LatticeForge — Flashcards

A Spark & Anvil printable flashcard deck. Quiz yourself on the LatticeForge cast's curriculum — one card at a time.

How to use these cards

Fold each sheet down the middle line so the answers are hidden. Read the **question** on the left, say your answer out loud, then **unfold** to check the right side. Testing yourself — then checking — is one of the most powerful ways to remember. Get one wrong? That's the best kind of practice: try it again tomorrow.

Want real flashcards? Cut along the fold line and the rows into cards — question on one side, answer on the other.

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1. Latin-square uniqueness — each symbol appears exactly once in every row, column, and box (Sudoku)

✂ Question (fold →)	Answer
Two different empty cells in the SAME row both seem to need a 6. What does that tell you?	**you made a mistake — a number appears only once per row** — A number appears exactly once per row, so two cells in the same row can't both be 6 — an earlier placement must be wrong.
Which THREE regions decide what number a Sudoku cell can hold?	**its row, its column, and its box** — Every cell sits in a row, a column, and a box; a number is allowed only if it doesn't already appear in any of those three.
How many boxes are there in a standard 9x9 Sudoku?	**9** — A 9x9 Sudoku is divided into nine 3x3 boxes.
A row of a 4x4 Sudoku already shows 1, 2, 3 and one empty cell. What number goes in the empty cell?	**4** — The row must contain 1-4 once each; 1, 2, 3 are present, so the empty cell must be 4.
A 2x2 box in a 4x4 Sudoku shows 1, 2, 4 and one empty cell. What number completes the box?	**3** — Each box holds 1-4 once; with 1, 2, 4 present, the empty cell must be 3.
In Sudoku, how many times may the same number appear in one row?	**exactly once** — The core Sudoku rule: every number appears exactly once in each row.
How many times may the same number appear in one column?	**exactly once** — Just like rows, each number appears exactly once in every column.
In a 9x9 Sudoku, each box is a block of what size?	**3x3** — A 9x9 Sudoku has nine 3x3 boxes, each holding the numbers 1-9 once.
Which of these is NOT allowed in Sudoku?	**the same number twice in one row** — A number may not repeat within a row (or column or box). The same number in a different row is fine.
A column of a 4x4 Sudoku shows 1, (empty), 3, 4 from top to bottom. What goes in the empty cell?	**2** — The column already has 1, 3, 4, so the missing number 2 must fill the empty cell.
A cell where only one number can possibly fit is called a 'forced' cell. What should you do with it?	**place that one number for certain** — When only one number can go in a cell, it is forced — you can place it with certainty, no guessing.
Why does a well-made Sudoku have exactly ONE correct answer?	**the starting clues force every cell to a single value** — A well-formed Sudoku gives clues that force each cell to one value through logic alone, so there is exactly one solution.
In a 6x6 Sudoku, which numbers does each row use?	**1 through 6, each once** — A 6x6 Sudoku uses 1-6, each appearing once in every row, column, and box.
A 4x4 row has two empty cells, and the numbers still missing from that row are 2 and 4. What can you say?	**one empty cell is 2 and the other is 4** — Since a row holds each number once, the two missing numbers 2 and 4 fill the two empty cells (which one goes where depends on the columns/boxes).

How many cells are in each row of a 9x9 Sudoku?	**9** — A 9x9 Sudoku row has 9 cells, one for each number 1 through 9.
In a 4x4 Sudoku, what is a 'box' (region)?	**a 2x2 block of cells** — A 4x4 Sudoku is divided into four 2x2 boxes; each box also holds one of each number.
What does it mean when a cell's number is 'forced'?	**only one number is possible there** — A forced cell is one where the row, column, and box constraints leave exactly one possible number.
A cell already has a 5 in its row, a 3 in its column, and a 7 in its box. Can this cell be a 5?	**no — 5 is already in its row** — Because 5 already appears in the cell's row, this cell cannot be 5 (a number appears once per row).
A box is complete except for one empty cell, and only the number 8 is missing from that box. What goes there?	**8** — A box holds each number once; if 8 is the only one missing, the empty cell must be 8.
In a 4x4 Sudoku, which numbers does each row contain?	**1, 2, 3, and 4, each once** — A 4x4 Sudoku uses 1-4; each row (and column and box) contains each of them exactly once.
A 4x4 row still needs a 2. The number 2 already appears in three of the four columns that cross this row. Where does the 2 go?	**in the cell of the one remaining column** — Scanning: the 2 can't repeat in the three columns that already contain a 2, so it must go in the cell where the row meets the one remaining column.
Onlie's rule sums up Sudoku. Which statement is it?	**each symbol appears exactly once in every row, column, and box** — Sudoku's single rule: each symbol appears exactly once in every row, every column, and every box.
What is the smartest FIRST thing to look for when solving a Sudoku?	**a cell where only one number can go** — The best first move is to find a forced cell — one where the rules leave only one possible number — and fill it with certainty.
If you place a number that repeats in a row by mistake, what happens to the puzzle?	**it breaks the rule and can no longer be completed correctly** — A repeated number in a row violates the rule, so the puzzle can't reach a correct solution until the mistake is undone.
A 4x4 column shows 3, (empty), (empty), 2 from top to bottom. A box tells you one empty cell is 1. What is the other empty cell?	**4** — The column needs 1-4; it has 3 and 2, so the empties are 1 and 4. If one is 1, the other must be 4.

