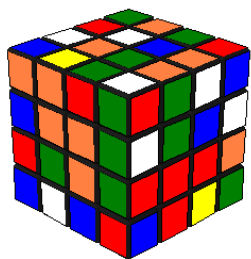


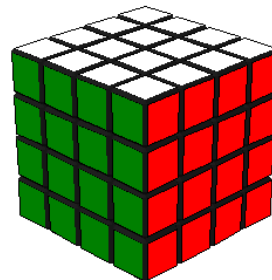
From this...



Ryan's Guide to Solving the 4x4

By Ryan Goessl

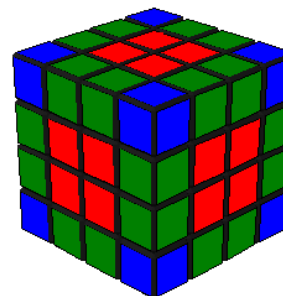
To this!



Before you start reading this tutorial and mastering the challenges that the Rubik's Revenge has in store for you, there are a few things you are required to have and know:

- It is, with vital importance, that you already know how solve a 3x3 Rubik's cube using the method in the Ryan's Guide to Speed Cubing. This is because the method used in this tutorial relies heavily on the knowledge of that method.
- Another important thing you'll need is a 4x4 Rubik's cube or access to a 4x4 computer cube. If you don't have a 4x4 cube already, you can go to the [Gabbasoft](#) website and download the free version of the Gabbasoft virtual cube program. This program includes virtual cubes from the 2x2 all the way to the 20x20!
- As you probably already know, to solve the 4x4 cube fast, it is recommended that you lubricate your cube with Silicone Lubricant. If you don't have Silicone lube, Vaseline will work, but not as well. **WARNING:** do not lubricate your cube with WD-40. It is known to corrode the plastic and ruin the cube.
- It is important when solving big cubes that you have memorized the exact position of where all the colours should end up when the cube is solved. For example, if I tell you that the front face of your cube is the orange face and the top face of your cube is yellow, you should be able to tell me the positions of all the other colours on the cube without looking at it.

After you have looked over the above points and are familiar with everything needed, then you are ready to start. The method in this tutorial is similar to the one found at the [Big Cubes](#) website. You will start by constructing all six centers, each of which is made up of 4 separate center pieces. Then you will pair up the 12 sets of edge pieces. Now what you have done is turned the 4x4 cube into a 3x3 cube, which you know how to solve. If you don't understand the relationship between the 4x4 and the 3x3, the picture to the right demonstrates this with the centers in red, edges in green, and corners in blue. Before we get into actually solving the cube, there's one more thing you have to learn. 4x4 Cube notation.

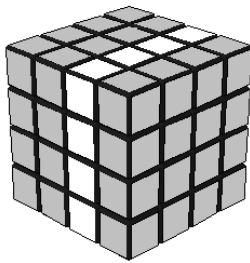


As you can see, the 4x4 now has 6 centers, 12 edges, and 8 corners, just like a 3x3 cube.

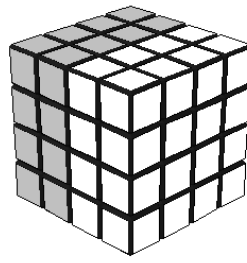
Cube Notation:

Since you can solve a Rubik's cube, you should already be familiar with 3x3 cube notation. 4x4 cube notation is very similar except there are a few more tags you have to learn about. These are the double lower case and upper then lower case tags. A double lower case tag looks something like this "rr". A double lower case tag tells you that you have to turn the inner layer beside the specified face. An upper lower case tag looks something like this "Rr". This tag tells you to turn the specified face and the inner layer

beside it as well. Both of these tags have the same rules that apply when followed by nothing, an apostrophe, and a 2. Here are some examples:



rr

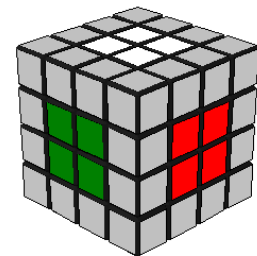


Rr

Now that you are familiar with the new tags of 4x4 cube notation, we can begin to solve the cube.

