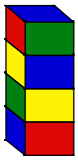
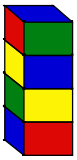


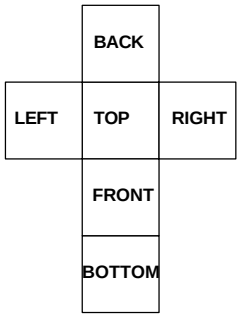
Instant Insanity



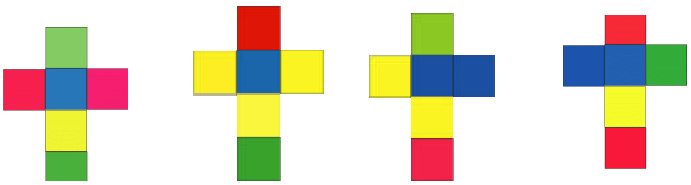
by Francine Webster

The “Great Tantalizer” better known, as Instant Insanity is an age-old puzzle whose vice revolves around four seemly harmless cubes. The dilemma begins with the six faces of each cube painted one of four colors (red, blue, green and yellow). The solution lies in arranging the cubes in a 4x1x1 column so that each color appears exactly once on each 4x1 side. Deceivingly simple at first glance, there are over 41,000 possible solutions, which can provoke insanity in some.

We begin with a representation of the cube colored according to their six faces.

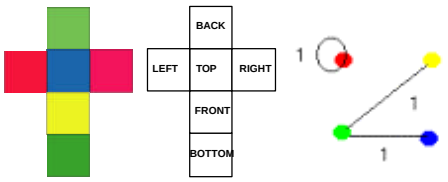


The four cubes, which compromise our puzzle, are colored below.



Cube 1 **Cube 2** **Cube 3** **Cube 4**

To solve this puzzle we create a graph to represent each cube. Each graph consists of four vertices of colors red, yellow, green and blue to represent the four possible colors for the faces of the cube. We then draw an edge from each colored vertex connecting its opposite faces. That is for each cube the top is matched with the bottom, the left with the right and the front with the back.

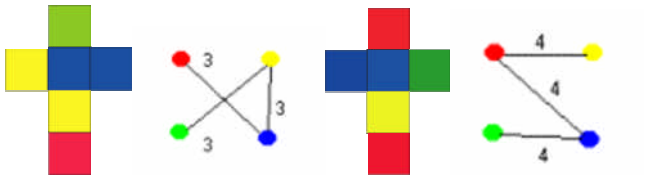


Since the left and right faces of cube 1 are both red we draw an edge connecting the red vertex to itself. Next we look at the top and bottom of the cube, colored blue and green, and draw another edge from blue to green. Finally, the front and back of the cube are colored yellow and green so the last edge connects the yellow and green vertices.

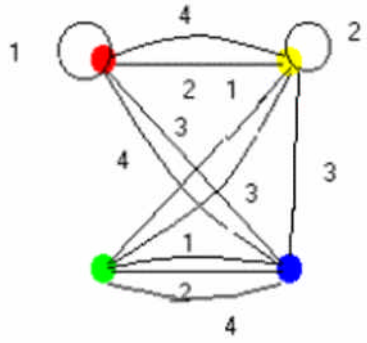
Applying the same rules to cube 2 we obtain a similar representation.

The left and right faces are both yellow so there is one edge drawn from yellow to itself. Yellow is on the top face of the cube while red is on the bottom, and an edge is drawn from red to yellow. Finally, blue and green represent the top and bottom faces respectively and we draw an edge from blue to green.

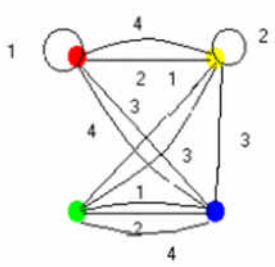
Cubes 3 and 4 are represented similarly.



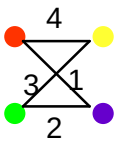
To continue with our representation we place all four graphs onto of each other for a combined graph of the puzzle.



This graph represents all four cubes in our puzzle with numbers indicating the cube that the edge represents. To test for and determine a solution to this puzzle we must find subgraphs within our larger graph, which meet to three stipulations. Foremost the subgraph must contain all four colored vertices. Secondly, an edge from each cube must be represented in the subgraph. Lastly each vertex must have an order of 2. We return again to our original graph to check for possible subgraphs.

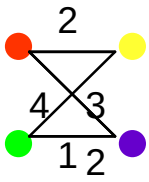


From this we can find a subgraph adhering to the three stipulations.

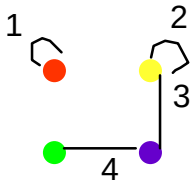


We take edge 1 from red to blue, edge 2 from green to blue, edge 3 yellow to green and edge 4 from red to yellow. All four colors and an edge from each cube appear in our representation. All vertices have order two and thus all three requirements are met. This graph gives us half of the solution to our puzzle.

We repeat our process to see if a second subgraph exisits. From the remaining subgraph a second subgraph does exist again meeting our requirements.



What remains of our original graph is below and had no bearing on the puzzle. This subgraph represents the faces if the cube which point inward and are not seen in the cubic arrangement.



The subgraphs not only tell us that a solution exisits to this problem but they also indicate how to arrange the cubes to achieve a solution. The first subgraph instructs us how to arrange the first set of opposing faces of the 4x1x1 column. The second subgraph instructs how to arrange the second column of opposing faces to complete the puzzle.

Representing this puzzle by graphs allows us to eaily check and solve Instant Insanity. Although discovering the solution through trial and error is an exciting method, a graphical representation sheds mathematically insight on this age old puzzle.