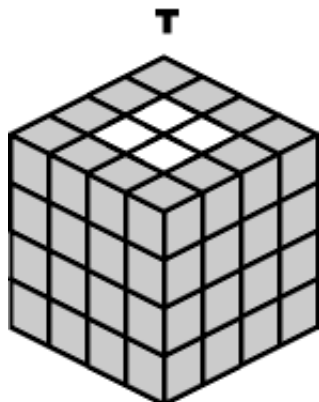


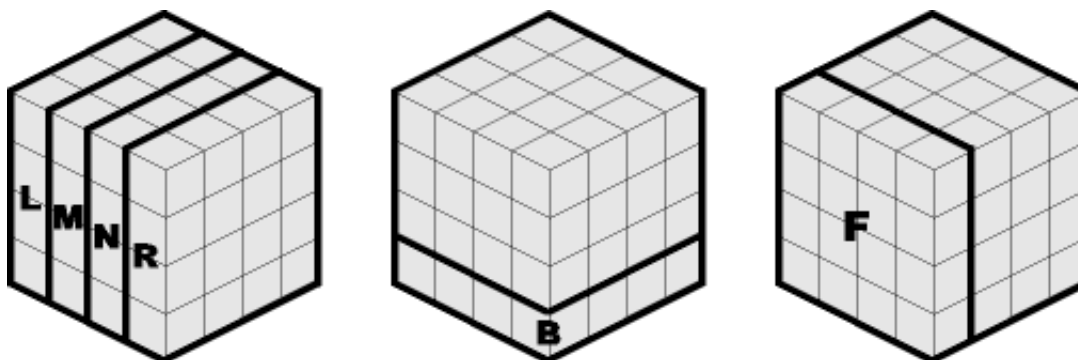
# Rubik's Revenge

## I. Solve the Top Centers



I am not going to describe how to do this, as this should be intuitive and easy enough for anyone to do. Besides, the enormous amount of mind-boggling combinations would cost me many MEGS in GIF files. You can arbitrarily decide what the top side is, and which color to use. After that, the top side stays on top for the remainder of the solution.

### Notation:



There are twelve layers in Rubik's Revenge, but we only need to concern ourselves with **six** of them; the four vertical slices (**Left, M, N and Right**), the bottom layer (**B**) and the front side (**F**).

- **L+** ...move the LEFT slice UP (1/4 turn)
- **L-** ...move the LEFT slice DOWN (1/4 turn)
  
- **M+** ...move the MIDDLE-LEFT slice UP (1/4 turn)
- **M-** ...move the MIDDLE-LEFT slice DOWN (1/4 turn)
  
- **N+** ...move the NEXT-to-the-RIGHT slice UP (1/4 turn)
- **N-** ...move the NEXT-to-the-RIGHT slice DOWN (1/4 turn)

- **R+** ...move the RIGHT slice UP (1/4 turn)
- **R-** ...move the RIGHT slice DOWN (1/4 turn)
  
- **[MN]+** ...move both (vertical) MIDDLE slices UP (1/4 turn)
- **[MN]-** ...move both (vertical) MIDDLE slices DOWN (1/4 turn)
  
- **B+** ...move the BOTTOM layer RIGHT (1/4 turn)
- **B2** ...move the BOTTOM layer HALF-WAY AROUND (1/2 turn)
- **B-** ...move the BOTTOM layer LEFT (1/4 turn)
  
- **F+** ...move the FRONT side CLOCKWISE (1/4 turn)
- **F2** ...move the FRONT side HALF-WAY AROUND (1/2 turn)
- **F-** ...move the FRONT side COUNTER-CLOCKWISE (1/4 turn)

---

NEXT: Solve the [Top Corners...](#)

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[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

[Return to Mathematica](#)

