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Numerical Brain Teasers

Exercise Your Mind

The Pragmatic Bookshelf

Raleigh, North Carolina

The Pragmatic Programmers

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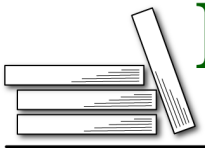

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2				12
		6	2	12
5	1			13
3	5			15
4				17
6	2	3		15

How to Play

Add the digits 1 through 6 to every white column. The grey column on the right holds the sum of each row. Fill empty cells so the sums are correct and every digit from 1 to 6 appears in each white column.

Keep these rules in mind:

- Each digit must appear exactly once in each of the white columns.
- The sum for each row must be correct.
- Numbers may repeat across rows. A single row might contain, for example, a pair of 2s or 5s—or no repeats at all.

For more information about this puzzle and its solution, turn the page. When you're ready for more puzzles like this one, see Having Fun with More Puzzles, on page ?.

About This Puzzle

Summing puzzles offer a quick challenge built on sums and a little logic. Each puzzle is a 2D grid. The grid contains a mix of blanks and numbers, with a special column on its right. You fill in any empty spaces with the missing number that belongs there.

Summing grid puzzles involve math and logic. Start by looking for easy wins. If any row or column is missing only one value, fill it in right away. For rows, sum up the numbers that appear and subtract that from the total. For columns, figure out which digit is missing and fill that in. Keep pushing forward with the new information until you exhaust the easy wins.

2				12
1	**3**	6	2	12
5	1			13
3	5			15
4				17
6	2	3	**4**	15

In this puzzle, there's a single empty square in both the first column and the final row. The first column number must be 1. 1 is the only digit left between 1 and 6 in column one. Subtracting 11, the sum of row six from 15 leaves 4.

Easy wins may or may not exist in any given puzzle. They depend on layout, size, and difficulty. More rows and columns can mean more empty spaces. The number of clues affects how hard a puzzle is.

Solving column one opens up row two, which then has just a single space left. As the sum of 1, 6, and 2 is 9, and the row sum is 12, the remaining digit in that row must be 3.

Next, consider each column's remaining digits. You always know the unused numbers for any column. If you're working on paper, write each column's missing numbers above or into the column's first box. You can erase or cross them out later. On a computer or tablet, use a stylus or drawing program. This often allows you to move those numbers around later; very handy!

2	4 6	1 4 2 5	3 1 6 5	12
1	**3**	6	2	12
5	1			13
3	5			15
4				17
6	2	3	**4**	15

For this example, two choices remain for the second column in the first and fifth rows: 4 and 6. The fifth row's sum is high (17). Try picking the larger digit for this row. This doesn't always work out but it's a sound approach.

Now, look for rows with only two numbers missing. Both rows three and four need a count of 7 to reach their target sums. (And so does row five, if that 6 is right.) Consider how this count might break down. You can make 7 from 1 and 6, 2 and 5, or 3 and 4.

Use this information to lay out your numbers. Make a rough approximation and try to keep your sums in mind. This grows difficult when you have more squares to work on. You'll need to consider more ways that digits sum together.

2	**4**	**5**	**3**	(12)
1	**3**	6	2	12
5	1	**4**	**1**	(13)
3	5	**1**	**6**	15
4	**6**	**2**	**5**	17
6	2	3	**4**	15

With your rough solution laid out, calculate your sums and note any rows that are incorrect. The two circles show rows with wrong sums. In both cases, the sums are off by 2.

2	**4**	**5**	**1**	12
1	**3**	6	2	12
5	1	**4**	**3**	13
3	5	**1**	**6**	15
4	**6**	**2**	**5**	17
6	2	3	**4**	15

You can flip two pairs: 5 and 4 in column three, and 3 and 1 in column four. Of these, only 3 and 1 are different by 2. Swapping the 3 and the 1 completes and solves this puzzle. In the completed puzzle, the digits in every row correspond to the sum on the right and every column contains the digits 1 through 6.

These strategies of easy wins, reduced sums, count breakdowns, and rough approximations should help you through all but the most difficult puzzles.

Background

Summing grids are a popular challenge. Variations include vertical layout with sums on the side, like here, and horizontal, with sums at the bottom. I've seen puzzles with as few as three or four sets of numbers and as many as seven or eight. More sets increases each puzzle's challenge. Solving them is a little messier.

In the preceding sample, I used six digits (1 through 6) per set. The largest puzzles may use nine or ten numbers for each set. The most famous style of summing grids I've found is the Zehnergitter, also called Tenner Grid puzzles and Grid Ten. They're commonly used in math education as well as for recreation.

These puzzles use the digits 0 through 9 laid out in rows with sums at the bottom. Some variations use the first ten numbers rather than single digits. Puzzles that target young solvers often add more clues. This reduces frustration and creates an easier path toward victory.

Here's an example for you to try. I've placed a solution for it into this chapter's answer key. The strategies and approach are the same as any other summing grid puzzle.

Complete the Grid

Use the digits 0–9 to complete each white row. The sums of each column add to the values in the grey row.

2	4		7			6			0
	5	7	0		6	4		2	9
3	5	7				4	2		
7	9	1			6		0	2	5
20	23	20	15	15	26	17	8	14	22