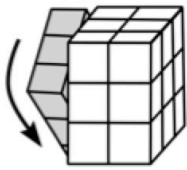
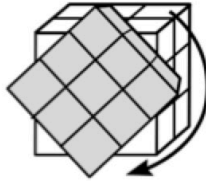


# 0. Notation

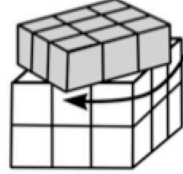
Single-layer and whole cube rotations



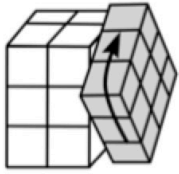
*L*



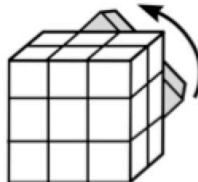
*F*



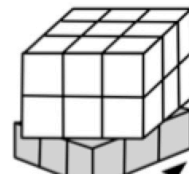
*U*



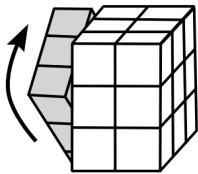
*R*



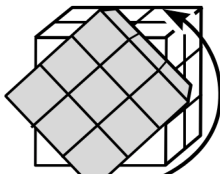
*B*



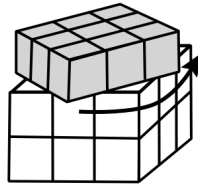
*D*



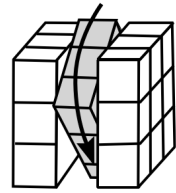
*L'*



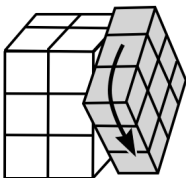
*F'*



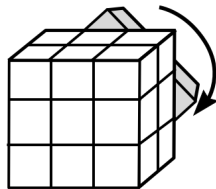
*U'*



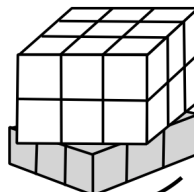
*M*



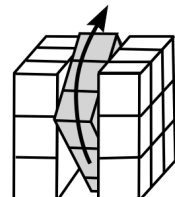
*R'*



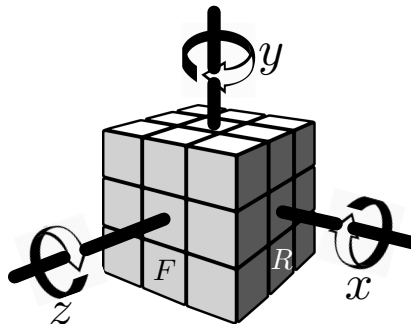
*B'*



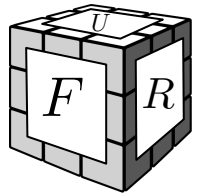
*D'*



*M'*

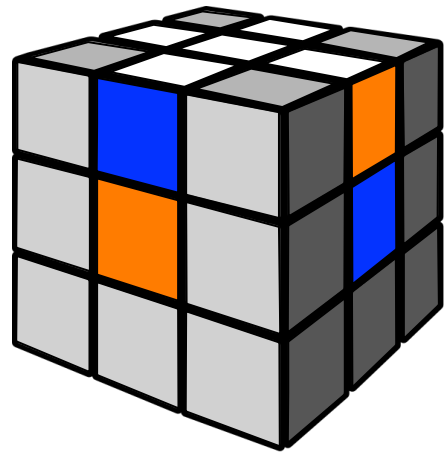
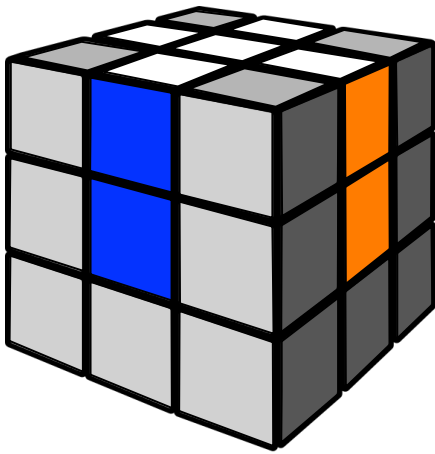


This tutorial is a modified version of Badmephisto's solution. I've tried to keep the algs to a minimum, using only those that will serve you as you get further in speedcubing. Images adapted from prof. Jamie Mulholland's Math 302 site, and the algdb.net. By Kees Storm, 2017.