# Rubik's Revenge

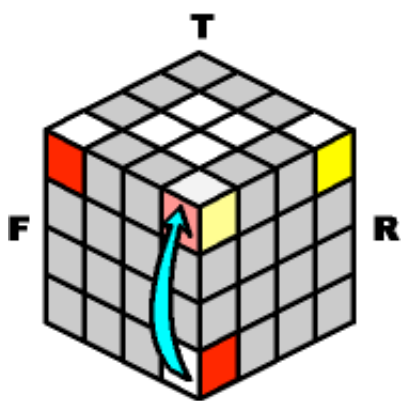
## II. Solve the Top Corners

The original Rubik's Cube had a cross-bar inside that kept the center faces fixed, defining the colors of each face. Rubik's Revenge does not have this luxury. You can look at the puzzle and know right away what the 6 colors are, but where they go is a mystery once the puzzle is scrambled.

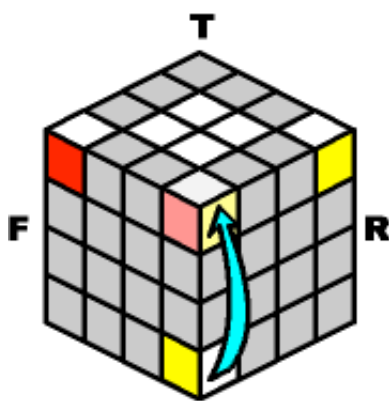
You already chose the top color and what side it belongs to (1 down, 5 to go). By properly placing a single corner-cube on top, you automatically define the color of two more sides (3 sides total). The next step is to match the other neighboring corner-cubes on the top. The neighboring cubes will then determine the colors of yet another 2 sides (5 sides total). This leaves the bottom side with the 6th and unused color, but you don't care about that right now.

### Move Up:

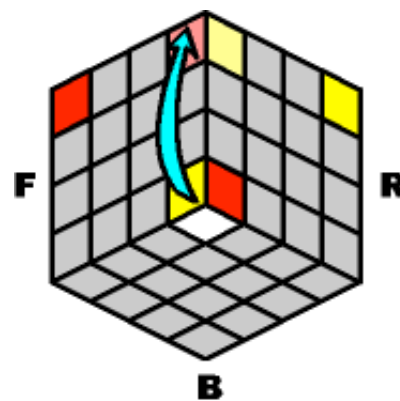
Below are 3 ways to get a corner-cube from the bottom to the top. Because a corner-cube can be rotated 3 different ways, there are 3 different sequences to get the corner-cube arranged correctly. Before attempting any of these moves, you must rotate the bottom layer until the desired corner-cube is directly below its destination.



**F+ B+ F-**



**R- B- R+**



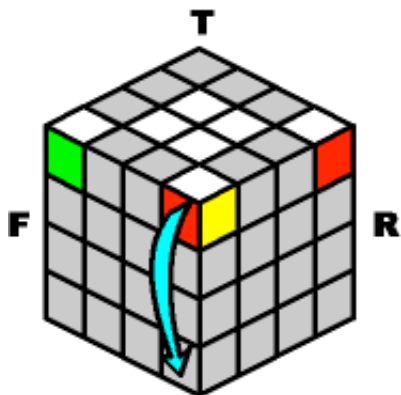
**R- B2 R+ B+  
R- B- R+**

*Oops! Did you MOVE UP this corner piece the wrong way? Don't panic... you can either KNOCK DOWN this piece, and start it over again; or merely ROTATE that same piece in its place later on.*

### Knock Down:

Sometimes, a top corner-cube is already on the top layer, but in the wrong corner. Use the sequence below

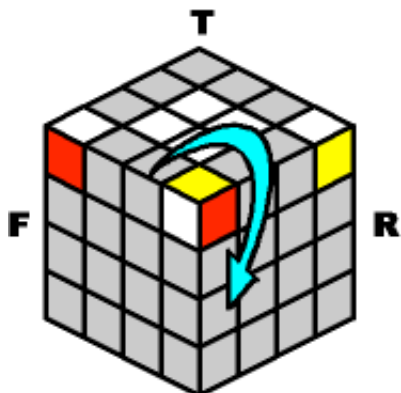
to knock it down to the bottom layer. Afterwards, you can climb it up to its correct spot by using one the previous sequences.



