

The Solving Guide

Cubes 4 Kids
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A Few Words

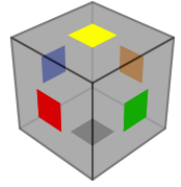
First and foremost, we want to start off by saying **thank you**, to both the donors and the kids. We want to thank each and every one of the kids, whose strength and hope has driven us to believe in ourselves. Cubes 4 Kids is working hard to make our vision a reality: one child, and one cube, at a time. Additionally, none of this would have been possible without the help of our donors and their donations, so once again, thank you.

The Rubik's Cube is the world's best selling puzzle. For over 25 years, it has stumped even the most brilliant of minds. If followed properly, this guide will teach you everything you need to know in order to unscramble the 6 sides of the Rubik's Cube from one of its over 43 quintillion different states. Use this tool wisely.

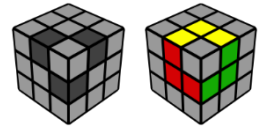
Notation

Colors – There are 6 sides to the Rubik's cube and each side has a different color. In the solved cube the colors are always in the same position, red will be opposite orange, green opposite blue and yellow opposite white. You can see the arrangement in the picture to the right

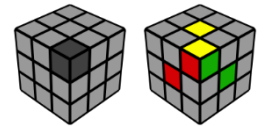
Centers – They're in the center of each side and never move, if you turn a side, the center just rotates in place (try this for yourself). We will refer to sides of the Rubik's Cube, like the 'green side'. This is the side that has the green center piece (the same goes for the other 5 sides with different colored centers).



Edge Cubie - An edge cubie has 2 stickers and is between 2 corners. There are 4 edges on each side and 12 edges throughout the entire cube.



Corner Cubie - Each corner cubie has 3 stickers. There are 4 corners on each side and 8 throughout the entire cube



Turning the Cube

There are 6 sides of the cube. We will refer to each side with it's own letter to make writing out sequences of moves easier. These are the abbreviations:

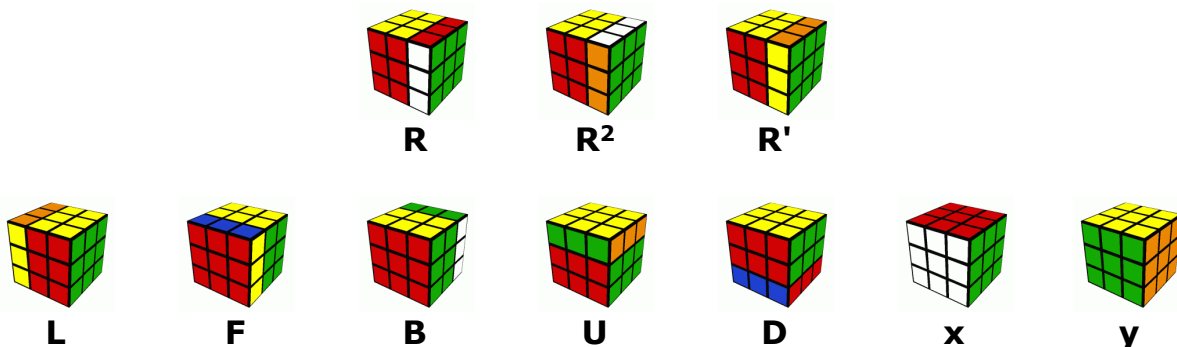
F: front side
B: back side

R: right side
L: left side

U: up (or top) side
D: down (or bottom) side



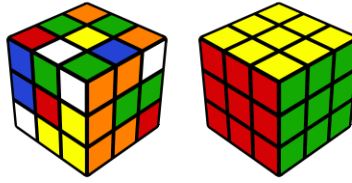
Simply writing one of these letters means turning that side 90° clockwise (or a quarter-turn). Writing one of these letters and having an apostrophe (') follow it (example: F') means a quarter-turn (90°) counterclockwise of that side. A "2" following a one of the letters means a 180° turn of that side (you might notice that it doesn't matter if you go 180° clockwise or 180° counterclockwise as they are the same). Examples of these turns are seen in the pictures. If you were to hold the cube with the red side on front and yellow on top, the picture shows the results of doing that turn. Something you might want to make note of is how an R and an L don't really turn the same way. This is the same for U and D as well as F and B. Finally, a letter followed by another letter indicates that you do the first turn, and followed by the second. For example, writing RU' would mean first do an R, than a U'.



