Cygnet Sudoku Volume II

Edited By FullDeck and Missing A Few Cards

Cygnet Sudoku Volume II

Spring 2024

Puzzle Constructors

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Edited by FullDeck and Missing a Few Cards

Original cover art by Nikolai Gallagher

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Foreword

In setting, solving, and teaching variant sudoku, it is the interactions with people that bring us the most pleasure. We love the joy solvers share through comments on puzzles and video solves of those puzzles. Discussions about logical paths and "can we *prove* that?" bring us tremendous delight. Every time our students are complimented for their puzzles or guest solves, we beam with pride. And in our outreach work, we celebrate the excitement children bring to engaging with the logic and mathematics of puzzling. We will talk about puzzles all day! (Just ask our family and friends.)

We have challenged ourselves this year to set and post a new puzzle every day. So far, we have met that goal. Nearly all of our puzzles are archived on our website, `missingdeck.net`. We regularly get messages from people who want to share an insight they have had on a puzzle, and we are tickled to death every time someone lets us know they have engaged with and enjoyed our creations. In fact, it was an email from Jon B. in the United Kingdom that resulted in this book having over 100 puzzles! He made a generous donation to support the work we are doing and also set a challenge for this second volume, one we are happy to have met.

We are often asked how to share these puzzles and bring oth-

ers into the world of both solving and creating puzzles. Both Volume 1 and Volume 2 of the series are available as free pdf downloads and we encourage you to share them far and wide:

`https://missingdeck.net/cygnet1.html`
`https://missingdeck.net/cygnet2.html`

If you wish to buy hard copies, there are links to do so on those pages, although we definitely recommend playing the puzzles online.

Many people have also asked how they can help support the continued development of this series. We are fortunate enough not to need financial support. However, if you wish to make a donation to support the students involved in the project, you can do so at `https://ko-fi.com/missingdeckpuzzles`. All donations and puzzle commissions through the Ko-Fi account, as well as all proceeds from hard copy sales of the book, help fund student participation in puzzle-related gatherings and events.

Why are we including some of our puzzles this time? Because the students, soon to be swans, are part of a team with us, as we are with them.

So ... who are we?

We are FullDeck and Missing a Few Cards. We have been using sudoku setting pseudonyms, or *sudokunyms* as we prefer to call them, since we started creating puzzles. Over the past couple of years, though, it has become easier and easier to identify who we are: mention of our university in the middle of a solve, or wishing us happy birthday by first name. So it is finally time to dox ourselves! We are both academics at Clemson University: FullDeck is Eliza Gallagher, an associate professor in the Engineering and Science Education Department, with a joint appointment to the School of Mathematical and Statistical Sciences. Missing a Few Cards is Neil Calkin, a professor in the School of Mathematical and Statistical Sciences.

We have been teaching puzzles classes for several years, and are also running an undergraduate research project aimed at exploring educational uses of variant sudoku, both in formal and informal learning spaces. If you would like to be on a project mailing list or to become involved with the project, please reach out to us! We are @full_deck and @missingafewcards on Discord, or you can email us at `fulldeck@missingdeck.net`.

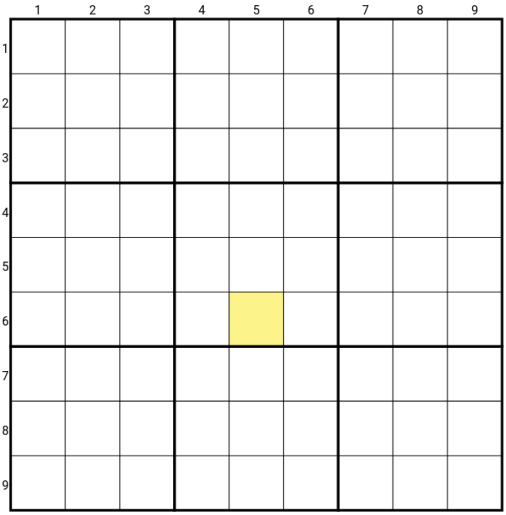
One final note: we have included verbatim the chapters on Variant Sudoku and Solving Online that first appeared in Volume 1, as they will be a handy reference for this volume as well. Feel free to skip them if you are already familiar with variant sudoku and the SudokuPad solving platform.

Now on to the puzzles!

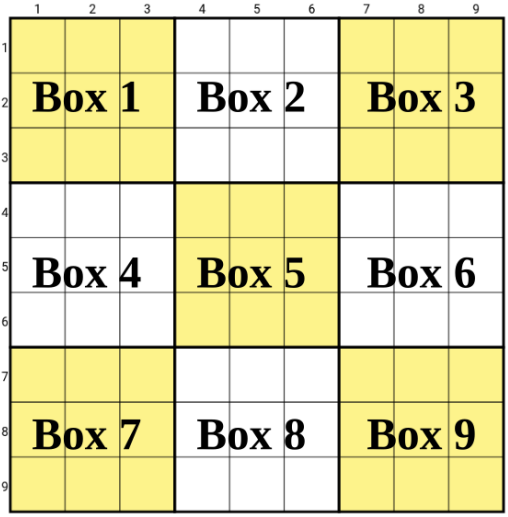
– FullDeck and Missing a Few Cards, April 2024

Variant Sudoku

What is variant sudoku, and how does it differ from classic sudoku? Both forms have a (typically) 9×9 grid, with the grid composed of nine 3×3 square boxes. Individual cells are referred to by row and column number, so that r6c5 refers to the cell in row 6 (counting from the top to bottom) and column 5 (counting from left to right).



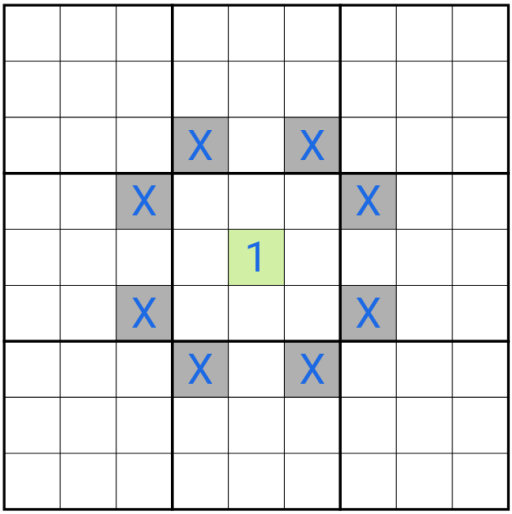
The boxes are labeled 1-9, with boxes 1, 2, 3 in the top band; 4, 5, 6 in the middle band; and 7, 8, 9 in the bottom band of three boxes.



In classic sudoku, the starting grid is populated with some given digits, and the goal is to fill the entire grid with digits 1-9 so that every row, column and box contains a complete set of the digits 1-9. It is known that for a classic sudoku puzzle to have a unique solution it must have at least 17 given digits, although many more may be necessary depending on their placement. Often, the number of given digits is used as a proxy for difficulty – the fewer the given digits, the harder the puzzle is assumed to be – although there are lots of examples demonstrating that this is a poor proxy.

In variant sudoku, extra types of clues are included, other than given digits. These may involve certain types of lines in the grid (palindromes, thermometers, arrows, modular lines, renbans, between lines, and more) or other symbols indicating re-

lationships between cells (kropki dots, quadruples, Xs, Vs, and more). Sometimes the additional rules needn't have any symbols or digits given at all! Such rules might involve restrictions on how digits are positioned relative to each other. For example, in an antiknight puzzle, digits that are a chess knight's move apart must be different. In this antiknight puzzle, 1 cannot appear in any of the cells marked with an 'X', since each of those cells could be reached in a single move of a chess knight from the 1 in the green cell.



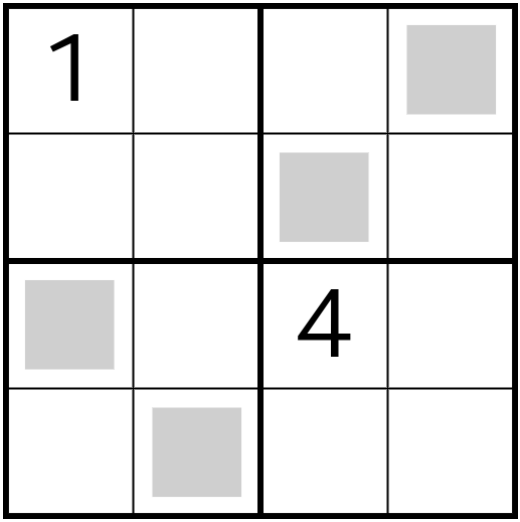
The constraints used for each puzzle in this book are stated in full with the puzzle, and should be self-explanatory. If you need further explanation, though, please reach out to us at `mailto:fulldeck@missingdeck.net`. For tips on how to use the online solving platform, see the Solving Online chapter starting on page 128 or check out some of our videos about learning to solve variant sudoku at `https://mdp.tiny.us/learning-videos`.

Small Puzzles

Puzzles in this section are all 4×4 puzzles using only the digits 1–4. The smaller size allows both setter and solver to explore some of the logical implications of a particular constraint or combination of constraints. This is also a good chance to start getting used to the online solving platform. If you haven't used SudokuPad before, we recommend opening one of the puzzles from this chapter online and trying out some of the features explained in the Solving Online chapter.

Even Steven

by 7ate9



Rules:

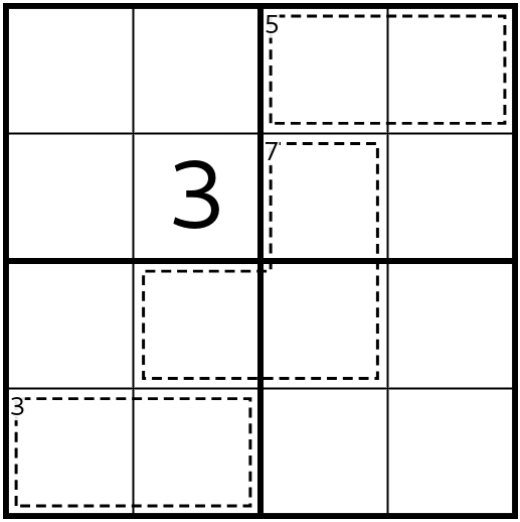
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Even:* Digits in grey squares must be even.

`https://sudokupad.app/lz9p4p9agl`

Odd Todd

by Dilemma



Rules:

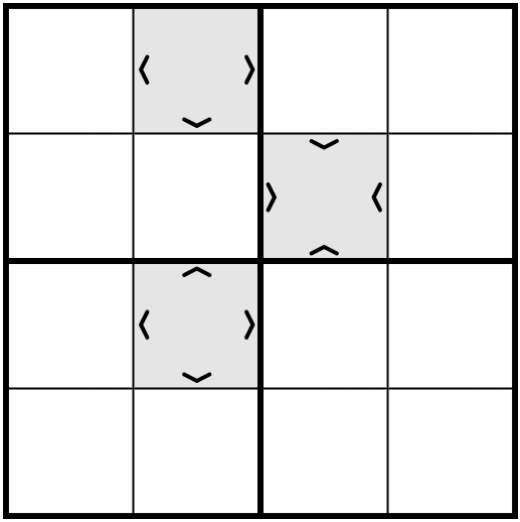
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/tt9x29a1vs`

Max-a-Min

by La Lune



Rules:

• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

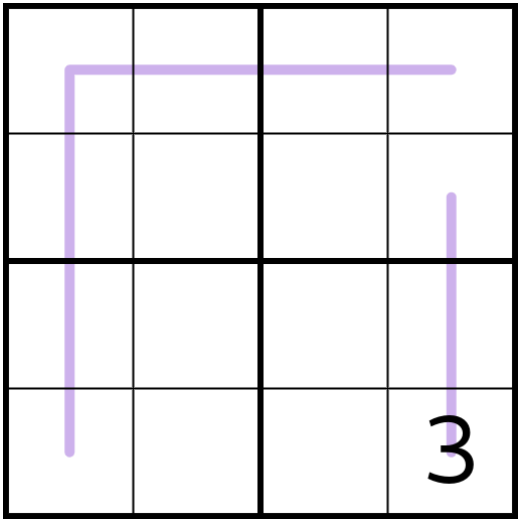
• *Minimum Cells:* Cells with arrows facing inward must contain numbers less than all orthogonal cells that don't also contain minimum constraints.

• *Maximum Cells:* Cells with arrows facing outward must contain numbers greater than all orthogonal cells that don't also contain maximum constraints.

`https://sudokupad.app/skekttksha`

House of Zipper

by Dicalfalous



Rules:

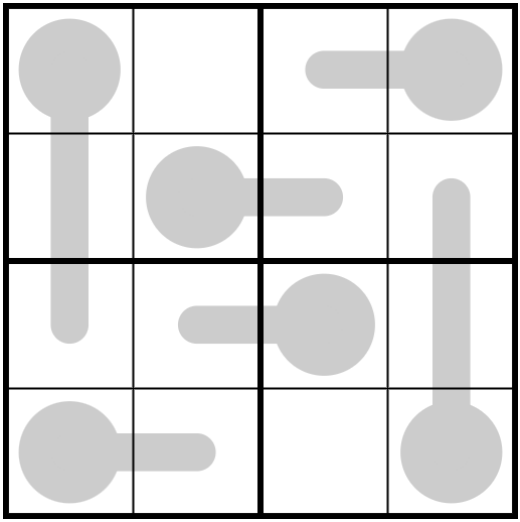
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Zipper Lines:* Along Zipper lines, pairs of digits equidistant from the center of the line have the same sum. For Zipper lines of odd length, that sum is the central digit on the line.

`https://sudokupad.app/y2q2h0lc7g`

Cheese and Crackers

by La Lune



Rules:

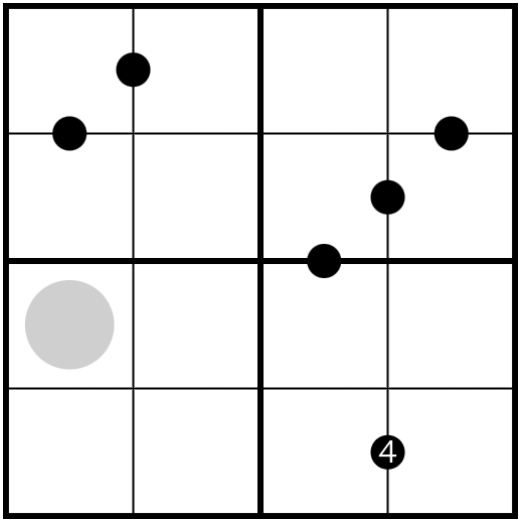
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/ze09hpw1xx`

Dominoes 4x4

by Dilemma



Rules:

• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

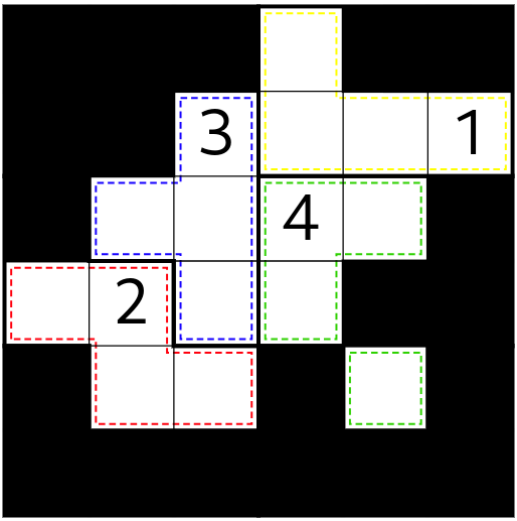
• *Variable Ratio Dots:* Digits separated by a black dot are in a 1:n ratio where n is the value shown inside the black dot. If no value is shown, the ratio is 1:2.

• *Odd:* Digits in grey circles must be odd.

`https://sudokupad.app/7oy2jz3dxt`

Jigsaw II (4x4)

by Phishy



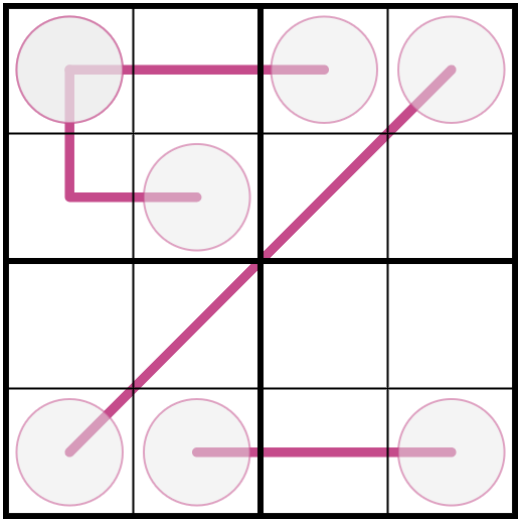
Rules:

• *Jigsaw:* Digits 1-4 must be placed in each regions without repeating. Regions are indicated by colour within the grid. Not all digits may appear in each row or column but no digits can repeat in a row or column.

`https://sudokupad.app/n84m1u2yuc`

Ebb and Flow

by La Lune



Rules:

• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

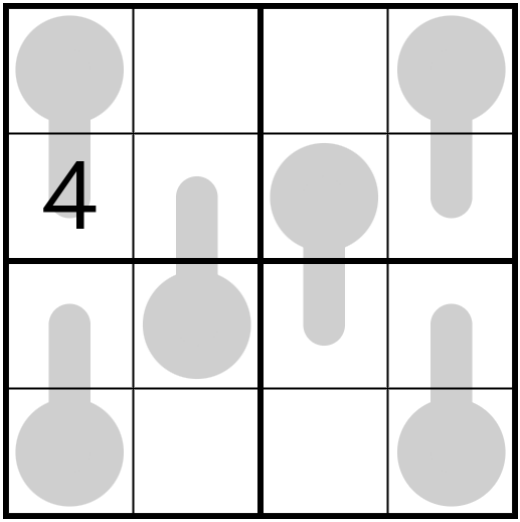
• *Double Arrows:* The sum of digits placed on a line must be equal to the sum of digits in the circles at each end of the line.

Two different lines can have the same circle marking the start/end of each line; these are two separate lines, not one line.

