Michigan Math Club

Can a random Rubik's Cube be solved?

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If the pieces of a Rubik's cube are pried apart with a screwdriver and reassembled in random positions, can the puzzle be solved? It turns out that the answer is no: the proportion of random arrangements of the puzzle pieces that can reach the "solved" position via legal moves is 1/12. In the course of explaining this curious fact, we will see how to use elementary ideas from group theory to analyze this famous puzzle as well as its 19th-century analogue, the 15-puzzle. Previous knowledge of group theory will not be assumed.