How To Hold The Cube

The cube should be held with both of your thumbs on the front side (the side facing you) and your remaining fingers on the back side.

The Game Plan



Let's discuss how we plan to solve the Rubik's Cube. We will solve the cube layer-by-layer. There are 3 layers, which we will commonly refer to as the bottom layer, second layer, and the top layer..

- We will first solve the "cross" on the bottom layer, then the rest of the bottom layer ($\frac{1}{3}$ done).
- Next we will place the edges into the the second layer, solving the second layer ($\frac{2}{3}$ done).
- Following, we will orient the pieces on the top layer, edges first and then the corners.
- Finally, we will permute the top layer- this time corners first and edges last. This will solve the 3rd layer ($\frac{3}{3}$ done), and also the entire cube.



1st Layer Complete



1st and 2nd Layer Complete



All 3 Layers Complete

In this guide, the pictures will portray a cube that is being solved with the white face on the bottom. For simplicity's sake, it would be best for you to solve your own cube with the white face on bottom too.

Important Notes

Before we jump into the 1st step, we have a few general tips:

- **Be patient, don't rush** - The journey to solving the Rubik's Cube is not a 100-meter dash. Rather, it's like training for a marathon, you have to slowly work your way to be able to run 26 miles, or in our case, the cube.
- **Get your cube** - This might sound obvious, but really make sure you go through these steps over and over on a cube so you can follow along and see what is going on for yourself.

Have fun - Solving the cube is supposed to be fun. If you're getting stuck or aren't enjoying it, put it down and pick it up later. It's a lot easier to learn when you're having fun.

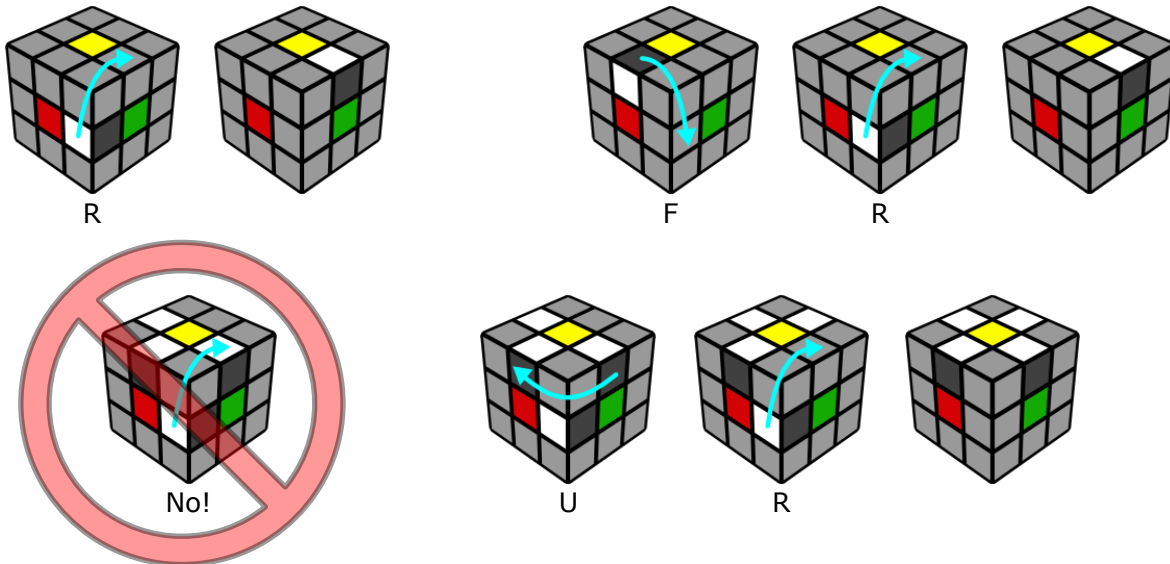
Let's Begin

Step #1 – Solving the cross

This step is more-or-less two "mini-steps".

