The beginners guide to solving the 3x3 Rubik’s cube

Using the modern Roux method

Roux is a modern speedcubing method with fewer algorithms and fewer moves than the dominating algorithm heavy CFOP method. This method is newer, and there are fewer resources available, but it is very popular by people solving the cube with only one hand (OH) due to the lower move count, which is important with lower execution speed.

This guide teaches the absolute beginner how to solve the 3x3 cube using a simplified Roux method. Kian Mansour has a video guide on YouTube, and some algorithm sheets on a webpage.They are a great next step if you like to watch video

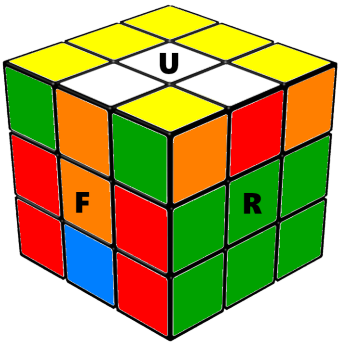
The method teached here uses only two algorithms. Sune which is pretty common to orient corners and a longer one called Jb Perm which is the most common algorithm for swapping corners. Some other guides use another shorter algorithm (Niklas) in place of Jb - and swaps 3 corners at a time before orienting them, adding some complexity to which corners to swap. Niklas is rarely used later, so I decided to teach the common Jb Perm instead.

This method is difficult to execute with a bad cube like the Rubik’s brand, since this method depends on lots of M moves, that is moves of the vertical middle slice by pushing it up/down using a single finger - most often the right hand middle finger. If you have a bad cube, consider picking another method.

If you want to use Roux on a bad cube, you could move the two vertical right slices one direction and after that the rightmost the opposite way.

The cube

The cube consists of 6 faces or sides, which are all in a fixed order. The centers are fixed relative to each other, and are typically screwed into the internal core.
A standard cube has white and yellow opposite, and green/blue and red/orange are opposite colors as well. If you have white down/yellow up, and you start wil blue, the colors are BOGR in clockwise order (Blue, Orange, Green, Red). It is a good idead to come up with some way to remember that.



Apart from the centers, there are 8 corners, all with 3 colors, and 12 edges, all with 2 colors.

The sides on the cube are usually named after the cube orientation, not colors. When you start solving, you will normally decide on a down color - typically white. When you use Roux,

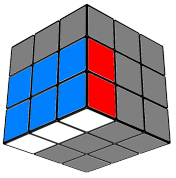
you will decide on a first block color as well. In this tutorial you will always pick the blue first block (FB) color, the white down color. Later on you can start learning to be color neutral.

The faces or sides on the cube are U/D (Up/Down), L/R (Left/Right), F/B (Front and back). And when the letters appear in algorithms later on, then R means: Turn the right side 90 degrees clockwise (CW) when looking at it. If there is a tick after the letter like R' it means turn it counterclockwise (CCW). The term Layer is used as well. Upper layer, lower layer, right layer, two rightmost layers etc.

The Roux method

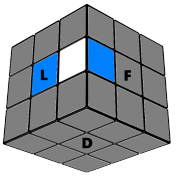
Roux consists of 4 steps.
Create First Block (FB) - 2x3 block left
Create Second Block (SB) - 2x3 block right
Orient and permute corners on top layer (CMLL)
Orient and move Last Six Edges. (LSE)

1 FB - First Block



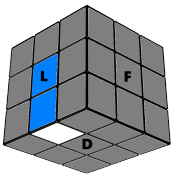
In this step you will build the cube with a2x3 blue first block with white down.

First step - attaching edge to center



The first step is to find the blue center.
Then find the blue/white edge. Turn some side such that it touches the blue center.

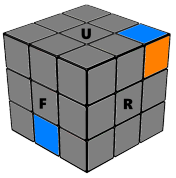
If the white face touches the blue center, then it is misoriented or a bad edge. But it is easy to correct. Assume you have blue color Left (L), and the white/blue on the left front - Then F' (Front CCW) will bring the blue to the lower layer on the front, and then you can do D' move (move Down face CCW). .