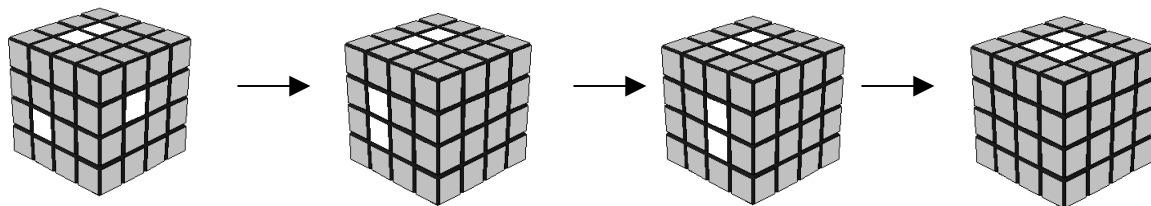
Step 1: Solve the Centers

This step is a step is a very simple step to figure out yourself but just incase, I have the directions how later. When centers are solved, the cube will look like this (grey representing that the colours don't matter). Right now it is extremely important to know the **exact** colour scheme of your cube before moving on. If you have a cube with a Rubik's colour scheme, the correct way to build the centers (when white is top and green is front) is: white on top, green in front, red to the right, orange to the left, blue on the back, and yellow on the bottom. Before you start reading how to solve the centers, I recommend that you at least try once to solve them by yourself. Trying by yourself is also better because if you can get all the centers, you will have a better understanding of it than if someone teaches you. If you try to solve the centers but can only get a few of them, that's okay. At least you tried, but you have also figured out some ways to compile centers yourself, which will make understanding the next part way easier.



Center 1

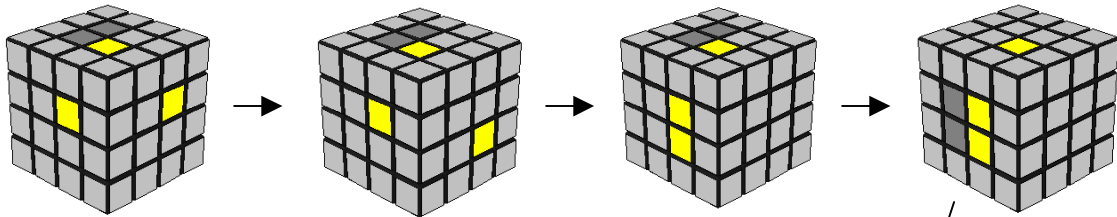
For this center piece, you can choose any colour you want to start with. I use white to start because it helps me get the colour scheme more easily, but this is a very bad habit to get into. It's best to search the cube for the center with the most pieces already in place. This leaves you with less work to do. Once found a starting center, the rest is very simple. What I do is construct 2 1x2 blocks made of two center pieces, and then put them together. Here's an example: uu F2 rr



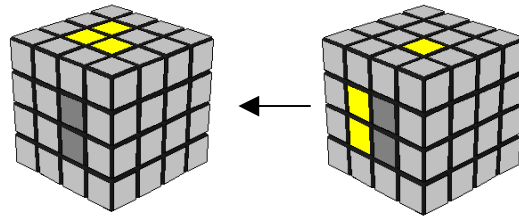
Now that you have made your first center, you're ready to move on to the second center.

Center 2

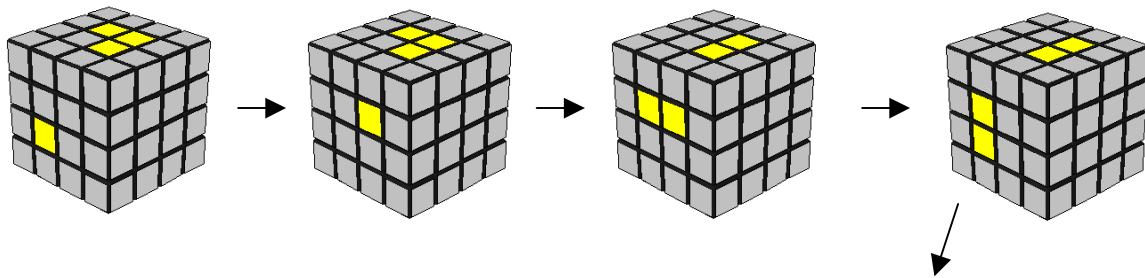
The second center is also very simple but not quite as simple as the first center because you have to make sure you don't ruin the first center in the process. The second center should always be the center opposite to the one you started with. This makes solving the 3rd center very easy. Solving the second center is sort of the same idea as solving the first. You make 1x2 blocks, and then put them together in the right spot. Here is an example (the dark grey pieces are colours that don't matter but they end up moving so I coloured them so you could tell the difference): $R\ dd' \ ll\ F2\ ll'$