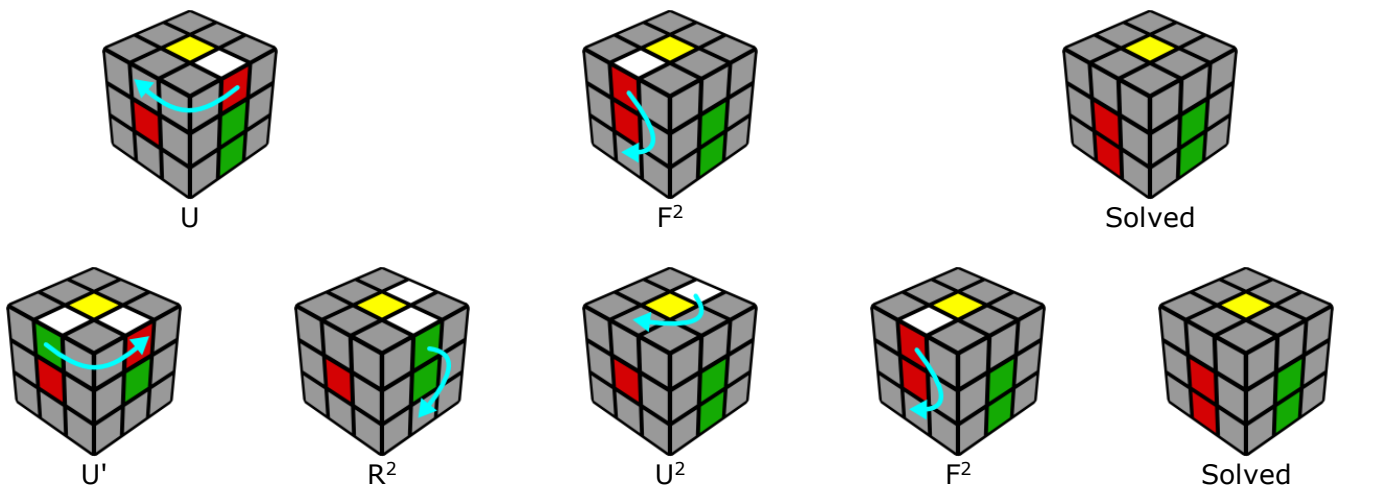
Part A

The goal of Part A is to get all of the white edges onto the yellow side (the side on top- opposite the white side). Look at the pictures below for some examples. Know that this may be tricky at first, so just take your time. I assure you after awhile, it'll be a piece of cake. One thing you need to make sure of is while you are placing one of the white edges: make sure that you don't mess up any of the other white edges already on placed on the yellow side (this is shown on the last 4 pictures in this section).



Part B

Next, turn the yellow side (do a U, U', or U2) to match the second sticker on one of the white edges to its side. Once matched up, do an F2 to move the edge down to its proper position on the right side. Do this for each of the 4 edges.

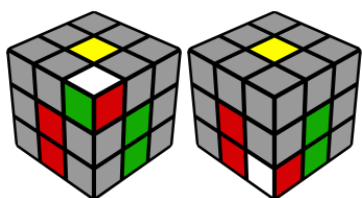


At the end of this step, your cube should look like this →

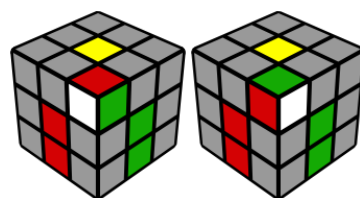


Step #2 - Solve the Corner Cubies on the 1st Layer

The Possibilities



We don't want the corners to look like this



Try to get the corner pieces to look like this

The Basic Approach

In this step, we will solve the white corner cubies. To do this, you start by locating a corner cubie with a white sticker.

