Nxnxn Rubik's Cubes and God's Number

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The Rubik's Cube is the most popular puzzle in the world. Two of its studied aspects are God's Number, the minimum number of turns necessary to solve any state, and the First Law of Cubology, a solvability criterion. We modify previous insufficient statements of the First Law of Cubology Rubik's Cubes made by Bonzio, Loi, and Peruzzi, and prove necessary and sufficient solvability conditions. We compute the order of the Rubik's Cube group and the number of distinct configurations of the nxnxn Rubik's Cube. Finally, we derive an improved lower bound for God's Number using the group theoretical results and a counting argument.

Awards Won:

Third Award of $1,000

American Mathematical Society: Second Award of $1,000