**R- B- R+**

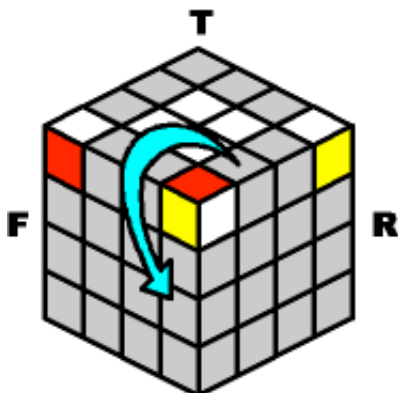
**Rotate:**

Other times, a top corner-cube is in the correct spot, but rotated wrong; or maybe you accidentally used the wrong sequence to bring it up. There's no need to worry as this can be fixed.



**R- B+ R+**  
**F+ B+ F-**

**Rotate Clockwise**



**F+ B- F-**  
**R- B- R+**

**Rotate Counter-Clockwise**

Go ahead and solve the other top corners. You will not disturb any of the ones that are already in place. After arranging all 4 top corner-cubes, you can proceed to solve the [Top Edges](#).

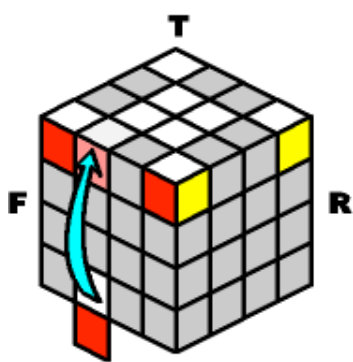
[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

# Rubik's Revenge

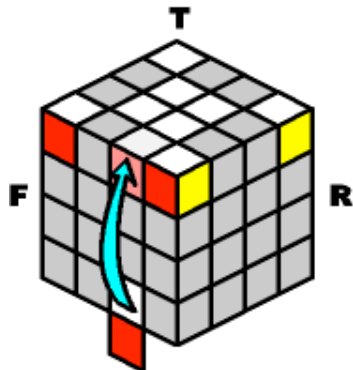
## III. Solve the Top Edges

### Move Up (from the Bottom):

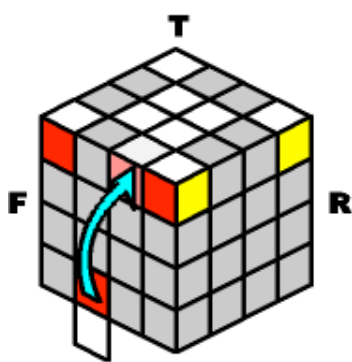
Here are 4 ways to get an edge-cube from the bottom to the top. An edge-cube has a strange property; it can invert itself while moving about, or it can land in unexpected places. Rotate the bottom layer until the edge-cube appears in the front, and then get ready to climb it to the top. Make sure the color patterns match before moving a single slice.