- The first part is to get the white sticker of the cube around the "U" layer (like the two cases on the right).
- Now look at the other 2 stickers on the corner cubie. In the picture, the corner also has a red and green sticker. Move the U layer so that the corner is between the sides of the 2 other colors (for our example between the red and green sides). Now you have one of the 2 cases pictured below.
- Follow the steps below the picture on how to put the corner in its correct position. You are basically "hiding" the corner, bringing up the parallel face, "unhiding" the corner, and bringing the parallel face back down.
- If there are no corner cubies with a white sticker on the "U" layer, we're going to have to get them there. A few examples of these are shown in the pictures.
- These will require bringing a cross piece out from its solved position. Remember- what comes up, must go down. During this step, make sure that whenever you bring up a cross piece, it goes back down.

The idea is to replace the dark grey cubie with the red/green/white corner. You do this by bringing the dark grey piece up to the top layer and replacing that piece with the red/green/white piece.

The Moves



U



R



U'



R'



End Result



U'



F'



U



F



End Result



At the end of this step, your cube should look like this →



Step #3 - Solve the Edge Cubies on the second layer

Okay, if you're here, congrats. You've completed 1 of the 3 layers of the cube. The purpose of Step #3 is to solve the edges that belong in the second layer. A quick analysis shows that the edges are the only thing left to solve in the second layer. Therefore, in completing Step #3, you will essentially complete the second layer.

- To find the edges that belong in the second layer, survey the top yellow layer for any edges that don't have a yellow sticker.
- Once you have found one of these edges (in our picture it's the green-red edge), refer to the algorithm.
 - You look at the sticker of this edge on the layer around the yellow side (in the 1st picture it is red, and in the 2nd it is green).
 - You want to match that color up with its correct side (the red with the red side and the green with the green side, which are both done).
 - Then you want to look at the edge sticker that is on the yellow side. Whatever color the sticker is, you want to move the top layer to "hide" the edge away from the side the side of that sticker (for example do a U' for the 1st to "hide" the edge from the red side).
 - Now bring the parallel side (the side you "hid" away from) up, "unhide" the edge, and bring the parallel face back down.
 - Now you will have a white corner piece that needs to be solved. Solve it like you would in Step #2.
- If there aren't any of the edge cubies without a yellow sticker on the yellow side, or the edge is in it's correct place, but flipped (refer to pic), you have to pretend that one of the edges on the yellow side belongs in that place. This will take out the edge that was in the spot, and it will be on the yellow side. Solve this edge as you would normally.

The Three Cases



A



B



C

The Moves



U'



F'



U



F



U



R



U'



R'

Same as Step #2



U



R



U'



R'



U'



F'



U



F

Same as Step #2

At the end of this step, your cube should look like this →

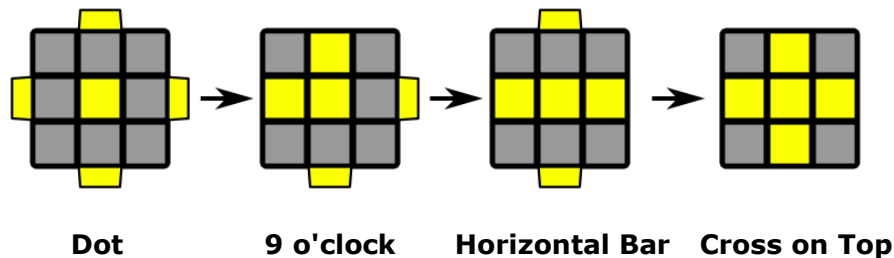


Slight Disclaimer – From this point on, what you're doing is simply memorizing multiple different sequences of turns, and learning when to use them. Take your time when doing them, and don't be afraid to take breaks now and then. We definitely do not expect you to memorize every algorithm we have here in a single sitting. As we said earlier, this is not a sprint - we are training for a long-distance run!

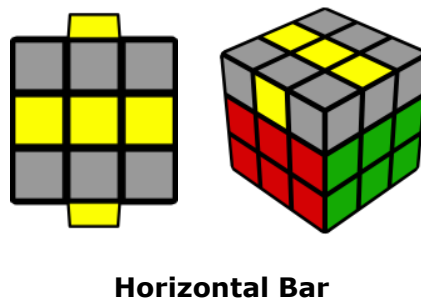
Step #4 - Orient the Edge Cubies

Well done, your second layer should be solved and now you're 2/3 of the way done. Keep it up. The purpose of this step is to orient the yellow edges on the top layer. This will make another cross on our cube. However, this time the cross is on the yellow layer instead of the white one. Orienting the edges means that the yellow edges will have their yellow stickers on the yellow face, but their exact location on the face isn't important - at least, not for now. The goal in this step is to do the algorithm as shown in the pictures. Continue to do the algorithm until the top looks like a horizontal bar, and then it one more time. All 4 of the yellow edges should on the yellow side, matching the final picture in this step. Once you have this, move onto Step #5.