2. deduction

✂ Question (fold →)	Answer
A row in a 4x4 puzzle already holds 1, 3, 4. Which number MUST go in the empty cell?	**2** — Only 2 is missing, so the empty cell is forced to 2 (a naked single).
A box in a 5x5 puzzle already holds 1, 2, 4, 5. Which number MUST go in the empty cell?	**3** — Only 3 is missing, so the empty cell is forced to 3 (a naked single).
A 'naked single' is a cell where...	**only one number can possibly go** — A naked single has exactly one remaining candidate, so it is forced.
A row in a 6x6 puzzle already holds 2, 3, 4, 5, 6. Which number MUST go in the empty cell?	**1** — Only 1 is missing, so the empty cell is forced to 1 (a naked single).
A row in a 5x5 puzzle already holds 1, 2, 3, 4. Which number MUST go in the empty cell?	**5** — Only 5 is missing, so the empty cell is forced to 5 (a naked single).
A box in a 4x4 puzzle already holds 2, 3, 4. Which number MUST go in the empty cell?	**1** — Only 1 is missing, so the empty cell is forced to 1 (a naked single).
A column in a 5x5 puzzle already holds 2, 3, 4, 5. Which number MUST go in the empty cell?	**1** — Only 1 is missing, so the empty cell is forced to 1 (a naked single).
A box in a 5x5 puzzle already holds 1, 3, 4, 5. Which number MUST go in the empty cell?	**2** — Only 2 is missing, so the empty cell is forced to 2 (a naked single).
A row in a 5x5 puzzle already holds 1, 2, 3, 5. Which number MUST go in the empty cell?	**4** — Only 4 is missing, so the empty cell is forced to 4 (a naked single).
Scanning a row, column, and box to eliminate candidates is called...	**cross-hatching** — Cross-hatching eliminates impossible numbers by scanning the three units.
A row in a 9x9 puzzle already holds 1, 2, 3, 4, 5, 6, 8, 9. Which number MUST go in the empty cell?	**7** — Only 7 is missing, so the empty cell is forced to 7 (a naked single).
If a number can go in only ONE cell of a row (even if that cell has other candidates), that is a...	**hidden single** — A hidden single is the only cell in a unit that can hold a given number.
A column in a 9x9 puzzle already holds 2, 3, 4, 5, 6, 7, 8, 9. Which number MUST go in the empty cell?	**1** — Only 1 is missing, so the empty cell is forced to 1 (a naked single).
A column in a 6x6 puzzle already holds 1, 2, 3, 4, 5. Which number MUST go in the empty cell?	**6** — Only 6 is missing, so the empty cell is forced to 6 (a naked single).
A cell's candidates are the numbers that...	**are still allowed by its row, column, and box** — Candidates are the values not yet ruled out by the cell's row, column, and box.
A box in a 9x9 puzzle already holds 1, 2, 3, 5, 6, 7, 8, 9. Which number MUST go in the empty cell?	**4** — Only 4 is missing, so the empty cell is forced to 4 (a naked single).
In a 4x4 puzzle, each 2x2 box contains the numbers...	**1, 2, 3, 4 each once** — Each box holds every number of the puzzle exactly once, like every row and column.
A row in a 4x4 puzzle already holds 1, 2, 4. Which	**3** — Only 3 is missing, so the empty cell is forced to 3 (a naked

number MUST go in the empty cell?	single).
A column in a 4x4 puzzle already holds 2, 3, 4. Which number MUST go in the empty cell?	**1** — Only 1 is missing, so the empty cell is forced to 1 (a naked single).
A column in a 6x6 puzzle already holds 1, 2, 4, 5, 6. Which number MUST go in the empty cell?	**3** — Only 3 is missing, so the empty cell is forced to 3 (a naked single).
If two cells in a box can each only be 2 or 5, then in that box the numbers 2 and 5...	**must fill those two cells** — A naked pair locks 2 and 5 into those cells, removing them as candidates elsewhere in the box.
A column in a 4x4 puzzle already holds 1, 2, 3. Which number MUST go in the empty cell?	**4** — Only 4 is missing, so the empty cell is forced to 4 (a naked single).
Why never guess in a well-made Sudoku?	**every cell can be deduced with logic** — A well-formed Sudoku is solvable by pure deduction — no guessing needed.
A row in a 9x9 puzzle already holds 1, 2, 3, 4, 5, 6, 7, 8. Which number MUST go in the empty cell?	**9** — Only 9 is missing, so the empty cell is forced to 9 (a naked single).
A row in a 6x6 puzzle already holds 1, 2, 3, 4, 6. Which number MUST go in the empty cell?	**5** — Only 5 is missing, so the empty cell is forced to 5 (a naked single).

3. arithmetic cages

✂ Question (fold →)	Answer
A 2-cell '5+' cage in a 1-4 puzzle can be...	**1 and 4, or 2 and 3** — 5 splits as 1+4 or 2+3; another clue is needed to choose.
The main reason to note a cage's possible digit sets early is to...	**narrow candidates for nearby cells** — Listing cage combinations shrinks candidates and drives deductions.
Numbers in a KenKen cage may repeat...	**only if they aren't in the same row or column** — A cage may repeat a value only when those cells share no row or column.
A single-cell cage labelled '3' contains...	**just the number 3** — A one-cell cage is a freebie: the number equals the label.
In a 3-cell '6+' cage using 1-4 with all different digits, the digits are...	**1, 2, 3** — 1+2+3=6 is the only set of three distinct 1-4 digits summing to 6.
A two-cell '+' cage in a 1-5 puzzle has target 9+ (no repeats in a cage line). Which pair fills it?	**4 and 5** — 4+5=9, the only distinct pair in range.
A two-cell '+' cage in a 1-8 puzzle has target 15+ (no repeats in a cage line). Which pair fills it?	**7 and 8** — 7+8=15, the only distinct pair in range.
KenKen combines arithmetic cages with which other rule?	**Latin square (no repeats in a row/column)** — KenKen = a Latin square PLUS arithmetic cage targets.
A two-cell '+' cage in a 1-6 puzzle has target 3+ (no repeats in a cage line). Which pair fills it?	**1 and 2** — 1+2=3, the only distinct pair in range.
A two-cell '+' cage in a 1-6 puzzle has target 11+ (no repeats in a cage line). Which pair fills it?	**5 and 6** — 5+6=11, the only distinct pair in range.
A two-cell 'x' cage in a 1-4 puzzle has target 12x. Which pair fills it (no repeats)?	**3 and 4** — 3x4=12, the only distinct pair in range.
A '2-' cage means the two numbers...	**differ by 2** — A '2-' cage's two cells have a difference of 2.
A two-cell 'x' cage in a 1-6 puzzle has target 24x. Which pair fills it (no repeats)?	**4 and 6** — 4x6=24, the only distinct pair in range.
A two-cell 'x' cage in a 1-5 puzzle has target 6x. Which pair fills it (no repeats)?	**2 and 3** — 2x3=6, the only distinct pair in range.
A two-cell 'x' cage in a 1-6 puzzle has target 10x. Which pair fills it (no repeats)?	**2 and 5** — 2x5=10, the only distinct pair in range.
A two-cell 'x' cage in a 1-4 puzzle has target 6x. Which pair fills it (no repeats)?	**2 and 3** — 2x3=6, the only distinct pair in range.
A two-cell 'x' cage in a 1-5 puzzle has target 15x. Which pair fills it (no repeats)?	**3 and 5** — 3x5=15, the only distinct pair in range.
Which is the best FIRST cage to solve?	**a single-cell (freebie) cage** — Freebie one-cell cages give certain starting numbers.
A two-cell '+' cage in a 1-7 puzzle has target 13+	**6 and 7** — 6+7=13, the only distinct pair in range.

(no repeats in a cage line). Which pair fills it?	
A two-cell '+' cage in a 1-4 puzzle has target 7+ (no repeats in a cage line). Which pair fills it?	**3 and 4** — 3+4=7, the only distinct pair in range.
A two-cell '+' cage in a 1-5 puzzle has target 3+ (no repeats in a cage line). Which pair fills it?	**1 and 2** — 1+2=3, the only distinct pair in range.
A two-cell 'x' cage in a 1-5 puzzle has target 20x. Which pair fills it (no repeats)?	**4 and 5** — 4x5=20, the only distinct pair in range.
A '2÷' cage means one number is...	**twice the other** — A '2÷' cage: the larger number is 2 times the smaller.
A two-cell 'x' cage in a 1-5 puzzle has target 8x. Which pair fills it (no repeats)?	**2 and 4** — 2x4=8, the only distinct pair in range.
A two-cell '+' cage in a 1-4 puzzle has target 3+ (no repeats in a cage line). Which pair fills it?	**1 and 2** — 1+2=3, the only distinct pair in range.