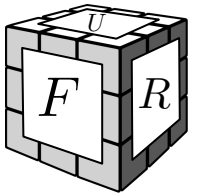


# I. White Cross

Form a white cross on the U face.

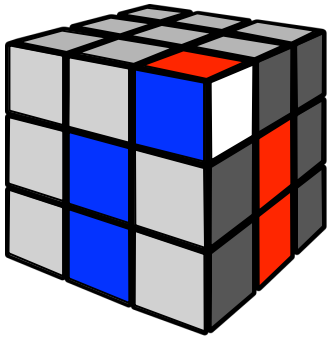


Make sure the white cross edge pieces are lined up with the four side centers.

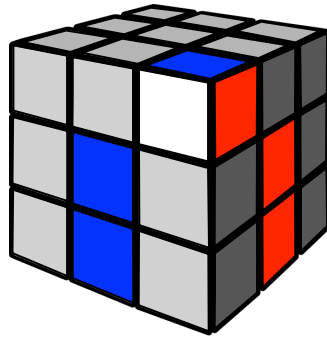


## 2. First Layer

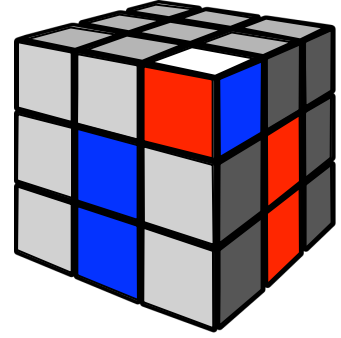
Flip the cube over (cross now on the bottom) and assemble the first layer, corner by corner.



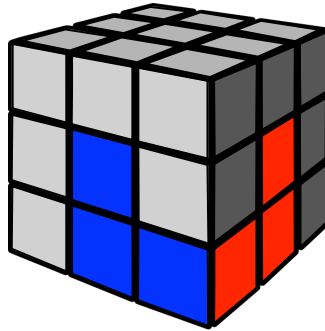
$RUR'$



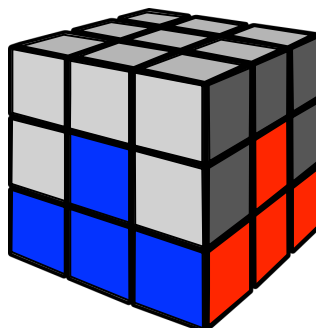
$URU'R'$



$RU^2R'U'RUR'$

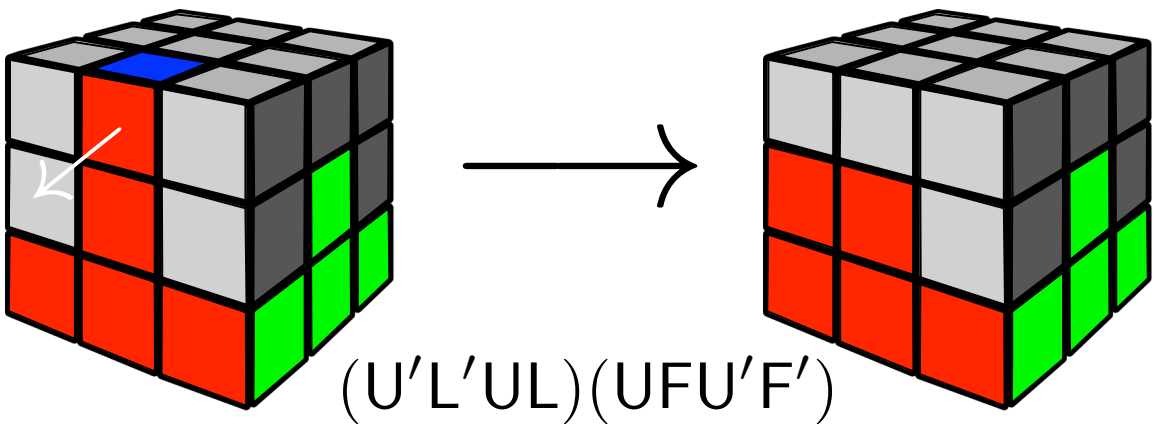
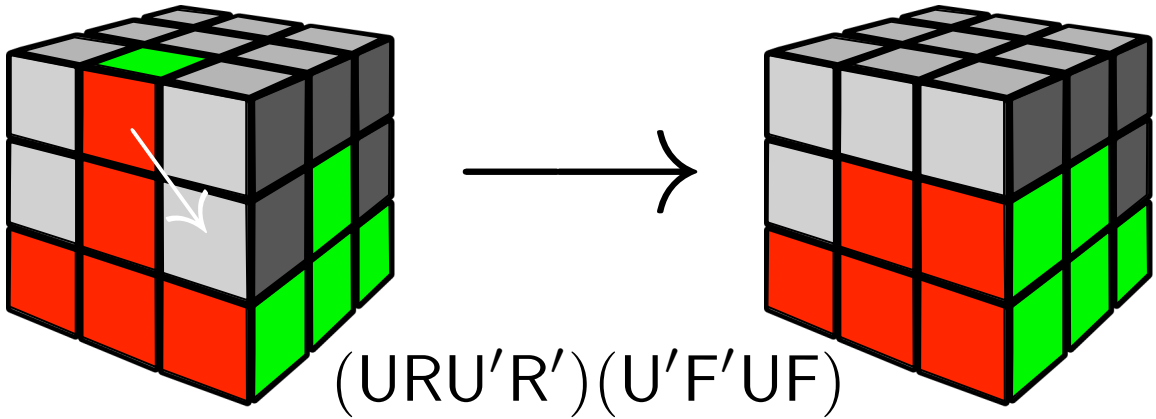