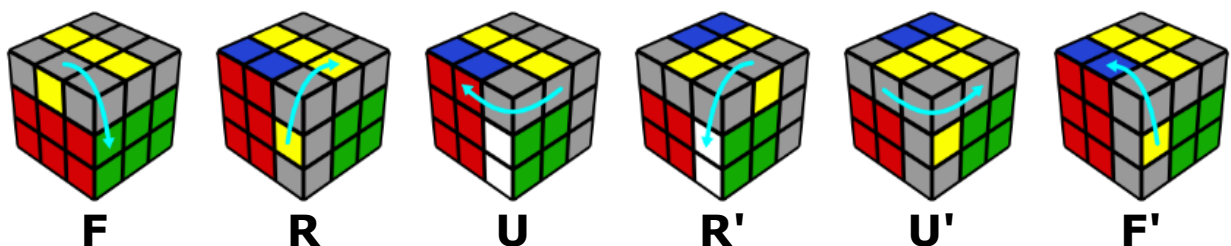
The 4 Possibilities



The Basic Case



The Moves



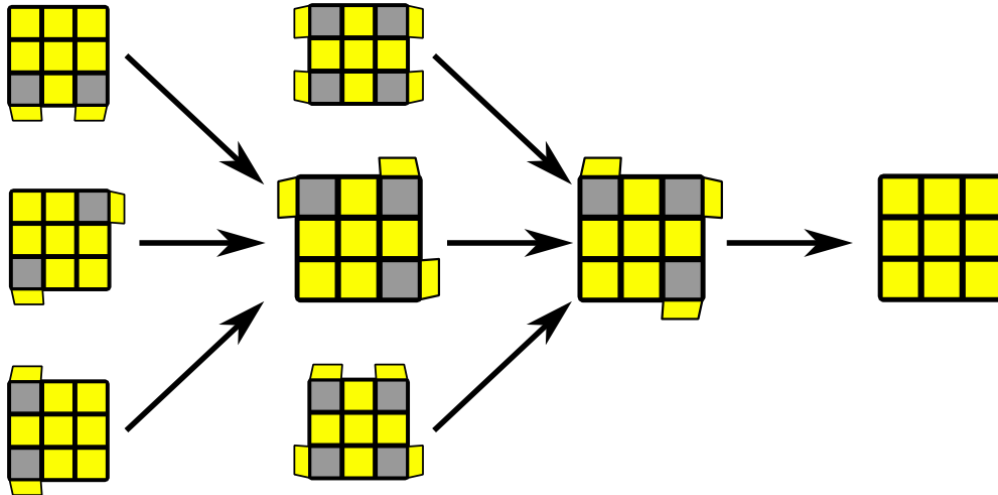
At the end of this step, your cube should look like this →



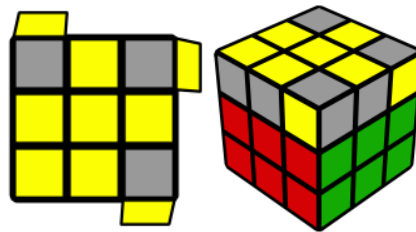
Step #5 - Orient the Corner Cubies

Let's get right into Step #5. Don't get alarmed at all of the pictures below. There's only 1 simple algorithm for this step. Our goal is to do the algorithm until we get the 'basic case' shown in the picture below. Then do the algorithm one more time and you should be ready for the 6th Step. The pictures are there to help as they show how to position the U layer when doing the algorithm in specific cases. Also note that there is a case very similar to the basic case. Match your cube up with its corresponding case and do the algorithm from the way the picture here has it. When completed, the yellow side should be completely yellow. Still, don't think you are finished yet. We still need to rearrange some of these cubies. Head over to Step #6.