So now you should have the blue/white edge connected to the blue center. Now turn the cube such that you have blue on the left with the blue/white edge having the white side down.

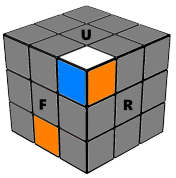
When you get a bit more practice, you can build the blue pair in place.

Pair up edges and corners, and insert

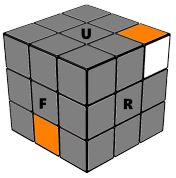


The next step of making the blue/white First Block (FB) is to pair up blue/white (and red or orange) corners with their edges, and insert them next to the blue/white edge + blue center.

For this purpose you start by locating the blue/orange or blue/red edge. And place it on the front in the lower layer, we call this the loading spot. Blue still on the left for the rest of the solve, with white down.
You can move Front, back, upper, and 1 or 2 right slices. You can NOT move the left layer or the bottom layer. That would "destroy" what you have already created.

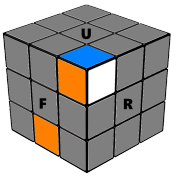


One easy strategy is turn whatever side the edge is on, such that it comes to the upper layer. Then rotate the upper layer, and turn the two right slices as one to bring it front down.



Now that you have the edge, say blue/orange down front - you need to locate the blue/orange/white corner and get it to the top layer. Again, not moving D or L.

If it is in the down-front-left corner (DFL), you can turn the front CW (F), move the upper slice either way (U or U') and restore the front with blue/orange by turning the front the opposite way (CCW or F').

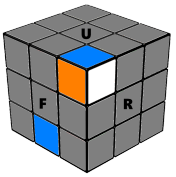


Now you need to look, what colors does the blue/orange/white corner have on the top? Is it white ? Then turn the U face until it is on the right slice. Then turn the right slice R or R' moving the white face up and over, and it should end with the white face to the back or front.

Now you have the corner on the top with a non-white face up. So it is blue or orange.

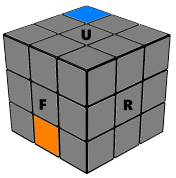
If it is orange on top, turn it with the white pointing to the right. Now you can turn the R slice CW or CCW to flip over the edge and make it blue on top.

Pairing up



Now look again at the edge on Front Down (FD), is it the same color front as the edge's color on top ?

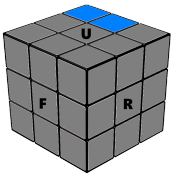
If yes, turn the upper U slice, such that the edge comes to the front with white to either left or right.



Now comes the M-slice move, or rather M’ - M’ is counterclockwise seen from the left for some reason. You push on the lower back part of the middle (vertical center marked F and U) slice with your middle finger. Thus lifting the Down-Front edge up to its matching corner in the U layer, and you will have a pair. blue/orange/white corner connected to the blue/orange edge.

If the edge's front color is not blue (that is, it is orange or later red), you need to move the U slice such that the corner goes to the back with white to the left or right. Then you need to do the M move twice. First lifting the edge to upper-front, then one more to flip it over and go the upper-back, forming the pair. Two M moves is called M2

Now turn the upper slice such that the pair is on the left (and thus white on left). Now turn that slice (front or back) to insert the pair next to the blue/white-blue-center pair.



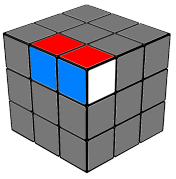
Now you have formed the first 2x2 blue square, with 2 white down and 2 orange on the back, (or 2 red in front if you started with blue/red)

Now repeat putting blue/red in the front/down position, using only sides that will not destroy what you have already built. So using R, the two rightmost layers, U or F. Aim to get it on the M-slice and then turn that to get it to the loading spot front down.

Then get the blue/red/white corner on top, flip it over once or twice such that it is blue on top. Turn the U slice as before, get white to left or right. Use M' or M2 (2x M-slice move) to pair it up to its corner.

