

Sample Logic 2009

Sudoku variant

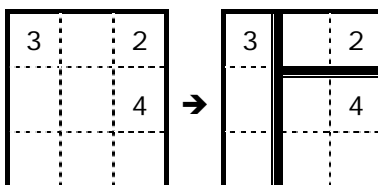
Fill in the empty boxes so that every number from 1 to 8 appears in each row and in each adjoining **pair** of columns.

2	3		4	8			
				1	4		3
5					6	8	
	7						

			7	3			
	2				6	4	
	8			1		5	
		1			2		

Shikaku □□□

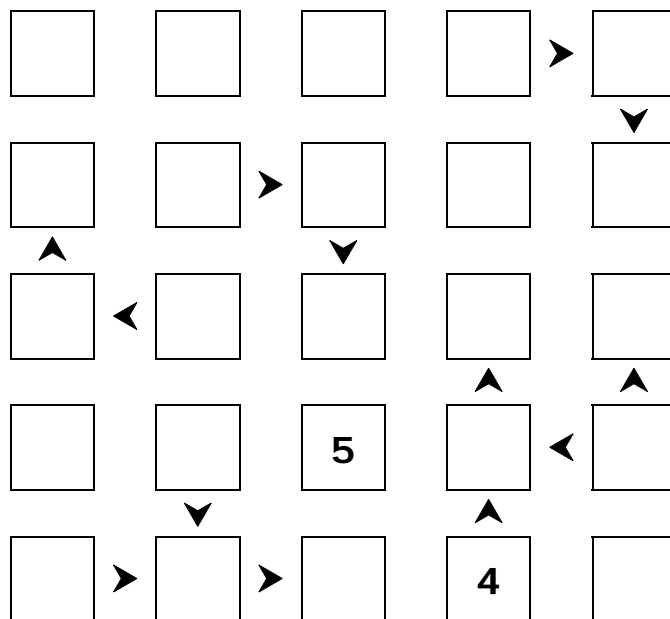
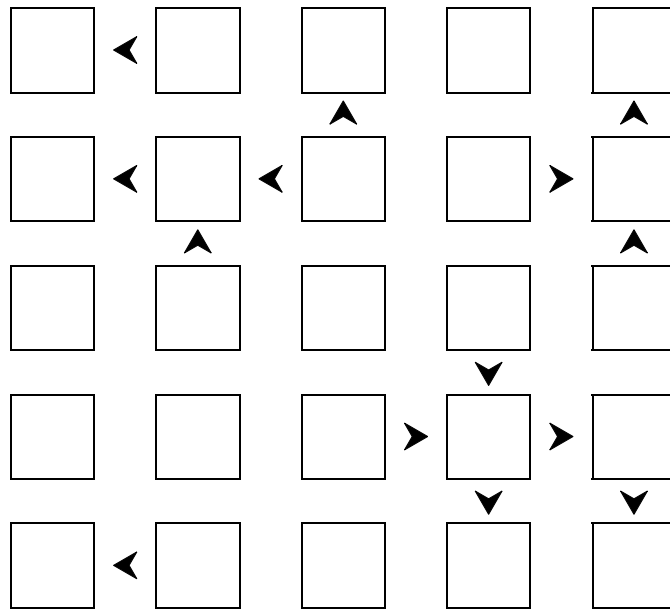
Divide the grid below into rectangles so that a) each rectangle contains one of the given numbers and b) each rectangle contains as many cells as the number it encloses. Remember: a square is also a rectangle



3					6
			5		
	2				6
		4			
4					5
	6			6	
2					

Futosiki

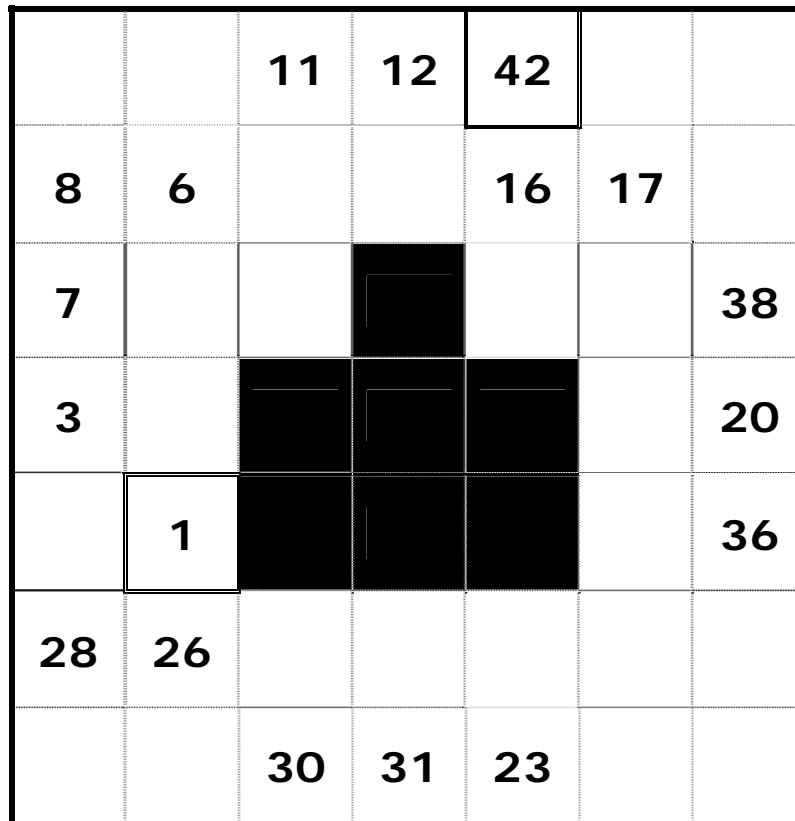
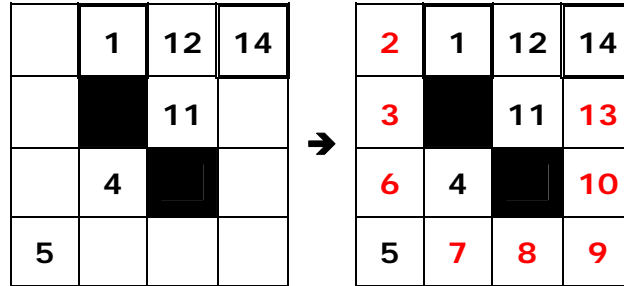
Place the numbers 1 – 5 so that a) no number is repeated in any row or column and b) numbers in cells linked by \blacktriangleleft “less than” or \blacktriangleright “greater than” must obey these signs



