9 in row 6. Obviously, with a 9 in this row, the option of 9 in box 4 at row 6 has been disproved, and the option can be erased. The 9 has to go in the only other available square at row 4, column 1 (or square 4,1). This is our first solved number. Whew! That wasn't so difficult, was it?

Solving for the second number

The fewer empty squares you have in any box, row, or column, the better your chances of proving the empty squares, so look for the most populated rows, columns, and boxes. For example, concentrate on the middle three rows. You have a 6 in box 5 and a 6 in box 6, but no 6 in box 4, so that seems like a good number to focus on.

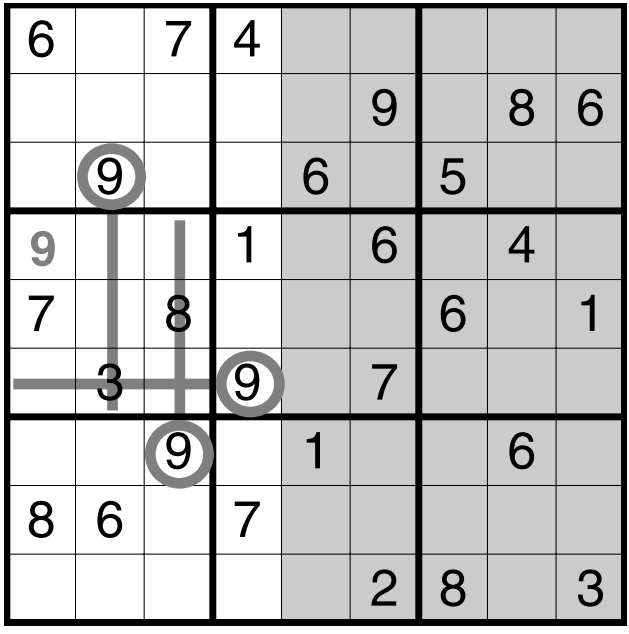

Figure 1-4: Gradually look at more and more of the puzzle for clues, keeping one number in mind.

The sixes in rows 4 and 5 means that the 6 of box 4 must be at either 6,1 or 6,3, so we can pencil in those options. Revealing the rest of column 1 in Figure 1-5, we find a 6 already in that column. So the 6 of box 4 can't be at 4,1 and must be in the only remaining square at 4,3. The second number of our puzzle has been solved.

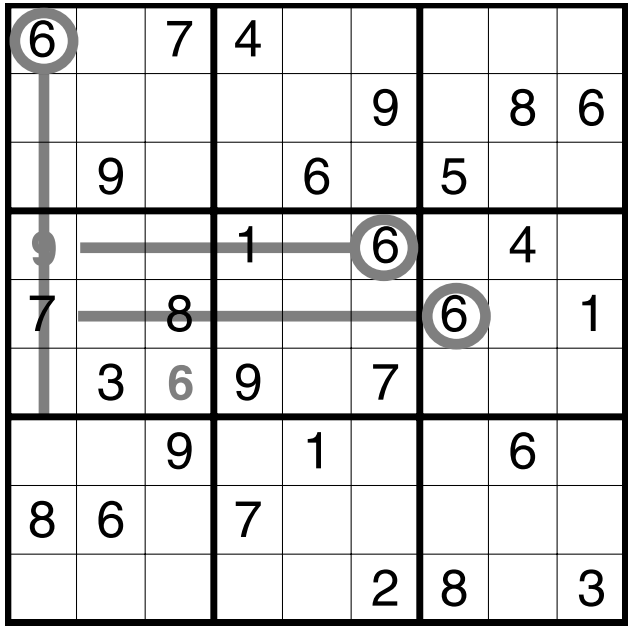

Figure 1-5: Searching for sixes to solve the su doku.

Incidentally, when we revealed the rest of the grid, did you spot the 6 in column 2? If we hadn't already excluded a 6 from column 2 of box 4 with our sixes at row 4 and row 5, this six would have done the job nicely. Having such a surfeit of riches is rare, but worth pointing out.

Cracking open the first box

Moving on in our exploration of the given clues; look at the 1 in row 4 and the 1 in row 5 in Figure 1-6. Between them they stop any 1 appearing anywhere in box 4 other

than in the only square available at 6,1. No pencilling required here, it's the only place for a 1 to go.

Now look at the 4 in row 4. It very nicely stops another 4 from going in box 4 at row 4. Because we've already solved some numbers in this box, only one possible square is left for the 4, at 5,2. Box 4 is filling up quite nicely and we have only the 2 and the 5 left to solve. Either of these numbers could go into each of 4,2 or 4,3. We don't have an obvious way of proving the correct square at this stage from the clues provided, so we're stuck for the moment.

