Pyraminx

*Patented by Meffert 1981 and Copyright by Tomy 1981; metalized version, with click-stop action, purchased from Mefferts 2006.*
(plastic with metal surfaces, back is green and bottom is gold, 4 inches; see also Meffert's Jing's Version of this puzzle)

**Notation:** There are 4 tips, 4 corners that the tips are attached to, and 6 edges. Holding the puzzle with one of the faces towards you, clockwise and counterclockwise rotations of the top, lower left, and lower right corners are denoted by T+, T-, L+, L-, R+, and R-.

**A Solution:**

1. Orient the tips (and to stay organized, keep them correct after each step).
2. Place the bottom edges (easy when you don't care about the corners).
3. Rotate the top so that at least one of the three remaining edges is correct, and position the puzzle so that this correct edge is in back.
4. The two front edges will now be in position; if they are flipped, do:

   \[
   \text{R- T- L- T+ L+ R+ T+}
   \]

5. Correct two corners at a time with simple 5-sequences that rotate the two front corners, where here \( x \) and \( y \) are each either + or −, and 5 means repeat five times:

   \[
   (L_x R_y)^5
   \]

Choose + and − to be opposite the direction you want to go. For example, do \( L^- \ R^+ \) five times to rotate the front left clockwise (60 degrees) and the front right counter-clockwise.

*Note:* If only one corner is incorrect, make it and an adjacent corner *incorrect* (by rotating in the wrong direction), and then use a second 5-sequence to correct the two. Similarly, three corners can be corrected by correcting one and leaving a second incorrect, and then correcting the remaining two.
Number of Moves Used
If Step 1 is skipped, then after completing Step 2, Step 3 is 1 move, Step 4 is 7 moves, Step 5 is 10 moves to correct two corners or 20 moves to correct 1, 3, or 4 corners, and finally correcting the tips is 3 moves, for a total of 31 moves in addition to Step 2. This is far more than used by an optimal algorithm (Jaap's Page describes a computer analysis that shows that a solution is always possible in at most 11 moves). However, it is a simple method that just boils down to memorizing the sequence of 7 moves for Step 4. Also, if one is careful to choose the easiest face for the bottom and minimize the number of moves for Step 2, the solution compares well with the total of 38 moves mentioned in the directions to the original Tomy version:

Other Versions of Pyraminx

(left plastic 4", middle plastic 4", right plastic with chain 1.75"

Further reading:
Mefferts Page, from: http://www.mefferts.com/puzzles/pyramsol.html
McFarren's Page, from: http://www.geocities.com/abcmcfarren/math/PyrMin.htm
Dry Erase Board Page, from: http://www.thedryeraseboard.com/mechpuz/pyraminx/solution
Nerd Paradise, from: http://www.nerdparadise.com/puzzles/pyraminx

Copyright J. A. Storer