Hidato

Complete the grid so that all the numbers from 1 to 42 connect in sequence, horizontally, vertically or diagonally

E.g.



Complete the grid so that all the numbers from 1 to 92 connect in sequence, horizontally, vertically or diagonally

	1						80		
		72	75	77		86			
4				88			67	65	82
	7			40	42			64	
	8	92			43				63
	11					52			
	13			34	48	49	53		59
14		36			32		29		58
	16	17	22			28			
			19	23	25				

Hint: Careful how you start...place the certain numbers first...

Tatami 6x6

Each small parallelogram contains the digits 1, 2 and 3. Each digit appears twice in each row and in each column of the big square. The same digit cannot appear horizontally or vertically next to itself, but it can appear diagonally next to itself. Fill in the figure.

			1	2	
	3				
				1	
	1	3			

Tatami 8x8

Each small parallelogram contains the digits 1, 2, 3 and 4. Each digit appears twice in each row and in each column of the big square. The same digit cannot appear horizontally or vertically next to itself, but it can appear diagonally next to itself. Fill in the figure.

	3						
1		3	2				
				2	4		1
2							3
1							2
2		3	4				
				3	2		1
						3	

Sample Maths 2009

Estimating with graphs

When a vehicle transports a piece of heavy equipment at a speed of v kilometres per hour, the cost of a journey of 100 kilometres is $\pounds \left(\frac{6000}{v} - 20v \right)$.

Complete the following table, which shows the cost in pounds © for values of v from 10 to 30

v	10	13	15	18	20	22	25	27	30
C	800	721		693		713		762	800

Draw a graph to show how the cost varies for speeds between 10kph and 30kph.

Use your graph to estimate

- the cost of the journey at a speed of 12.4kph
- the speeds at which the journey will cost £780
- the speed at which the cost of the journey is least

Graphs

Draw the lines $y = x - 1$ and $x + 2y = 4$ for $x \geq 0$ and use your graphs to find the area of the triangle that lies between $x + 2y < 4$, $x \geq 0$ and $y \geq x - 1$.

Some solutions

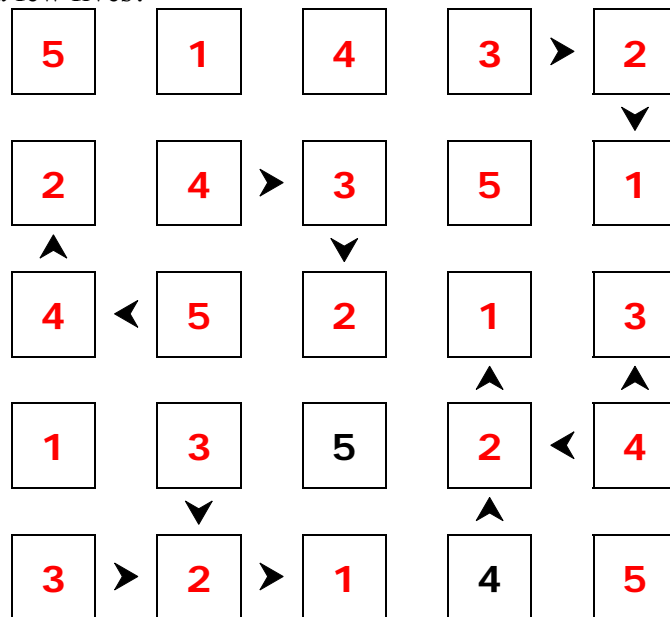
Sudoku variant

Note: One quickly realises that the conditions are such that the same four numbers have to appear in alternate columns.

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

Futoshiki

Begin by placing a few fives?



Hidato

Note: This particular Hidato is quite difficult

	1	74	71	70	78	79	80	84	
2	73	72	75	77	69	86	85	81	83
4	3	90	76	88	87	68	67	65	82
5	7	91	89	40	42	44	66	64	62
6	8	92	39	41	43	45	51	61	63
9	11	12	38	47	46	52	50	54	60
10	13	37	35	34	48	49	53	55	59
14	15	36	21	33	32	31	29	56	58
	16	17	22	20	24	28	30	57	
		18	19	23	25	26	27		

Tatami

3	2	3	1	2	1
1	3	1	2	3	2
2	1	2*	3	1	3
3	2	1	2	3	1
1	3	2	3	1	2
2	1	3	1	2	3

Here, the * value is the trickiest to find, as it is the first value to require the rule that no number appears twice in a row or a column.