Turn U to get the pair on the left side (that will be front for blue/red pair), and turn front CCW (F') to insert the 2nd pair.

Now, if you made the pair with blue on the side rather than on the top, don't despair. You can either flip them over by turning 2 rightmost slices up (CW), do a U2 and insert or you can move the pair to the D layer (two rightmost slices CCW), and insert it from there with F.

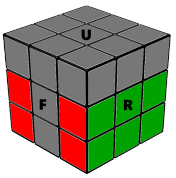


Now you have completed FB or First Block, without any algorithms at all. Just intuition.

BTW: You picked the blue/orange first, because when you insert that on the back of the cube, more of the unsolved cube will be visible from the front. If you had inserted blue/red first, there would be one more place on the back where the corners/edges could be hiding. Thus there is a small advantage in filling up the back slot first.

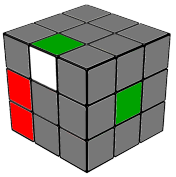
2 SB - Second Block

Now that you have the 3x2 on the left side, you can no longer turn L, D, F or B. That would destroy what you have built. Front and back layers are now "locked as well".



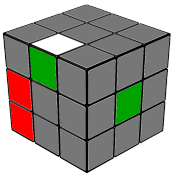
So in this step you will move only U, M, R or r aka Rw (Right wide). The r "slice" (somewhere called Rw) is the name for turning the two rightmost (or center + right) slices together.

DR (Down Right) Edge



First step of the second block is to get the DR (Down Right) edge in place. It will be the green/white edge, as green is opposite blue, and you are solving with white down.

To do this, first locate the green/white edge, and bring it to the top layer.



Is it green on top ? Then it is a bad edge. Re-orient it by flipping it over - From front to back or back to front using either M-slice move or r/r' - moving 2 rightmost layers. This is sometimes easier, and will be used later to insert SB (Second Block) pairs.

Now it is white on top, turn the U slice to bring it to the right over the green center. Turn the right slice 180 degree = 2 R-moves in the same direction called R2. Now the DR edge is in place.

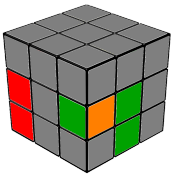
DR is green/white in our case, and for the rest of this tutorial.

SS - Or Second Block Square (SS) or Second Block First Square

Next is forming Second Block Square (SS) - A green/orange 2x2 on the right side.

To start, you need to get the green/orange or green/red edge to the Front-Down (FD) loading slot you used for FB.

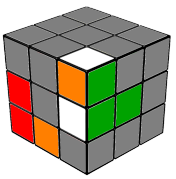
If it is on the M-slice, just use M' moves. If it is on the upper left or right, do an U move to bring it to the M slice, and do M moves to bring it to FD. You know it is not where you have formed the blue 2x3 block.



If it is on the right slice on the middle layer, you need to take it out first. You move the right layer R or R' to bring the edge to the top. Turn U either way to bring it over the M-slice, and restore the right layer with green/white down. Then move the edge to FD with M move(s). In the case here: R U r' - The last r' is moving both right slices CCW or down, restoring the green/white AND putting the green/orange edge in the loading spot.

If it had been on the middle layer back, you would have needed R' U R M - That is to restore the R slice first, and then move the edge down with M.

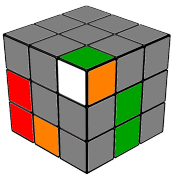
Now that you have the edge in the loading spot, look for the matching corner. You want it to be on the Upper layer, and not be white on top. It can be in one of the 6 unsolved corner positions. Either top, or Down Front or Back on the right.



If the corner is Down, you need to take it up the same way as you took up the edge. Say it is Down Front (DF), then you need to turn R' CW to get it to the top layer, U or U' to move it, and R to restore the green/white edge.

