

Beginner's Method for Solving the 5x5 Cube

Supplementary to video tutorials at

<https://www.cubeskills.com/tutorials/beginners-method-for-solving-the-5x5-cube>

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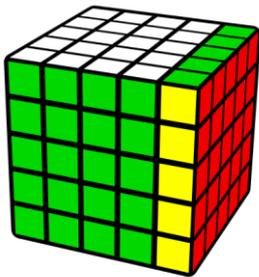
Images sourced from Conrad Rider's VisualCube - <http://cube.crider.co.uk/visualcube.php>

Notation

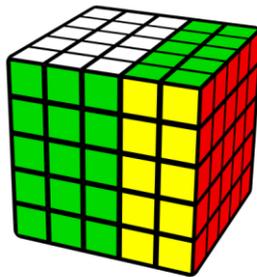
Due to the additional layer on the 5x5 we need to define one more piece of notation to solve the cube. On the 4x4 cube, an Rw denoted a wide turn of two layers, and this is the same on the 5x5. To notate a wide turn of 3 layers, we simply add a 3 before the Rw. The same principle applies to moves on other faces of the cube.

Example Moves

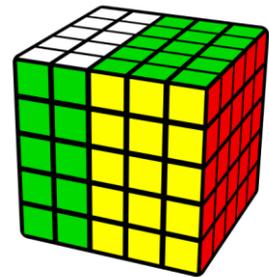
R (Outer Face)



Rw (Wide turn)



3Rw (Wide turn – 3 layers)



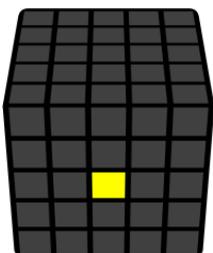
The Reduction Method

To solve the 5x5, we will use what is known as the reduction method. Essentially, this involves 'reducing' the cube to a state that can be solved as if it were a 3x3 cube, by solving the center pieces and pairing up the matching edge pieces.

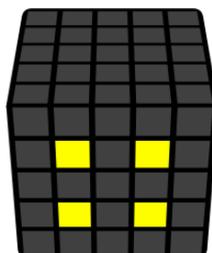
Types of Center Pieces

The first step in solving the 5x5 is to solve the center pieces. On a 4x4 cube there were no fixed center pieces, however on a 5x5 cube (and all odd-layered cubes) there are fixed center pieces. That is, the center piece that lies directly in the middle of each side denotes the final colour of that side, just like on a 3x3. On a 5x5, there are three different types of center pieces, which cannot be interchanged with one another – the middle (fixed) centers, corner centers, and edge centers.

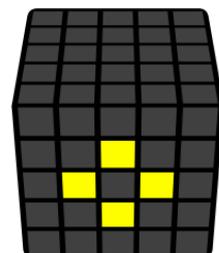
Middle Centers (fixed)