4. cross-sums

✂ Question (fold →)	Answer
A Kakuro run of 3 cells sums to 7 with all different digits 1-9. Which digits fill it?	**1-2-4** — 1+2+4=7 is the only distinct-digit set — a unique Kakuro combination.
A Kakuro run of 2 cells sums to 3 with all different digits 1-9. Which digits fill it?	**1-2** — 1+2=3 is the only distinct-digit set — a unique Kakuro combination.
A Kakuro run of 3 cells sums to 23 with all different digits 1-9. Which digits fill it?	**6-8-9** — 6+8+9=23 is the only distinct-digit set — a unique Kakuro combination.
A Kakuro run of 2 cells sums to 4 with all different digits 1-9. Which digits fill it?	**1-3** — 1+3=4 is the only distinct-digit set — a unique Kakuro combination.
A digit may repeat within a single Kakuro run…	**never** — No digit repeats inside one Kakuro run.
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 6?	**2** — 2 pairs sum to 6 (e.g. 1+5).
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 15?	**2** — 2 pairs sum to 15 (e.g. 6+9).
Kakuro reasoning is most like which Sudoku idea?	**no repeats along a line** — Both Kakuro and Sudoku forbid repeats along a line; Kakuro adds the sum.
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 5?	**2** — 2 pairs sum to 5 (e.g. 1+4).
A Kakuro run of 4 cells sums to 30 with all different digits 1-9. Which digits fill it?	**6-7-8-9** — 6+7+8+9=30 is the only distinct-digit set — a unique Kakuro combination.
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 8?	**3** — 3 pairs sum to 8 (e.g. 1+7).
A Kakuro run of 2 cells sums to 17 with all different digits 1-9. Which digits fill it?	**8-9** — 8+9=17 is the only distinct-digit set — a unique Kakuro combination.
A Kakuro run of 4 cells sums to 11 with all different digits 1-9. Which digits fill it?	**1-2-3-5** — 1+2+3+5=11 is the only distinct-digit set — a unique Kakuro combination.
Kakuro digits come from which set?	**1 to 9** — Kakuro uses 1-9; 0 is not allowed.
A Kakuro run of 3 cells sums to 24 with all different digits 1-9. Which digits fill it?	**7-8-9** — 7+8+9=24 is the only distinct-digit set — a unique Kakuro combination.
The largest sum for a 2-cell run is…	**17** — 8+9=17 is the maximum two-cell run.
A Kakuro run of 4 cells sums to 29 with all different digits 1-9. Which digits fill it?	**5-7-8-9** — 5+7+8+9=29 is the only distinct-digit set — a unique Kakuro combination.
A 2-cell run summing to 3 fills as {1,2}. Which cell is the 1?	**whichever the other clues allow** — The combination fixes which digits, but crossing clues fix their order.
A Kakuro run of 3 cells sums to 6 with all different digits 1-9. Which digits fill it?	**1-2-3** — 1+2+3=6 is the only distinct-digit set — a unique Kakuro combination.

The smallest sum for a 2-cell run is...	**3** — 1+2=3 is the minimum for two distinct digits.
A Kakuro run of 2 cells sums to 16 with all different digits 1-9. Which digits fill it?	**7-9** — 7+9=16 is the only distinct-digit set — a unique Kakuro combination.
A Kakuro run of 4 cells sums to 10 with all different digits 1-9. Which digits fill it?	**1-2-3-4** — 1+2+3+4=10 is the only distinct-digit set — a unique Kakuro combination.
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 13?	**3** — 3 pairs sum to 13 (e.g. 4+9).
How many distinct-digit pairs (1-9) can fill a 2-cell Kakuro run summing to 10?	**4** — 4 pairs sum to 10 (e.g. 1+9).
Why are 'magic' blocks (like 2 cells = 3) so useful?	**they have exactly one digit combination** — Unique-combination blocks pin down the digit SET, leaving only the order.

5. line clues

✂ Question (fold →)	Answer
A nonogram line of length 5 has the clue [2, 1]. How many cells are filled in total?	**3** — The clue's runs sum to 3 filled cells.
A nonogram line of length 7 has the clue [4, 1]. How many cells are filled in total?	**5** — The clue's runs sum to 5 filled cells.
Does the clue [1, 1] fit in a line of length 3? (runs need one gap between them)	**yes, it fits** — Minimum needed = 3; the line is 3, so: yes, it fits.
A nonogram line of length 6 has the clue [2, 2]. How many cells are filled in total?	**4** — The clue's runs sum to 4 filled cells.
An empty clue (0) for a line means…	**no cells in that line are filled** — A 0 clue leaves the entire line empty.
A nonogram line of length 6 has the clue [4]. How many cells are filled in total?	**4** — The clue's runs sum to 4 filled cells.
Does the clue [5] fit in a line of length 5? (runs need one gap between them)	**yes, it fits** — Minimum needed = 5; the line is 5, so: yes, it fits.
A single run clue of 5 in a length-5 line means…	**every cell is filled** — A run equal to the line length fills every cell.
A nonogram line of length 4 has the clue [1, 1]. How many cells are filled in total?	**2** — The clue's runs sum to 2 filled cells.
A nonogram line of length 6 has the clue [6]. How many cells are filled in total?	**6** — The clue's runs sum to 6 filled cells.
A nonogram line of length 5 has the clue [5]. How many cells are filled in total?	**5** — The clue's runs sum to 5 filled cells.
Overlapping (finding cells filled in every possible position) is useful because…	**those cells are certain to be filled** — When a run is long relative to the line, its overlap cells are always filled.
Does the clue [3] fit in a line of length 5? (runs need one gap between them)	**yes, it fits** — Minimum needed = 3; the line is 5, so: yes, it fits.
A nonogram line of length 4 has the clue [2]. How many cells are filled in total?	**2** — The clue's runs sum to 2 filled cells.
A nonogram line of length 6 has the clue [1, 1, 2]. How many cells are filled in total?	**4** — The clue's runs sum to 4 filled cells.
Does the clue [2, 1] fit in a line of length 4? (runs need one gap between them)	**yes, it fits** — Minimum needed = 4; the line is 4, so: yes, it fits.
A nonogram line of length 8 has the clue [2, 3]. How many cells are filled in total?	**5** — The clue's runs sum to 5 filled cells.
A nonogram line of length 6 has the clue [3, 1]. How many cells are filled in total?	**4** — The clue's runs sum to 4 filled cells.
A nonogram line of length 5 has the clue [1, 2].	