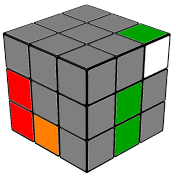
The choice of U or U’ is important. You do not want white on top when green/white has been restored. So if it is white on top after the initial R’ - you want to turn the U face, such that the white top will stay on the R side. Then it will be turned over when you restore DR (green(/white). In this example you need U’ - turn Upper side CCW, such that green will be on the back, and green will end on the top when you restore DR with R’

Pairing Up



Look at Front Down (FD). Is it the same color at the front as the edge is on the Upper side? Here you have orange FD and green Up. So they are different.

Since you have different colors, you can’t just match up like on FB turning U then M’.
You need to get the orange flipped in the process.



To do that, you need to turn the U face such that you get the corner on the Back and white on the side. Like for the FB pairs.

Now you can do 2x M’ or M2 as it is called. The first M’ will put orange on U, green on Front - and the second will move orange to the back and green to Up.

And you will have paired non-matching DF and corner-Up colors into a pair.

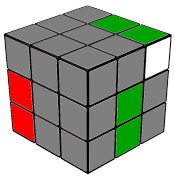
Inserting the pair.

Now, how do you insert the pair on the right side, if you can't use the F or B slices ?

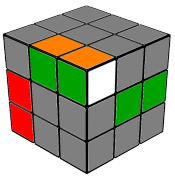
It is not that difficult. If you have green on top like here, you turn the U side such that white is on the green side.

Now you turn r’ (two rightmost slices CCW) such that the pair moves up and over. And you will get green in front and green/white on Back.

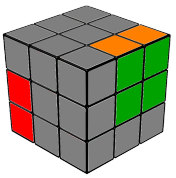
Now you can insert it with U’ (U CCW) and restore the DR with r or R.



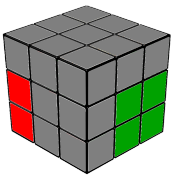
r’



U’

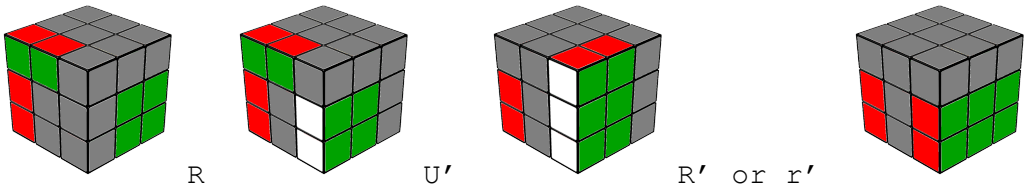


R or r



If you have the pair on top with the SB color (green) on Front/Back or one of the sides, it is just as easy to insert. You just need to start with the white on the Left side.

Then you turn R to bring the place where you want to insert the pair to the Upper layer, rotate the pair in place (U’) and restore the right side.



So now you have formed two opposite 2x3 blocks, FB and SB. These are the ones where there are no algorithms, just experience. When you get more experienced you can pair up in different places around the cube. More on this in another tutorial.

3 CMLL - Corner Manipulation of Last Layer

For the last layer, you are now basically limited to using the M and U slices, since R is now completed as well. The exception is algorithms, which will move whatever slices, but restore whatever matters when the algorithm is complete.

This is the step where you will need to learn algorithms. There are 42 in total - But I will limit it to two algorithms in this beginners guide.

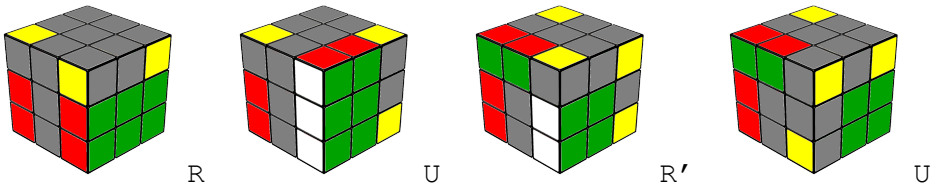
Some guides swaps corners first, and then orient them with yellow up, which allows them to use a simple algorithm to swap corners. But since the simpler algorithm (Niklas) is not used later on, I have decided to teach you how to first orient corners and then swap them afterwards. You will end up using the corner swap algorithm a lot if you continue cubing, thus it is better to learn it now.

