

HOW TO SOLVE A RUBIX'S CUBE

[Method By Matty Hiroto Inaba | Ranked 6th in WCA]

TERMS (To Know)

S. No.	Type of Piece	Description	Details
1.	Center Pieces	Have only One Colored Side, and remain Fixed Relatively to other Center Pieces and Faces.	Total (3×3): 06 Standard: W Opp. To Y, B Opp. To G, R Opp. To O Helps identify the color of any face of the cube.
2.	Edge Pieces	Have Only Two-Colored Sides, placed in the middle of two faces.	Total (3×3): 12 The Middle Piece of a corner
3.	Corner Pieces	Have 3 colored Faces, maximum-colored faces possible in a 3×3 Cube.	Total (3×3): 08
4.	Face	Can mean the Face of an independent Piece or the Entire Cube as a whole. In a 3×3 Cube it includes all the 9 pieces visible on a side.	When taking about rotation it means rotating the face of the cube (for a piece we shall refer this process as Twisting a piece → illegal). While taking about color we generally mean the color of a particular piece, color of a face of the cube is referred to by the color of the center piece.
5.	Spot	A Spot refers to the spatial position where a piece was recorded at, at a particular time with the same orientation of its own colors as well.	Moving the cube around while remembering a spot is not allowed, only rotations are allowed to be made.
6.	Layer	Refers to the Faces of the cube stacked on top of each other.	Standard: White Face is the first or bottom most-layer, the Middle one is the second layer, and the yellow one forms the third or top-most layer.

ALGORITHMS (To Remember)

1. **Righty Shift Algorithm:** Right Face \uparrow \gg Top Face \leftarrow \gg Right Face \downarrow \gg Top Face \rightarrow
2. **Lefty Shift Algorithm:** Left Face \uparrow \gg Top Face \rightarrow \gg Left Face \downarrow \gg Top Face \leftarrow
3. **Sune Algorithm:** take note of a pair on the bottom right from the front face, do the first three steps of a right shift and instead of the last one now the top face in the opposite way, now move its slot in the top layer (Right Face \uparrow), now finally reinsert the pair back into its slot.
4. **Niklas Algorithm:** Similarly to a “Sune”, but have to remember not one but two pairs bottom left and right. Bring the right pair up and move it back, bring the left pair up, now put it in the back, now again insert the right pair back in its spot and then insert the left pair back in its spot.

STEPS (To Solve)

THE FIRST LAYER

1. Form a “Daisy” around the Yellow Center Piece, with White edge pieces.

NOTE 01: This involves 2 Types of Steps,

either simply moving an edge piece into position by rotating left/right faces, or

in case of an inverted piece move the edge piece to the side, and rotate the top (yellow centered face) with the insertion position above it.

2. Now Turn the White edge pieces 180° to form a White Cross around the White Center Piece, while matching the other colors of the edge pieces.

NOTE 02: This Involves matching each white edge of the daisy with its center face side and then rotating 180° to match the white Centered Face.

3. Hold the White cross facing down, with yellow center face facing you.
4. Now to move the White corner pieces into their positions, find (On the Yellow Face) and move them in between the side where they should go based on the center piece colors, doesn't matter if the colors aren't matching the center face colors yet.
5. The White Corner Piece should now be exactly above the place it should go finally.
6. Perform a Righty Shift or Lefty Shift algorithm based on the Right/Left Side where the corner swap is required.

NOTE 03: Maybe multiple shifts are required to be performed, but at the best 5 as performing the 6th same type of Shift will result in the cube reaching the initial position again. After each shift check if the piece is inserted correctly, if not continue till it is inserted correctly.

NOTE 04: To reduce the no of moves use left shift algo if the white faces the Left on the corner piece, while holding the corner to your left, and righty shift in case the white face is facing right, if white faces the top you can use any shift algorithm to move it into its correct place. As it will take 3 shifts anyways.

NOTE 05: In case a piece is in its correct position and placed on the white centered face but not facing the correct center pieces move it out of the position using the shift algo and put it back into the correct place using the same.

THE SECOND LAYER

7. To move the edges of the second layer into position, hold the white side facing down, and look for an edge piece not having the yellow color, move the top face to match the edge piece and one of the center pieces colors, and move the top piece again 90 Degrees away from the side it has to be inserted into.
8. Perform the lefty/righty algorithm on the opposite side/where the edge piece has to be inserted into.
9. Now, a corner piece is moved out of its place and using it put it back in its place based on the Righty/Lefty shift algo based on the NOTE 04 above. This inserts not only the corner piece back into its place but also the edge piece we wanted to.

NOTE 06: In case a non-yellow edge is not found at the top, find the non-yellow edge and insert a yellow edge in that position using the same technique as above, now continue solving as usual.

THE THIRD LAYER

10. Now make a yellow cross with the yellow center piece.
 - a. In case there is a cross already, skip this step.
 - b. In case you have a line rotate the top piece so that the line is parallel to you, turn the front side clockwise and then do a righty shift algo, return the front counter-clockwise again.
 - c. For a Hook (2 consecutive sides of the cross matching), rotate the top so that the hook is facing the back left, rotate the front clockwise, do 2 righty algos, return the front counter-clockwise.
 - d. For a Dot (No matching pieces of the cross), do the same steps for a line which creates a hook and then follow the hook steps.
11. Now to Match the yellow edges, start by matching as many as possible with their correct edge colors by rotating the top itself,

- a. If all 4 edges match, skip the step
 - b. If there are 2 edges matching across each other, do a Sune algorithm with the yellow on top, now two edges next to each other can be aligned, follow the c part.
 - c. For two edges next to each other aligned, hold them facing back and right, do another Sune.
12. To match the final corners,
- a. If you have no corner piece at its correct spot (even with mismatched colors) do a Niklas at any angle, align the edges of yellow again, giving one corner in the correct spot.
 - b. If you have one corner in the correct spot, you hold it in the left front, and do one Niklas, align the edge of yellow again. Now if you have either all the corners in the correct spot or do another Niklas.
13. Now to match the corner colors, put the white face up, now use the righty algo to solve one corner, now rotate the bottom layer so that in the same pos, another unsolved corner is there, and solve the same. Do this for all unsolved corner pieces on the bottom layer.
14. Re-align (match the rows/columns/pieces of a face with their respective colors) the bottom layer to complete the cube.

NOTE 07: Twisting the last corner pieces to match the color is not morally right to do ... LOL

REFERECES (To Watch)

To get a better and clear visual understanding of the steps visit the below linked video, from where the short notes are made:

<https://www.youtube.com/watch?v=PW2J8IblczM>

[made by [#CubeHead](#) feat. Matty]

The Video has very simple explanations and easy to follow for a beginner such as myself, hats off to them for making such a video. Thanks Guys.