Repeat for all four corners. Pop a wrongly placed corner to the top layer using  $RUR'$ , for instance. In the end, the cube should look like this

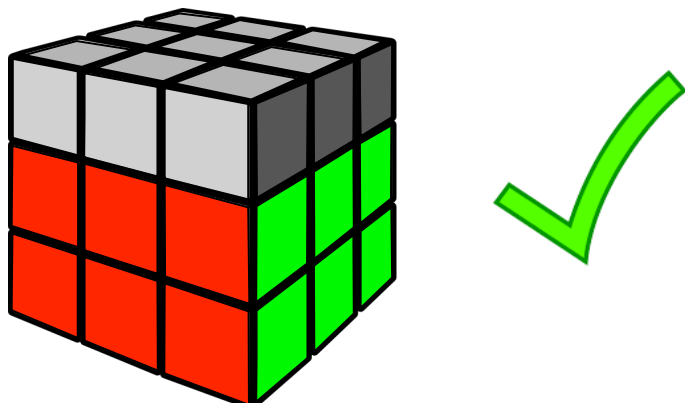


### 3. Second Layer

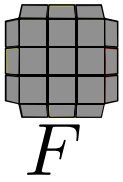
Assemble the second layer by moving the four edges from the top layer to the second layer.



To pop a wrongly placed edge to the top layer use either of the two algorithms. In the end, your cube should look like this



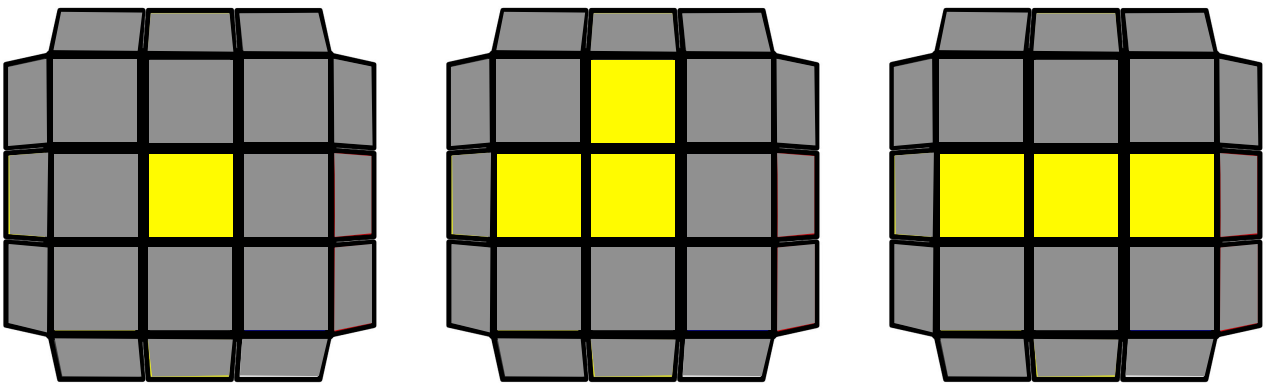
## 4. Last Layer Edge Orientation (yellow cross)