`https://sudokupad.app/80rsl6e74n`

Crossbite

by Dicalfalous



Rules:

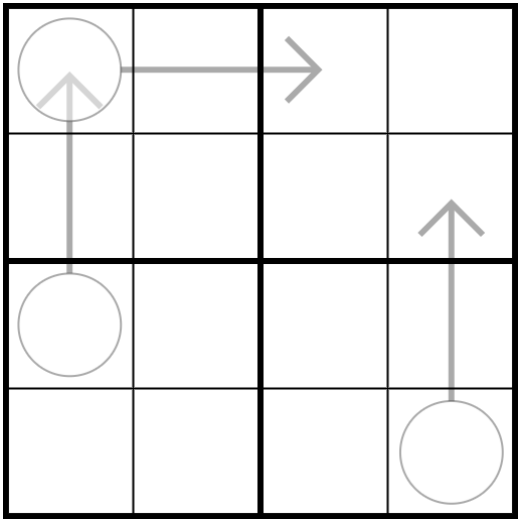
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/xzvqnjx11n`

Aerosmith

by La Lune



Rules:

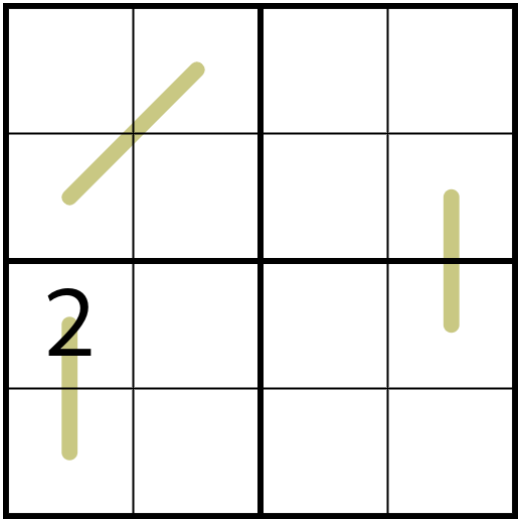
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Arrows:* Digits along an arrow must sum to the number indicated in the circle from which the arrow emerges.

`https://sudokupad.app/yga1wl37pg`

Nabner's Apprentice

by Dicalfalous



Rules:

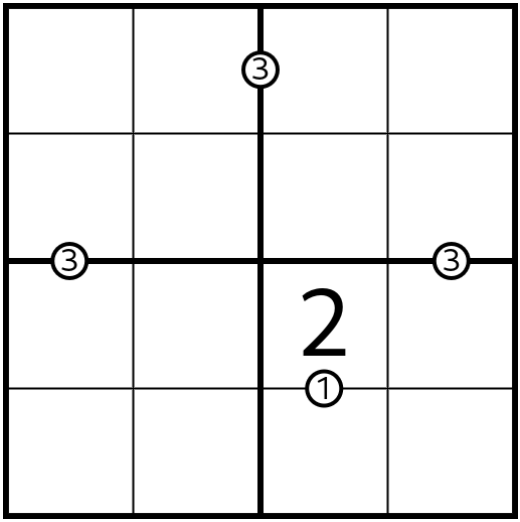
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Nabner Lines:* No two digits along a Nabner line can be consecutive, regardless of their position on the line. Digits may not repeat on Nabner lines.

`https://sudokupad.app/0h5nr5vdxl`

Such a Different Game

by La Lune



Rules:

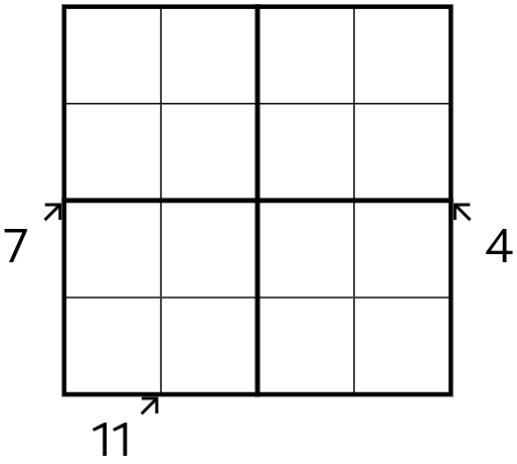
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Difference Dots:* Digits in cells separated by a white dot must have a difference given by the number inside the dot. If no value is shown, the difference is 1.

`https://sudokupad.app/imvzff0rfp`

Teeny Tiny Little Killer

by Dilemma



Rules:

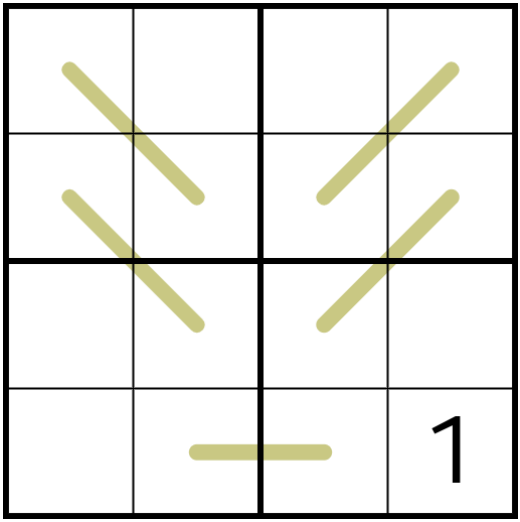
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

`https://sudokupad.app/ht48qplpnb`

Bee's Knees

by Dicalfalous



Rules:

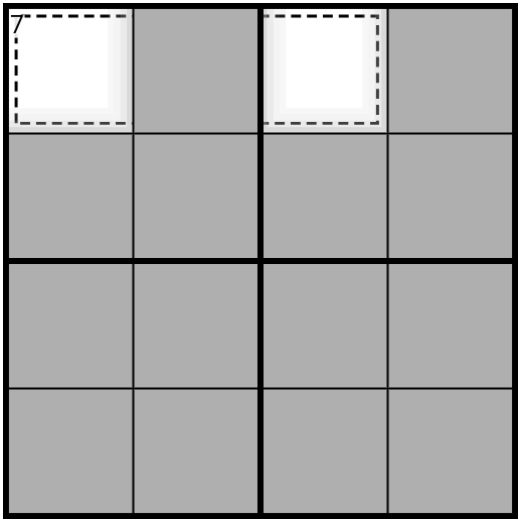
• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Nabner Lines:* No two digits along a Nabner line can be consecutive, regardless of their position on the line. Digits may not repeat on Nabner lines.

`https://sudokupad.app/b5ol3jwvrv`

Killer 4x4

by Phishy



Rules:

• *Normal* 4×4 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-4.

• *Fog:* The grid is covered with fog. There is an initial light source that clears the fog. Placing correct digits into cells clears the fog from all adjacent cells. Fog puzzles can only be solved online.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

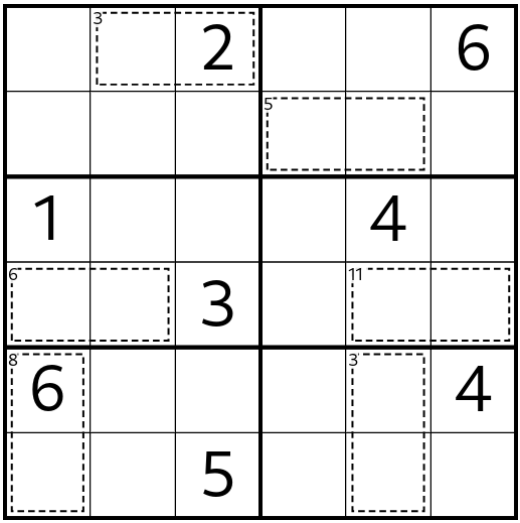
`https://sudokupad.app/j3xzz8quf1`

Smallish Puzzles

Puzzles in this section are all 6×6 puzzles using only the digits 1–6. As with the 4×4 puzzles, this allows for a more contained exploration of logic associated with particular constraints. That doesn't mean they are necessarily easy, though! Some of the 6×6 puzzles in this chapter may be harder than some of the full 9×9 puzzles in the Easy Puzzles chapter. As with all of the puzzles in this book, we recommend solving online, rather than on paper.

Newbie

by Lumos



Rules:

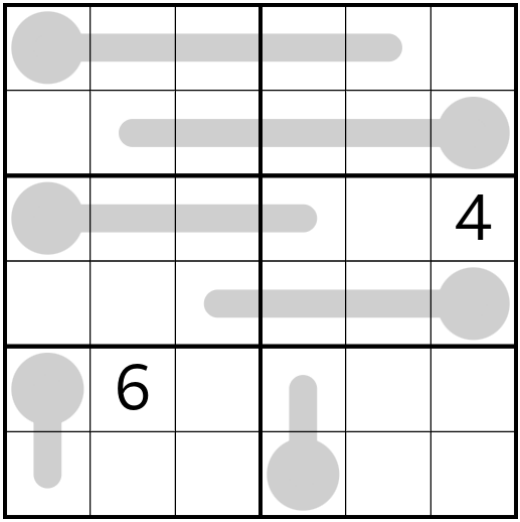
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/n57216mr8u`

Intro Thermo

by Dilemma



Rules:

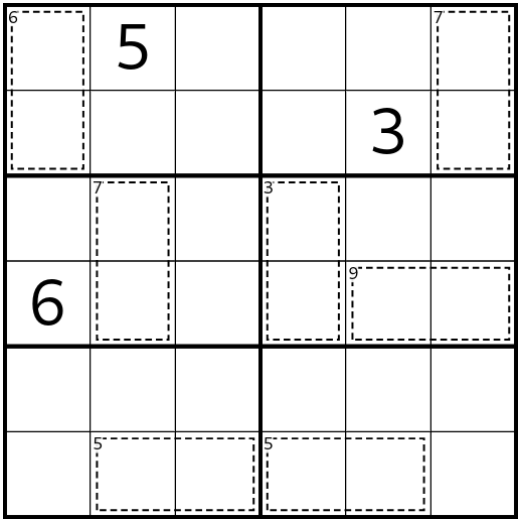
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/f6t0v9mgkp`

What's That Over There?

by Lumos



Rules:

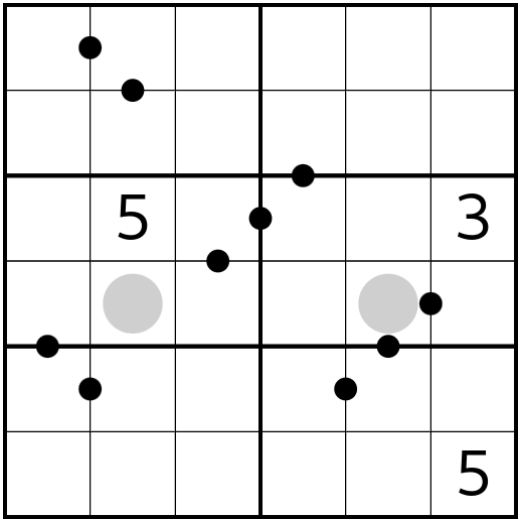
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/dy49jmo7jc`

Dominoes 6x6

by Dilemma



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

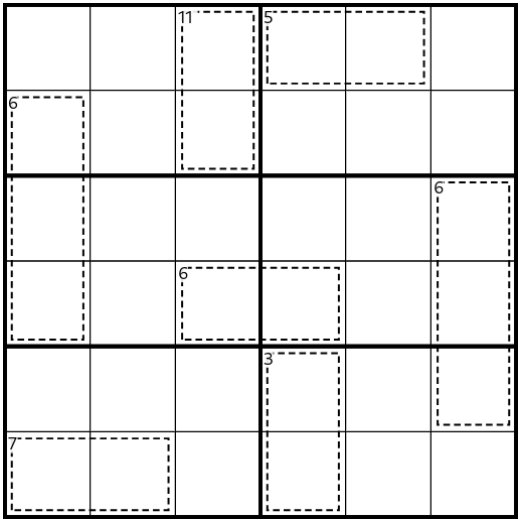
• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

• *Odd:* Digits in grey circles must be odd.

`https://sudokupad.app/chvsrxh04y`

Escape (2022 Remaster)

by La Lune



Rules:

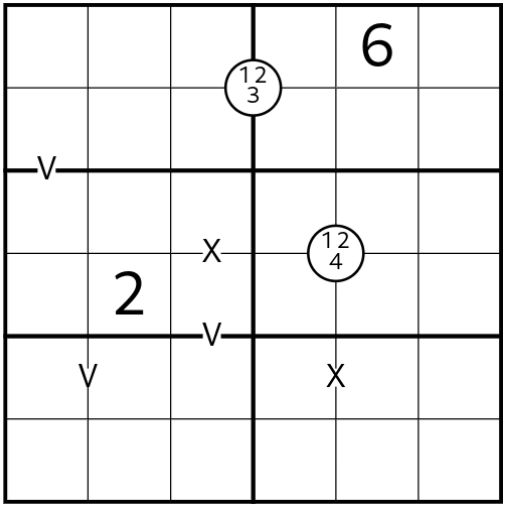
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/401djyal21`

$4 + 5 = 10$

by Lumos and Pickup



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

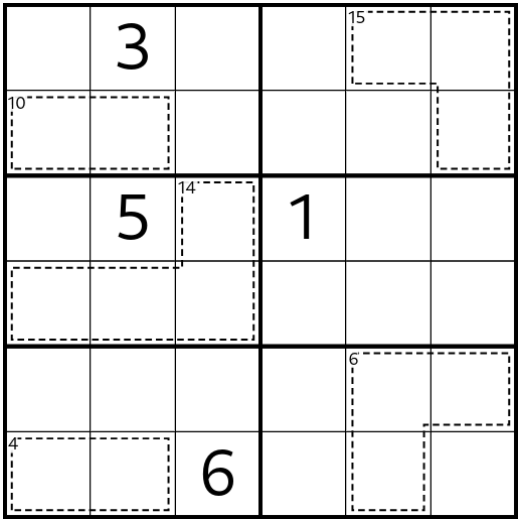
• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

`https://sudokupad.app/ov09bhav81`

Look Both Ways

by Lumos



Rules:

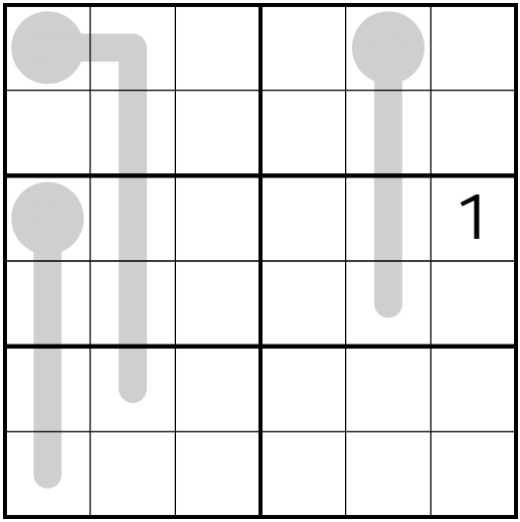
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/mw8rzrcit7`

Intro Thermo 2.0

by Dilemma



Rules:

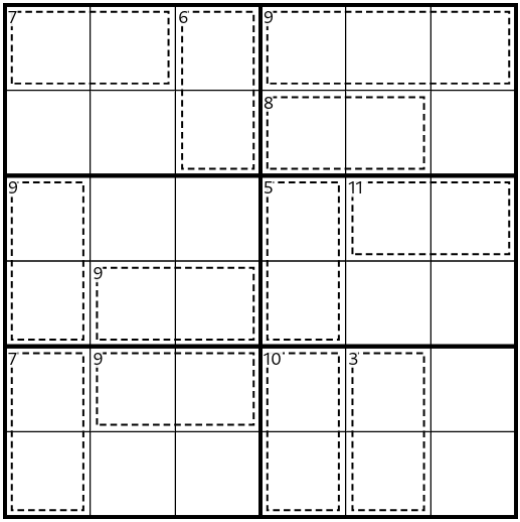
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/3qxzrosyp4`

Unmarked Cages

by froggy



Rules:

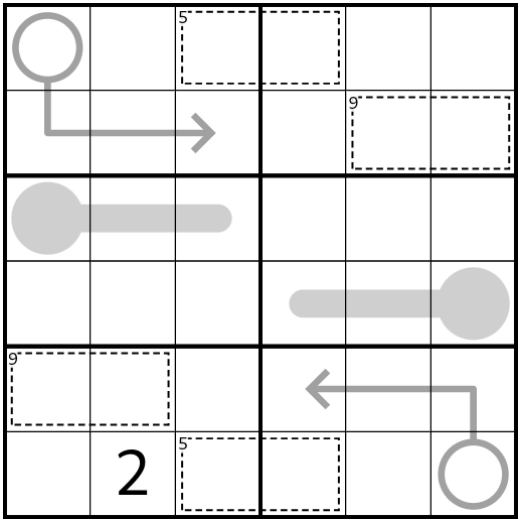
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/q6eos1h3ck`

Conduit

by CakeyQ



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

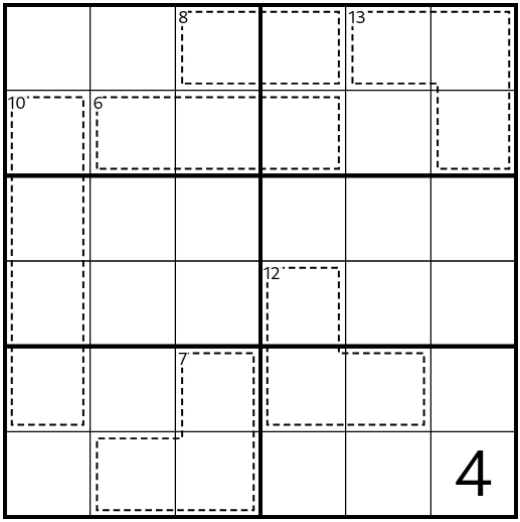
• *Arrows:* Digits along an arrow must sum to the number indicated in the circle from which the arrow emerges.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/llo9ka9y1p`

Killer Queen

by La Lune



Rules:

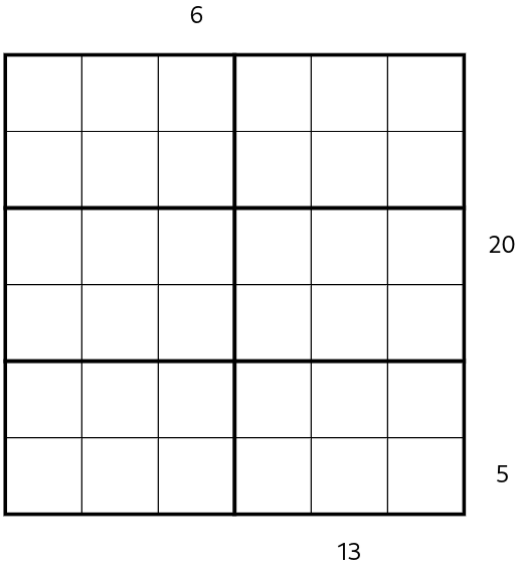
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/xhr7271bso`

44

by tkoq



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

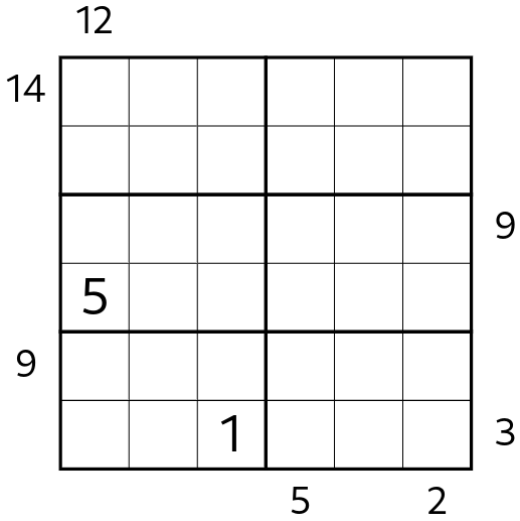
• *Antiknight:* Cells that are a chess knight's move apart cannot contain the same digit.

• *X-Sums:* Numbers outside the grid indicate the sum of the first X digits in that row or column, where X is the first digit seen from the direction of the clue.

`https://sudokupad.app/ft5dj2ygt0`

Stuck in the Middle with You

by La Lune



Rules:

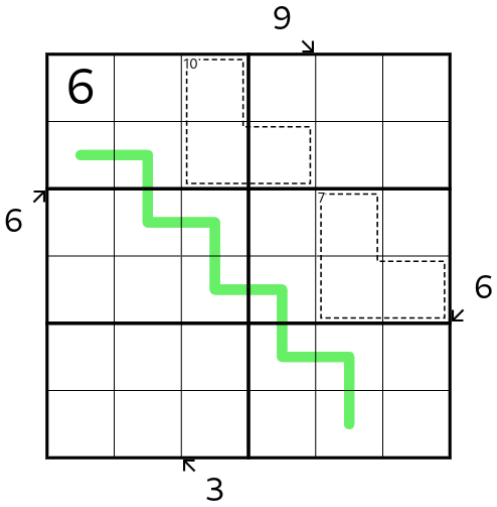
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Sandwich:* Numbers outside the grid indicate the sum of the digits between 1 and 9 in that row or column.

`https://sudokupad.app/3i2tgurl5x`

Whispering Stairs

by Lumos



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 3.

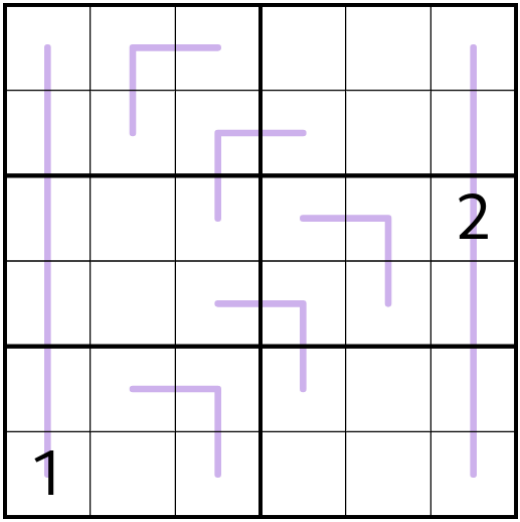
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

`https://sudokupad.app/pqmp7drr60`

Conveyor Belt

by Dicalfalous and Dilemma



Rules:

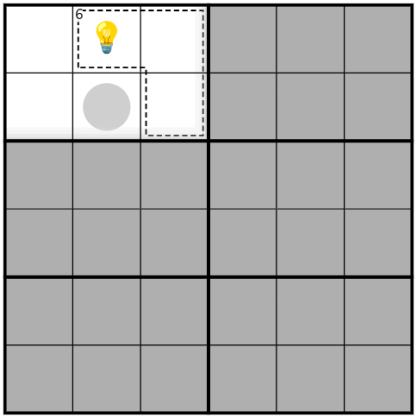
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Zipper Lines:* Along Zipper lines, pairs of digits equidistant from the center of the line have the same sum. For Zipper lines of odd length, that sum is the central digit on the line.

`https://sudokupad.app/f2uxu3ka0p`

Nox

by Lumos



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Fog:* The grid is covered with fog. There is an initial light source that clears the fog. Placing correct digits into cells clears the fog from all adjacent cells. Fog puzzles can only be solved online.

• *Antiknight:* Cells that are a chess knight's move apart cannot contain the same digit.

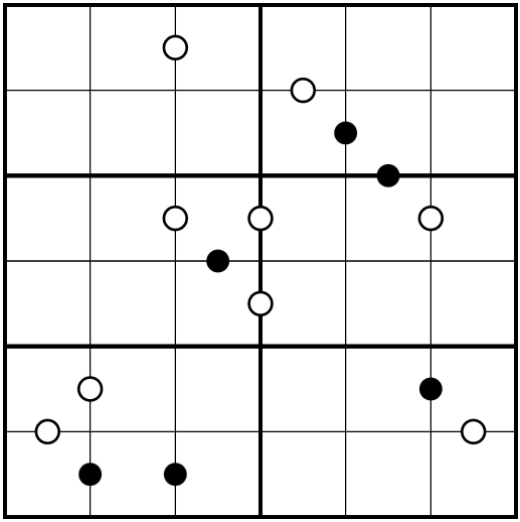
• *Odd:* Digits in grey circles must be odd.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/tl1k017pbf`

Sudo-Go

by Dicalfalous



Rules:

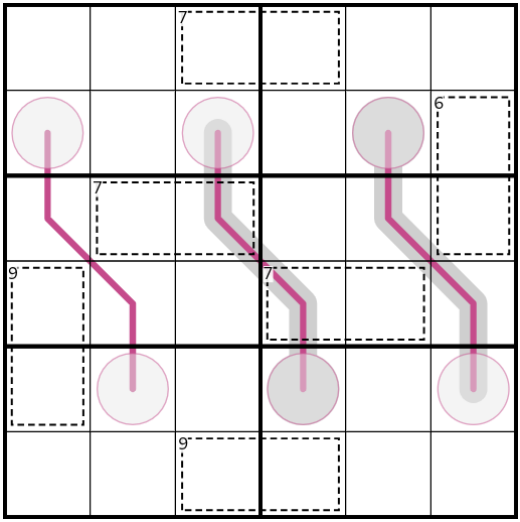
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/o7pt66nupg`

The Number of Completion

by Damsalfly



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

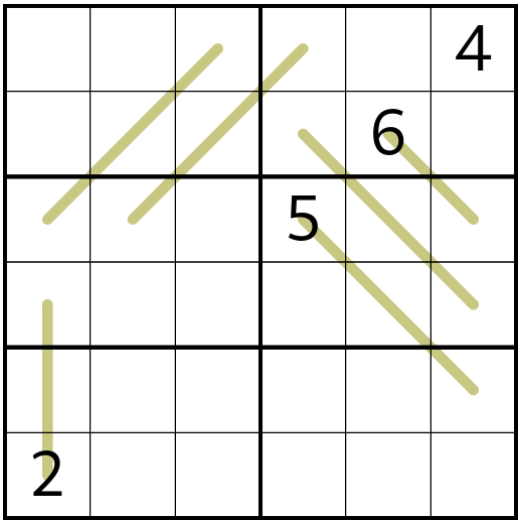
• *Double Arrows:* The sum of digits placed on a line must be equal to the sum of digits in the circles at each end of the line.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/cg05un6pmv`

Nabner's Journeyman

by Dicalfalous



Rules:

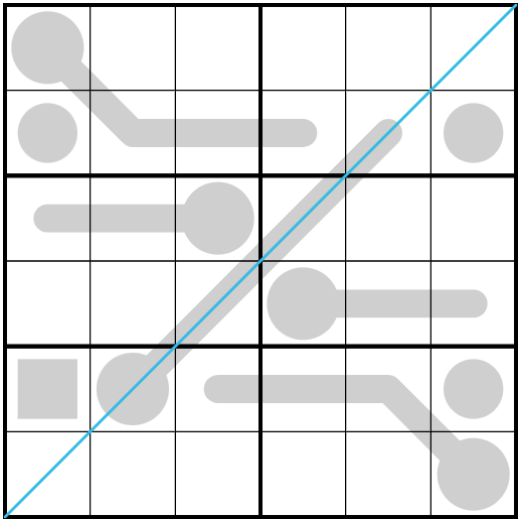
• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Nabner Lines:* No two digits along a Nabner line can be consecutive, regardless of their position on the line. Digits may not repeat on Nabner lines.

`https://sudokupad.app/dtjn17n3so`

Thermo Web

by Phishy



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

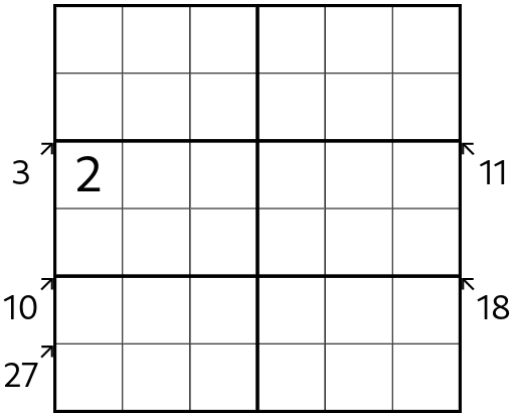
• *Diagonal:* Digits may not repeat along marked diagonals.

• *Odd/Even:* Digits in grey squares must be even. Digits in grey circles must be odd.

`https://sudokupad.app/hbmcqxes70`

Tiny Little Killer

by Dilemma



Rules:

• *Normal* 6×6 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-6.

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

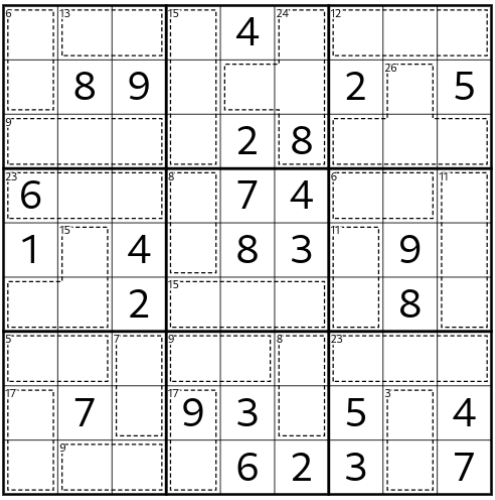
`https://sudokupad.app/5s8jleibnt`

Easy Puzzles

The puzzles in this section should be straightforward for those with some experience. The solutions may include logical interactions between constraints, as well as the use of pointing pairs and triples. You may need to use centermarks and cornermarks to keep track of some deductions.

Alphabet Cage

by CakeyQ



Rules:

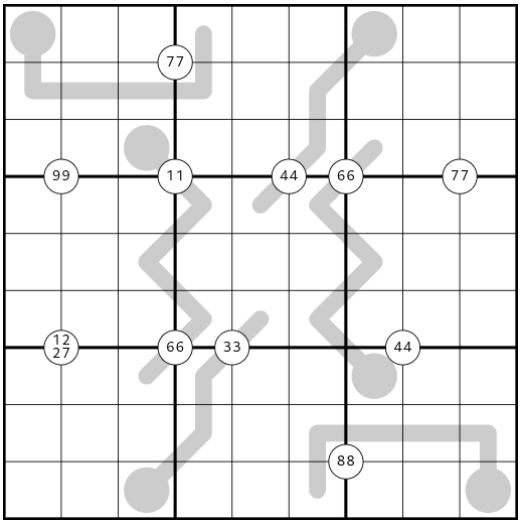
• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/5rz0rsl02y`

A Slow Walk Around the Quad

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

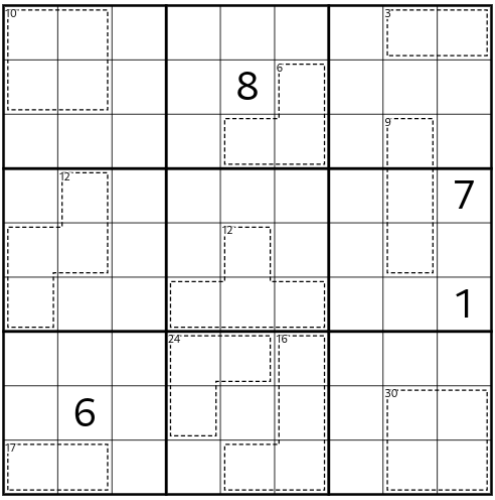
• *Slow Thermometers:* Digits along slow Thermos may not decrease from bulb to tip.

• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

`https://sudokupad.app/q5spa9ydxu`

Losing Tetris

by Lumos



Rules:

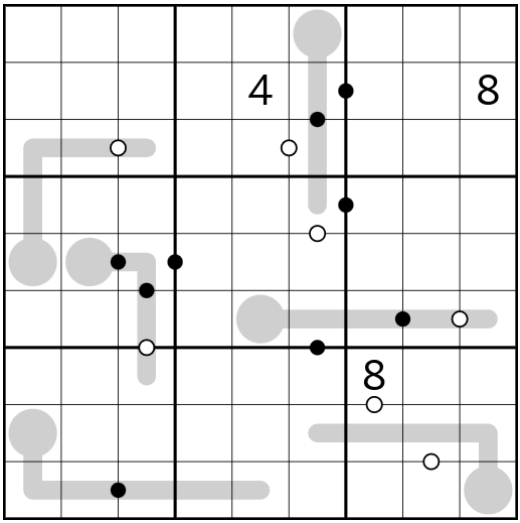
• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/gk20y9ms8b`

Salt the Roads

by Pickup



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

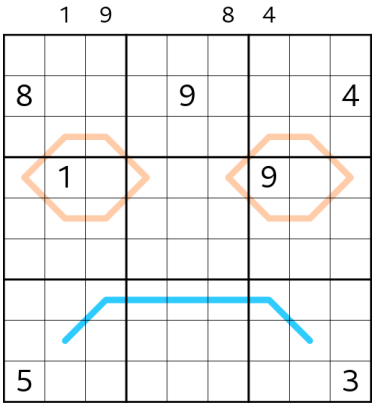
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/jvndn5jppn`

Big Brother

by Falconi



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

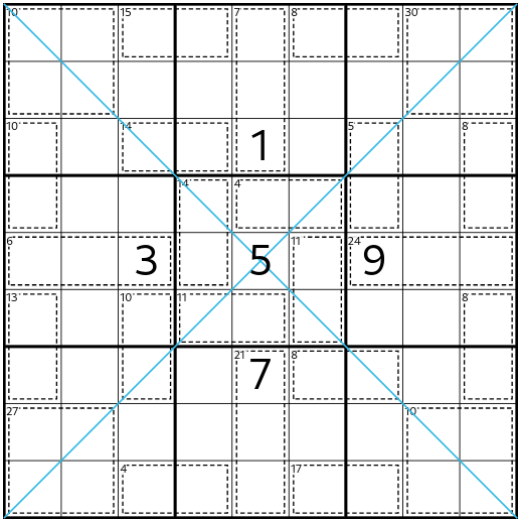
• *Region Sum Lines:* The sum of the digits along a blue Region Sum Line within a particular region must be the same for all of the regions the line passes through.

• *Skyscrapers:* Each cell represents a skyscraper whose height is the digit in that cell. Taller skyscrapers obscure the view of smaller ones. Clues outside the grid tell how many skyscrapers are visible looking across the row or column from the direction of the clue.

`https://sudokupad.app/hs6y1xgw37`

X-traterrestrial

by Damsalfly



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

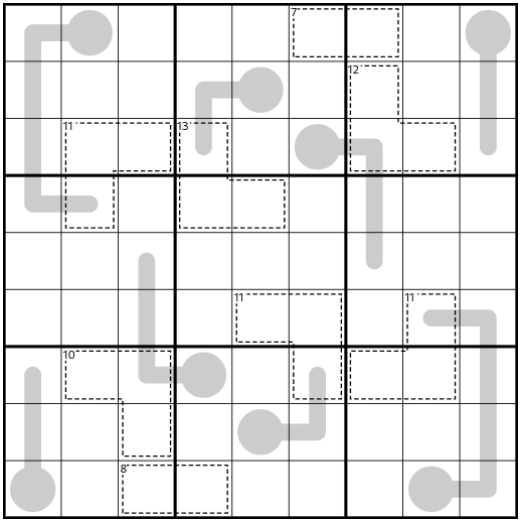
• *Diagonal:* Digits may not repeat along marked diagonals.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/xc2ftfpxu2`

Trapped Heat

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

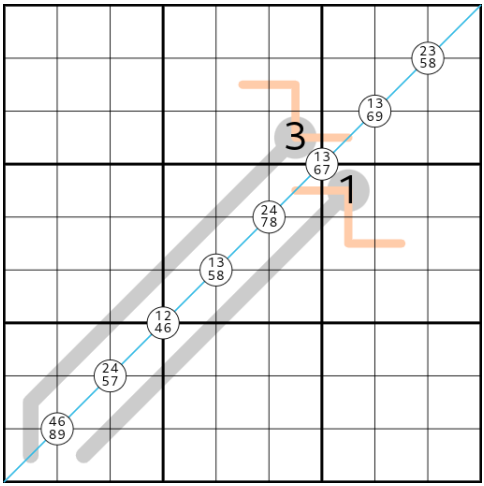
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/248w6iceag`

Andruil

by Damsalfly



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Diagonal:* Digits may not repeat along marked diagonals.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

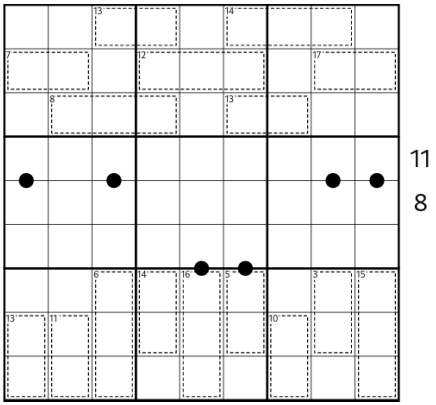
• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

`https://sudokupad.app/0zcfmyn198`

Lunch Atop a Skyscraper

by froggy



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Skyscrapers:* Each cell represents a skyscraper whose height is the digit in that cell. Taller skyscrapers obscure the view of smaller ones. Clues outside the grid tell how many skyscrapers are visible looking across the row or column from the direction of the clue.