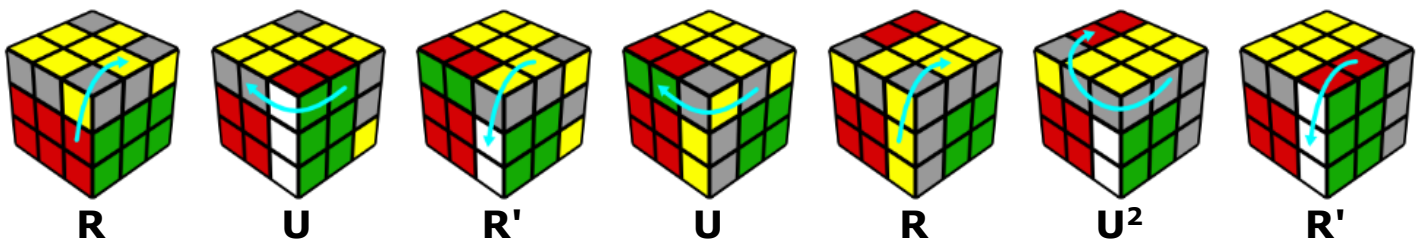
The Possibilities/The Approach



The Basic Case



The Moves



At the end of this step, your cube should look like this →



Step #6 - Permute Corner Cubies

You're getting closer. Start off Step #6 by figuring out which of the 3 pictures matches up with what you have. If you have the 1st case, do the algorithm like shown. If you have the 2nd, make sure that you do the algorithm with the "headlights" in the back. As shown in the picture, "headlights" refers to when two corners of the same color are around the U layer. Do the algorithm and you should be ready to go on to Step #7.