How many cells are filled in total?	**3** — The clue's runs sum to 3 filled cells.
Two runs '2 2' in one line must be separated by…	**at least one empty cell** — Distinct runs are separated by one or more empty cells.
Does the clue [2, 2] fit in a line of length 5? (runs need one gap between them)	**yes, it fits** — Minimum needed = 5; the line is 5, so: yes, it fits.
The number in a nonogram clue tells you…	**how many cells in a row are filled together** — Each clue number is the length of a block of consecutive filled cells.
A nonogram line of length 7 has the clue [3, 2]. How many cells are filled in total?	**5** — The clue's runs sum to 5 filled cells.
A nonogram line of length 5 has the clue [1, 1, 1]. How many cells are filled in total?	**3** — The clue's runs sum to 3 filled cells.
A nonogram line of length 5 has the clue [3]. How many cells are filled in total?	**3** — The clue's runs sum to 3 filled cells.

6. inequalities

✂ Question (fold →)	Answer
'>' and '<' are examples of...	**inequality signs** — > and < are inequality (comparison) signs.
A < B with both from 1-6. If A = 1, what is the SMALLEST B can be?	**2** — The smallest value greater than 1 is 2.
A < B, both from 1-4, and A = 3. What is B?	**4** — Only 4 is greater than 3 in 1-4.
A < B with both from 1-5. If A = 1, what is the SMALLEST B can be?	**2** — The smallest value greater than 1 is 2.
The sign '<' between two cells means the left cell is...	**smaller than the right** — '<' means the left value is less than the right.
A > B, and B = 4 (numbers 1-5). What is A?	**5** — A must be greater than 4, so A=5.
A < B with both from 1-6. If A = 5, what is the SMALLEST B can be?	**6** — The smallest value greater than 5 is 6.
A < B, and B = 2 (numbers 1-4). What is A?	**1** — A must be less than 2, so A=1.
A > B, both from 1-3, and B = 2. What is A?	**3** — Only 3 is greater than 2 in 1-3.
A cell greater than a 4 in a 1-5 puzzle must be...	**5** — The only value greater than 4 in 1-5 is 5.
A < B, and A = 4 (numbers 1-5). What is B?	**5** — B must be greater than 4, so B=5.
Why start Futoshiki at the ends of long inequality chains?	**the extremes are often forced** — Long chains pin the extreme values first, then the rest follow.
A > B, and A = 2 (numbers 1-4). What is B?	**1** — B must be less than 2, so B=1.
If A < B and B < A were both required, the puzzle would be...	**impossible (a contradiction)** — A<B and B<A cannot both hold — a contradiction.
A < B with both from 1-4. If A = 1, what is the SMALLEST B can be?	**2** — The smallest value greater than 1 is 2.
A < B < C (numbers 1-3, all different). What is A?	**1** — The smallest of three ordered values is 1.
A < B with both from 1-5. If A = 4, what is the SMALLEST B can be?	**5** — The smallest value greater than 4 is 5.
A < B with both from 1-5. If A = 3, what is the SMALLEST B can be?	**4** — The smallest value greater than 3 is 4.
A < B < C (numbers 1-3, all different). What is B?	**2** — The middle value is 2.
A < B with both from 1-3. If A = 2, what is the SMALLEST B can be?	**3** — The smallest value greater than 2 is 3.
Besides the inequalities, Futoshiki also obeys...	**the Latin-square rule** — Futoshiki is a Latin square with extra inequality constraints.

In a 1-4 row, a cell on the SMALL side of a chain a<b<c<d must be…	**1** — a<b<c<d over 1-4 forces a=1,b=2,c=3,d=4.
A < B, both 1-5, and B = 1. This is…	**impossible** — Nothing in 1-5 is less than 1, so B can't be 1.
A < B with both from 1-4. If A = 3, what is the SMALLEST B can be?	**4** — The smallest value greater than 3 is 4.
A < B < C (numbers 1-3, all different). What is C?	**3** — The largest of three ordered values is 3.

7. elimination

✂ Question (fold →)	Answer
Two shaded cells may never be…	**next to each other (adjacent)** — No two shaded cells are orthogonally adjacent.
If a cell is unshaded, its equal-valued neighbours in the same line must be…	**shaded** — Keeping one copy white forces its line-duplicates to be shaded.
If shading a cell would split the white cells into two pieces, you…	**must NOT shade it** — You can't shade a cell whose removal disconnects the white region.
The three Hitori rules together guarantee a grid that is…	**duplicate-free, non-adjacent-shaded, and connected** — A valid Hitori grid satisfies all three rules at once.
In the triple 'a a a' along a line, which cell stays unshaded?	**the middle one** — Shading both ends of a triple keeps them non-adjacent and leaves the middle white.
If two equal numbers sit side by side, you know…	**at least one must be shaded** — Adjacent duplicates: one must shade to remove the repeat.
A good first Hitori move is to find…	**a run of three equal numbers in a line** — In 'a a a', the middle must stay white and the ends shade (adjacency).
The UNshaded cells must all be…	**connected in one group** — All unshaded cells form a single connected region.
Can a shaded cell and an unshaded cell be adjacent?	**yes** — The adjacency rule bans two shaded cells touching, not shaded-next-to-white.
Hitori mainly trains which kind of thinking?	**elimination and connectivity** — Hitori is about elimination while preserving one connected region.
In Hitori you make duplicates disappear by…	**shading (blacking out) cells** — Hitori removes duplicate numbers by shading cells black.
Before shading a cell you should check it won't…	**disconnect the white cells** — Every shade must preserve the connected white region.
A row reads 2 2 3. To satisfy Hitori you should shade…	**one of the 2s** — Shading one 2 leaves a single unshaded 2, removing the duplicate.
The rule you use MOST in Hitori is…	**no duplicate numbers left unshaded in a line** — Removing line duplicates is Hitori's central rule.
A white cell fully surrounded by shaded cells would…	**break connectivity** — Isolating a white cell violates the single-connected-region rule.
A number appearing only once in its row and column…	**never needs shading** — A non-duplicated number never needs shading.
Hitori's three rules are: remove duplicates, no adjacent shaded, and…	**keep white cells connected** — The three rules: no line duplicates unshaded, no adjacent shaded, white stays connected.
Shading in Hitori is an example of…	**elimination (removing the impossible)** — Shading is elimination — removing values that can't remain.

Can two shaded cells touch at a diagonal corner?	**yes** — The adjacency ban is orthogonal only; diagonal shaded cells are allowed.
A Hitori grid starts as…	**a square filled with numbers** — Hitori begins as a filled square grid of numbers.
If two equal numbers are adjacent and one must be shaded, but shading either breaks a rule, then…	**the cell between constraints is forced the other way** — When one option violates adjacency/connectivity, the other colour is forced.
If leaving a cell white would repeat a number already kept in its column, you must…	**shade that cell** — The no-duplicate rule covers both rows and columns.
Cells orthogonally adjacent means sharing…	**an edge (up/down/left/right)** — Orthogonal adjacency is the four edge-sharing neighbours.
If a number appears three times in one column, how many stay white?	**exactly one** — Only one copy of a value stays unshaded per line.
A number that appears only ONCE in its row and column…	**is safe to leave unshaded** — A non-duplicated number never needs shading.