Corner Centers

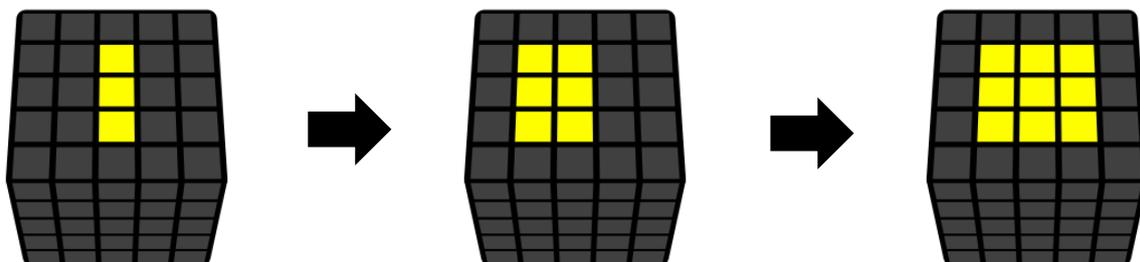


Edge Centers



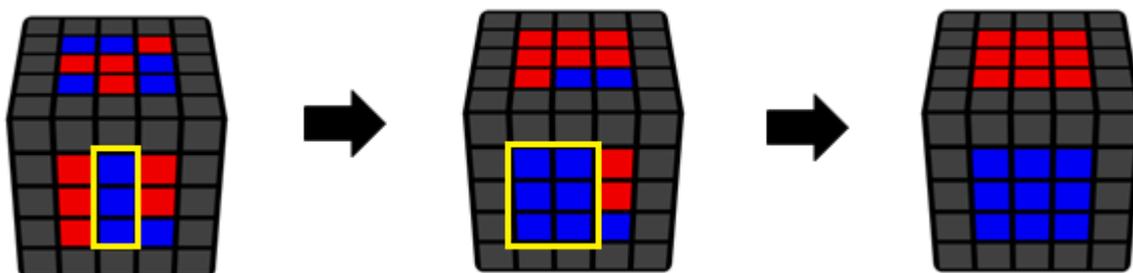
Solving The Centers

The first step in this method is to solve one center. One simple strategy to do this is to solve the inner 1x3 bar comprised of two edge centers and the middle center, and then create the outer 1x3 bars (comprised of two corner centers and an edge center), and attach those to the first 1x3 bar. After you have solved the first center, you can solve the pieces of the center on the opposite side in the same fashion, but without messing up the completed first center.



After solving the first two centers on opposite sides, hold them on the left and right hand side of the cube and solve pieces of a third and fourth center. Make sure to solve two adjacent centers as your third and fourth centers. As you solve more center pieces, your move set will be slightly more restricted.

To solve the last two centers, we can take the same approach, and solve the center on the front face again using 1x3 bars (inner and then 2*outer).

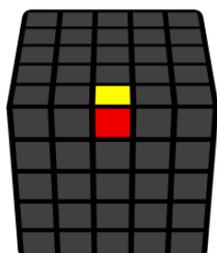


For more detail on this step and examples of solving center pieces, please refer to the video tutorials linked at the beginning of this document.

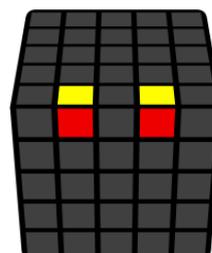
Types of Edge Pieces

The second step in the reduction method is to pair up matching edge pieces. On a 5x5 cube, we have two different types of edge pieces – middle edges (midges), and wings. Midges can be flipped (change orientation) in their position, whereas the same cannot occur for wing pieces.

Middle Edges (Midges)

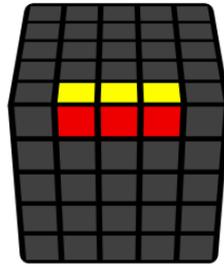


Wings

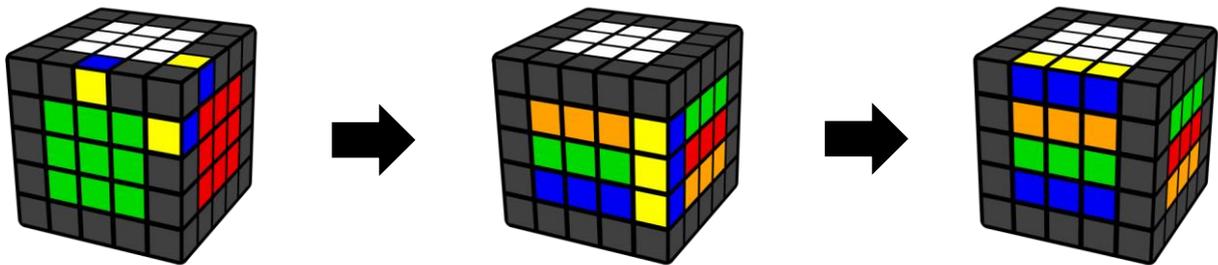


Edge pairing – First 8 Edges

For every combination of two colours on the cube (excluding opposites), there will be three edge pieces which have those colours. For every colour combination, our goal is to pair up these pieces to create an equivalent edge piece as shown in the figure below.