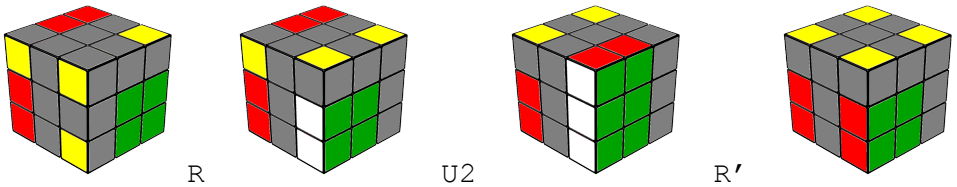
Corner orientation

To orient corners with yellow up, you will use an algorithm called Sune. Only a few algorithms have names after a person, and this is one of them. You will keep using this algorithm when solving the cube later on. It is an algorithm that is 7 moves long, thus it is one of the shorter ones.

The sequence written with letters is: `R U R' U R U2 R'`

It looks like below - where you have the optimal Sune case.





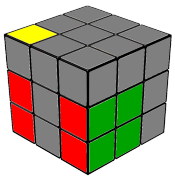
Basically it is move right side up, push with index finger (U CW), move right side back down. Push U a bit further CW with the right index finger. Right side up, now undo the 2 U moves by turning U2 times pushing with left or right index finger, and restore R with green/white down.

Try to find a way to break algorithms down in pieces that makes sense for you.

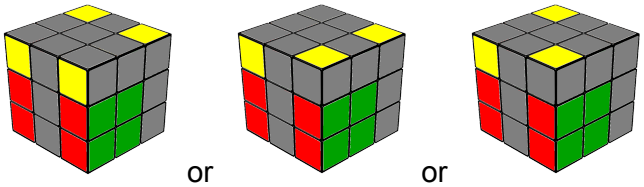
When learning algorithms, don't remember the letters, but remember the moves. Practice a lot to get it into muscle memory.

As with all algorithms, it swaps/turns a limited number of pieces. So if you repeat the algorithm some times (for this one 6 times), you will restore the cube back to how it looked before. This algorithm has the advantage of keeping all top layer corners relative positions, but will twist 3 of them (all clockwise). It will not disturb any of the first 2 layers. But it will move edge pieces around. But this is of no importance here, as you will finish edges later.

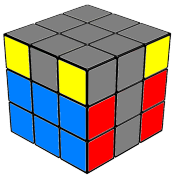
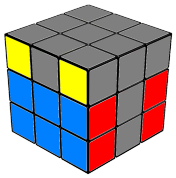
To orient all 4 corners you need to orient the top layer, and execute Sune depending on how many are already yellow on top. You execute Sune, then you look again, and select the right case to continue on. 1 yellow corner might either result in 4 solved corners (if the Front Right Up is yellow as well), or cause a yellow corner somewhere else.



1 yellow corner solved - Put it on **UP FRONT LEFT** - then execute Sune



2 yellow corners solved - Make sure there is a yellow sticker on **FRONT LEFT UP**.

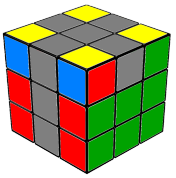
 or 

0 yellow corners solved - Make sure there is a yellow on **LEFT FRONT UP**. That is a yellow should be over the blue First Block (FB).

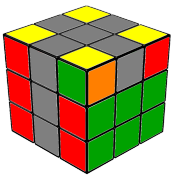
After orientation of Up face, and executing Sune - and repeating a few times, you should end up with all 4 corners being yellow on top. And you can move on to the next step

Swapping Corners

The next step is swapping corners. If you are lucky, all the yellow corners have sides that match each other. If not, you need to swap corners.



Here you will learn the long Jb algorithm for swapping 2 adjacent corners. The algorithm is long, even in normal cubing standard, as it is 13 moves. But it is one of the algorithms you will use a lot. Thus learn it, and practice it. The name Jb comes from the other cube solving method CFOP, where it, together with Ja are one of the algorithms to swap 2 corners and 2 edges. Jb will swap Right edges, the back and Front Right edge, as well as the two corners on the right side.