• *Sandwich:* Numbers outside the grid indicate the sum of the digits between 1 and 9 in that row or column.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

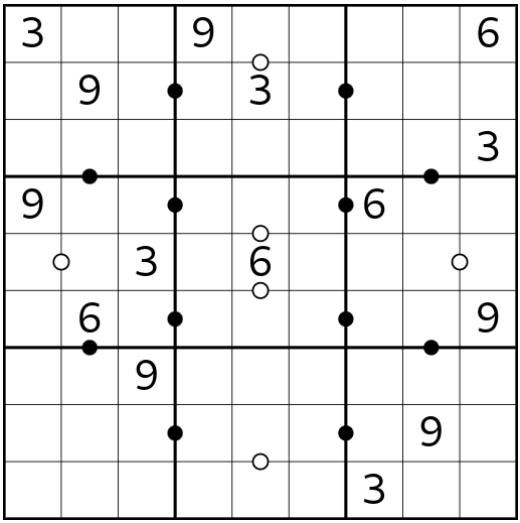
• *Ratio Dots:* Digits separated by a black dot are in a 1 : 2 ratio. Not all dots are necessarily given.

In this puzzle, the '11' is a sandwich clue and the '8' is a skyscraper clue.

`https://sudokupad.app/ta06qzb5pm`

The Magic Number

by Falconi



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

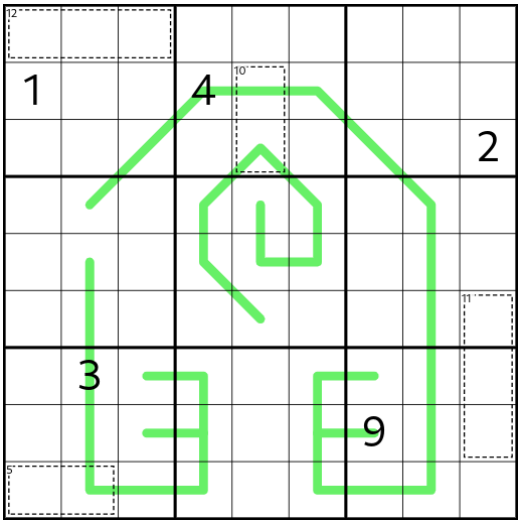
• *Antiking:* Cells that are a chess king's move apart cannot contain the same digit.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/4syn3lkpri`

There are no Marks in Ba Sing Se

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

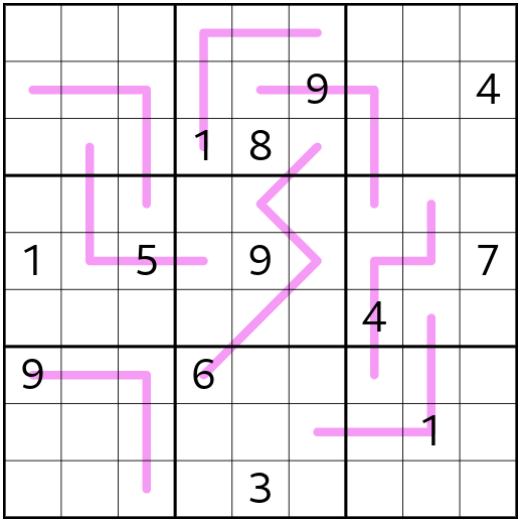
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/bqc3uurdyl`

Renban Trailer

by Pickup



Rules:

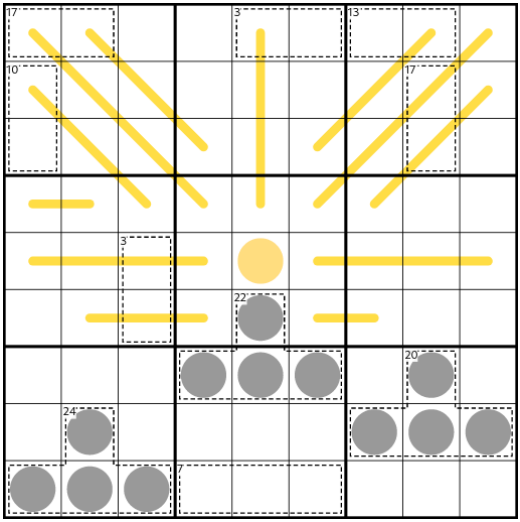
• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/g4je2v8cqz`

Here Comes the Sun

by La Lune



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Shown as yellow lines, adjacent digits along German Whispers lines differ by at least 5.

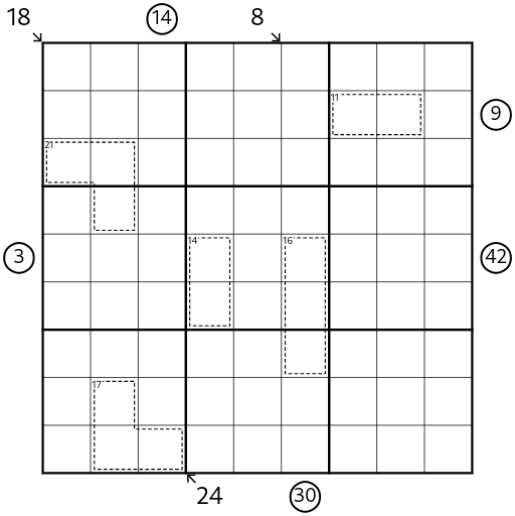
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Odd:* Digits in grey or yellow circles must be odd.

`https://sudokupad.app/hh3w4601p2`

Killer

by Chaos



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

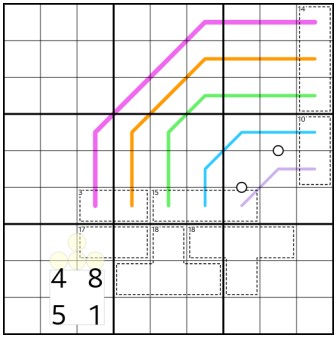
• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

• *X-Sums:* Numbers outside the grid indicate the sum of the first X digits in that row or column, where X is the first digit seen from the direction of the clue.

`https://sudokupad.app/mn130f77ex`

Over The Rainbow

by 7ate9



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Region Sum Lines:* The sum of the digits along a blue Region Sum Line within a particular region must be the same for all of the regions the line passes through.

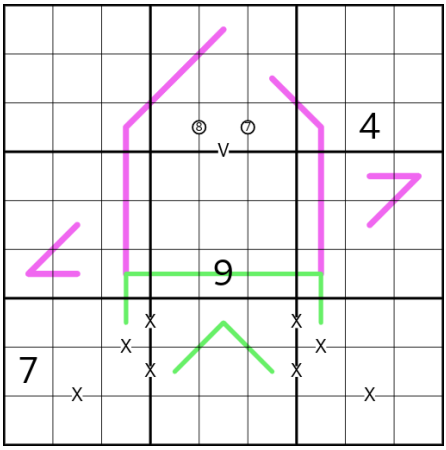
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Note:* The pot of gold in box 7 is for cosmetic purposes only.

`https://sudokupad.app/d30ohvtnvr`

Patrick Star

by 7ate9 and Dilemma



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

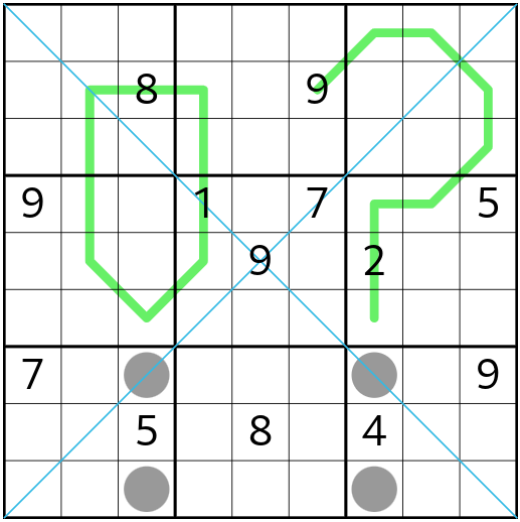
• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

• *Difference Dots:* Digits in cells separated by a white dot must have a difference given by the number inside the dot. If no value is shown, the difference is 1.

`https://sudokupad.app/4a67n1fw1y`

Punctuate?!

by Falconi



Rules:

- *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.
- *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.
- *Diagonal:* Digits may not repeat along marked diagonals.
- *Odd:* Digits in grey circles must be odd.

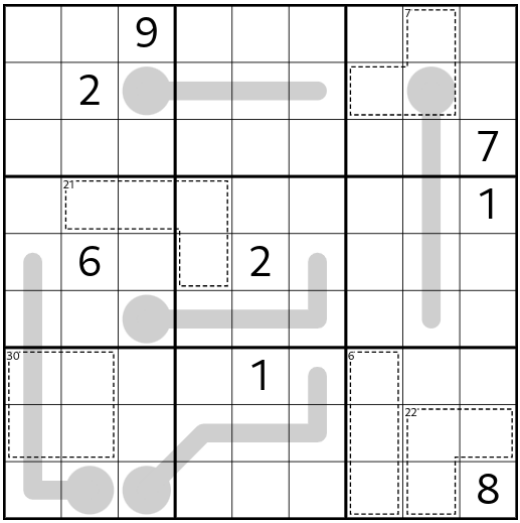
`https://sudokupad.app/ocig37v59b`

Moderately Difficult Puzzles

The puzzles in this section are more challenging. You may need to think about how different constraints interact to limit or force placement of digits. You will almost certainly need centermarking, and may need cornermarking, to keep track of intermediate deductions. If you are new to variant sudoku and haven't already looked at the tips in the appendix, now might be a good time to do that!

Microwave

by Pickup



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

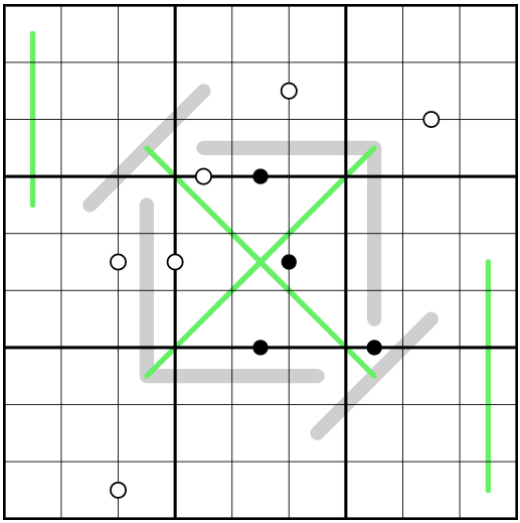
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/r4pbzj5nf3`

Green Lantern

by Glitch Horse, Lumos, & Nash



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

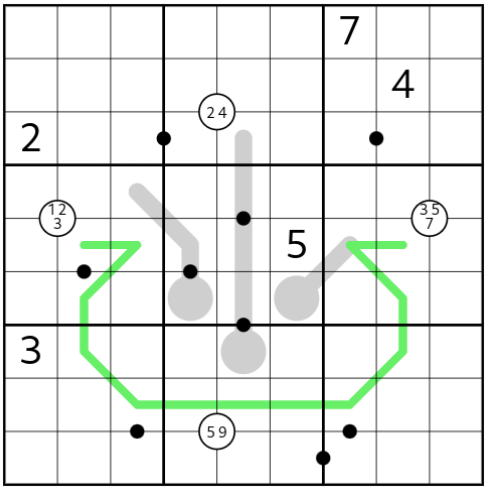
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Palindromes:* Digits on a palindrome read the same forwards and backwards along the line.

`https://sudokupad.app/vy5rllrq7j`

Cold Brew

by Lumos



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

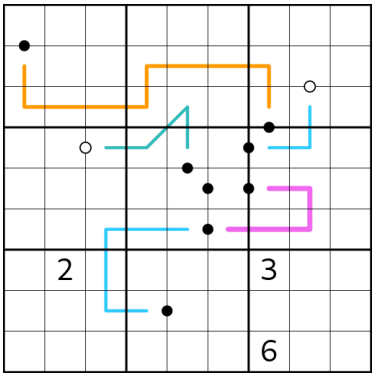
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

`https://sudokupad.app/hl771hfw77`

Connect the Dots

by Nash and 7ate9



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Region Sum Lines:* The sum of the digits along a blue Region Sum Line within a particular region (boxes 3 and 6; boxes 4, 5, 7, and 8) must be the same for all of the regions the line passes through.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

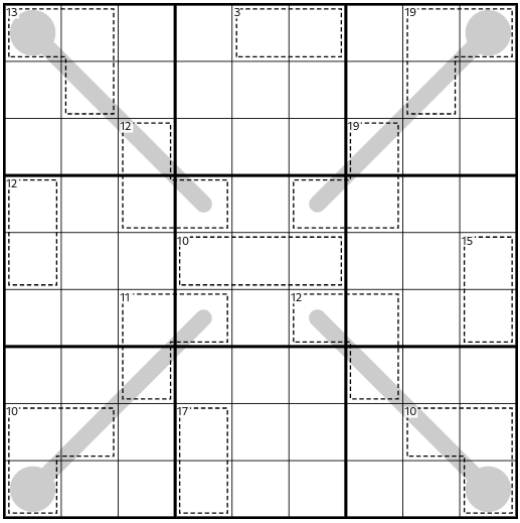
• *Modular Lines:* Any set of three adjacent cells along a teal Modular Line in boxes 2, 4, and 5 must contain digits with three different remainders when divided by 3.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/auhyr9zvdz`

Convection Oven

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

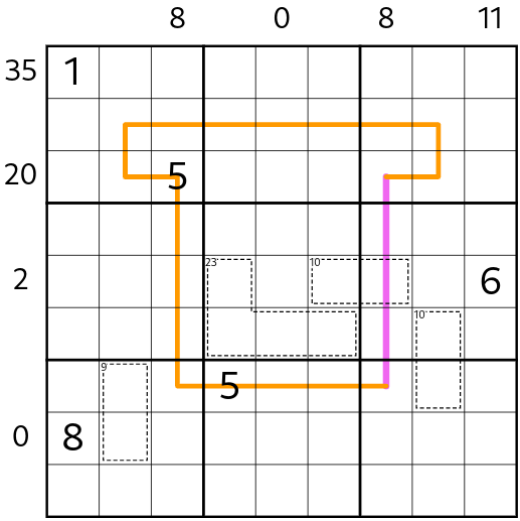
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/p5m25v9dzm`

PB & J

by 7ate9



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Sandwich:* Numbers outside the grid indicate the sum of the digits between 1 and 9 in that row or column.

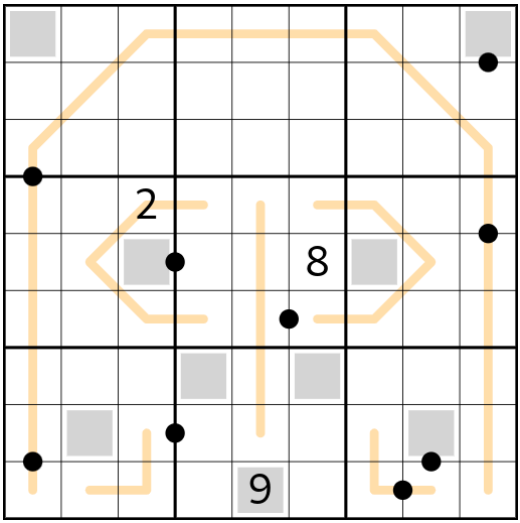
• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/kgngkbm8mh`

Aristos Achaiōn

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

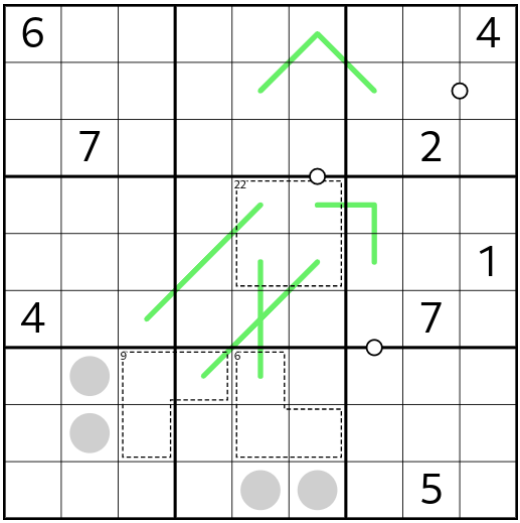
• *Extra Regions:* Each extra region indicated in the grid must contain a complete set of the digits 1-9 without repetition.

The cells marked with grey squares form an extra region.

`https://sudokupad.app/0nusl4hqnx`

Roller Girl

by 7ate9



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

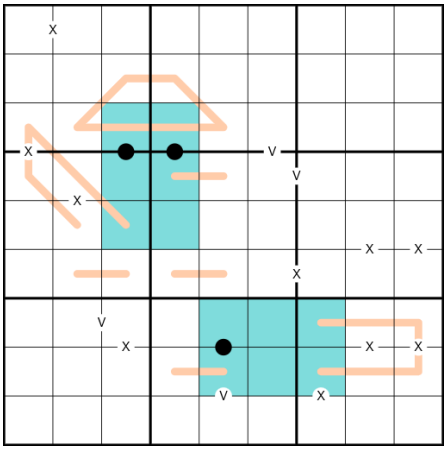
• *Odd:* Digits in grey circles must be odd.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/axnlnh6saw`

PERRY the Platypus?!

by Lumos, Scaly Griffon, and Glitch Horse



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Clone regions:* Each clone region contains the same digits in the same relative positions as its clone. The lower clone is rotated 90 degrees counterclockwise with respect to the upper clone, meaning R3C3 should contain the same digit as R8C5.

• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

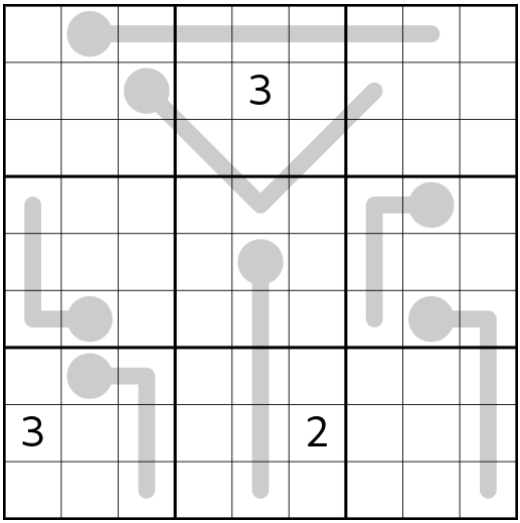
• *Ratio Dots:* Digits separated by a black dot are in a 1 : 2 ratio. Not all dots are necessarily given.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

`https://sudokupad.app/p2cci2kmwa`

Chalice

by Preston



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

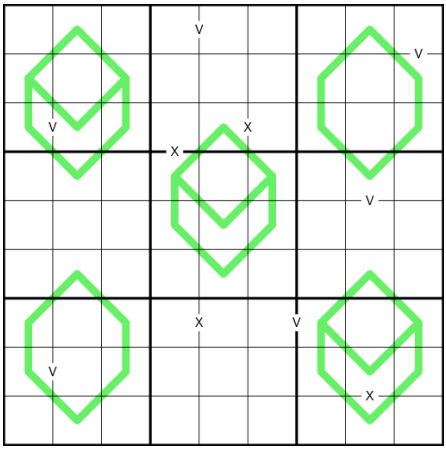
• *Antiking:* Cells that are a chess king's move apart cannot contain the same digit.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/1r2cflk684`

Cubed

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Antiking:* Cells that are a chess king's move apart cannot contain the same digit.

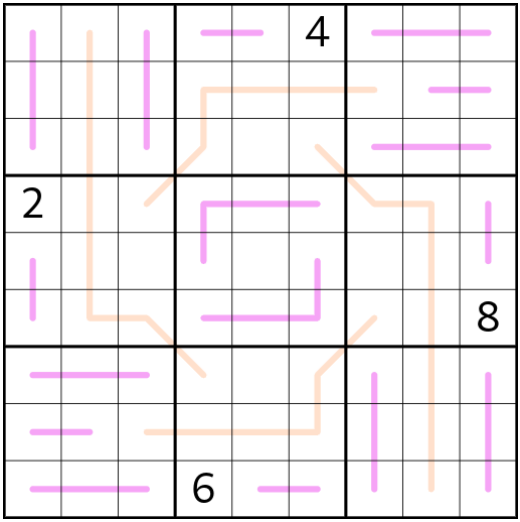
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

`https://sudokupad.app/bwiwzfsv9d`

Glyph

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

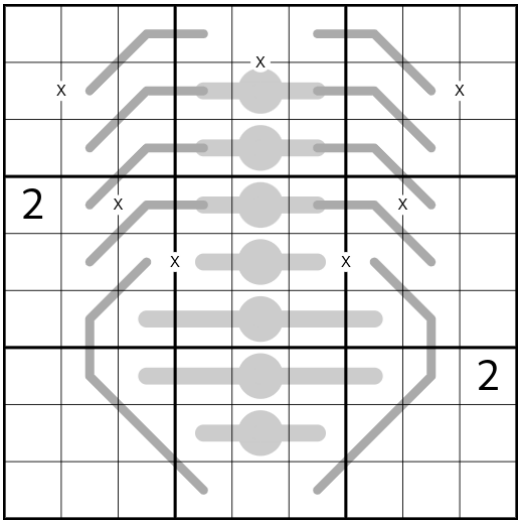
• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/smwplnh6vb`

Anatomy of a Sudoku

by Scaly Griffon



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Thermometers:* Digits on a light grey Thermo must strictly increase from bulb to tip.

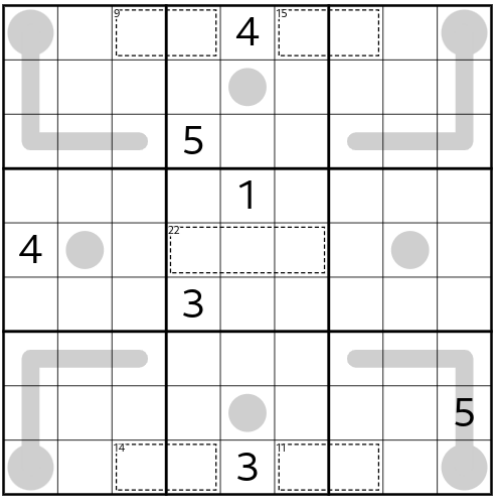
• *Palindromes:* Digits on a dark grey palindrome read the same forwards and backwards along the line.

• *X Pairs:* Digits separated by an X must sum to 10. Not all possible Xs are necessarily given.

`https://sudokupad.app/yzj0syl4e2`

Bounce House

by ifletchr



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

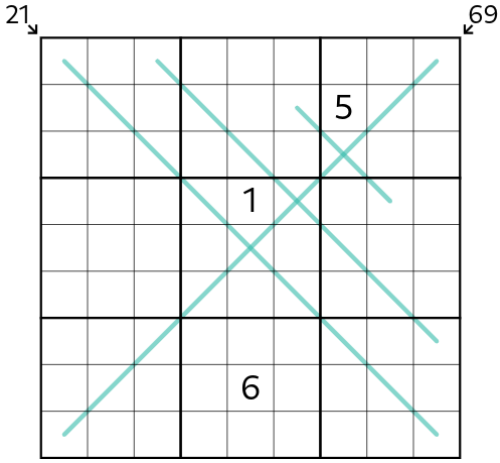
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Odd:* Digits in grey circles must be odd.

`https://sudokupad.app/giay8hmezd`

Antenna

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

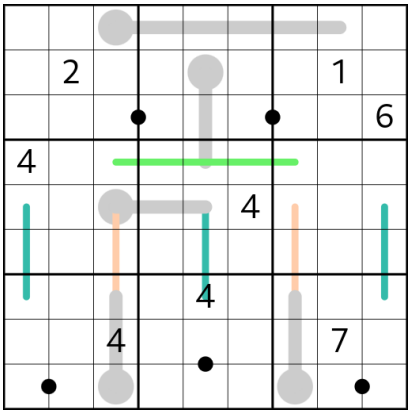
• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

`https://sudokupad.app/30c7ed6zjj`

Machina 444

by ifletchr



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

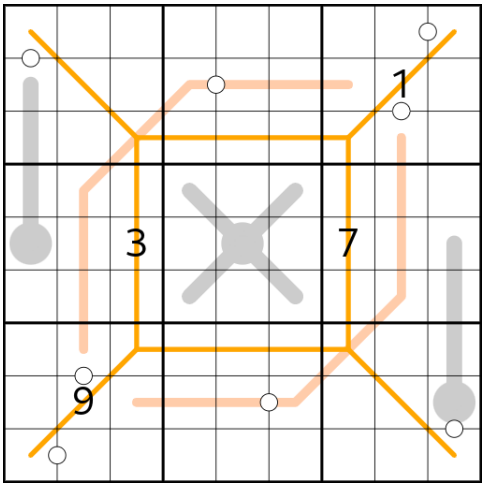
• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

`https://sudokupad.app/l82qhol3px`

Eye of Sauron

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Entropic Lines:* Any set of three sequential cells along a peach Entropic Line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

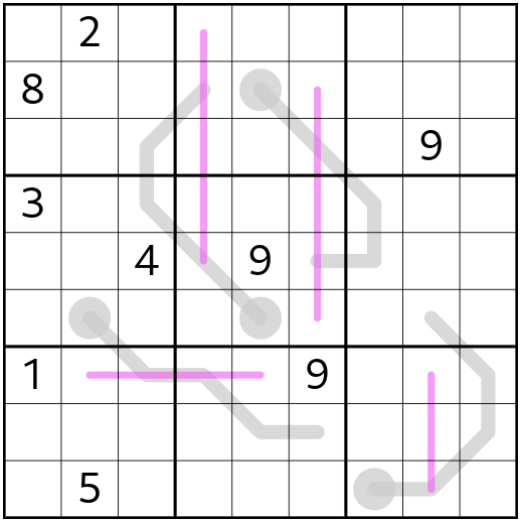
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/1yo8js1zjq`

Hot Wings

by Pickup



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

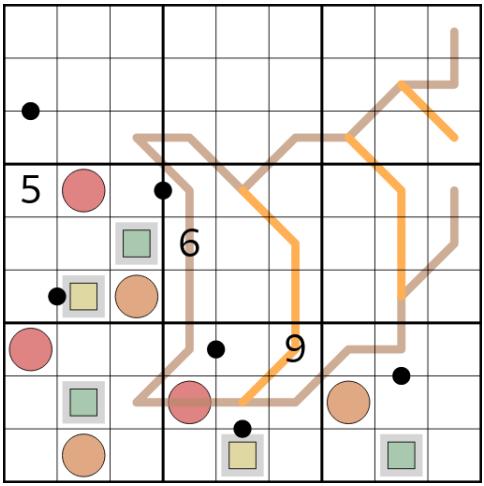
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/9rz7nkl0d6`

Cornucopia

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Dutch Whispers:* Adjacent digits along an orange Dutch Whispers line differ by at least 4.

• *Entropic Lines:* Any set of three sequential cells along a light brown Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

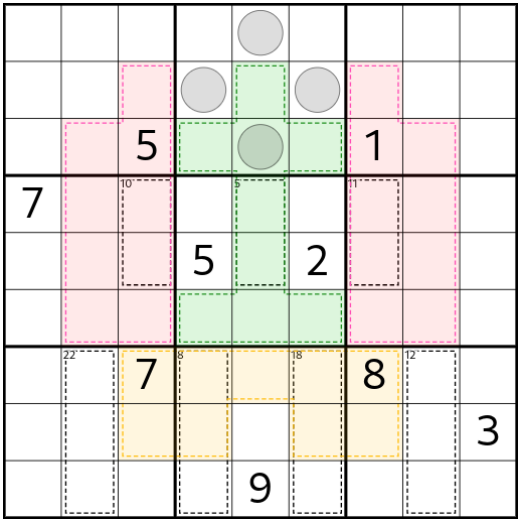
• *Ratio Dots:* Digits separated by a black dot are in a $1:2$ ratio. Not all dots are necessarily given.

• *Odd/Even:* Digits in multicolored squares must be even. Digits in multicolored circles must be odd.

`https://sudokupad.app/881tmlj9jr`

Petra

by MeanGold



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Extra Regions:* Each coloured region in the grid forms an extra region containing a complete set of the digits 1-9 without repetition. Disconnected regions are separate regions; repeated colours are for aesthetic purposes only.

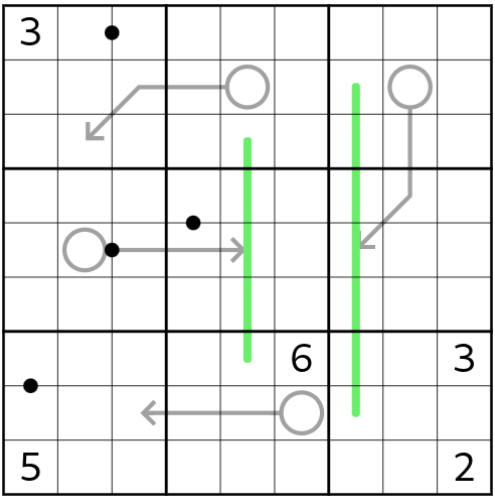
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Odd:* Digits in grey circles must be odd.

`https://sudokupad.app/c02lko3dq7`

Bow & Arrow

by ifletchr



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Thermo Arrows:* Digits along an arrow must sum to the digit in the bulb. Digits must strictly increase from tip to bulb.

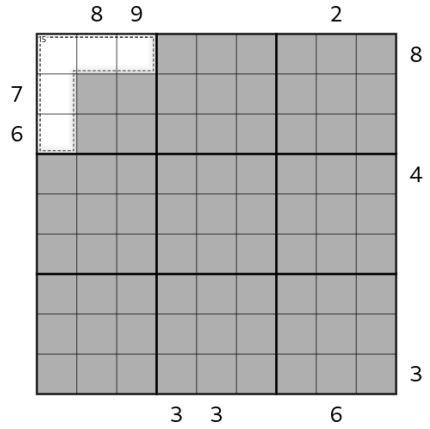
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

`https://sudokupad.app/8cjrjk5of6`

Room 237

by froggy



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Fog:* The grid is covered with fog. There is an initial light source that clears the fog. Placing correct digits into cells clears the fog from all adjacent cells. Fog puzzles can only be solved online.

• *Numbered Rooms:* Clues outside the grid indicate the digit that must be placed in the N^{th} cell of the indicated direction, where N is the digit placed in the first cell from that direction.

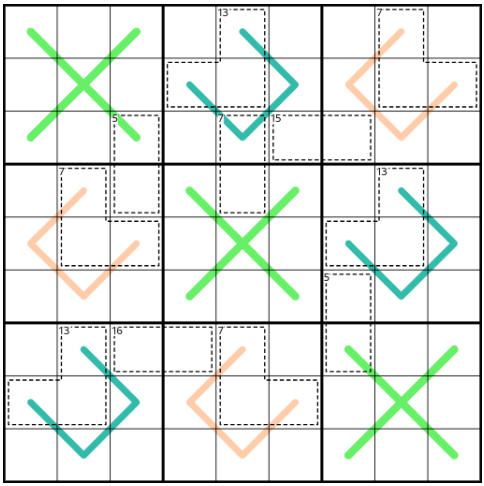
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Difference Dots:* Digits in cells separated by a white dot must have a difference given by the number inside the dot. If no value is shown, the difference is 1.

`https://sudokupad.app/hsunq3blus`

Tic Tac Lizard Toe

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

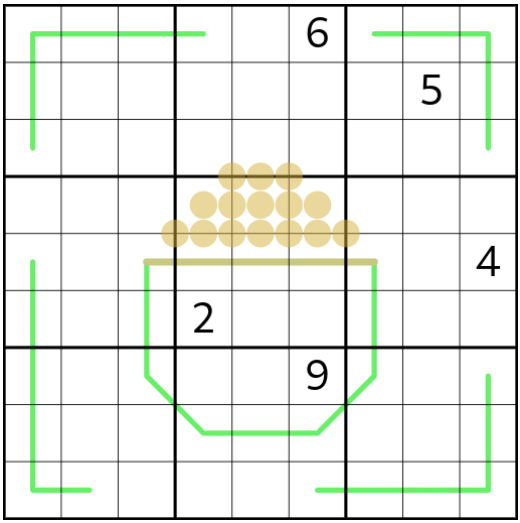
• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

`https://sudokupad.app/93qi78lbsj`

Pot O'Gold

by Dilemma



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

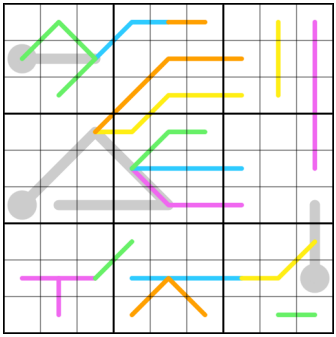
• *Nabner Lines:* No two digits along a Nabner line can be consecutive, regardless of their position on the line. Digits may not repeat on Nabner lines.

Gold coins are purely cosmetic.

`https://sudokupad.app/08c5kq6hac`

The Dark Side

by froggy



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Dutch Whispers:* Adjacent digits along an orange Dutch Whispers line differ by at least 4.

• *Entropic Lines:* Any set of three sequential cells along a yellow Entropic Line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

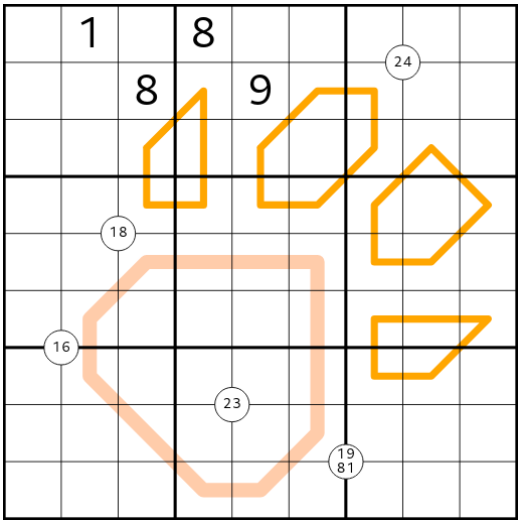
• *Region Sum Lines:* The sum of the digits along a blue Region Sum Line within a particular region must be the same for all of the regions the line passes through.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/34pe8ctexa`

C-L-E-M-S-O-N

by Glitch Horse & Nash



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Entropic Lines:* Any set of three sequential cells along a thick beige Entropic Line must contain a low digit (123), a middle digit (456), and a high digit (789).

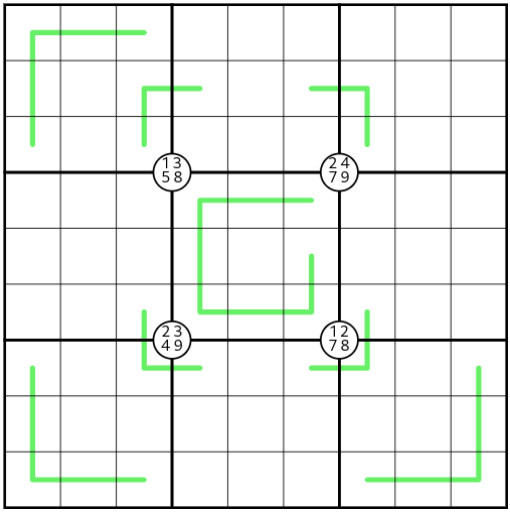
• *Dutch Whispers:* Adjacent digits along a thin orange Dutch Whispers line differ by at least 4.

• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

`https://sudokupad.app/1crmg4blaw`

Thinking Outside the Box

by ArkAngel0



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

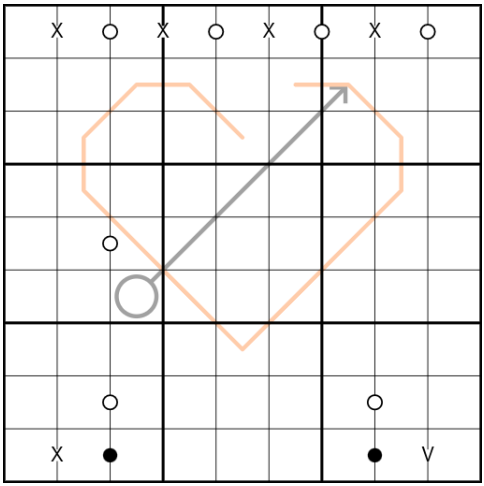
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

`https://sudokupad.app/h0b64us8cw`

Shot Through the Heart

by Glitch Horse, Nash & Lumos



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

• *Arrows:* Digits along an arrow must sum to the number indicated in the circle from which the arrow emerges.

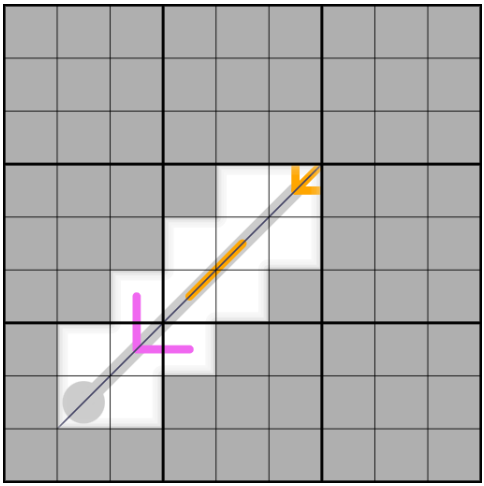
• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

`https://sudokupad.app/y2lq6zn55t`

Torch

by froggy



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Fog:* The grid is covered with fog. There is an initial light source that clears the fog. Placing correct digits into cells clears the fog from all adjacent cells. Fog puzzles can only be solved online.

• *Diagonal:* Digits may not repeat along marked diagonals.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

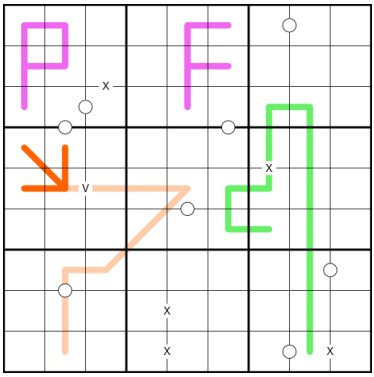
• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/ng8f72vvg5`

I know what we're gonna do today!

by Scaly Griffon, Lumos, & Glitch Horse



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Dutch Whispers:* Adjacent digits along an orange Dutch Whispers line differ by at least 4.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

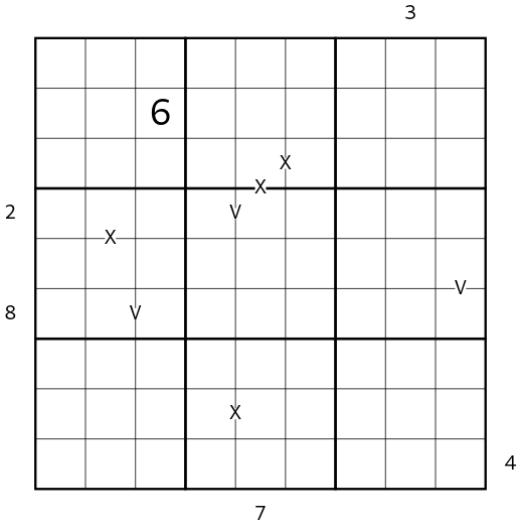
• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/7o9yqdb1fv`

Don't Fall

by Chaos



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Antiknight:* Cells that are a chess knight's move apart cannot contain the same digit.

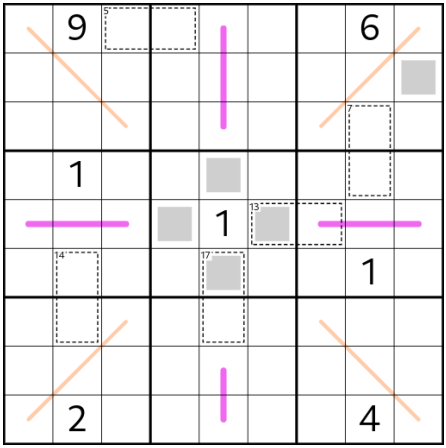
• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

• *Skyscrapers:* Each cell represents a skyscraper whose height is the digit in that cell. Taller skyscrapers obscure the view of smaller ones. Clues outside the grid tell how many skyscrapers are visible looking across the row or column from the direction of the clue.

`https://sudokupad.app/kf77xdegwu`

Firework

by Nash



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Antiknight:* Cells that are a chess knight's move apart cannot contain the same digit.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

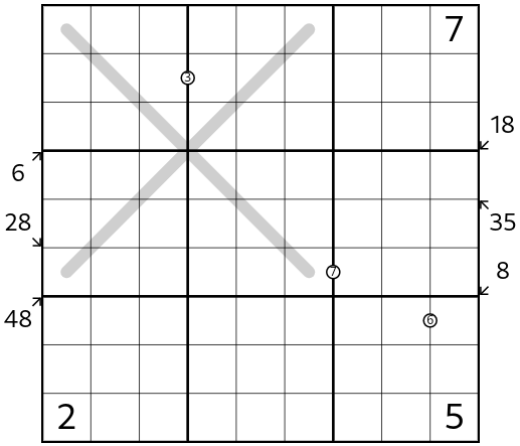
• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Even:* Digits in grey squares must be even.

`https://sudokupad.app/lv5w3oaee2`

Little Killer Plus

by Dilemma



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

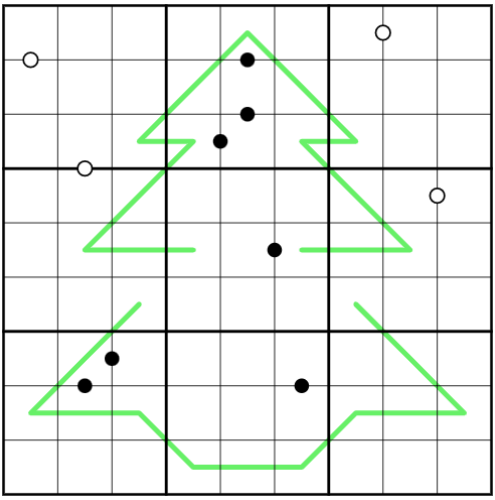
• *Palindromes:* Digits on a palindrome read the same forwards and backwards along the line.

• *Difference Dots:* Digits in cells separated by a white dot must have a difference given by the number inside the dot. If no value is shown, the difference is 1.

`https://sudokupad.app/50mpldgbsw`

O Tannenbaum

by Glitch Horse & Scaly Griffon



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

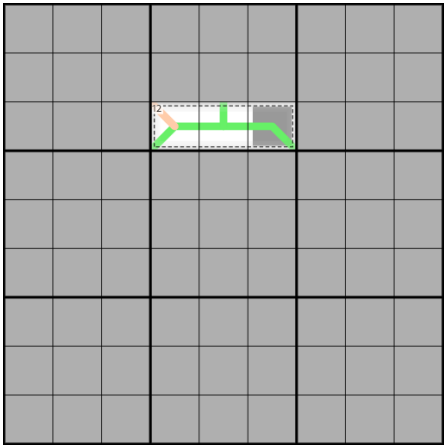
`https://sudokupad.app/1hn4xbj8n5`

Hard Puzzles

Although some of the deductions in the puzzles in this chapter may take time to spot, each puzzle is solvable by humans, without guessing. In addition to center- and corner-marking, you might need to use colours to spot ways in which the geometry of the grid moves the solution forward. You may have to think carefully about where the puzzle is under the most pressure in order to spot a key deduction. You may have to think four or five steps ahead to spot why a particular digit cannot go in a particular cell. Having to look ahead further than that starts gets into the "guessing" category, so if you can't spot a contradiction within that many logical steps, try looking elsewhere in the puzzle.

Live Wire

by froggy



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Fog:* The grid is covered with fog. There is an initial light source that clears the fog. Placing correct digits into cells clears the fog from all adjacent cells. Fog puzzles can only be solved online.

• *Even:* Digits in grey squares must be even.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

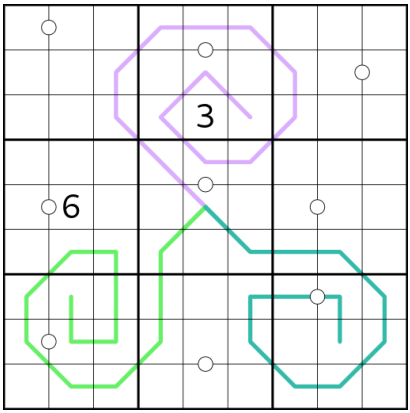
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

`https://sudokupad.app/n55zdqyfz4`

Triskelion

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

• *Modular Lines Variant:* Any set of four adjacent cells along a Mod Four Line must contain digits with four different remainders when divided by 4.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

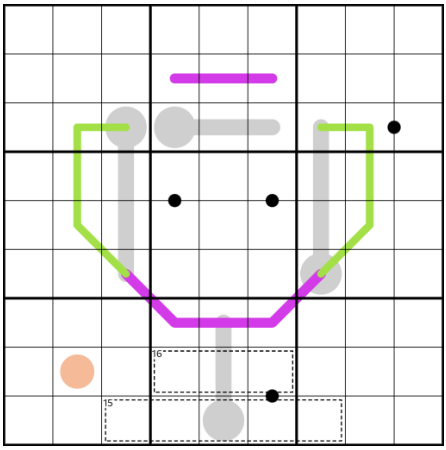
• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

Teal lines are modular and purple lines are mod four.

`https://sudokupad.app/yjid4zavr0`

Trophy Case

by ifletchr



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Odd:* Digits in orange circles must be odd.

• *Ratio Dots:* Digits separated by a black dot are in a 1 : 2 ratio. Not all dots are necessarily given.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

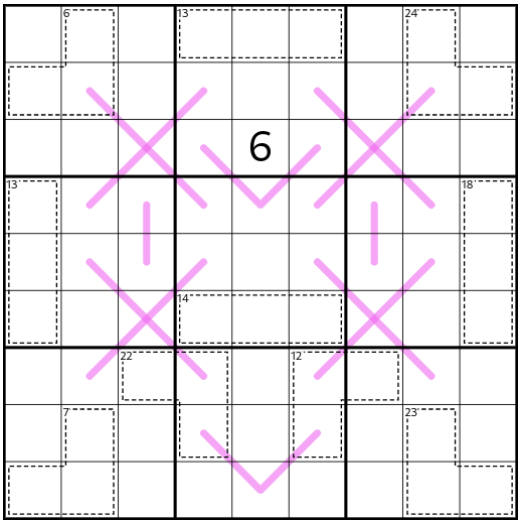
• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/byk12uain4`

Valentine's Kisses

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

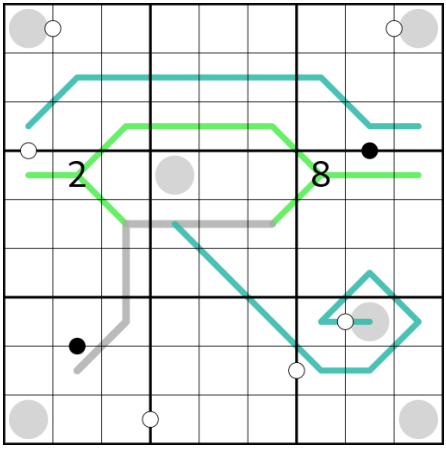
• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

Each pair of intersecting lines in this puzzle forms a single 5-cell Renban line.

`https://sudokupad.app/wrb9w2awn4`

Eye of Horus

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

• *Palindromes:* Digits on a palindrome read the same forwards and backwards along the line.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

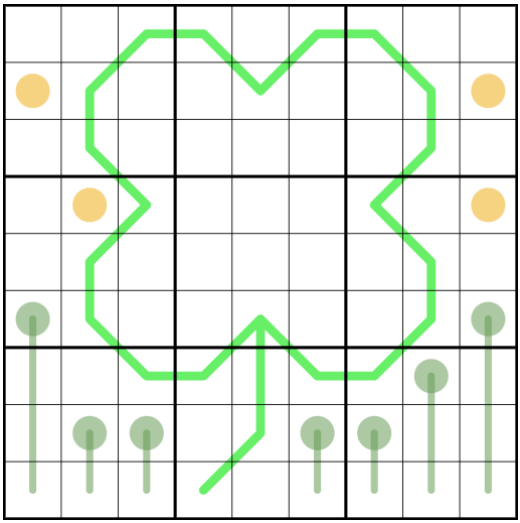
• *Odd:* Digits in grey circles must be odd.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/hrc5wggn7j`

Feeling Lucky

by Scaly Griffon & Glitch Horse



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Adjacent digits along a lime green German Whispers line differ by at least 5.

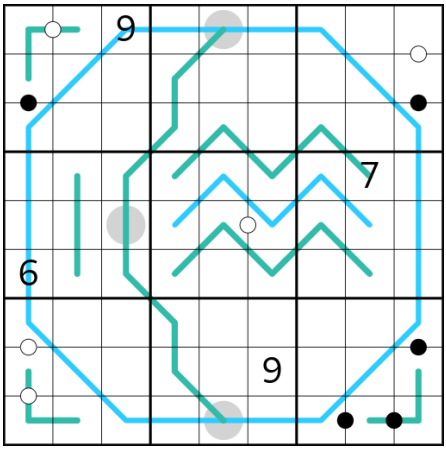
• *Thermometers:* Digits on sage green Thermos must strictly increase from bulb to tip.

• *Gold Coins:* Cells marked with a gold circle contain odd digits.

`https://sudokupad.app/z32ikj4sbe`

Agna Qel'a

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

• *Region Sum Lines:* The sum of the digits along a blue Region Sum Line within a particular region must be the same for all of the regions the line passes through.

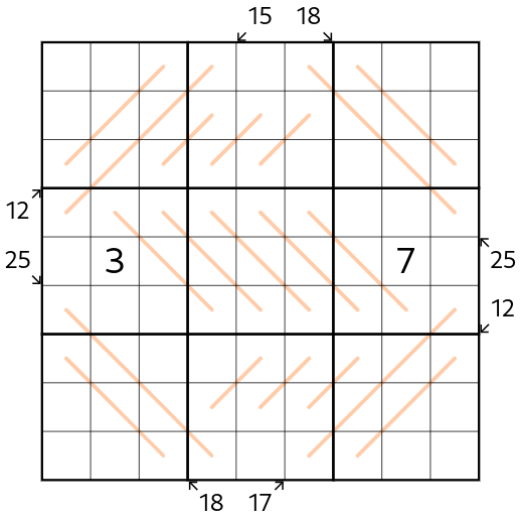
• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

• *Odd:* Digits in grey circles must be odd.

`https://sudokupad.app/5cvi3itaxj`

Scratching the Surface

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

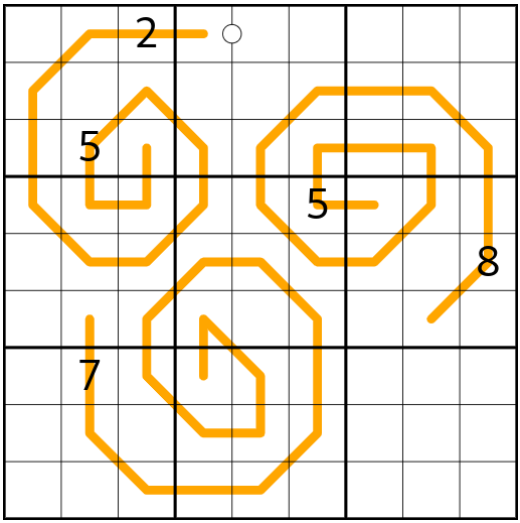
• *Entropic Lines:* Any set of three sequential cells along a beige Entropic line must contain a low digit (123), a middle digit (456), and a high digit (789).

• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

`https://sudokupad.app/mjws7auxyz`

Air Nomads

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

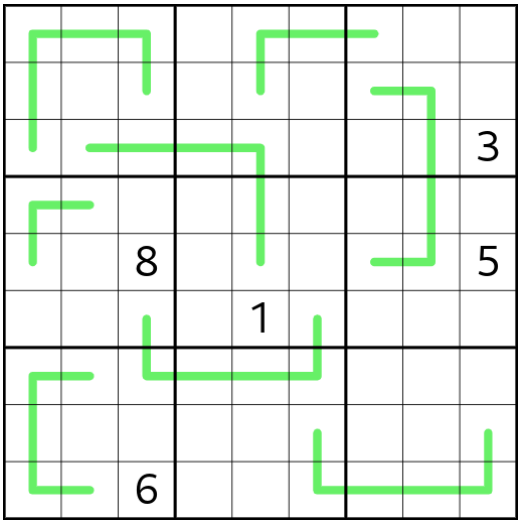
• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/8besj0ha9t`

Silent Staples

by Pickup and Lumos



Rules:

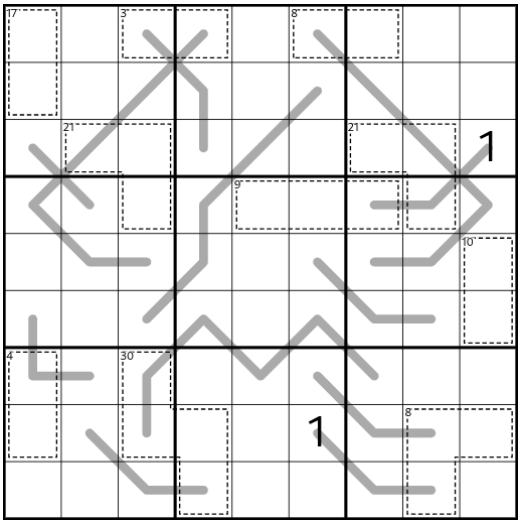
• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

`https://sudokupad.app/1d3l60bl6g`

Lines and Boxes

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

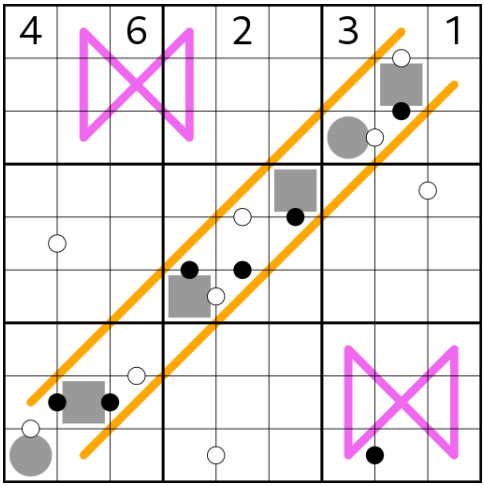
• *Palindromes:* Digits on a palindrome read the same forwards and backwards along the line.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/mrd5pj4s35`

Whatcha Doin'?

by Lumos, Scaly Griffon, and Glitch Horse



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

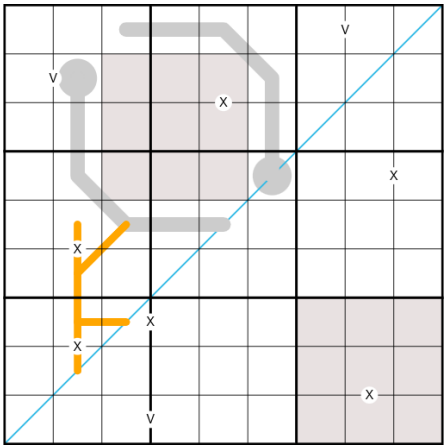
• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

• *Odd/Even:* Digits in grey squares must be even. Digits in grey circles must be odd.