To solve our first 8 edges, we will use what is known as the Freeslice method. In this method, we use one slice (axis) of the cube as a working zone to help us pair up wings and midges. We use double layer (wide) turns around that axis to connect edge pieces and form a solved edge. After forming the edge in our "free slice", then we can store it in the top or bottom layer and continue working to pair up more edges using the "free slice". When inserting or replacing an edge into the free slice, be mindful not to change the orientation of any centers.



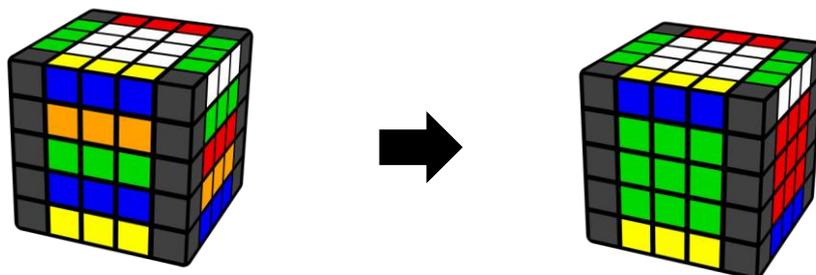
Two useful algorithms to insert an edge from the top-front position to the front-right position are:

- **$R U' R'$** (preserves edge orientation)
- **$F R' F' R$** (changes edge orientation)

A useful algorithm to flip the front-right edge piece in its position is:

- **$R U R' F R' F' R$**

Continue working to pair up edge pieces until you have stored 8 solved edges in the top and bottom layers (4 in the top, 4 in the bottom, as shown below). Once you have done this, slice to restore the center pieces to their solved positions. At this point, there will be just 4 remaining edges to solve.



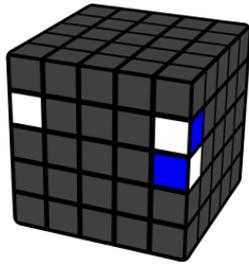
This entire process and examples are shown in more detail in the tutorial videos linked at the beginning of this document.

Edge pairing – Last 4 Edges

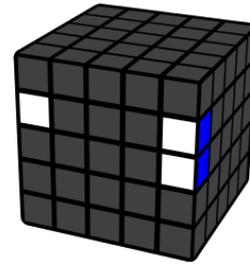
To begin solving the last 4 edges around the cube, we need to find an instance of where one wing is already connected to its corresponding midge.

There are two possible situations when we have a wing and a midge connected in the same overall edge piece – either they will be correctly paired with colours matching on each face, or they will be incorrectly paired, with the two colours creating a checkerboard pattern. These two basic cases and the procedure to solve them are shown below.

If you don't have a wing either correctly or incorrectly paired with a midge, we can also apply one of the below sequences (or a similar variation) to attach a wing piece to its corresponding midge.



Uw' (R U R' F R' F' R) Uw
Slice Flip Slice



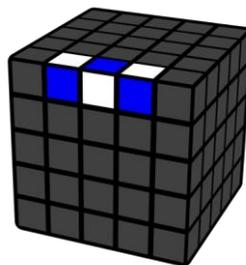
Dw' y' (R U R' F R' F' R) Dw
Slice Flip Slice

In the tutorial videos, I show variations on these algorithms which can be applied to other similar cases during the last 4 edges. It's also important to remember that the reason we perform a slice-flip-slice sequence is because we need to preserve our center pieces whilst solving these last 4 edges.

We will use this overall procedure to solve three of our last four edges on the 5x5 cube.

Edge Parity

After you have solved 11 edges, your 12th and final edge will either be solved by default, or you will have 5x5 edge parity, which requires you to swap two wing pieces using the following algorithm:



Rw U2 x Rw U2 Rw U2 Rw' U2 Lw U2 3Rw' U2 Rw U2 Rw' U2 Rw'

3x3 Stage

After solving the centers and pairing up the edges, you can now effectively solve the cube as if it were a 3x3. The centers you have formed on a 5x5 are equivalent to the single centers on a 3x3, and each group of 3 edge pieces is equivalent to a single edge on a 3x3 cube. The corner pieces are the same on both cubes. Using the outer layers, go on and solve the cube like a 3x3.

Congratulations on solving the 5x5 Rubik's cube!