8. visibility ordering

✂ Question (fold →)	Answer
Skyscrapers adds visibility clues on top of a…	**Latin square** — Skyscrapers = Latin square + edge visibility clues.
On a row of heights 1-4, a clue of 1 means the nearest building is…	**4 (the tallest)** — A clue of 1 forces the tallest building nearest the clue.
A Skyscrapers edge clue counts…	**how many buildings you can see from that edge** — An edge clue is the number of buildings visible looking down that line.
Heights 1 then 3 (nearest first): how many visible?	**2** — 1 then 3: both visible.
A clue of 3 on a 1-3 row forces the order…	**1, 2, 3** — A clue of n forces strictly ascending heights.
Placing the tallest in the middle tends to…	**lower both edge clues** — A central tall building reduces visibility from both edges.
The tallest building always…	**is visible from the near edge that faces it** — The tallest building is never hidden.
Placing the tallest building in the middle of a line tends to…	**reduce how many are visible from both ends** — A central tall building blocks the view, lowering both edge counts.
A taller building in front of a shorter one makes the shorter one…	**hidden (not visible)** — A building is visible only if it's taller than every building before it.
On a 1-5 row with a clue of 1, the nearest height is…	**5** — Clue 1 forces the tallest (5) nearest the clue.
A clue of 1 helps solving because it…	**pins the tallest at that edge** — A clue of 1 fixes the tallest building's position.
On a 1-5 row with a clue of 5, the nearest height is…	**1** — Clue 5 forces ascending order 1,2,3,4,5.
A clue counts buildings looking…	**inward from that edge** — A clue counts buildings visible looking inward from its edge.
The largest possible clue on an n-wide row is…	**n** — At most n buildings are visible, so the largest clue is n.
A clue of 2 on a 1-4 row means exactly…	**two buildings are visible from that side** — A clue of 2 means two buildings are visible from that edge.
The smallest possible clue is…	**1** — You always see the nearest building, so the smallest clue is 1.
Skyscrapers trains reasoning about…	**ordering and visibility** — Skyscrapers is about ordering heights to satisfy visibility counts.
Heights 3 then 1 (nearest first): how many visible?	**1** — A shorter building behind a taller one is hidden; 1 visible.
	the nearest one to the clue — The building nearest the clue is always

Which building is ALWAYS visible?	visible.
In a 1-5 puzzle, heights range from...	**1 to 5** — Heights are 1..n, each once per line.
On a row of heights 1-4, a clue of 4 means the order is...	**1, 2, 3, 4 (ascending)** — Seeing all n buildings forces strictly ascending heights from the clue.
Skyscrapers also obeys which core rule?	**each height 1-n appears once per row and column** — Skyscrapers is a Latin square of heights plus edge visibility clues.
If two opposite clues on a line are 1 and 2, the tallest building is...	**at the '1' end** — The clue of 1 forces the tallest building at that end.
A clue equal to n (the grid size) forces the nearest building to be...	**1 (the shortest)** — With a clue of n the line ascends, so the nearest building is height 1.
On a 1-4 row, both opposite clues can never both be 4 because...	**the order can ascend from only one side** — Both edges can't see all n buildings — ascending order faces one way.

9. loop building

✂ Question (fold →)	Answer
The finished loop must be…	**closed and unbroken with no crossings or branches** — The solution is a single closed, non-self-crossing loop.
Marking edges you KNOW are empty (with an x) helps because…	**it narrows the remaining choices** — Marking impossible edges empty focuses the deductions.
A cell marked 1 uses how many of its four edges on the loop?	**1** — A 1-cell uses exactly one of its four edges.
The goal of Slitherlink is to draw…	**one single closed loop** — Slitherlink builds exactly one non-crossing closed loop.
A cell marked 3 has…	**three of its four edges on the loop** — A 3 cell uses three of its four edges.
How many separate loops does a solved Slitherlink have?	**exactly one** — A valid solution is exactly one loop.
Slitherlink leans on which kind of counting?	**parity (even/odd)** — Vertex parity (0 or 2 lines) drives Slitherlink.
Adjacent 3-clues force…	**a shared edge and surrounding segments** — Adjacent 3s create forced edges between them.
A cell marked 0 has…	**no loop edges around it** — A 0 cell has none of its four edges on the loop.
Why can't a corner have exactly 1 line?	**a loop can't dead-end** — A single line at a vertex is a dead end, impossible for a closed loop.
A grid-corner cell with clue 1 tends to force its two outer edges…	**empty** — Corner clues tightly restrict the limited available edges.
Marking edges you KNOW are empty helps by…	**narrowing remaining choices** — Marking impossible edges empty focuses deductions.
A solved Slitherlink has how many loops?	**exactly one** — A valid solution is one closed loop.
Loop segments run along cell…	**edges (between the dots)** — The loop is drawn along cell edges between corner dots.
A cell marked 2 has how many edges NOT on the loop?	**2** — A 2-cell has 2 edges on and 2 off (4 total).
A clue of 1 on a corner cell of the grid often forces…	**the two outer edges to stay empty** — Corner cells have fewer options, so their clue tightly constrains edges.
At every dot (corner), the number of loop lines meeting must be…	**0 or 2** — A closed loop meets each vertex 0 or 2 times (it never branches or stops).
If three edges around a 3-cell are decided as OFF, the puzzle is…	**in contradiction (a 3 needs 3 on)** — A 3-clue cannot have three edges off — that's a contradiction.
Slitherlink lines run along cell…	**edges** — The loop runs along cell edges between dots.

A cell marked 0 forces its four edges to be…	**all empty** — A 0-cell has no loop edges.
The loop must never…	**cross itself or branch** — A valid loop is simple: no self-crossing or branching.
A cell clue tells you how many of its 4 edges are…	**part of the loop** — A number is how many of that cell's four sides are used by the loop.
Two 3-clues sitting side by side force…	**an edge between them plus surrounding segments** — Adjacent 3-clues create a forced chain of loop edges between them.
Three edges of a 3-cell decided OFF is…	**a contradiction** — A 3-clue can't have three edges off.
Slitherlink reasoning relies heavily on…	**parity (even/odd counting)** — The 0-or-2-per-vertex rule is parity reasoning.

10. placement & spacing

✂ Question (fold →)	Answer
In a 2-star 8x8 puzzle, total stars =	**16** — 2 stars x 8 rows = 16.
If only two non-adjacent cells remain in a region, both…	**must be stars (for a 2-star puzzle)** — When a region's legal cells exactly equal its star count, all are stars.
A column with 2 stars already placed blocks new stars…	**in the rest of that column** — A satisfied column takes no more stars.
If a region's only legal cells equal its star count, those cells…	**are all stars** — When legal cells match the star count, all are stars.
If a region can only place its stars in one row, that row's OTHER cells (outside the region)…	**cannot hold more stars than the count allows** — A region confined to a row consumes that row's stars, limiting the rest.
Two stars may never be…	**touching, even diagonally** — No two stars are adjacent, including diagonally.
In a 2-star Star Battle, each row contains exactly…	**2 stars** — A 2-star puzzle has exactly 2 stars in every row, column, and region.
Placing a star immediately blocks…	**its 8 surrounding cells** — A star blocks all 8 neighbours.
The first cells to mark empty are usually…	**neighbours of a placed star** — Marking a star's neighbours empty is the fastest elimination.
If a star is placed, the 8 cells around it must be…	**empty** — A star blocks all eight surrounding cells.
Star Battle mainly trains…	**placement under spacing and counting constraints** — Star Battle is placement logic under count + spacing constraints.
Star Battle counts stars per row, per column, and per…	**region** — Stars are counted per row, column, and region.
Besides rows and columns, stars are also counted per…	**region (outlined shape)** — Each bordered region holds the same number of stars as each row/column.
A column already holding its 2 stars takes…	**no more stars** — A satisfied column takes no more stars.
Two stars may touch at a diagonal corner?	**no** — Diagonal-corner adjacency between stars is banned.
Can two stars share a diagonal corner?	**no** — Diagonal-corner adjacency is not allowed between stars.
A region that fits inside a single row must hold its stars…	**in that row** — If a region lies within one row, its stars are also that row's stars.
In a 2-star 10x10 puzzle, how many stars total?	**20** — 2 stars x 10 rows = 20 stars.
A 1-star puzzle places per unit exactly…	**1 star** — 1-star: one star per row, column, region.
The fastest eliminations come from…	**marking a placed star's neighbours empty** — A star's 8 neighbours are all empty.
In a 1-star Star Battle, each column has…	**exactly 1 star** — A 1-star puzzle places exactly one star per row, column, and region.

A region confined to one row places its stars…	**in that row** — A region inside one row holds that row's stars.
If a row already has its 2 stars, the other cells in that row are…	**all empty** — Once a row has its required stars, its remaining cells are empty.
Star Battle is mainly about…	**placement under counting + spacing rules** — Star Battle is placement logic under count and spacing constraints.
Stars are counted per row, per column, and per…	**region** — Stars count per row, column, and region.

11. propagation

✂ Question (fold →)	Answer
Across families, the shared idea is that constraints…	**reduce the candidates for other cells** — Every family's rules work by shrinking candidate sets.
Filling the most-constrained cell first…	**drives further deductions** — The most-constrained cell propagates the most.
A naked pair {3,7} in a unit lets you…	**remove 3 and 7 from other cells of that unit** — A naked pair removes its digits from the rest of the unit.
A contradiction during propagation means…	**an earlier placement was wrong** — A contradiction reveals a wrong earlier deduction.
The payoff of thorough propagation is…	**solving with no backtracking** — Good propagation avoids backtracking entirely.
The order you resolve forced cells…	**doesn't change the final solution** — Forced deductions give the same unique solution in any order.
The order you solve forced cells in…	**does not change the final solution** — Because each step is forced, order doesn't affect the unique result.
When a cage's digit set is fixed, nearby cells…	**lose those digits as candidates** — A fixed cage removes its digits from cells sharing its lines.
Constraints from different families (cage + line)…	**combine to narrow candidates** — Different-family constraints combine to reduce candidates.
Constraint propagation is used by computer solvers because it…	**reaches the answer by pure logic** — Propagation is the logical engine behind human and computer solving.
A 'pointing' candidate confined to one line in a box lets you…	**remove it from that line outside the box** — A pointing pair/triple eliminates a digit along its line outside the box.
Propagation stops (and you must look harder) when…	**no cell is currently forced** — When nothing is immediately forced, use advanced patterns — still not guessing.
A fixed cage's digit set…	**leaves cells sharing its lines** — A fixed cage removes its digits from cells sharing its lines.
Constraint propagation is the engine behind…	**logical solving (human and computer)** — Propagation is the logical engine of human and computer solvers.
If two cells share every candidate {3,7}, other cells in their unit…	**cannot be 3 or 7** — A naked pair removes its two digits from the rest of the unit.
A chain of forced cells lets you solve WITHOUT…	**guessing** — Propagation solves by certainty, so no guessing is needed.
The payoff of good propagation is…	**solving with certainty and no backtracking** — Thorough propagation yields a certain solution without backtracking.
'Constraint propagation' means…	**one placement forces the next, and so on** — Constraint propagation is chaining forced deductions from one cell to the next.

When you place a number, you should immediately…	**remove it as a candidate in the shared units** — Placing a value eliminates it from every cell that shares a unit.
A contradiction found during propagation means…	**an earlier placement was wrong** — A contradiction shows a previous deduction/assumption was incorrect.
The best cell to fill next is usually the one with…	**the fewest candidates** — Filling the most-constrained cell first drives propagation.
If cell X being 5 would force cell Y to break a rule, then X…	**cannot be 5** — If a candidate forces a contradiction, that candidate is eliminated.
Propagation across DIFFERENT families (say a cage feeding a Latin line) shows constraints are…	**combinable** — Constraints from different families combine to narrow candidates.
A 'locked candidate' is a number confined to…	**one line within a box, removing it elsewhere on that line** — A locked candidate confines a digit to a line, eliminating it from that line outside the box.
When no single cell is forced, you should…	**use pairs/chains, not guess** — At a stall, use higher patterns — never guessing.

12. parity

✂ Question (fold →)	Answer
Odd + even =	**odd** — An odd plus an even is odd.
Odd + even =	**odd** — Odd plus even is odd.
A quick contradiction check is to ask whether a required total's parity…	**matches what the cells can provide** — If the needed count's parity can't be met, the configuration is impossible.
Why is parity called a 'loop argument' in these puzzles?	**loops force even counts at crossings/vertices** — Loops impose even-degree/even-crossing counts — the parity argument.
An odd-length cycle cannot be…	**two-coloured by alternating** — An odd cycle can't be alternately 2-coloured — a parity obstruction.
A simple closed loop splits the plane into…	**inside and outside** — A simple closed loop divides the plane into inside and outside.
A Slitherlink vertex has an even number of lines because…	**a loop enters and leaves** — A loop gives each vertex even degree (0 or 2).
Parity means a number is…	**even or odd** — Parity is the even/odd property.
A quick contradiction check compares a required count's parity with…	**what the cells can provide** — A parity mismatch signals an impossible configuration.
A closed loop crosses any straight line an…	**even number of times** — A closed loop meets a line an even number of times (in = out).
A closed loop meets any straight line an…	**even number of times** — A closed loop crosses a line an even number of times.
If shading must alternate and a loop of cells has odd length, then…	**it can't alternate perfectly** — An odd cycle can't be two-coloured alternately — a parity obstruction.
If a region needs an even number of a thing but only an odd number fit, the puzzle is…	**impossible there** — A parity mismatch (needing even, having odd) is a contradiction.
Parity means whether a number is…	**even or odd** — Parity classifies numbers as even or odd.
Odd + odd =	**even** — The sum of two odd numbers is even.
Odd + odd =	**even** — Two odds sum to an even.
Parity arguments help most when a puzzle asks about…	**counts that must be even or odd** — Parity shines when a required count has a forced even/odd nature.
Point-in-loop parity: crossing the loop an ODD number of times from outside means you end up…	**inside** — Odd crossings flip you to the inside; even keeps you outside.
At each corner of a Slitherlink loop, the number of lines is…	**0 or 2 (even)** — Loop vertices have even degree: 0 or 2 lines.
Even + even =	**even** — The sum of two even numbers is even.

Even + even =	**even** — Two evens sum to an even.
To check connectivity you can imagine…	**walking between white cells through shared edges** — Connectivity holds if you can travel between all white cells via edges.
Crossing a loop an ODD number of times from outside lands you…	**inside** — Odd crossings put you inside the loop.
In Hitori, connectivity is a form of which structural idea?	**the white cells form one connected graph** — Connectivity treats white cells as a single connected graph.
A single closed loop divides the plane into…	**an inside and an outside** — A simple closed loop splits the plane into inside and outside.

13. partitions

✂ Question (fold →)	Answer
How many ways can 10 be written as TWO different digits (1-9)?	**4** — There are 4 such pairs (e.g. 1+9).
How many ways can 4 be written as TWO different digits (1-9)?	**1** — There are 1 such pairs (e.g. 1+3).
How many ways can 8 be written as THREE different digits (1-9)?	**2** — There are 2 such triples (e.g. 1+2+5).
How many ways can 3 be written as TWO different digits (1-9)?	**1** — There are 1 such pairs (e.g. 1+2).
How many ways can 12 be written as TWO different digits (1-9)?	**3** — There are 3 such pairs (e.g. 3+9).
How many ways can 14 be written as TWO different digits (1-9)?	**2** — There are 2 such pairs (e.g. 5+9).
How many ways can 6 be written as THREE different digits (1-9)?	**1** — There are 1 such triples (e.g. 1+2+3).
How many ways can 5 be written as TWO different digits (1-9)?	**2** — There are 2 such pairs (e.g. 1+4).
How many ways can 6 be written as TWO different digits (1-9)?	**2** — There are 2 such pairs (e.g. 1+5).
A two-cell run sums to 3. Which digits MUST appear?	**1 and 2** — 3 = 1+2 only, so both 1 and 2 are forced.
How many ways can 11 be written as TWO different digits (1-9)?	**4** — There are 4 such pairs (e.g. 2+9).
How many ways can 9 be written as TWO different digits (1-9)?	**4** — There are 4 such pairs (e.g. 1+8).
How many ways can 17 be written as TWO different digits (1-9)?	**1** — There are 1 such pairs (e.g. 8+9).
A 3-cell run of 7 (distinct 1-9) is...	**1+2+4** — 7 = 1+2+4 is the unique distinct triple.
How many ways can 15 be written as TWO different digits (1-9)?	**2** — There are 2 such pairs (e.g. 6+9).
Which target has the MOST two-different-digit combinations (1-9)?	**10** — Sums near the middle (10) have the most distinct pairs.
How many ways can 24 be written as THREE different digits (1-9)?	**1** — There are 1 such triples (e.g. 7+8+9).
How many ways can 16 be written as TWO different digits (1-9)?	**1** — There are 1 such pairs (e.g. 7+9).
How many ways can 22 be written as THREE different digits (1-9)?	**2** — There are 2 such triples (e.g. 5+8+9).
How many ways can 7 be written as TWO different digits (1-9)?	**3** — There are 3 such pairs (e.g. 1+6).
How many ways can 7 be written as THREE different digits (1-9)?	**1** — There are 1 such triples (e.g. 1+2+4).

A two-cell run sums to 17 (digits 1-9, different). Which digit MUST appear?	**9** — 17 = 8+9, so 9 (and 8) must appear.
How many ways can 8 be written as TWO different digits (1-9)?	**3** — There are 3 such pairs (e.g. 1+7).
How many ways can 23 be written as THREE different digits (1-9)?	**1** — There are 1 such triples (e.g. 6+8+9).
How many ways can 13 be written as TWO different digits (1-9)?	**3** — There are 3 such pairs (e.g. 4+9).

14. proof

✂ Question (fold →)	Answer
An X-wing eliminates a digit using…	**its aligned positions across two lines** — X-wing uses aligned candidate positions to eliminate.
Proof-based solving avoids…	**backtracking from wrong guesses** — Proof-based elimination removes the need to backtrack.
Chains link cells that…	**imply each other's values** — Forcing chains link cells by implication.
A forcing chain proves a cell's value when…	**every possibility leads to the same value** — If all cases converge on one value, it's forced.
If assuming A=6 forces two 2s into one row, then A…	**is not 6** — The assumption breaks a rule, eliminating A=6.
A move is provably safe when it…	**violates no rule in any scenario** — A safe move breaks no constraint in any case.
The safest first advanced technique after singles is…	**the naked/hidden pair** — Naked/hidden pairs are the natural next step after singles.
The value of proving over guessing is…	**you never undo a wrong branch** — Proof-based moves never require undoing a guess.
A well-formed puzzle guarantees logic will…	**reach the unique answer** — A unique solution is always reachable by logic.
If both candidates of a cell force cell Z to be 4, then Z…	**is 4** — If all cases lead to Z=4, then Z=4 with certainty.
A 'forcing chain' follows implications until…	**they all agree on one cell's value** — A forcing chain proves a cell's value because every possibility leads to it.
A contradiction is valuable because it…	**eliminates a candidate for certain** — Deriving a contradiction removes a candidate with certainty.
'No guessing' solving means every move is…	**logically forced** — No-guess solving makes only forced, provable moves.
A contradiction is useful because it…	**eliminates a candidate for certain** — Deriving a contradiction removes a candidate with certainty.
A well-formed puzzle guarantees advanced deduction will…	**always reach the unique answer** — A unique solution is always reachable by logic alone.
The value of proving instead of guessing is…	**you never hit a dead end to undo** — Proof-based moves never require undoing a wrong guess.
Chains are drawn between cells that…	**imply each other's values** — Forcing chains link cells by logical implication.
The strongest evidence a move is safe is that…	**no rule can ever be broken by it** — A move is safe when it violates no constraint in any scenario.
After singles, the natural next tool is…	**the naked/hidden pair** — Pairs come right after singles.

Advanced deduction proves the puzzle has…	**one reachable solution by logic** — It confirms the single solution is logically reachable.
When stuck with only singles, the next tool is usually…	**pairs, pointing, or chains** — When singles run out, use naked/hidden pairs, pointing, and chains.
If assuming cell A = 6 forces two cells to both need 2 in one row, then A…	**is not 6** — The assumption forces a rule break, eliminating A=6.
An 'X-wing' style pattern eliminates candidates using…	**two lines that share a digit's positions** — X-wing uses aligned candidate positions across two lines to eliminate.
A proof by contradiction assumes a value, then…	**shows it breaks a rule, ruling it out** — Assume-and-refute eliminates a candidate by deriving a contradiction.
Advanced deduction avoids backtracking by…	**eliminating candidates with proofs** — Proof-based elimination removes the need to backtrack.

