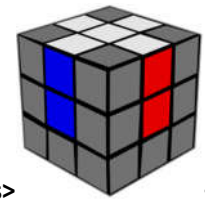
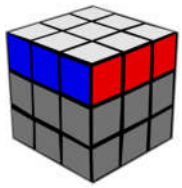
Minimum knowledge required to solve 3x3x3



<Get the Cross>

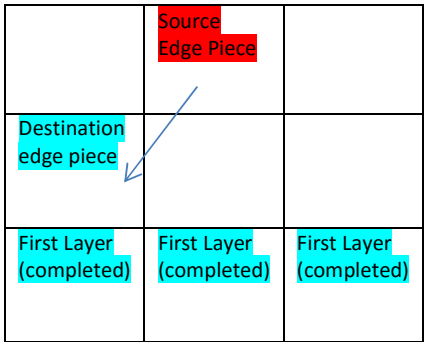


<finish 1st layer>

(knowledge of how to do this is assumed)

Second Layer (old method from "Mastering Rubik's Cube" by Don Taylor)

(side view)



^^ completed face ^^

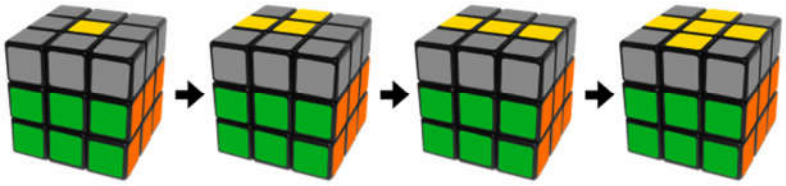
- If source edge piece is flipped: **F U2 R U' R' U2 F'**
- If source edge piece is not flipped:
  - Move Source Edge Piece to Right (**U'**)
  - Then **F U2 R U R' U2 F'**

(of course, once you get serious about cubing, you will probably want to learn F2L)

3rd Layer

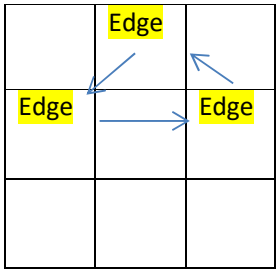
Flip (orient) Edges:

F R U R' U' F' - repeat until cross on top



Permute Edges (Ua permutation – one of the 21 PLLs):

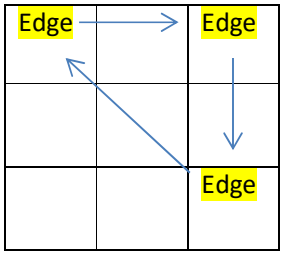
(top view)



R2 U' R' U' R U R U R U' R

Permute Corners (Aa permutation – one of the 21 PLLs):

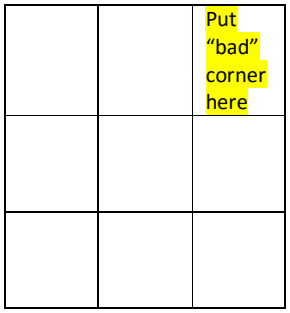
(top view)



x R' U R' D2 R U' R' D2 R2

Orient Corners:

(top view)



UBR

^^ front ^^

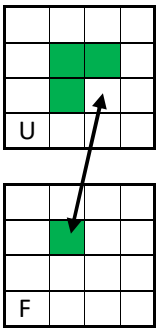
- Repeat **R D R' D'** until correct colour is on top.
- Rotate the top layer to place next bad corner into the UBR position
- Repeat **R D R' D'** until correct colour is on top etc

(don't worry about cube being "corrupted" during the process – it will come good at the end !)

Additional information required for solving 4x4x4

Solving the Centers

Make sure you are absolutely familiar with the colours on your cube – You need to know where each center is supposed to go.

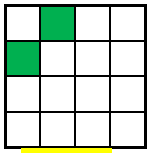


(R'r') F (Rr)

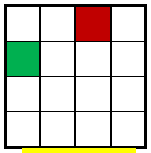
Dedge Pairing

The following 4 algorithms are for pairing-up dedges and storing them in the top layer.

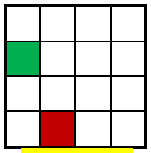
The diagrams represent the configuration of the front face.