If you have the pair in front, as above, then you need to make sure the pair is on the Left side of the cube, over the blue 2x3 first block. In this case it is a blue pair over the blue side (as you can't see any blue Front/Right), but the color does not matter. Just turn the U face such that the pair is on the Left side.

One little tip: If you have a pair, you can either see the pair on F or R, or you can see only 3 different colors. The pair is the last color, and it is always opposite the side with two opposite colors. In this case opposite orange/red - And it is the missing color, which is blue.

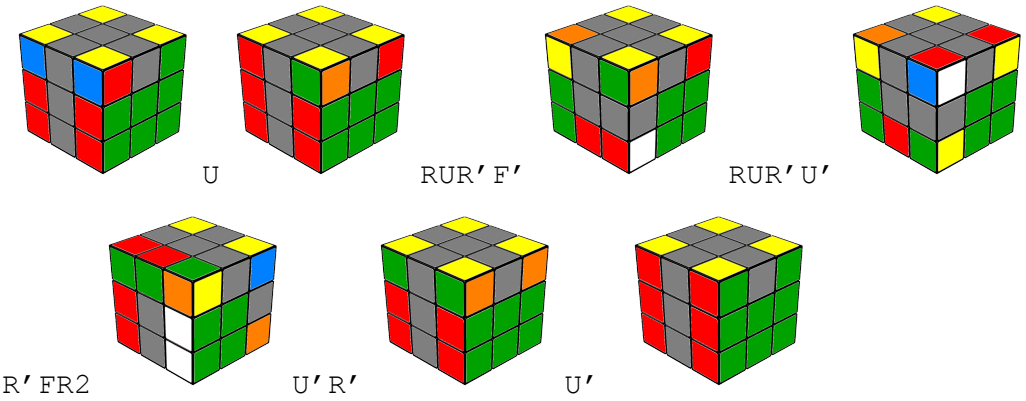
The Jb algorithm for Adjacent Corner Swap

The algorithm is written as: `(R U R' F')(R U R' U')(R' F R2) U' R'`
Parentheses are just used to group things in a sensible manner.
Or as I like to break it up in smaller pieces

```
R U R' F'    // Up-index-down  and Front CCW
R U R' U'    // Up-index-down  and U CCW (This 4 move sequence is called sexy move)
R' F R2      // Down- Front CW - and R2 such that you can insert the pair up front left.
U' R'        // turn U so white will be in front and you have inserted the pair.
```

This will complete 2x3 + upper corners on right side, then last R' will restore right side.

This is how it will look after the 4 multi-move steps:

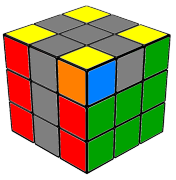


Now you can turn the Upper face (called AUF or Adjust Upper Face). In the case above, the blue pair will be opposite the green pair, so U' will place all corners correctly with the blue pair on the left (it ended up moving from left to back during the corner swap)..

If you look at the cube, you can see that the first `RUR'F'` Takes out the green/red pair and puts in place of blue/red that goes to down. Next `RUR'U'` takes out the blue/red/white corner. `R' F R2` Inserts the corner the easiest way, restores the blue/red pair on the blue side, and turns the R such that you can easily insert the green/red pair now on top with `U'R'`.

It is very individual how people remember algorithms, and beginners especially like to have some intermediate steps where they can verify that they didn't make mistakes. But as you practice, you will quickly learn to execute the algorithms without looking at all.

Now, there are some cases where you do not have 2 corners of the same color on the same side. In that case you can see all 4 side colors (BOGR) by looking at any 2 adjacent sides of the top layer.

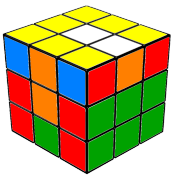


In this case you execute the above algorithm once in any orientation to get 2 corners with the same side color, then you turn the side with 2 corners of the same color to the left, and execute the algorithm again as above. Thus you might need to execute the algorithm twice when solving the cube.