15. uniqueness

✂ Question (fold →)	Answer
The clearest sign your deductions are correct is…	**they lead to one consistent full grid** — Correct logic yields one consistent, contradiction-free solution.
A 'unique rectangle' warns against four cells forming…	**a swappable two-candidate rectangle** — A unique rectangle would allow a swap → two solutions, so it's disallowed.
Correct logic yields…	**one consistent, contradiction-free grid** — Sound logic yields one consistent solution.
A well-formed logic puzzle has…	**exactly one solution** — A well-formed puzzle has a unique solution.
The 'unique rectangle' warns against four cells forming…	**a swappable two-candidate rectangle** — A unique rectangle of two candidates would allow a swap, so it's disallowed.
Assuming uniqueness lets a solver reject any move that would create…	**a second solution** — Uniqueness logic rejects moves that would permit two solutions.
Uniqueness reasoning is only valid when…	**the puzzle is known to be well-formed** — Uniqueness deductions require the well-formed (single-solution) guarantee.
Too FEW clues usually makes a puzzle…	**have more than one solution** — Too few clues leaves multiple solutions.
Uniqueness lets solvers use…	**the 'avoid two solutions' deduction** — Assuming uniqueness, any move that would allow two solutions is rejected.
Uniqueness reasoning is valid only when the puzzle is…	**known to be well-formed** — Uniqueness deductions need the single-solution guarantee.
The minimum clues rule of thumb is 'enough so that…	**the solution is forced and unique'** — Clues must suffice to force a single solution.
Adding more clues than needed makes a puzzle…	**easier but still unique** — Extra clues reduce difficulty without changing the unique solution.
Generators verify uniqueness by…	**confirming exactly one solution before publishing** — Generators confirm a single solution before release.
Puzzle setters aim for a solution that is unique AND…	**reachable by logic (no guessing)** — Quality puzzles are both unique and solvable by pure logic.
A generator checks uniqueness by…	**confirming only one solution exists before publishing** — Puzzle generators verify a single solution before release.
If a puzzle has TWO solutions, it is…	**not well-formed** — Multiple solutions means the puzzle is not well-formed.
Extra clues beyond the minimum make a puzzle…	**easier but still unique** — Extra clues reduce difficulty without changing the unique answer.
Setters aim for a solution that is unique AND…	**reachable by logic** — Quality puzzles are unique and solvable by pure logic.

Uniqueness is a property of the...	**whole puzzle (clues + rules together)** — Uniqueness is a global property of the clue set under the rules.
Uniqueness is a property of...	**the whole clue set under the rules** — Uniqueness is a global property of the clues under the rules.
If two fillings satisfy all clues, you must...	**add a clue to force one** — Ambiguity is fixed by adding a clue for uniqueness.
A 'deadly pattern' (like a 2x2 of the same two candidates) is avoided because it would give...	**two valid solutions** — A rectangle of two swappable candidates yields two solutions, so it's forbidden.
A puzzle with NO solution is...	**also not well-formed** — Both zero and multiple solutions violate well-formedness.
If two different fillings both satisfy every clue, the puzzle...	**must be fixed (add a clue)** — Ambiguity is repaired by adding a clue to force uniqueness.
Why do good solvers TRUST uniqueness?	**well-made puzzles guarantee it** — Because reputable puzzles are verified unique, uniqueness deductions are sound.

16. synthesis

✂ Question (fold →)	Answer
Which two families are 'Latin square + extra rule'?	**Sudoku and Futoshiki** — Sudoku and Futoshiki are both Latin squares with an added constraint.
Across ALL these puzzles, the shared big idea is that…	**constraints narrow possibilities until the answer is forced** — All constraint puzzles work by narrowing possibilities to a forced solution.
The habit that solves every family is…	**look for the most-constrained cell and force it** — Find the most-constrained cell, force it, and propagate — across every family.
A two-cell '+' cage in a 1-4 puzzle has target 3+ (no repeats in a cage line). Which pair fills it?	**1 and 2** — 1+2=3, the only distinct pair in range.
In Hitori you make duplicates disappear by…	**shading (blacking out) cells** — Hitori removes duplicate numbers by shading cells black.
'Constraint propagation' means…	**one placement forces the next, and so on** — Constraint propagation is chaining forced deductions from one cell to the next.
Constraint puzzles are related to which computer-science idea?	**constraint satisfaction** — They are constraint-satisfaction problems — a core CS concept.
A puzzle that is unique and fully logical is called…	**well-formed** — A unique, logic-solvable puzzle is 'well-formed'.
The single most transferable move across families is…	**eliminate what's impossible** — Elimination — ruling out the impossible — is the universal technique.
A row in a 4x4 puzzle already holds 1, 2, 4. Which number MUST go in the empty cell?	**3** — Only 3 is missing, so the empty cell is forced to 3 (a naked single).
On a row of heights 1-4, a clue of 1 means the nearest building is…	**4 (the tallest)** — A clue of 1 forces the tallest building nearest the clue.
The best way to START almost any of these puzzles is…	**with the cells whose value is already certain** — Begin with certain cells (freebies, forced values, extreme clues).
The number-placement puzzle family builds which school-useful skill?	**logical reasoning and proof (MP.1/MP.3)** — These puzzles train problem-solving and argument — CCSS Math Practices MP.1/MP.3.
A cell marked 3 has…	**three of its four edges on the loop** — A 3 cell uses three of its four edges.
A < B, and B = 2 (numbers 1-4). What is A?	**1** — A must be less than 2, so A=1.
A nonogram line of length 5 has the clue [5]. How many cells are filled in total?	**5** — The clue's runs sum to 5 filled cells.
A well-formed logic puzzle has…	**exactly one solution** — A well-formed puzzle has a unique solution.
A cage summing to a UNIQUE digit set is most like a Nonogram clue because both…	**pin down content, leaving only arrangement** — Both fix WHAT is present, leaving only WHERE it goes.

How many ways can 9 be written as TWO different digits (1-9)?	**4** — There are 4 such pairs (e.g. 1+8).
Which two families both rely on PARITY reasoning?	**Slitherlink and Hitori** — Slitherlink (loop parity) and Hitori (connectivity/parity) both use parity arguments.
If a move in ANY of these puzzles requires a guess, it usually means...	**you missed a logical deduction** — A needed guess in a well-formed puzzle signals a missed deduction.
A 'forcing chain' follows implications until...	**they all agree on one cell's value** — A forcing chain proves a cell's value because every possibility leads to it.
In a 2-star Star Battle, each row contains exactly...	**2 stars** — A 2-star puzzle has exactly 2 stars in every row, column, and region.
A closed loop crosses any straight line an...	**even number of times** — A closed loop meets a line an even number of times (in = out).
A Kakuro run of 2 cells sums to 3 with all different digits 1-9. Which digits fill it?	**1-2** — 1+2=3 is the only distinct-digit set — a unique Kakuro combination.

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