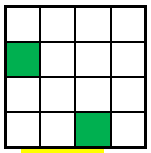
R U' R' (D'd') L' U L (Dd)



U' F' U F (D'd') L' U L (Dd)

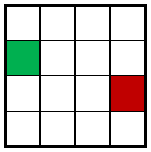


D F D' F' (D'd') L' U L (Dd)

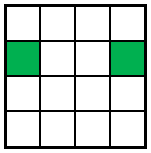


R' D R (D'd') L' U L (Dd)

The following cases are for solving the last 4 dedges. They leave the solved dedge in the middle layers, instead of storing it in the top:



R U R' F R' F' R ...then immediately proceed the case below:



(Dd) R U R' F R' F' R (D'd')

4x4x4 Parity fixes*

A) Flip single edge (Fix Orientation):

pure version:

r2 B2 U2 l U2 r' U2 r U2 F2 r F2 l' B2 r2

Inverse: r2 B2 l F2 r' F2 U2 r' U2 r U2 l' U2 B2 r2

fast version:

(Rr)2 B2 U2 (Ll) U2 (Rr)' U2 (Rr) U2 F2 (Rr) F2 (Ll)' B2 (Rr)2

Inverse: (Rr)2 B2 (Ll) F2 (Rr)' F2 U2 (Rr)' U2 (Rr) U2 (Ll)' U2 B2 (Rr)2

(The fast version, although faster, has the side effect of messing up the last layer, so it is best executed immediately after F2L)

B) Swap Pair of Opposite Edges (Fix Permutation):

r2 U2 r2 (U2u2) r2 u2

Inverse: u2 r2 (U2u2) r2 U2 r2

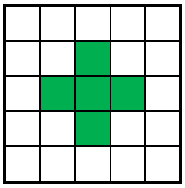
Memorize the above two algs and you can solve any 4x4. These same algorithms can also be used on larger cubes.

*Note: in the notation for 4x4x4 cubes, a lowercase letter refers to an *inner* slice and uppercase letter refers to an *outside* slice.

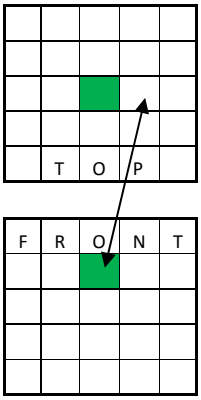
Additional knowledge for solving 5x5x5

Solving the centers

1.Form a cross with the edge-centers



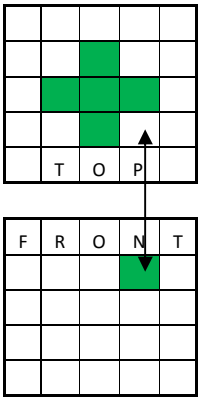
Place desired edge-center in Fu position and apply algorithm below to fill the Ur position.



(R'r') F (Rr)

Repeat this process to assemble the entire cross as shown above

2.Solve the Corner-Centers

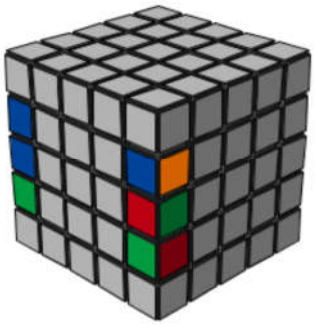


(Rr) U (R'r') U (Rr) U2 (R'r')

If desired corner-centre is on bottom face (instead of front face) do this:

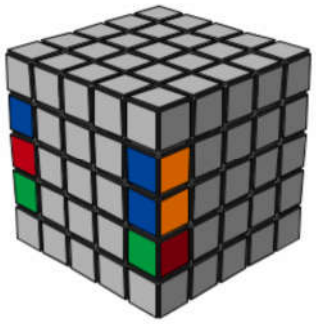
(R2r2) U (R2r2) U (R2r2) U2 (R2r2)

Simple Match/Flip



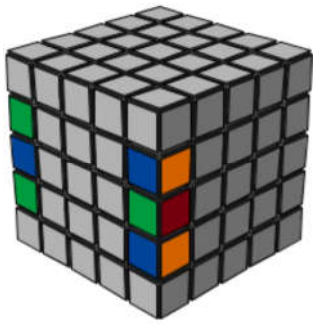
(Dd) R U R' F R' F' R (D'd')

(The next case is the mirror of above:)



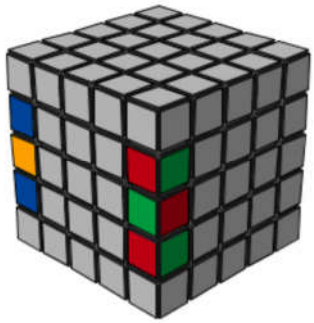
(D'd') L' U' L F' L FL' (Dd)

Double wing-swap



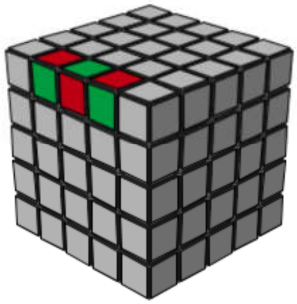
(U2u2) (R2r2) F2 u2 F2 (R2r2) (U2u2)

Double edge-flip



(U'u') (Dd) R U R' F R' F' R (D'd') (Uu)

Single Edge-Flip (Parity)



(R2r2) B2 U2 (Ll) U2 (R'r') U2 (Rr) U2 F2 (Rr) F2 (L'l') B2 (R2r2)

This is the same as the parity algorithm used for the 4x4x4