

Megaminx

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The **Megaminx** is a dodecahedron-shaped puzzle similar to the Rubik's Cube. It has a total of 50 movable pieces to rearrange, compared to the 20 of the Rubik's cube.

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History

The Megaminx, or Magic Dodecahedron, was invented by several people simultaneously and produced by several different manufacturers with slightly different designs. Uwe Mèffert eventually bought the rights to some of the patents and continues to sell it in his puzzle shop under the Megaminx moniker.^[1] It is also known by the name Hungarian Supernova, invented by Dr. Cristoph Bandelow.^[2] His version came out first, shortly followed by Meffert's Megaminx. The proportions of the two puzzles are slightly different.

Description

The Megaminx is made in the shape of a dodecahedron, and has 12 face center pieces, 20 corner pieces, and 30 edge pieces. The face centers each have a single color, which identifies the color of that face in the solved state. The edge pieces have two colors, and the corner pieces have three colors. Each face contains a center piece, 5 corner pieces and 5 edge pieces. The corner and edge pieces are shared with adjacent faces. The face centers can only rotate in place, but the other pieces can be permuted by twisting the face layer around the face center.

There are two main versions of the Megaminx: the 6-color version in which opposite faces have the same color, and the 12-color version in which all faces have a different color.

The purpose of the puzzle is to scramble the colors, and then restore it to its original state of having one color



The 6-color Megaminx in solved state



The 12-color Megaminx, in a star-pattern arrangement

per face.

Solutions

Despite its daunting appearance and greater number of possible positions, the Megaminx is not much more difficult than the standard 3x3x3 Rubik's cube. This is because it is not a deep-cut puzzle; it only has pentagonal face layers which are similar in structure to the square face layers of the cube. There are no pieces that do not have a counterpart on the cube. Many of the techniques employed in the solution of the Rubik's cube can also be adapted for the Megaminx, except those that involve turning the center slice of the cube, since the Megaminx has no equivalent slice.

The 6-color Megaminx comes with an additional challenge which is not immediately obvious. Its edge pieces come in visually-identical pairs, because of the duplicated colors of opposite faces. However, although visually indistinguishable, they are nevertheless mathematically bound in a parity relationship. In any legal position (reachable from the solved state without disassembling the puzzle), there is always an even number of swapped pairs of edges. However, since swaps may be between visually indistinct edges, one may find that having solved almost the entire puzzle, one is left with a pair of swapped (distinct) edges that seems to defy all attempts to exchange them. The solution is to swap a single pair of 'identical' edges to reverse the parity, and then restore the rest of the puzzle.

This property is absent in the 12-color Megaminx, because all its edges are visually distinct, and it would be immediately obvious that there is another pair of swapped edges besides the pair one is working with.

Number of combinations

Both versions of the puzzle have 20 corners and 30 edges. In both cases, only even permutations are possible, regardless of the position of the other set of pieces. Thus, while it is possible to have two corners and two edges swapped on a Rubik's Cube, this is impossible on the Megaminx. There are $20!/2$ ways to arrange the corners and 3^{19} ways to orient them, since the orientation of the last corner depends on that of the preceding ones. There are $30!/2$ ways to arrange the edges and 2^{29} ways to flip them.

$$\frac{20! \times 3^{19} \times 30! \times 2^{29}}{4} \approx 1.01 \times 10^{68}$$

The full number is 100 669 616 553 523 347 122 516 032 313 645 505 168 688 116 411 019 768 627 200 000 000 000 (roughly 101 unvigintillion on the short scale or 101 undecillion on the long scale).

The corners are distinguishable on a six-color Megaminx because two corners with the same three colors will be mirror images of each other. There are 15 pairs of identical edges. It would not be possible to swap all 15 pairs, since this would be an odd permutation of the edges, so a reducing factor of 2^{14} is applied to the preceding figure.

$$\frac{20! \times 3^{19} \times 30! \times 2^{15}}{4} \approx 6.14 \times 10^{63}$$

The full number is 6 144 385 775 971 883 979 645 753 925 393 402 415 081 061 792 664 780 800 000 000 000 (roughly 6.1 vigintillion on the short scale or 6.1 decilliard on the long scale).

Records

The current world record for a single solve of the Megaminx stands at 57.94 seconds, set by Bálint Bodor at the *World Rubik's Cube Championship 2009*. Erik Akkersdijk currently holds the record for an average over 3 attempts at 1 minute and 4.34 seconds, set at the Danish Open 2009.^[3]

Variations

More complex variations of the Megaminx have been made, including the Gigaminx, Teraminx and Petaminx.^{[4][5]} These are 5-, 7-, and 9-layer versions of the Megaminx. A variant with only the corners (equivalent to the Impossiball) has also been made, called the Kilominx. As of August 2009, only Gigaminx has entered mass production.

Another variant is the Holey Megaminx, which has no center pieces, like the Void Cube. It is being produced by Mèffert as of July 2009.

See also

- Impossiball
- Alexander's Star
- Pyraminx Crystal
- Rubik's Cube
- Pyraminx
- Skewb Diamond
- Dogic
- Combination puzzles
- Magic 120-cell

References

- ¹ ^ Jaap's puzzle page, Megaminx (<http://www.geocities.com/jaapsch/puzzles/megaminx.htm>)
- ² ^ twistypuzzles.com, Hungarian Supernova (<http://www.twistypuzzles.com/cgi-bin/puzzle.cgi?pid=651>)
- ³ ^ World Cube Association Official Results - Megaminx (<http://www.worldcubeassociation.org/results/e.php?i=minx>)
- ⁴ ^ Gigaminx and Teraminx (<http://www.chaosottolo.it/se-pensate-che-il-cubo-di-rubik-sia-difficile-non-avete-ancora-visto-megaminx-gigaminx-teraminx-e-petaminx.html>) (**Italian**)
- ⁵ ^ Video of Petaminx (<http://www.youtube.com/watch?v=ZLyFqm4D9tI>)

External links

- Meffert's puzzle shop (<http://www.mefferts.com/>)
- Jaap's Megaminx page (<http://www.jaapsch.net/puzzles/megaminx.htm>) — contains solutions and other information

Retrieved from "<http://en.wikipedia.org/wiki/Megaminx>"



Cube4U's Gigaminx, with black body



Holey Megaminx, with black body

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