`https://sudokupad.app/z2f8650zdj`

Sisyphus's Boulder

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Diagonal:* Digits may not repeat along marked diagonals.

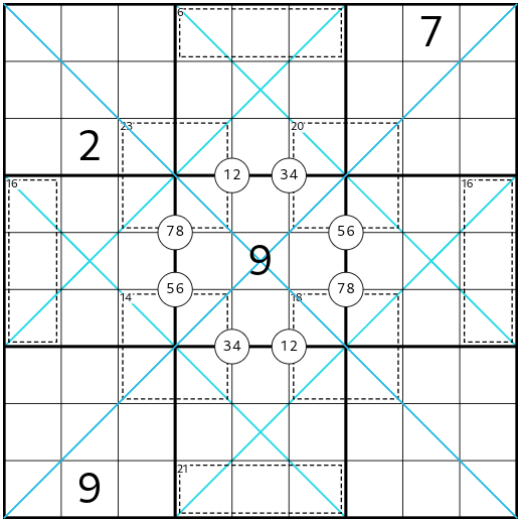
• *XV:* Digits separated by a V must sum to 5. Digits separated by an X must sum to 10. Not all Xs and Vs are necessarily given.

• *Clone regions:* Each clone region contains the same digits in the same relative positions as its clone. The lower clone is rotated 180° from the upper clone, meaning r3c5 contains the same digit at r8c7.

`https://sudokupad.app/h4fp2ryqpe`

Crystal

by ifletchr



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Diagonal:* Digits may not repeat along marked diagonals.

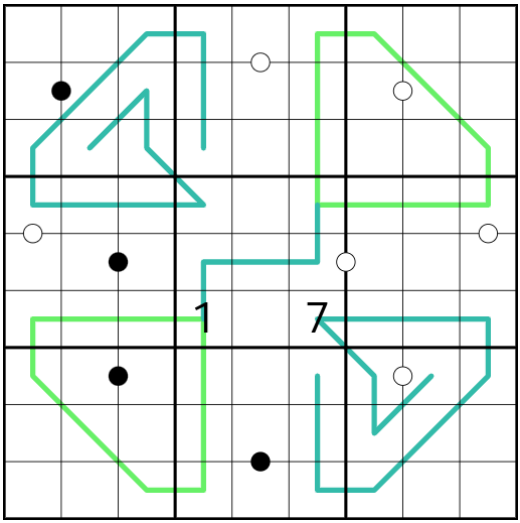
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

`https://sudokupad.app/1xhl0028p9`

Four Leaf Clover

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

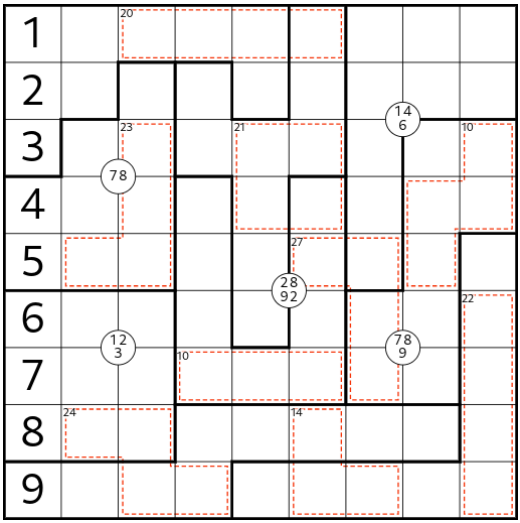
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Kropki Pairs:* Digits separated by a black dot are in a 1:2 ratio. Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/jv74dtp7t1`

Something Like Tetris

by Lumos



Rules:

• *Irregular Regions:* Each row, column, and indicated region must contain a complete set of the digits 1-9 without repetition.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

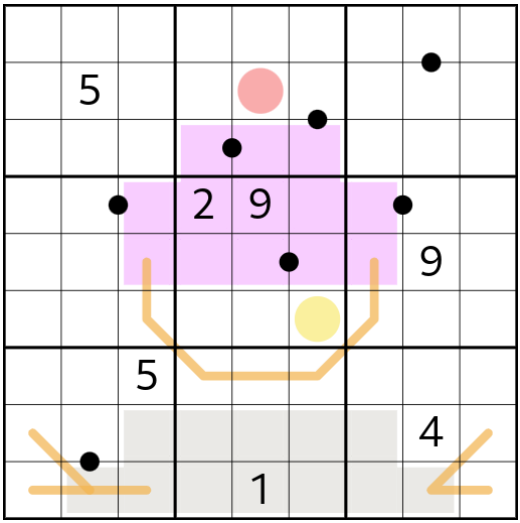
• *Quadruples:* Digits in a quadruple circle must be placed at least once in the four cells touching that circle.

Cages are coloured red solely for visibility.

`https://sudokupad.app/cygw4gz411`

Bakeoff Winner

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4.

• *Antiknight:* Cells that are a chess knight's move apart cannot contain the same digit.

• *Ratio Dots:* Digits separated by a black dot are in a $1 : 2$ ratio. Not all dots are necessarily given.

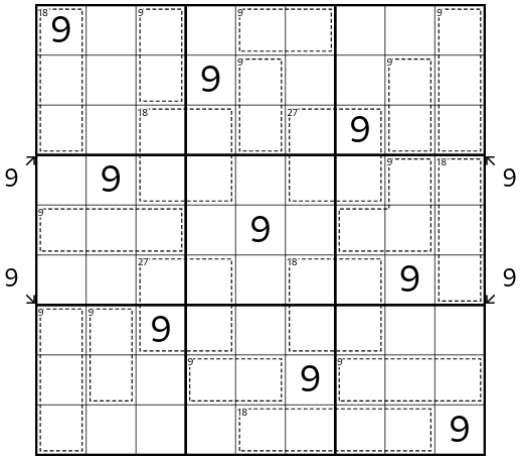
• *Odd:* Digits in yellow and red circles must be odd.

Purple and grey regions are purely cosmetic.

`https://sudokupad.app/fvvz0vfkmw`

Dressed to the Nines

by Sparkles



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

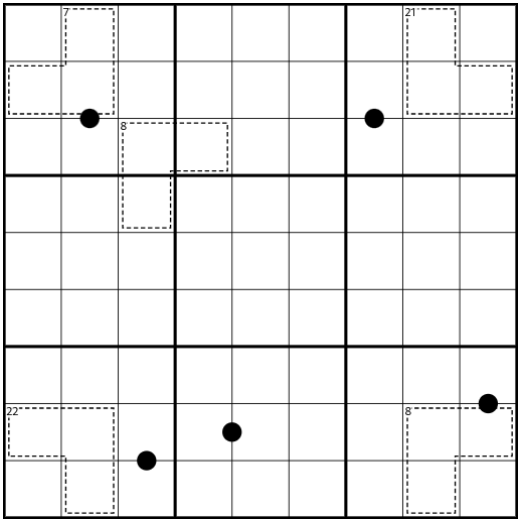
• *Little Killers:* Clues outside the grid give the sum of the digits along the indicated diagonal. Digits can repeat if allowed by other rules.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/vw5t9vtdxq`

It's a Modular World After All

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

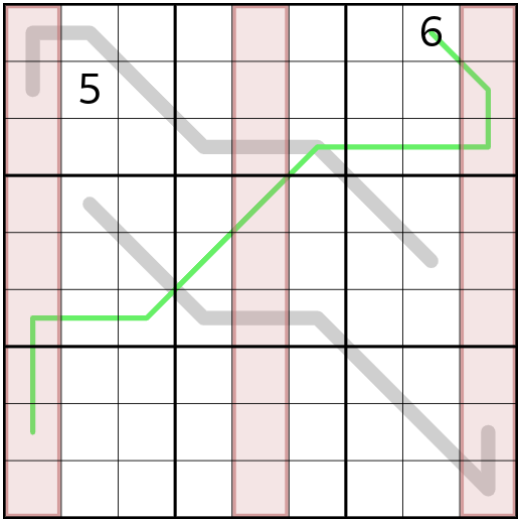
• *Global Modularity:* Every 2x2 region must contain digits with three different remainders when divided by 3.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/wgc1tyzz91`

Chutes and Ladders

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Palindromes:* Digits on a palindrome read the same forwards and backwards along the line.

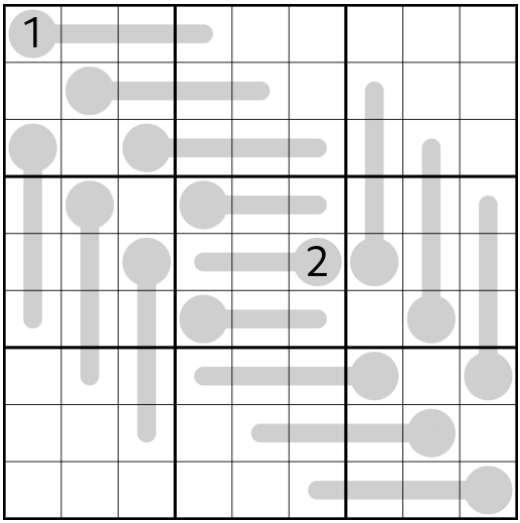
• *Column Indexing:* Digits in shaded cells in column 1 indicate the position of the digit 1 in that row. The same is true of 5s and 9s in columns 5 and 9 respectively.

• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

`https://sudokupad.app/ybvqruq5sm`

4-Lengths

by Damsalfly



Rules:

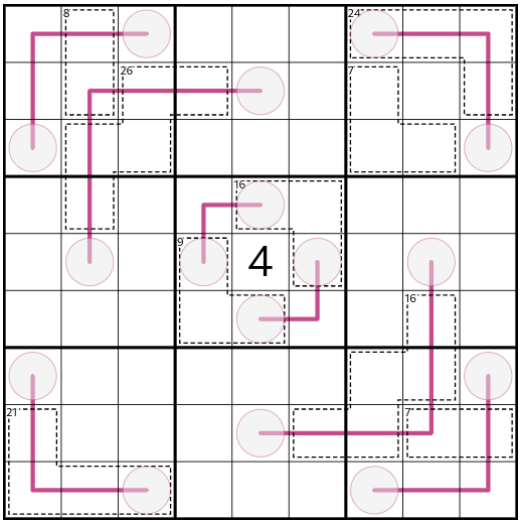
• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

`https://sudokupad.app/0iwo8ysqal`

4 Corners

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

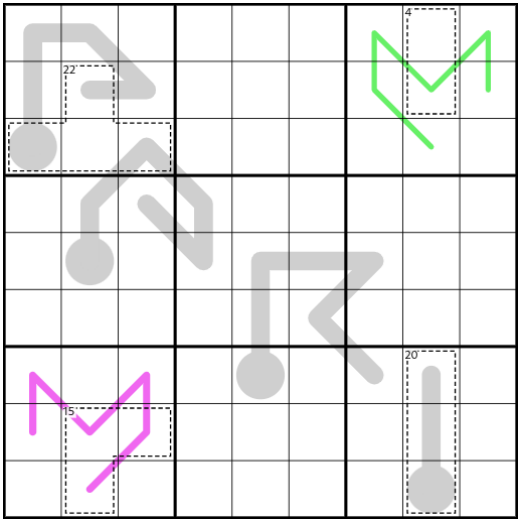
• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

• *Double Arrows:* The sum of digits placed on a line must be equal to the sum of digits in the circles at each end of the line.

`https://sudokupad.app/jeac3v6tdh`

Pari

by Damsalfly



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Thermometers:* Digits on a grey Thermo must strictly increase from bulb to tip.

• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

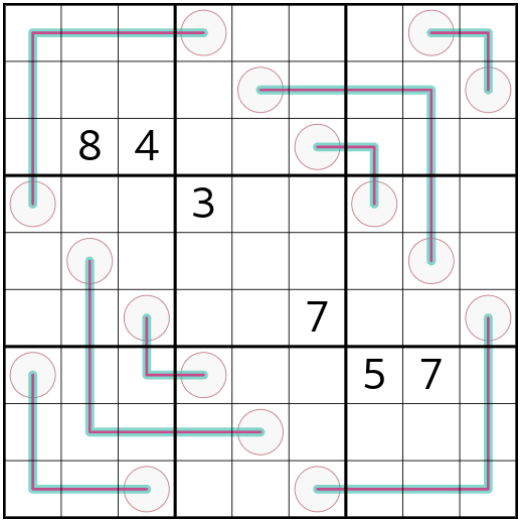
• *German Whispers:* Adjacent digits along a green German Whispers line differ by at least 5.

• *Killer Cages:* Digits add to the total in the top left corner of the cage, if the sum is given. Digits cannot repeat in cages.

`https://sudokupad.app/gqz34et0qm`

Modouble

by FullDeck and Missing a Few Cards



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Double Arrows:* The sum of digits placed on a line must be equal to the sum of digits in the circles at each end of the line.

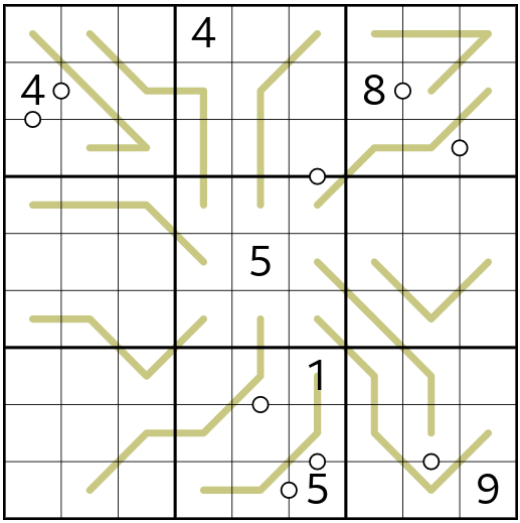
• *Modular Lines:* Any set of three adjacent cells along a teal Modular line must contain digits with three different remainders when divided by 3.

Every double arrow in this puzzle ALSO forms a modular line, including the attached circles.

`https://sudokupad.app/ph93q6dana`

Nabner's Master

by Dicalfalous



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

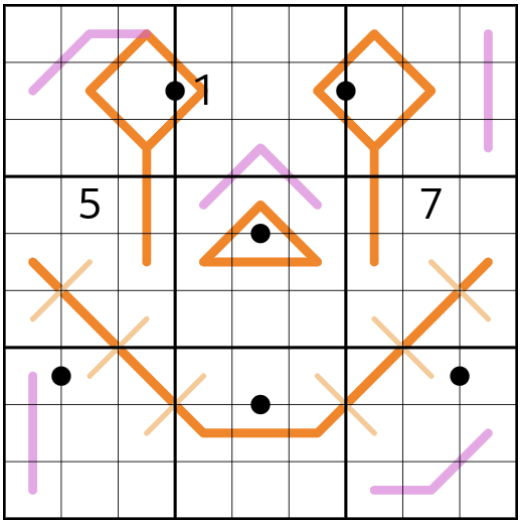
• *Nabner Lines:* No two digits along a Nabner line can be consecutive, regardless of their position on the line. Digits may not repeat on Nabner lines.

• *Difference Dots:* Digits separated by a white dot are consecutive. Not all dots are necessarily given.

`https://sudokupad.app/cnyp9cy399`

Glowing Glee

by Stine



Rules:

• *Normal* 9×9 *sudoku:* Every row, column, and box must contain a complete set of the digits 1-9.

• *Dutch Whispers:* Adjacent digits along a Dutch Whispers line differ by at least 4. Different shades of orange indicate distinct Dutch Whispers lines.

• *Ratio Dots:* Digits separated by a black dot are in a 1 : 2 ratio. Not all dots are necessarily given.

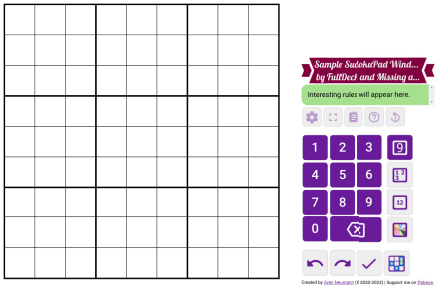
• *Renban Lines:* Digits placed on a purple Renban line must be a set of consecutive, non-repeating digits, in any order.

`https://sudokupad.app/klfcmf14iy`

Solving Online

There are a number of online tools for setting and solving variant sudoku. Our favorite platform for solving is Sven Neumann's SudokuPad. It is browser independent but works better on a laptop or tablet than on a cell phone. Online solving allows for a variety of annotations to the grid which enable the solver to keep track of information and deductions. It also allows the solver to backtrack, check digits, and get confirmation of a correct solution. Each puzzle in this book provides a short link to play online in SudokuPad. Sven is constantly improving SudokuPad, so the images we provide below may be slightly different than what you see, but the functionality will be similar.

When you open a puzzle in SudokuPad you'll see a browser window with the puzzle grid on the left.