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

Figure 1-6: The 4 at 4,8 means the only place for a 4 in box 4 is at 5,2.

Before we move on, pencil in the two options of 5 and 2 for both squares: At some stage we'll be able to prove one of the numbers and can solve the box.

We can draw a very important implication from the two unsolved squares: Both contain either 5 or 2 as we have proved, but that must mean that these two squares can be the only place for a 5 or 2, not only in that box, but also for the remaining unsolved squares in that row. Only one 5 and one 2 can be in the row and we've just proved where they are.

What we just discovered are a matched pair of *twins*. A twin is a number that has been proved to appear in either of two squares that helps disprove its presence in another part of the grid. A matched pair can help us solve other problems as the puzzles get harder.

Using your clues

By now, you've probably familiarised yourself with the position of given numbers and can dispense with blocking off parts of the grid, although it's a useful tool when you're concentrating on a specific part of the grid. The 'good' clues eventually start to jump out at you as in Figure 1-7. Here we have a combination of sixes stopping another 6 from appearing anywhere but in 9,4 of box 8. The 6 of this box doesn't really help us to solve any other numbers, so we move on.

We're getting a good handle on the grid in Figure 1-8. The eights aren't helping to solve the 8 of box 6 immediately, but they allow us to note that the 8 could be in 4,9 or 6,9. While the eights don't solve anything immediately, making these observations is always helpful for use at a later stage of solving.

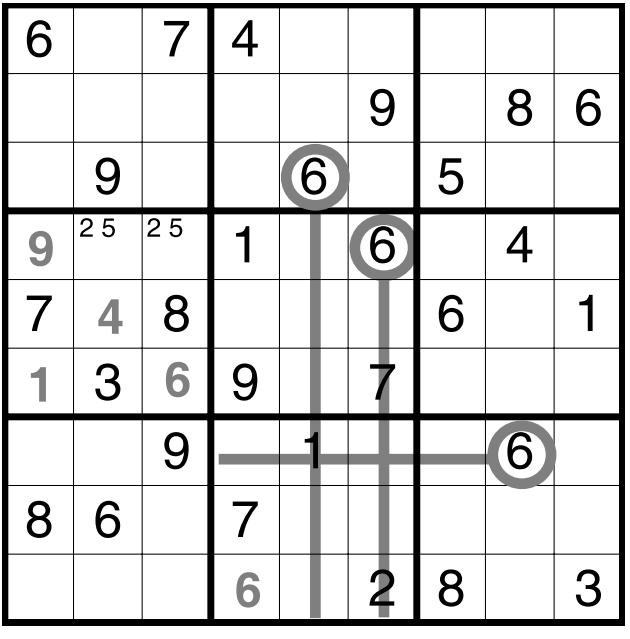

Figure 1-7: Separating out the 'good' clues.

We can still make plenty of observations and solutions from the given clues and those squares that we've already solved. For example, look at the 7 in column 4 and the 7 in column 6. Together with the 7 in row 1 they solve the 7 in box 2.

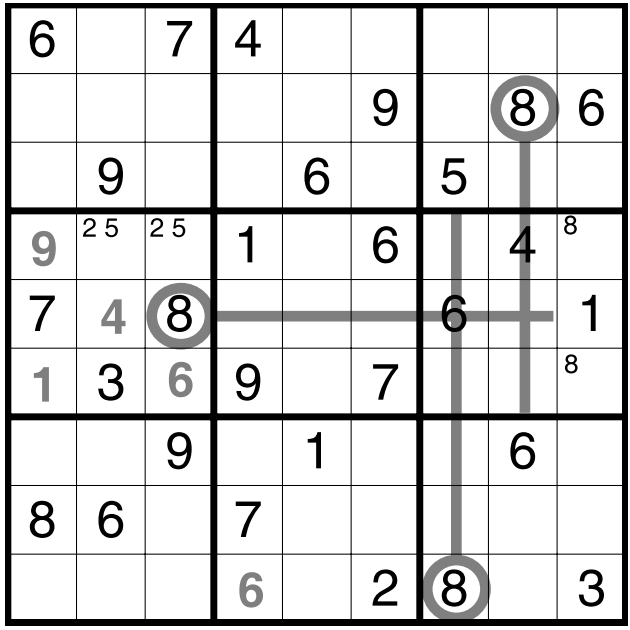

Figure 1-8: Getting a good grip on the grid.

You have enough clues to start solving some numbers for yourself, so here's the grid as far as we've solved it in Figure 1-9. See how much further you can get using the same simple logic that we've used so far.

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

Figure 1-9: You're on your own with the rest of this puzzle. Good luck!