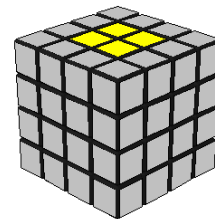
Why bring the dark greys down?
Because this lifts up half of the first center up so when the 1x2 block is inserted, the removed half of the first center is reunited with the other half and it doesn't get ruined!



Using the one yellow center piece on the face as part of my first 1x2 would have been smarter because then I wouldn't have ended up with three pieces on top. I did this though to show you what to do if you end up with three pieces on top. Here's how to solve this problem: $F2\ ll\ F'\ ll'$

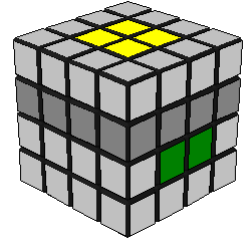


When making the move where you bring a piece down from the top and join it with a piece in the middle, remember that this is momentarily destroying the first center so while that center is broken, don't make any horizontal middle turns.

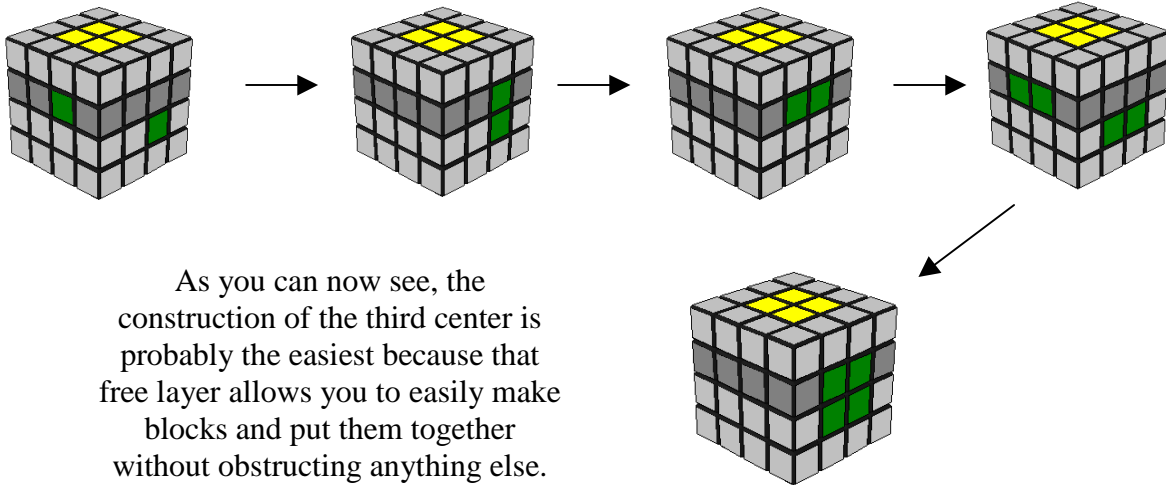


Center 3

For this step, find a pair of two or more center pieces already formed somewhere in the middle layer. Now put them parallel with one of the constructed centers so that there is a layer free to be turned that doesn't wreck any of the constructed centers. To the right is an example of this. This layer enables you to easily pair up another two pieces and then put them all together. Here is an example: $uu' R' y uu'$



The dark grey layer is free to move without wrecking any built centers.



As you can now see, the construction of the third center is probably the easiest because that free layer allows you to easily make blocks and put them together without obstructing anything else.

