SUDOKU VIDEO

Link to "The Impossible Sudoku":

<http://www.conceptispuzzles.com/index.aspx?uri=info/article/452>

This web site claims to have "The Impossible Sudoku." It has been mathematically proven that the minimum number of clues necessary to solve a Sudoku puzzle is 17. This is one of those "Minimum Sudokus."

At the bottom of the page he bets no one can solve his "Impossible Sudoku." That's like waving a red flag in front of a bull. What do you say we give this one a shot?

First, I constructed a template. Every box contains all possible solutions from 1-9. For those of you who have played Sudoku, you may have experienced the thrill of victory only to notice that something wasn't right: you noticed duplicate numbers in a row, column, or grid. That's when your heart sank and you realized that you had made a mistake.

The exclamation points that you see at the end of each row, at the bottom of each column, and in the shaded area called "The Grid Tracker," will disappear when the sum of the digits for that row, column, or grid equal 45. When all the exclamation points have disappeared ... you have won.

If you would like to have this Excel workbook, simply email me at:

neo@theskepticarena.com

and I will send you a copy.

The first tab of the book contains instructions, tips, and a link to

<http://websudoku.com>

where you can find puzzles in 4 categories:

easy, medium, hard, and evil.

And another link to Minimum Sudoku puzzles (17 clues):

<http://www.free-sudoku.com/sudoku.php?dchoix=evil>

The second tab of the book contains the template.

The third tab is called "play." This is where you will copy the given numbers into a copy of the template (advice: never touch the template on the second tab, except to copy it to the "play" tab).

The first thing we have to do, is to copy the given puzzle into our template on the "play" tab. I then change those numbers to red font so that I always have the original puzzle while I play.

Now, we are ready to begin. The first step is to use the given numbers to remove duplicates from the rows, columns, and grids. You could go box by box. For instance, starting with the top leftmost box (B2), you would remove any given numbers that appear in row 1, column 1, and grid 1. So you would remove a 1, a 2, a 5, and an 8. Then you would repeat that process for all unsolved boxes - in this case, 63 more boxes.

I prefer a faster method which I also find less prone to error:

I remove all of the duplicates from row 1, in this case a 1 and a 5, by deleting them from the first unsolved box, copying the result, and then pasting that result in the remaining unsolved boxes in row 1. Then I repeat that process for all 9 rows.

However, I cannot use this time-saving trick on the columns and grids because the rows have different numbers in them, which would cause me to overwrite boxes with incorrect data.

So when the 9 rows are finished, I move to column 1 and remove the 1 and the 8 from all boxes in that column. Then I do the same for the rest of the columns. Finally, I repeat the process of removing given numbers from all 9 grids.

Since there are now fewer numbers in the unsolved boxes,

I was able to make this easier to see by enlarging the font.

Notice J3. That box has been solved. It is the ONLY box that we solved. This is our first clue that this puzzle is going to be really difficult. Usually you get more than one solved box. The reason I marked it with an underline is because I need to remove duplicate 7's from the same row, column, and grid, but I didn't want to do it when I was in the middle of my algorithm. Now that we are done removing duplicates from the given numbers, we remove the duplicates created when we solved the 7.

Notice the pair in K3-L3. That tells us that there must be a 3 in one of those boxes and a 9 in the other. Even though we don't know which box contains which number, we can still use that information to delete other 3's and 9's in the same row and grid. Since the 3 and 9 are in different columns and we don't know which number is in which column, we can't delete any 3's or 9's from either column.

Let me just take a minute to interrupt this puzzle so I can give you an example (from a different puzzle) that shows you how you can take advantage of triplets.

In the upper right grid we have a 5, an 8, and a 9 distributed in 3 boxes. Therefore we can remove any 5, 8, or 9 that appears in the grid. That information will enable us to solve 3 boxes in that grid.

Since the triplet is spread across different rows and columns, we cannot use that information in the rows or columns.

In the bottom center grid we have a 2, a 7, and an 8. Because the triplet boxes are also in the same column, we can eliminate duplicates of those numbers in the column as well as the grid.

Now, getting back to "The Impossible Sudoku," let's look at the results after we used the information in the 3-9 pair boxes.

We've solved 2 additional boxes. They have been underlined so that we can go back and eliminate any duplicates created by those solved boxes in the appropriate rows, columns, and grids. When finished, we remove the underlines and view the results.

Now we scan the rows and columns again. This time we are searching for unique numbers, which are numbers that only appear once in a row or column. Finding a unique number solves that box.

