

Rubick's Cube Solution

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Welcome to my Rubik's Cube solution! This documentation was created Fall 2008 from various sources along with my own algorithms and methods. Some solutions can get very involved and complicated, so I tried to keep this as simple as possible. Some editing still needs to be done. All photographs were taken as I was writing this guide!

Notation:

F = front face
B = back face
R = right face
L = left face
U = up face
D = down face

A letter by itself means turn that face 90 degrees clockwise (e.g. F).

A letter followed by an apostrophe (say F prime) means turn that face 90 degrees anti-clockwise (e.g. F').

First Layer:

The first layer is solved in two stages:

1. Form a cross
2. Insert the 4 first layer corners (each corner is inserted individually)

1. You want to form a cross on the top of the cube such that the top two colors of the middle column match:



You may run into a situation like this:



In which case you do the following:

F' U L' U'

Now the piece will be in its correct place.

Making the cross may seem difficult at first, but play around and it will quickly become more of a natural thing.

2. Now you want to get the corners in place. Line the corner up in the correct position:



You can see that the bottom corner has a red and green (bottom is white) and the top row of the center columns are red and green (and the top is white). Once lined up, use the following algorithm:
 $R' D' R D$
 You may have to do this many times! Keep going until the corner is in the right spot!
 Repeat this for all four corners.

The first layer should now be complete and you should have something that looks like this:



Second Layer:

Now you want to start filling in the second row, which is a little easier. You want to begin by lining up the middle column of the bottom row with the correct color. You'll want to move that block with up and to the left, or up and to the right:



The following algorithms will do the trick:

To move LEFT: $D L D' L' D' F' D F$

To move RIGHT: $D' R' D R D F D' F'$

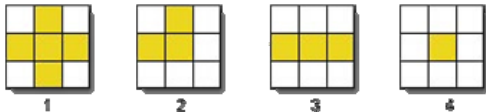
Make sure you watch the color on the bottom! The color needs to match up with the color on either the right side or left side (this is how you decide which algorithm to use!)
 Do this for all four edges and you should have a cube that looks something like this:



The Final Layer:

You are almost there; only a few more steps to go! The first thing you're going to do is flip the cube upside down (in following the photos, white will now be on bottom and yellow on top).

There are four patterns that can occur on the bottom that we're interested in:



(Keep in mind that the face shown is the U!)

State 1: Everything is exactly where you want it to be! Move on to aligning the corners!

State 2: You want to move some things around! Use the following algorithm: $F U R U' R' F'$

State 3: Use the following algorithm $F R U R' U' F'$

State 4: Use either the State 2 or State 3 algorithm. This will bring you to a new state and you can repeat.

Now that you have the cross, you'll need to line up the colors in the middle column. At this point you will always have two colors that will line up. Twist your U face around to find these matches. Once found, there are two possibilities:

- 1: The two matches are opposite of each other (see next step).
- 2: The two matches are next to each other (skip next step).

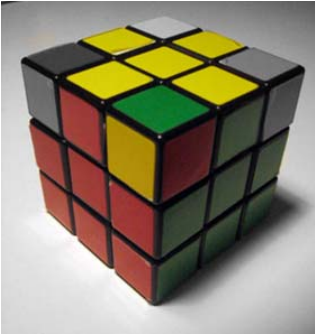
1: If they are opposite, you want to rotate the cube such that those sides are your front face and back face, then perform the following algorithm: $R U R' U R U R'$
Now you should have the two faces next to each other.

2: With the two faces next to each other, your cube should look something like this:



Now, you want to rotate the cube such that those sides are your back face and right face, then perform the following algorithm: $R U R' U R U R' U$

Now you'll need to arrange the four corners so that they are in their correct spaces (Not necessarily flipped the right way). You can tell a corner is in its correct position when all of the colors are "connected" to that corner. In the photo, the corner contains Red, Green and Yellow:



If you have a corner that is in the correct position, put that corner in the lower right hand corner of the cube (so that it is the corner for your R face, F face and U face). If there are no corners in the correct position, then just hold the cube arbitrarily.

Perform the following algorithm: $U R U' L' U R' U' L$

You may need to perform this twice, but never more than twice.

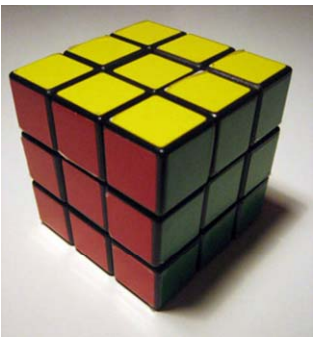
Now you're ready to solve it.

Pick any corner that isn't flipped properly and put that corner in the lower right hand corner of the cube (so that it is the corner for your R face, F face and U face) and perform the following algorithm until that corner is flipped correctly:

$R' D' R D$

Once it is flipped properly, rotate ONLY the U face so that there is another corner in the lower right hand corner of the cube that needs to be flipped. Repeat.

When you're last corner comes into place, your cube will be solved! Congratulations, you just solved Rubik's cube!



If there is any confusion or typos please email me! This is a rough draft!