

Group Theory Sudoku

Complete each of the following group multiplication tables (also called "Cayley Tables").

Where needed, "id" is used to represent the identity element. Remember, the rules of a group's multiplication table are (1) every element appears exactly once in each row and column, (2) if $xy = \text{id}$, then $yx = \text{id}$, (3) $x(yz) = (xy)z$. Here, rule (3) is not used. Try Section 4.3, problem 8 for a harder one.

·	id	a	b	c
id	id	a	b	c
a	a	id	c	b
b	b	c	id	a
c	c	b	a	id

·	id	a	b	c	d
id	id	a	b	c	d
a	a	d	c	id	b
b	b	c	a	d	id
c	c	id	d	b	a
d	d	b	id	a	c

·	id	2	3	4	5	6	7	8
id	id	2	3	4	5	6	7	8
2	2	id	8	7	6	5	4	3
3	3	6	4	5	id	7	8	2
4	4	7	5	id	3	8	2	6
5	5	8	id	3	4	2	6	7
6	6	3	2	8	7	id	5	4
7	7	4	6	2	8	3	id	5
8	8	5	7	6	2	4	3	id

In the following Cayley table for a group of with 8 elements, it is helpful to first determine which element is behaving like the identity element.

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