At the same time, we also search the rows and columns for numbers that must appear in a particular grid, and therefore, cannot appear anywhere else in that same row or column. We will call these numbers, "particular numbers."

Finally, we search the grids for unique and particular numbers. Particular numbers in a grid will appear in the same row or column, allowing us to delete any duplicates that appear in the other 2 grids in that same row or column.

If you'll look at the first grid on the bottom row, you will notice that a 3 appears in only one box. Therefore, the 3 is a unique number and that box must be a 3.

After solving for the 3, we now have 2 7's that appear in the last column of the grid but nowhere else in the grid. Therefore, one of those 2 boxes must be a 7. That means that we can remove any 7's that appear in that column, in the grids above. Those 7's were particular numbers.

Now you see why I selected that box: it contained the only unique number in the entire puzzle.

the 4 7's we removed from the last column above the grid were also the only particular numbers which we were able to remove.

For all our efforts, we have only solved 4 boxes in addition to the original 17 that we were given. If this were a baseball game, and we were running the bases, 21 boxes out of 81 would mean that we are standing on first base; and the bad news is ...

we've reached the end of our rope.

On his web site, the guy did provide a link to the solution to this puzzle. From perusing his site, I got the impression that he is a computer programmer which leads me to believe that he solved it by using a brute force computer algorithm.

Computers can use such algorithms to solve difficult problems in seconds. But using brute force methods are impractical for humans. You could be sitting here for weeks trying all the different permutations. So we must rely on our resourcefulness. What we must do is: study the possible solutions and choose the most promising path; or in other words ... guess.

But ... it will be an educated guess.

We want to look for boxes that have been reduced to only 2 possibilities. If we guess wrong, we simply go back and follow the other number which we now know is correct.

There are 5 boxes that fit our criteria. If you examine the two boxes with the 3-9 combination and then project how many boxes you can solve by choosing either number, you will see that those boxes will get us nowhere.

I'll save you some time by telling you that J10 and B3 also failed to solve very many boxes. But F3 was much more promising; especially if I choose the 5.

So, we insert a new worksheet, give it the name of the box we are guessing, and then copy the puzzle from the tab where we got stuck to the new tab.

This way, if our guess fails, we simply recopy the puzzle from the tab where we got stuck and begin again, only this time, using the correct number.

When you run out of solved boxes to follow up on,

Then you must search the rows, columns, and grids

For pairs, triplets, and unique and particular numbers.

These will create more solved boxes for you to eliminate.

For example, in the bottom row, the boxes containing 25, 29, and 259, form a triplet, so you can remove any 2's, 5's, or 9's that you find in that row.

So, what was the result of our guess?

Keep your eyes on the exclamation points.

We have solved "The Impossible Sudoku."

WORST SUDOKU

We played and beat "the impossible sudoku."

Now we're going to play one that is even harder. You might remember that we were able to solve the impossible sudoku by making a strategic guess that paid off for us.

The first time I played this puzzle, it took me 6 guesses to solve it! So I played it again using a different path and still took 6 guesses. Then I carelessly deleted the solution, and had to solve it all over again from scratch, but this time I chose a different path, and was rewarded, by solving it in only 4 guesses. Using this new path as a basis, I then experimented with a different guess, playing it one last time in an attempt to solve it in fewer than 4 guesses.

This puzzle was not a "Minimum Sudoku" (17 clues). It provided 24 starting clues. After removing all duplicates and finding the unique numbers, here is the result:

We've solved 7 more boxes. So now we only have 50 more to go.

Unfortunately, we are out of tricks and must guess our next move.

I chose the 4 in D3 and took it as far as it would go before getting stuck again.

For my next guess, I chose the 7 in F6, and played that path until it too, ran into a dead end.

My third guess was the 9 in K7. Remember, I was trying to beat my best effort which required 4 guesses, so this path had to lead to victory or else.

Just as I could almost taste the thrill of victory, I ended up in this situation: It looked like I was going to have to resign myself to making that 4th guess. Then I realized that I did not have to guess. I could use logic to solve the puzzle.

When you encounter a square like this one, no matter which number you choose for the upper left box of the square, you will solve the puzzle. That is because this is one of those rare sudoku puzzles with 2 solutions.

In each row, column, and grid, it doesn't matter in which order you put the 6 and the 7, they will sum to 13. Therefore we win either way. However, it is technically true that after 3 guesses, the puzzle was still incomplete so you could argue that it still requires 4 guesses.

If anyone out there can solve this puzzle in less than 4 guesses please email the answer to me at "neo@theskepticarena.com"