Center 4

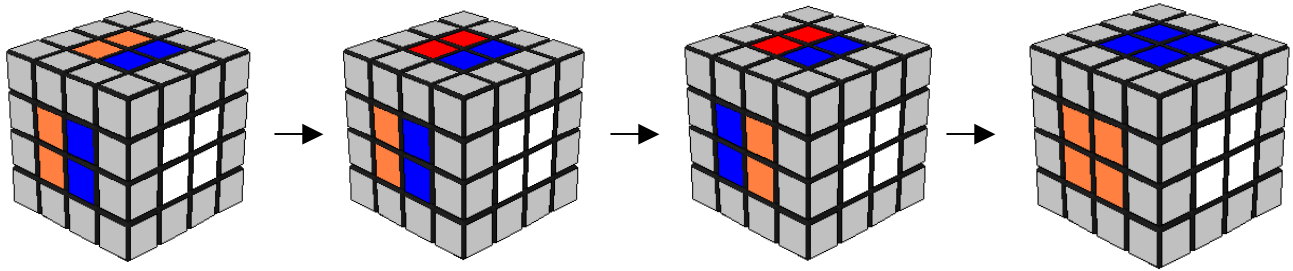
There isn't really much more I can tell you about solving centers to help you with center 4. The only useful thing you need to know is that center 4 should be adjacent to center three (thus leaving the last two centers adjacent). As for the center construction, it's pretty much like solving the second center except you have to be careful about not destroying the three built centers. Although this sounds a lot more difficult than center 2 but it really isn't. Just remember that when you separate one of the centers into two 1x2 blocks don't destroy those 1x2 and instead, make sure you can pair them back up as soon as possible.

Center 5 & 6

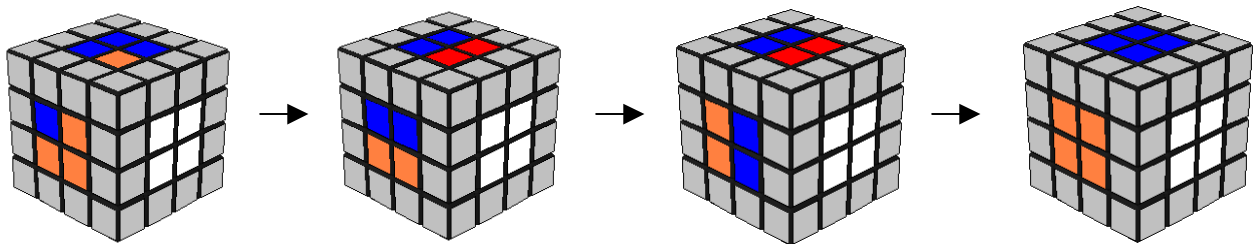
The construction of the final two centers is very simple and usually can be solved intuitively, but I still have some solution tips to show you. The construction of the final two centers consists of 3-9 moves making it a very short step (The minimum moves can be 0 if the last two centers are already solved). There are four possible cases for this step. The first two are very easy and consist of 3-5 moves. The other two are still easy but they are longer and consist of 6-9 moves.

The first two are as shown below:

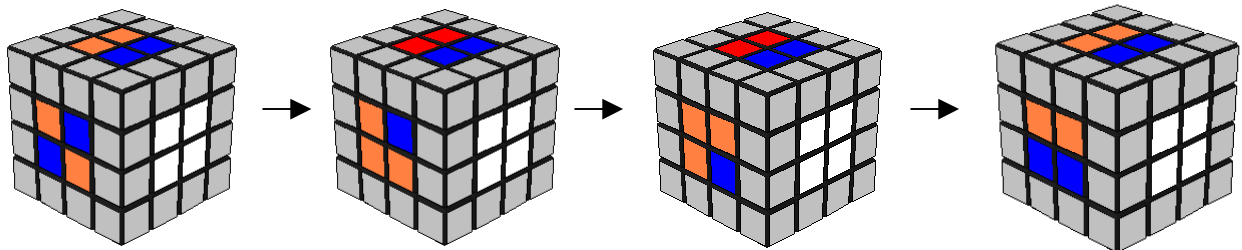
Case 1: $ll F2 ll'$



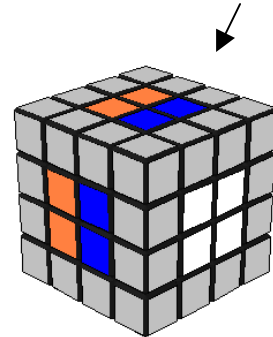
Case 2: $rr' F rr$



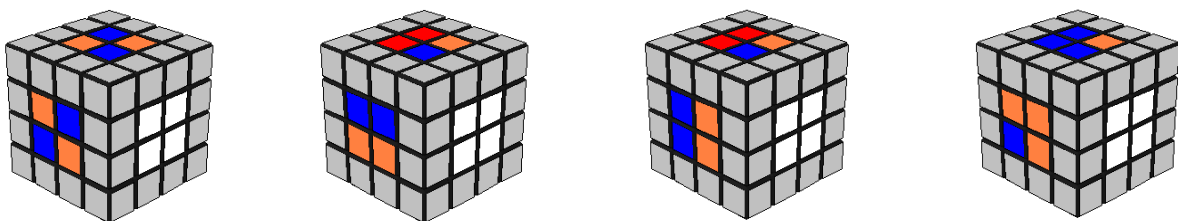
Case 3: $ll F ll' F'$



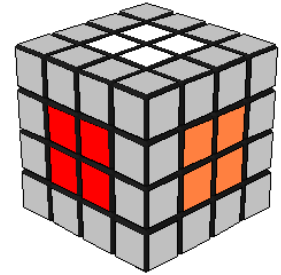
Now you have turned a case 3 into a case 1 which you can solve.



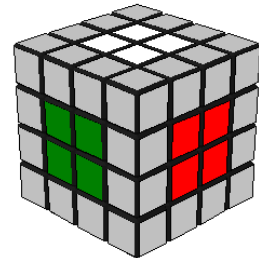
Case 4: $ll F' ll'$ This turns your case 4 into a case 2



There is a problem that you may encounter on your first few solves of the 4x4. The image to the right is an example of this problem, which is when two opposite centers are adjacent. This is likely because you constructed the last two centers in the wrong spots or you don't know your cube's correct colour scheme. To fix this, find the two centers that if switched, would correct the colour scheme. In this example you could use green and red or orange and blue. When these centers are located, rotate the cube so that those two centers are the top and front face, then perform this sequence: $rr' F2 rr2 U2 rr'$

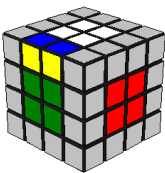


Congratulations, you officially finished the first step of solving your 4x4 cube. You are almost ready to move on to the next step but before that, don't forget to scramble your cube a few times and practice solving the centers. Without a lot of practice, you may forget this step and have to re-learn it, which isn't very fun.

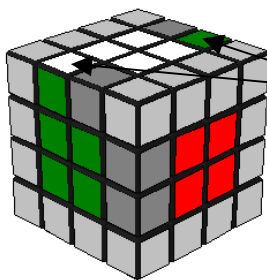


Step 2: Solving edges

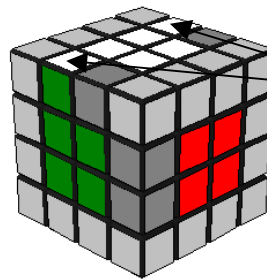
The purpose of this step is to pair up all the sets of edge pieces to make a total of twelve dedges (I will refer to the pairs of edge pieces as dedges because it's a double-edge). To the left is an example of a blue and yellow dedge. This step doesn't take very long to learn due to the fact that it is a very repetitive in how the construction of the first nine to ten dedges is the same.



First, find two dedge pieces that share the same two colours and put them across from each other on the top face but make sure the two dedge pieces don't share the same colour on the top face.

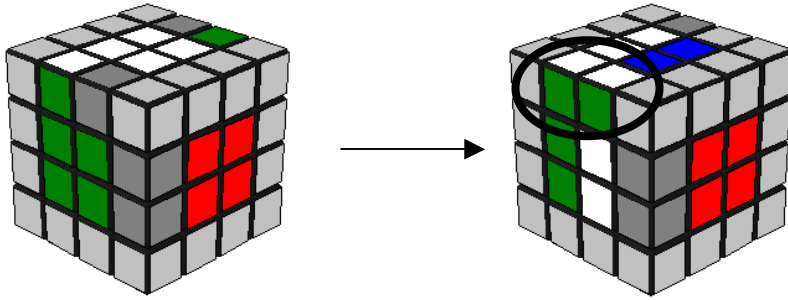


Correct: Colours are different

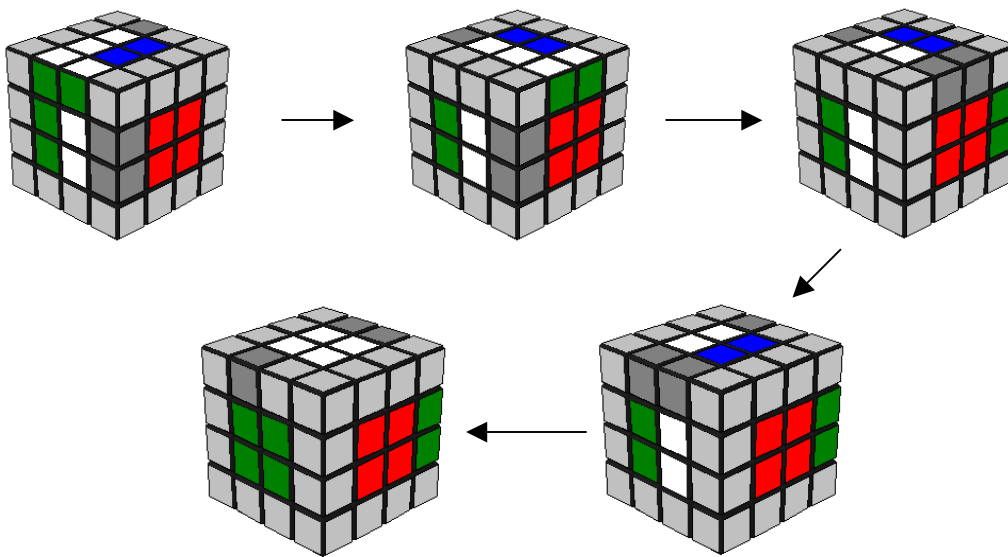


Wrong: Both colours the same

Then move one of the middle slices to pair up the two dedge pieces:



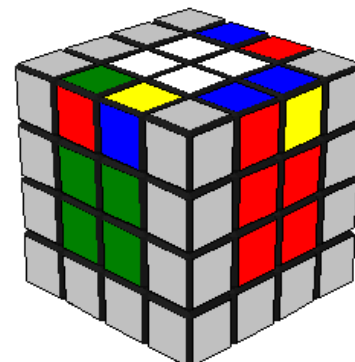
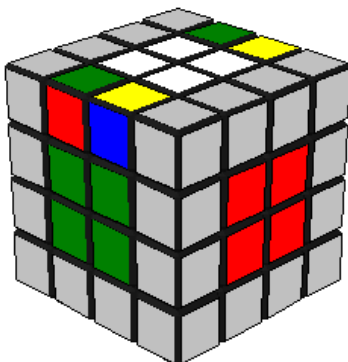
Then move your solved dedge to the side and swap it for an unsolved dedge. Then move that unsolved dedge to where the solved dedge was and reset the middle layer. $U' R U r r$



This can be used to solve the first 9-10 dedges. Just remember to **swap the solved dedge with an *unsolved dedge***. Now with what I have taught you, you should be able to get to one of these two cases:

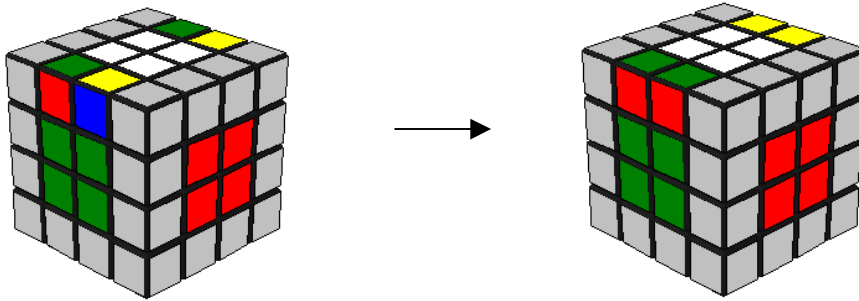
Case 1: Two dedges are wrong

Case 2: 3 dedges are wrong

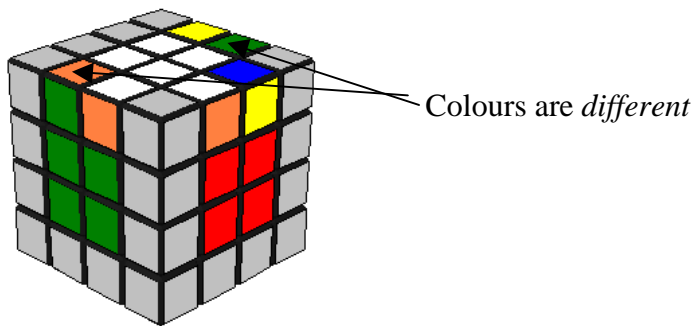


Both of these cases are fairly easy to solve. For case 1, you just have to perform a special alg that will swap two of the dedge pieces and for case 2, all you have to do is build the dedge normally but set up the broken one a certain way so when you swap for it, you solve all three at once!

Case 1: $U L U' L' F' L F U$

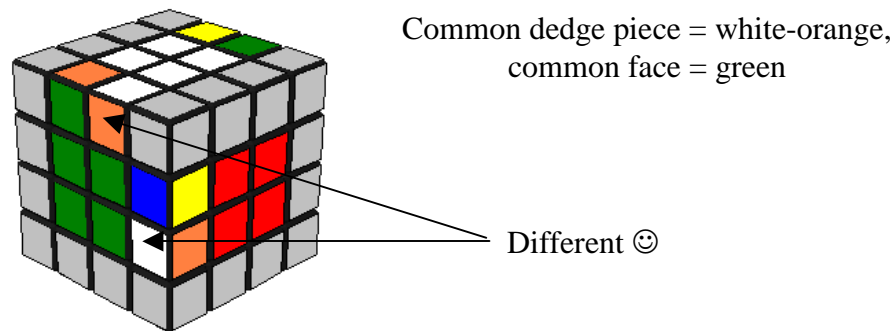


Case 2: This case is pretty easy and my favourite of the two to get. First, align two of the dedges like you normally would:

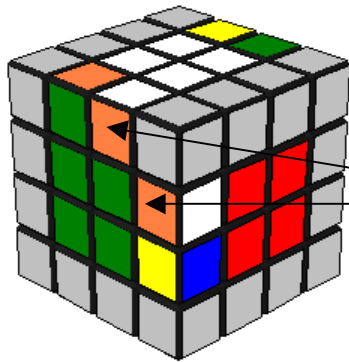


Then put the third unsolved dedge to the side of one of the dedges you're solving. This time, make sure that the common dedge pieces don't share a colour on that face (You probably won't understand that right away so here's a visual):

Correct: Colours of common dedge pieces are different



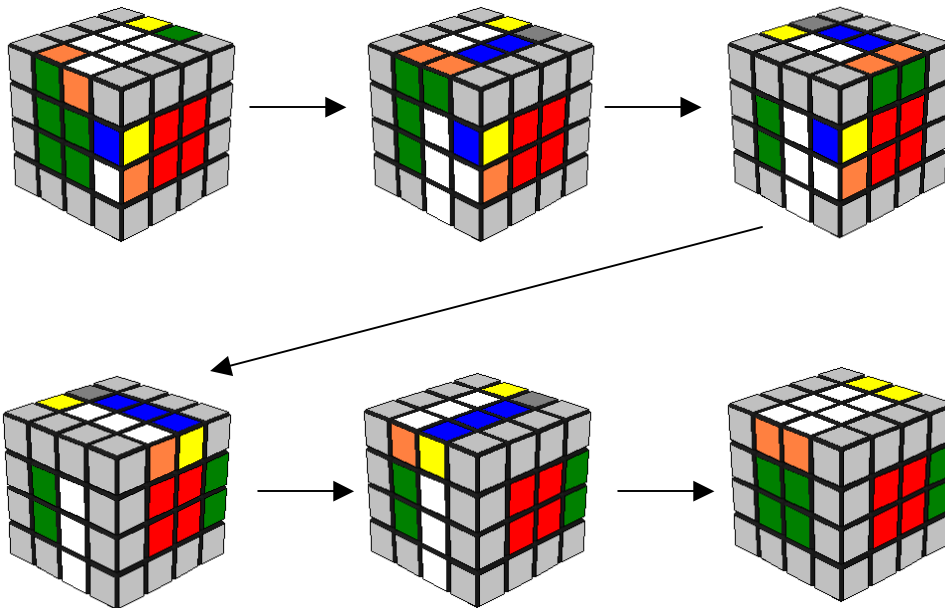
Incorrect: Colours of common dedge piece are the same