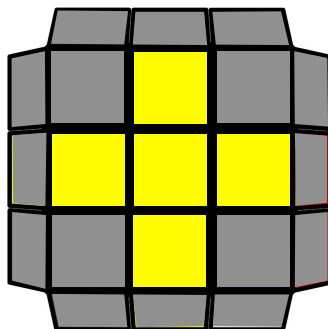
One alg will let you complete the yellow cross

$$F(RUR'U')F'$$

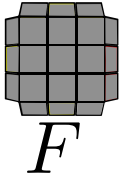
Look for the yellow pattern and orient as below



(F face is down) Apply the alg, reorienting as above each time, until you have the yellow cross (possibly, with some yellow corners already in place). If you already had the yellow cross after step 3, you can skip ahead to step 5. In the end, your top face should look like this



## 5. Last Layer Corner Orientation (complete yellow face)

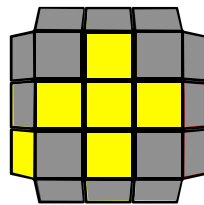


One alg will let you complete the yellow face

$$(RUR'U)(RU2R')$$

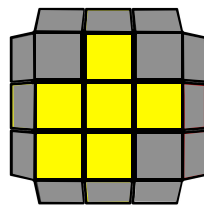
Determine the case, orient U face as below. Cases:

Zero corners:



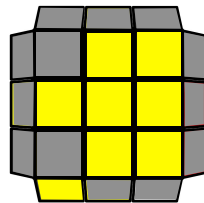
Put a yellow sticker  
bottom left, facing left.

One corner:



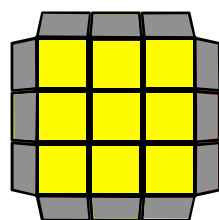
Put the one corner  
bottom left.

(Any) two corners:



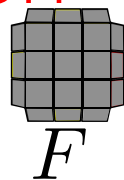
Put a yellow sticker  
bottom left, facing front.

Apply the alg and repeat, reorienting each time until you have a completed yellow face. The two corner case may have differently placed yellow corners – just rotate U face until you have a front facing yellow sticker. Your top face should look like this:



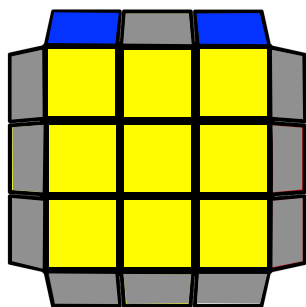
## 6. Last Layer Corner Permutation

One alg will allow you to place the last corners.

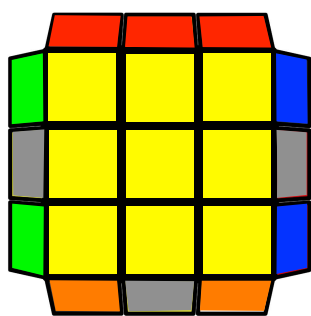


$$x(R'UR'D2)(RU'R'D2)R2$$

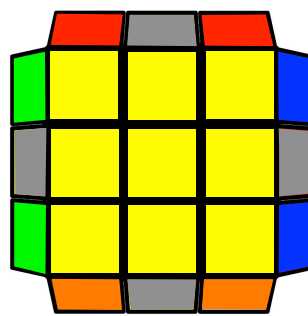
First, find the 'headlights' (two same color corners) and rotate the U face to put them in the back. If you do not have headlights, apply the alg once (from any orientation) to get them. Cube should look like this



The headlights may also be a bar – three same colors. In that case, too, put it in the back. From this orientation, apply the alg once to solve the last layer corners. After, the cube will be in one of two cases

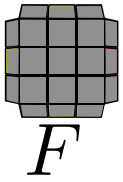


One solved face.



No solved faces.

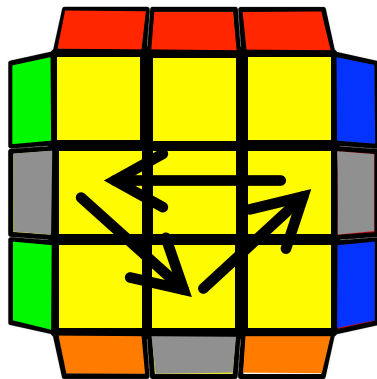
# 7. Last Layer Edge Permutation (Solving the cube)



Nearly there! One alg will solve the cube

$$(RU'RU)(RURU')R'U'R^2$$

Rotate the U face so that the solved face is in the back. If you had no solved face, apply the alg once to get it, then put it in the back.



The alg rotates the three unsolved edges counterclockwise. After the alg, the cube is solved. If not, apply it again and it will be. In the end, your cube will look like this:

