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Puzzle may be first sudoku

Mystery ends after 250 years of stumping numbers nuts "When I was in grade school, all I remember hearing about Franklin was that he was a crazy man flying a kite in the rainstorm," said Loly, referring to the uncon

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By Gabrielle Giroday

A University of Manitoba physicist has solved the mystery of famous puzzles by U.S. inventor Benjamin Franklin that stumped mathematicians for centuries.

The puzzles that Franklin drew idly on slips of paper when he was a lowly government clerk appear like early versions of the Sudoku puzzles that are wildly popular today.

Franklin's puzzles -- they're nicknamed bent magic squares -- were so tricky, however, that scientists may not have been able to compose them without the use of computers.

For 250 years, mathematicians couldn't compute how many puzzles could be made that fit the unique "bent" pattern invented by Franklin. But Peter Loly, a University of Manitoba professor on the verge of retirement this year, has computed the long-sought answer.

He created by computer 1,105,920 magic squares that feature Franklin's unique mathematical design. Presumably, there are 1,105,920 more possible.

"When I was in grade school, all I remember hearing about Franklin was that he was a crazy man flying a kite in the rainstorm," said Loly, referring to the unconventional discovery of electricity by Franklin, whose face now appears on the U.S. \$100 bill.

"But Ben's been good to us...I've found out everything about him since becoming involved with those crazy magic squares."

In magic squares, numbers in a box add up to the same sum, whether they are added up and down (in columns) or side to side (in rows).

To make matters more complicated, the numbers also have to add up to the same sum when added diagonally.

"People think it looks simple, but then it becomes diabolical," said Loly, chuckling. "You can waste a lot of time trying to solve them."

And that's not including Franklin's own crazy twist.

Drawing magic squares of eight numbers by eight numbers, Franklin created his own peculiar pattern.

Numbers in Franklin's "bent magic squares" not only add up vertically, horizontally and diagonally, but they also add up on a "bent" diagonal -- driving scientists mad as they try to count the number of magic squares that fit Franklin's unusual pattern. That is, until Loly found the answer.

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A research paper published yesterday by University of Manitoba researchers in a British scholarly journal, *Proceedings of the Royal Society of London*, states Loly's discovery of the precise number of Franklin's bent squares.

"The bent magic squares strike people as being Franklin's dalliance with something really unorthodox," Loly said yesterday in his ramshackle university office stuffed with more than four decades of notes from his career.

"All the great mathematicians have tried magic squares, and if they've found something, they've published it."

Loly said his discovery of the ultimate number of versions of the bent magical square was thanks to a computer program a high-school level programmer could set up.

The program, created by now-graduated University of Manitoba students Daniel Schindel and Matthew Reardon, tested every possible combination of numbers that could fit into Franklin's bent magical square.

Loly himself said he was shocked when he came up with one final number.

It was just the beginning of a long span of time spent testing the solution.

"We ran through it until all combinations had been tried," he said, adding that the team never expected to be able to come up with the exact number of solvable bent squares, and instead expected just a general estimate. The math theory used in magic squares can be applied in computer coding like online banking, said Loly, and top-secret data between intelligence agents.

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Here's how they work

A magic square is a puzzle where numbers add up to the same sum up and down (in columns), side to side and diagonally.

In Franklin's bent magic squares, another unusual pattern can be noted.

Numbers on a bent diagonal (the groups of coloured squares above) also add up the same sum: 260.

Benjamin Franklin published two examples of the "bent" magic square in his lifetime, and three more examples created were found by researchers years after his death. Yesterday, U of M researchers announced 1,105 Franklin's bent squares mathematically exist.

-- *University of Manitoba*

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