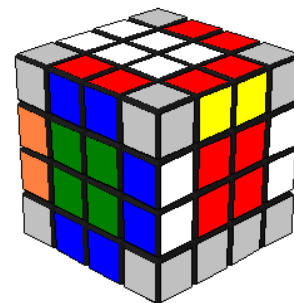
Common dedge = white-orange,
Common face = green

Same ☹

Now that you understand that, the rest is easy. It's just like normally making a dedge:
 $rr' U' R U rr$



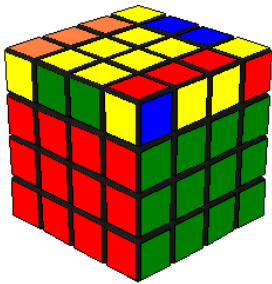
Now from what I have taught you, your cube should look something like this. If it does, then give yourself a pat on the back because you have successfully completed the second step of solving a 4x4 and are almost ready to move onto the third. But before you can do that, you must keep scrambling your cube and practicing, practicing, practicing! If you don't practice you'll likely forget something in the middle of a solve which isn't very fun.



Step 3: The Final Solve

This step is where most of your 3x3 knowledge comes in. All the steps we have done previous to this were just set up for the final solve. Your 4x4 has turned into a 3x3 except there's a 75% chance you will have parity. In this step I will show you how to correct parity. It's crucial that before you begin this step that you solve the 3x3 the same way as in the "Ryan's Guide to Speed Cubing" (Cross, first layer corners and edges, OLL, PLL) or else the parity tips and algs may not help very much.

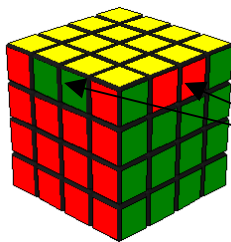
Start by solving the cross, first layer corners and edges just as you normally except treating the pairs of edges as 3x3 edges and the groupings of centers as 3x3 centers. In other words, only turn the outer layers, **never down the middle** (unless performing a parity alg). Once you've finished the F2L, you may end up with something like this where you don't have a dot, line, or backwards L:



This is known as OLL parity. There's a 50-50 chance you'll have OLL parity so if you don't have it, just proceed as you would on a 3x3. If you do have OLL parity, then perform this alg: $Rr2 B2 U2 Ll U2 Rr' U2 Rr U2 F2 Rr F2 Ll' B2 R2$.

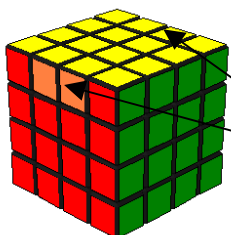
After fixing your OLL parity, you can continue until you reach the PLL. As well as with OLL parity, there is a 50-50 chance of having PLL parity. So once again, if you don't have parity, proceed as normal and solve the cube. How do you tell if you have PLL parity? It's easiest just to proceed as normal until you reach an abnormality such as two opposing edges needing to be swapped or two adjacent edges needing a swap. Each case has a separate algorithm, but using either alg on either case will fix the parity.

Case 1: $R U R' U rr2 U2 rr2 Uu2 rr2 Uu2 U R U' R'$



Adjacent Swap

Case 2: $rr2 U2 rr2 Uu2 rr2 uu2$



Opposing Swap

CONGRATULATIONS! You have officially solved the Rubik's 4x4 cube! Now you can go and show off to your friends as they drop their jaws with amazement. But remember, practice makes perfect! So keep practicing so you can get faster and so you don't forget how to do it. Now you should shoot for greater heights with the Rubik's 5x5 and by your side will be the Ryan's guide to solving a 5x5. If you want to meet some cubing friends, show off your skills, or just have a fun time cubing, go to the official [canadianCUBING](#) website for all your info about upcoming tournaments, gatherings, and more.