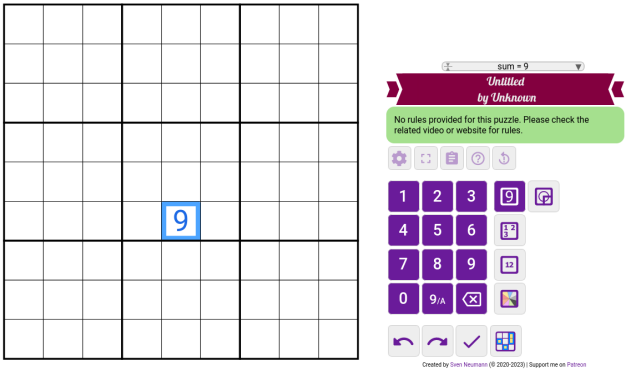
On the right you will find several panels. The top panel includes information about the puzzle: title, author, and rules. Below are tools for interacting with the grid. To the right of a number pad are four options: a large digit (for placing digits in the grid), a set of three small digits in corners (for corner marking digits), a set of two small digits in the center (for center marking digits), and a colour wheel (for colouring cells in the grid). These tools can help you keep track of information you have deduced about possible values. Below the number pad are arrows for backtracking (and then moving forward again) and a checkmark for seeing whether digits you have placed so far are correct or not. Above the number pad, to the left, is a cog button that opens the settings window where you can customize your solving experience. Below, we talk more about how to use these features to improve your solving experience.

Placing digits

The most basic task in solving a sudoku puzzle is entering correct digits. This is done by clicking on the place digits button

then clicking on a cell in the grid and either typing a digit or clicking on the appropriate digit in the number pad. We some-

times refer to digits placed in this way as “big digits.”



Centermarks and Cornermarks

When you are solving a sudoku puzzle, whether online or on paper, it’s often helpful to ask yourself two important questions:

What values can possibly be placed in this cell?

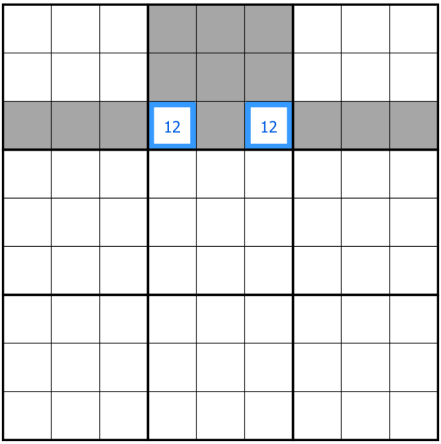
Where can digit X possibly be placed in this box?

There are lots of other good questions, but these are the two that correspond to using center and corner marks.

Centermarks

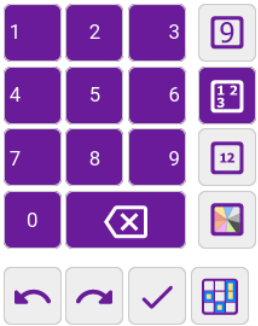
If you can narrow down the values which can be placed in a single cell to just a couple of choices, it is useful to keep track of this by centermarking those values in the cell. Select the centermark button (the one with two small digits in the center):

then enter the digits. Sometimes you will find that you have two cells in a box with the the same two digits center marked: this is useful because it rules out those digits from anywhere else in the box. Similarly two cells with the same pair of centermarks in a row, or in a column, rule out those digits in the rest of that row or column. In this grid, none of the shaded cells can be 1 or 2 because the 1 and 2 are used up in box 2 and in row 3.

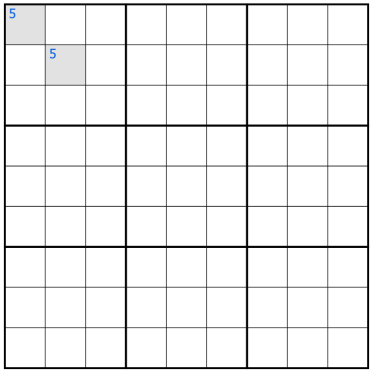


Cornermarks

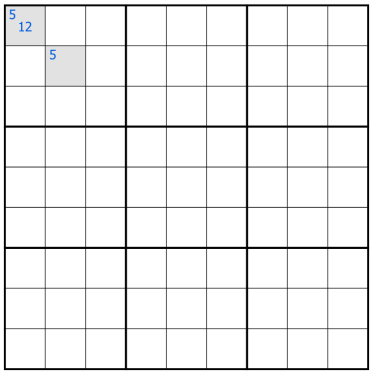
If you can narrow down the possible positions of a particular digit in a box, you can place that digit as a cornermark in those cells. Select the cornermark option (the one with three small digits in corners):



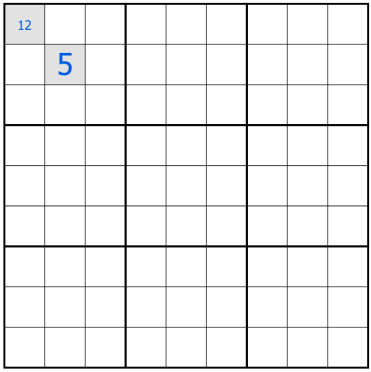
then place the digits in the possible locations within the box. We usually only do this if the digit is restricted to two, or occasionally three, possible positions. This is useful because of the interaction between center- and cornermarks. For example, if you've been able to cornermark 5's in r1c1 and r2c2, (so that those are the only cells in box 1 where 5's could possibly go)



and subsequently can centermark 1 and 2 as the only digits which can possibly be placed in r1c1



then the elimination of the centermarked 5 in that cell means that r2c2 *must* be a 5.



Check digits

If the puzzle you are solving has an embedded solution (as is the case for all of the puzzle in this book) and you have placed "big digits," you can reassure yourself that you have not made

a mistake by clicking on the check mark below the number pad:

A window will pop up telling you that the puzzle is not finished, but that the digits you have placed are correct. Of course, if they are *not* correct, it will tell you that, too!

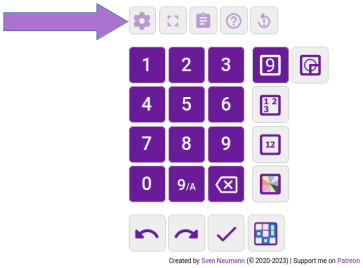
Undo and Redo

If you do discover that you have made an error, you may wish to rewind your work in the puzzle until you reach a point where you know your work is correct. SudokuPad makes that easy! Under the number pad, there are "Undo" and "Redo" buttons.

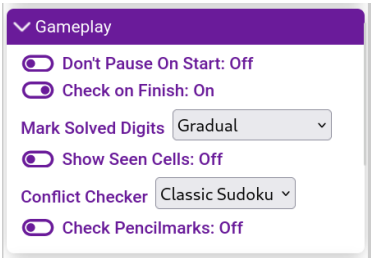
Each click of the "Undo" button (counter-clockwise arrow) goes back one step in the puzzle state. Each click of the "Redo" button advances the puzzle state one step to the furthest point in your solve. Watch out, though! If you undo to an earlier point in the puzzle, then make a new deduction, you will be starting a new branch in the timeline and will only be able to go back and forth along that branch.

Conflict Checking

In SudokuPad, you can customize how much help you want in spotting errors and eliminations in your pencilmarks. To change these settings, click the cog button above the number pad.

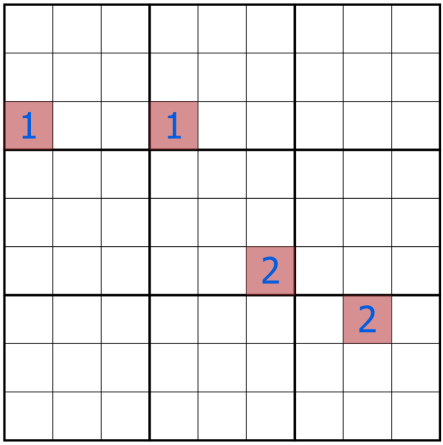


Under the "Game Play" tab, there are three settings for the Conflict Checker: *On*, *Classic Sudoku*, and *Off*.

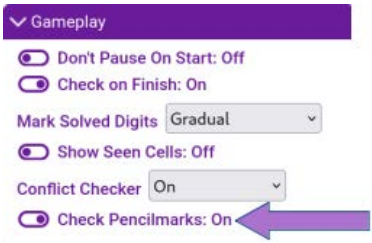


If either *On* or *Classic Sudoku* is selected and you try placing a big digit in a cell which conflicts with other big digits already placed in the same row, column, or box, the conflicting digits will be highlighted. This can be particularly helpful if you accidentally mistype a digit and fail to notice it at the time. The *Classic Sudoku* setting only checks for conflicts in rows, columns, and boxes. The *On* setting also checks for conflicts arising from added constraints. For example, in a puzzle with an antiknight constraint, the grid below would show conflicting digits for both the 1's (same row) and 2's (antiknight) if conflict checking is set

to *On* but would only show the conflict with 1's (same row) if conflict checking is set to *Classic Sudoku*.



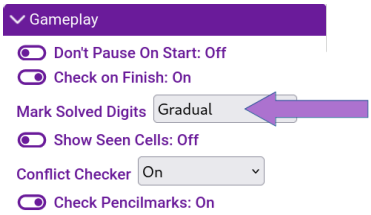
Still under the "Game Play" tab, you can also toggle between having "Check Pencilmarks" on or off:



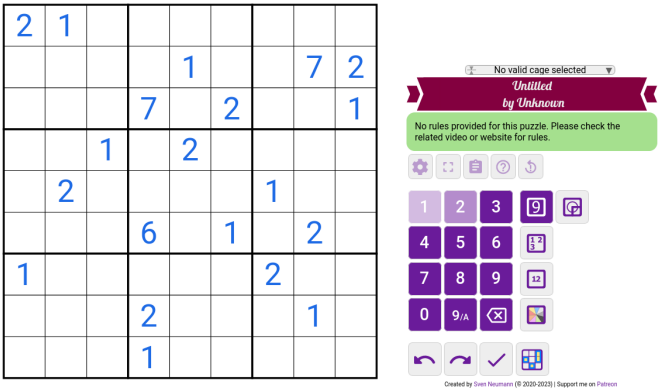
With "Check Pencilmarks" set to *Off*, only big digits are checked for conflicts. With "Check Pencilmarks" set to *On*, centermarks and cornermarks are also checked.

Marking Solved Digits

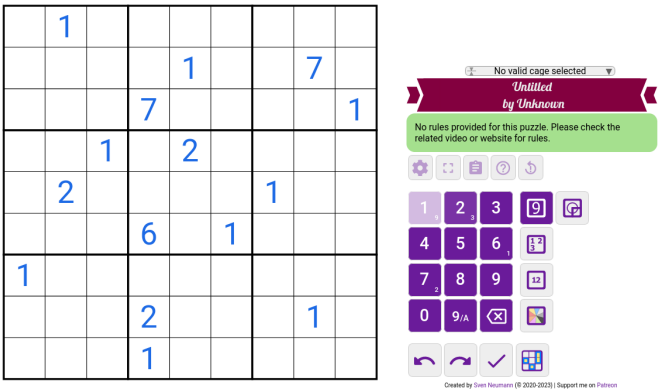
Near the end of the puzzle, it can be useful to know which digits are left to place. Under the Gameplay tab you can turn on "Mark Solved Digits."



This tool has four settings: *On*, *Gradual*, *Count*, and *Off*. When set to *On*, digits are greyed out on the number pad once all instances of that digit have been placed (correctly or incorrectly) in the grid. When set to *Gradual*, digits are greyed out proportional to how many remain to be placed.

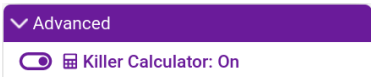


When set to *Count*, digits are greyed out once all instances have been placed. In addition, a small number in the lower right corner of each digit on the number pad tells you how many of that digit have already been placed in the grid:

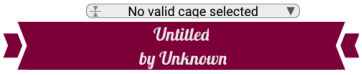


Cage Calculator

In "killer cages" the number in the corner of the top left cell of the cage indicates the sum of the digits in the cage. If you would prefer not to have to keep mental track of all the possible combinations for a particular sum, you can choose to use the built-in cage calculator in SudokuPad. Under the "Advanced" tab in the settings window you can turn on a Killer Calculator:

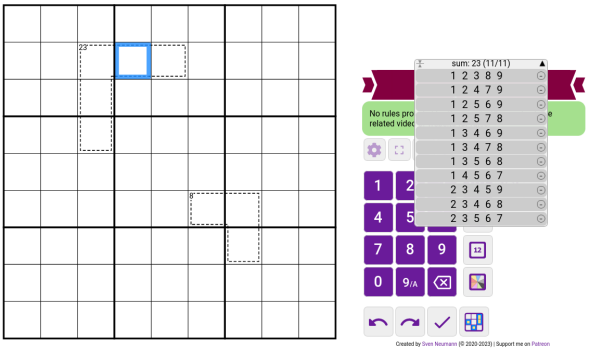


The Killer Calculator enables a pulldown list of all the possible combinations of digits that sum to a given total. Until you click on a cage in the puzzle, the calculator shows up above the puzzle title as "No Valid Cage Selected."



Once you click on a cell within a cage, the cage calculator shows you how many combinations of digits are possible; clicking on

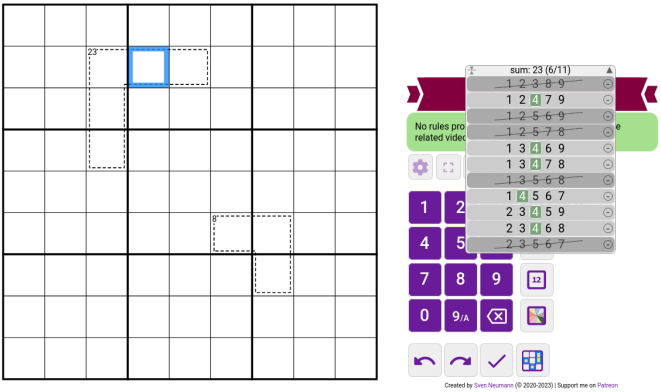
the arrow in the cage calculator panel drops down a list of all possible combinations.



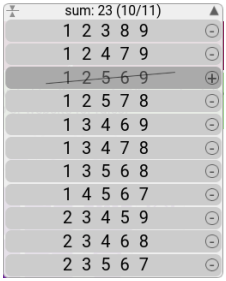
Clicking on a single digit in the list toggles through three states:

The digit MUST be in the cage.
The digit CANNOT be in the cage.
We don't know whether the digit is in the cage.

With each option, the list of possible combinations will be updated. For example, if we know 4 MUST BE in the 23-cage in this grid, we click on "4" once in the list and discover that we now have only six possible combinations.



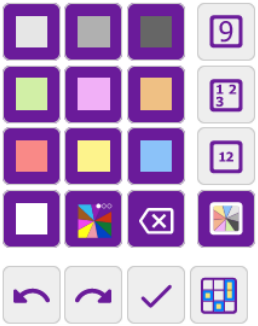
You can also click on the "−" sign to the right of a possible combination to eliminate it from the list; it will be greyed out and struck through. To rule that combination back into contention, just click on the "+" sign.



Sometimes the calculator automatically eliminates choices. For example, if you have placed a digit in the cage, all combinations that do not contain that digit are eliminated.

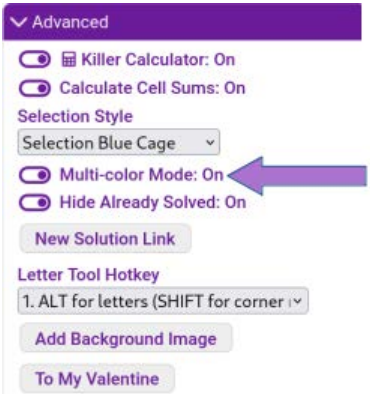
Colours

The colour wheel lets you add colour to cells as an aide to keeping track of intermediate deductions.



This is particularly helpful if a puzzle is built around keeping

track of parity (which cells contain even digits and which contain odd digits), entropy (low, middle, and high digits), or 3-modularity (remainder when a digit is divided by 3). With German Whispers, for example, it is very common to keep track of whether digits along a whisper line are low (1234) or high (6789). If you need to keep track of multiple colours within a single cell, you can select that option in the "Advanced" section of the Settings menu.



Other Options

Other advanced options we frequently use include letter mode (allowing both upper and lower case letters in the grid) and a pen tool. These can be toggled on/off in the settings window. Sven Neumann is actively developing SudokuPad and often introduces new features. Explore and enjoy!

Acknowledgements

The variant sudoku community is filled with wonderful people, many of whom have become good friends, whether we have met in person or not. We have attempted to list many of these friends, as well as individuals without whom the community would not exist, in this partial list of fabulous sudoku enthusiasts. To those we've left off, we apologize profusely.

Blobz

BremSter

Carabet

Cracking the Cryptic
(Simon Anthony and Mark Goodliffe)

Cris Moore

Crusader175

Derektionary

Dream Librarian

f-puzzles.com
(Eric Fox and subsequently AfrayedKnot)

Fool on Hill

Fraπ

GAS Team
(Clover, Philip Newman, Bill Murphy, Sam Cappleman-Lynes)

Gliperal

grkles

James W. Sinclair and Artisanal Sudoku

JC Godart

Jeremy Dover

Maggie

Memeristor

Panthera

Prof Meow

Rangsk

Raumplaner

Rockratzero

Sirxemic and sudokumaker.app

Skunkworks
(and Riffclown in particular)

SudokuCon

Sven Neumann and SudokuPad

Tantan Dai

Towandaa

Virtual

zetamath

Many of the puzzles in this book have been (or will be) solved online on various YouTube channels. We maintain a list of all solves we are aware of at `www.missingdeck.net`. If you solve or come across a solve of any of these puzzles that we don't already have listed on the site, please let us know so we can add it! We are grateful to the many YouTube puzzle streamers who take their time to showcase variant sudoku puzzles and the logic involved in solving them. We encourage the reader to seek out these channels, and we apologize to anyone we have inadvertently left off this list.

24gas5
BremSter Puzzles
Catus SDK
Cracking the Cryptic
Crusader Puzzles
Genuinely Approachable Sudoku
JC Godart
JohnDave Spaghetti (Sudoku Sauce)
Lucian's Place
Magic Owls
Puzzlelith
Puzzles Pundit
Puzzling with Chord
Rangsk
Scott Stro-solves
Solver Tom
SudoKanard
Sudoku Sleuth
SudokuCon
Unshackling Sudoku
Wenchang Lu
zetamath does puzzles

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