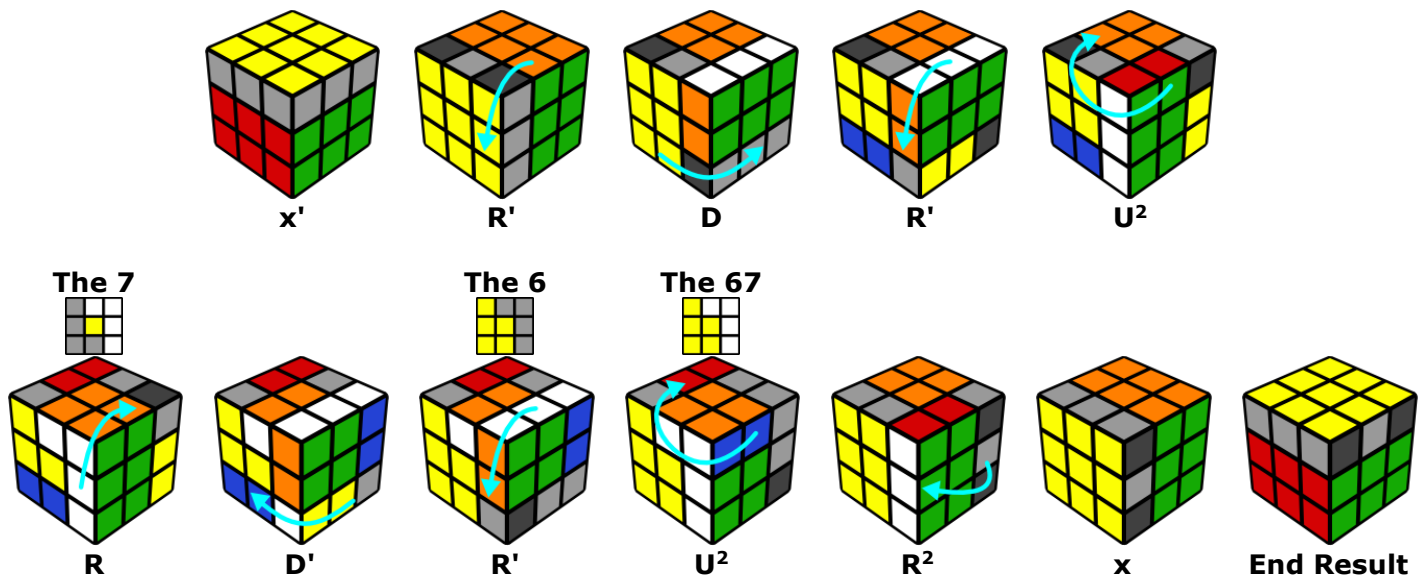
The Possibilities/The Approach



The Basic Case



The Moves



At the end of this step, your cube should look like this →



Step #7 - Permute the Edge Cubies

This is it - the final stretch. 26 miles down, and only .2 to go. Don't give up now. In this step we will permute/rearrange the yellow edges. Your cube should look almost identical to one of the four cases pictured below. The cases that we want are A or B. If you get one of the two cases in C then just perform either of the algorithms below and you will get either case A or B.

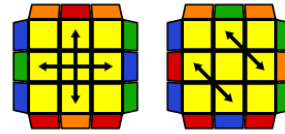
The Possibilities/The Approach



A



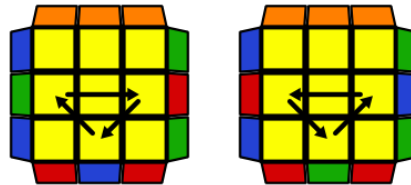
B



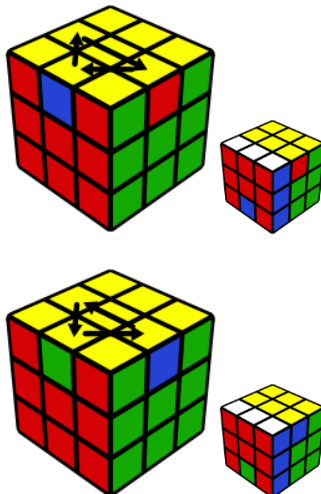
C

The Basic Case

The cases show 3 of the edges on the top that have to cycle clockwise or counterclockwise, and 1 side fully solved. Put this side in the back. Next, do the algorithm shown. In order to do this correctly, you will have to look at the edge on the face that is facing you. For example, on the top picture, the blue edge, and on the bottom picture, the green edge. That will indicate the direction that you turn the U face (or yellow side). You move the U face towards the side that matches the edge on the front. For example, for the top picture, where you see "U", you would do the U' turn twice. Proceed with the algorithm.



The Moves



F^2	<u>U</u>	L	R'	F^2	L'	R	<u>U</u>	F^2
	↑						↑	
F^2	<u>U'</u>	L	R'	F^2	L'	R	<u>U'</u>	F^2
	↓						↓	

At the end of this step, your cube should look like this →



Congratulations!

At this point, hopefully you have solved your Rubik's Cube. If not, backtrack to the appropriate step and continue. You may think that your journey is over, but we hope you'll find that this is where the fun really begins. Practice these steps until you can remember how to do them without the assistance of the guide. Then, time yourself and see how fast you can get! We hope that whenever you aren't feeling so well, or just want something to do, that you can pick up your Rubik's Cube and have some fun. It's been our honor to teach you guys and hopefully gotten to know you.

Summary

Step #1 – Solving the Cross

- Get all 4 of the white edge cubies on the yellow side
- Match the edge sticker with its side and spin it to the white side

Step #2 – Solve the Corner Cubies on the 1st Layer

- Get the corner around the "U" layer
- Hide, bring up parallel, replace, bring back down

Step #3 – Solve the Edge Cubies on the second layer

- Match the edges without a yellow sticker to their side
- Move the edge away, bring up parallel, move edge back, bring down
- Solve the white corner like you would in Step #3

Step #4 – Orient the Edge Cubies

- Do F R U R' U' F' until you have the "horizontal bar", then do it once more
-

Step #5 – Orient the Corner Cubies

- Do R U R' U R U2 R' until you have the "fish", then do it until all yellow
-

Step #6 – Permute Corner Cubies

- Get headlights, place headlights in the back
- Do x' R' D R' U2 R D' R' U2 R2 (The 67 algorithm)

Step #7 – Permute Edge Cubies

- Get a solved side, place it in back
- Do this move F2 _ L R' F2 L' R _ F2 with either U or U' for the underlines

Then it should be Solved!