4 LSE - Last Six Edges

Now that the corners are in place you are only missing the Last Six Edges (LSE). This last step consists of some substeps. 4a is Edge Orientation(EO), 4b is to insert Left and Right edges, thus completing the blue and green sides, and finally you have 4c, which is finishing up the M layer. For all of this, you will use only the M and U slice, and there will be no algorithms.

4a EO - Edge Orientation



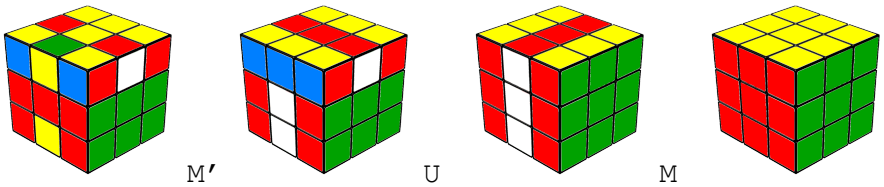
What you will accomplish in this step is turning all the edges, such that you will only have yellow and white colors on the top and bottom of the cube. Both centers and edges. On the bottom, the underside of the first block / second block are already white, so you only need to keep an eye out for the pieces on the M slice.

You will always have an even number of non-yellow/white aka colored pieces on top and bottom (if added together).

The Arrow

The goal is to try to form an “arrow” on top. An arrow is 3 colored (blue/orange/green/red) pieces on top, with a white or yellow center, which implies one colored piece on the bottom to get an even number.

When you have the arrow with the point over the bottom colored piece, you lift the arrow point (green), forming a colored line across the top. Turn U or U’, and then pull the colors down on the side with M or M’. And then the Edge Orientation (EO) step is solved – And you will have a mix of yellow and white pieces on top and bottom. See the illustrations.



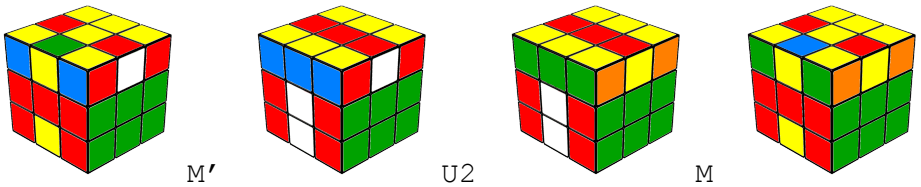
One little tip, all the edges at this stage have one color + yellow or white. Thus if you see yellow or white Front Down (the loading spot aka FD), then you know it has a color on the Down side. On the first image with the arrow, you can see yellow FD, thus it is a color on the down side.

If you have the arrow on top and a color FD, then you know it is white on the Down side, so the single colored edge on the Down face is Down Back (DB).

How do you get the arrow ?

This is an intuitive step for beginners. Trial and error, but I will give a few tips here.

One sequence of moves that is too short to be considered an algorithm is a way to swap Up Front and Down Front. What you do is M’ to move both the two front-pieces to the U layer, then U2 top swap back/front (former Up/Down), and M to re-insert.



This will swap UF and DF – As a side effect it will swap the left and right side of the U slice, but that doesn't matter at all. The only thing we worry about at this stage is the number of colored vs yellow-white pieces on top. This swapping is good if you have 4 colors on top, and 2 white on bottom. Or 2 colored on top (on the sides) and 2 colored on the M slice on D.

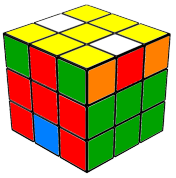
6 colored pieces up+down

What do you do if you have 4 colored on top and 2 colored down ? That is 6 colored up+down. Well, you get some white/yellow on top by M or M' (Not M2) and then turn the upper face U/U' to get the white/yellow to the sides, and restore a yellow/white center on top. Now you are down to the case with 4 colored edges on up/down.

If you have only 2 colored edges in total, you need to get more colored to the top. Use M or M' to get more more colored to the top, and you can turn U to get them left/right and restore centers. It is all about experimenting, trying to get the arrow aka 3 colored on top.

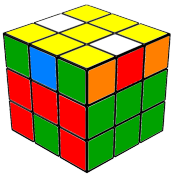
There are short algorithms for all the cases, but for now you should orient the edges by using your intuition and trial and error.

4b Inserting Left and Right Edges



The easiest way to do this is to place green and blue opposite each other on the lower layer facing front and back (Front Down and Back Down), and then insert both at once using M2.

If you have both on the lower layer, then Adjust Upper Face (AUF) such that the green corners are above the blue edge, and thus the blue corners over the green edge on the back. Then do M2 to insert both at once. Finally AUF U' turns the upper face such that the green and blue sides are complete.



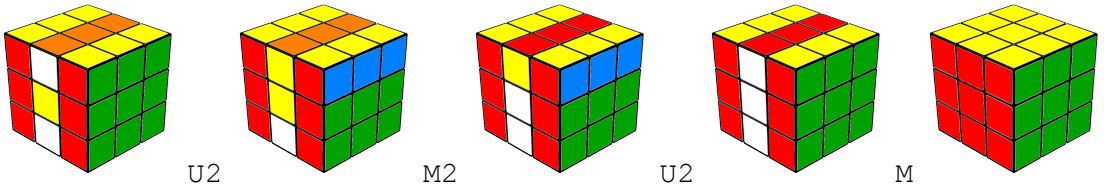
If you have green on the lower layer and blue on the upper, then AUF such that the green is on the M slice but opposite Front/Back from the blue color. Now you use the method you learned in EO to swap top and bottom edges. That is move M such that green goes up to the U layer, do U2, and turn M the opposite way to restore it. Now you should have both green and blue edges below. Then do as above.

If they are both in the top layer, they are either opposite, in which case AUF and M2 will bring them down, or they are next to each other, on M and one on the side, then just M2 to move one down, and do as above.

4c The cycle cases

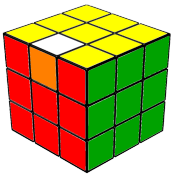
Now only the M slice needs to be fixed. And you will have either centers 2 with 2 mismatched edges, or you will have the cycle case where you have 2 white / 1 yellow or 2 yellow / 1 white on top.

If you have 2 mismatched edges around a center, then make sure the center is in Front, use M or M' if needed. Then U2 and you will have fixed one of the edges, then M2 U2 and you will have fixed the other edge. Now you can restore the M slice, and will likely have solved the cube. Or you still have one set that you need to solve the same way.



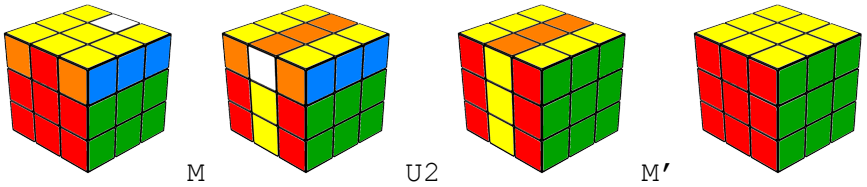
The cycle cases, where you have 2 yellow / 1 white or 2 white / 1 yellow is solved differently. First you need to turn the Upper face such that the single color is over the single color on the bottom.

In this example you have the white/orange in front.



Here is a yellow Down Back, so U start doing U2 to stack the opposite single colors white over yellow. Then you will have to Raise the Dot. That is, you will push under the white piece, thus resulting in an M move, and then follow up by U2. You can continue raising the dot (RtD), until the middle slice looks complete. M/M' followed by U2.

Since you can swap no less than 3 edges, if the Up and Front of the M slice is complete, so is the backside, and you just need to orient the M slice the right way



Now you have learned to solve the cube using the Roux method, learning only 2 common, and often used, algorithms.

Look for the next document in this series, where I will teach you how to improve the method a bit further. I will look at more ways to build the first block, the basic algorithms to orient all 4 corners at once, the diagonal corner swap, more ways to insert blue/green, and finally, a way to solve the 4c step more optimal.