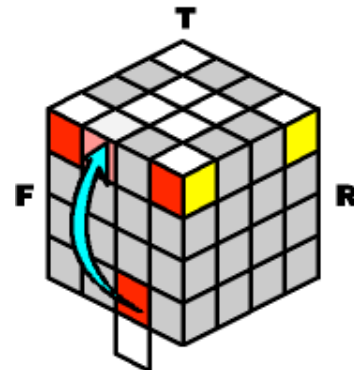
**B- M- B+ M+**



**B+ N- B- N+**



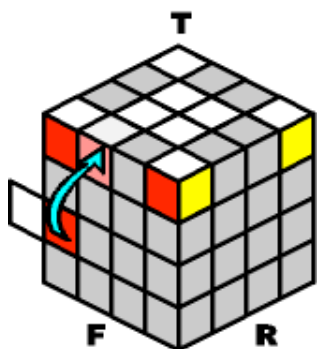
**N- B2 N+ B+  
N- B- N+**



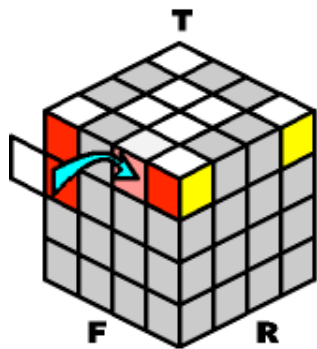
**M- B2 M+ B-  
M- B+ M+**

### Move Up (from the Equator):

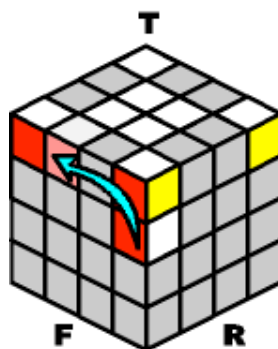
An edge-cube can also appear at the "equator" of the puzzle. It can start from 4 different places, so once again there are 4 different moves to navigate it to the top. You may have to rotate the top layer to match the diagrams below.



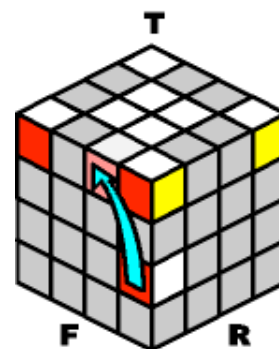
**M- B- L- B+  
M+ B- L+**



**N- B- L- B+  
N+ B- L+**



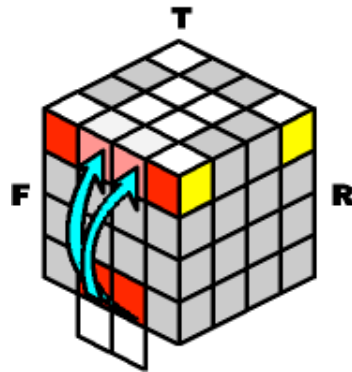
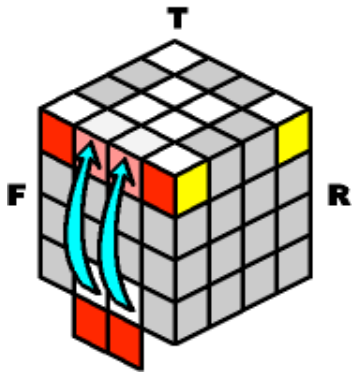
**M- B+ R- B-  
M+ B+ R+**



**N- B+ R- B-  
N+ B+ R+**

### Move Up (Doubles):

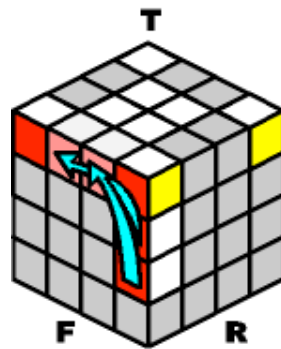
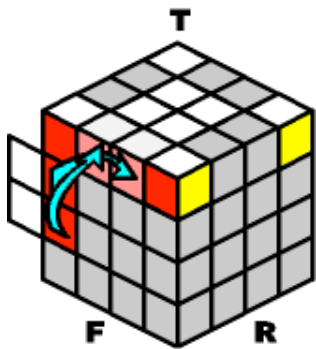
Once in a while, the 2 edge-cubes are already paired. You can still use the previous moves to place them one at a time, or you can use the shortcuts to get them on the top much faster. There is a draw-back: you have to memorize more moves!



**B- [MN]- B+ [MN]+**

**[MN]- B2 [MN]+**

Moving a Pair from the Bottom



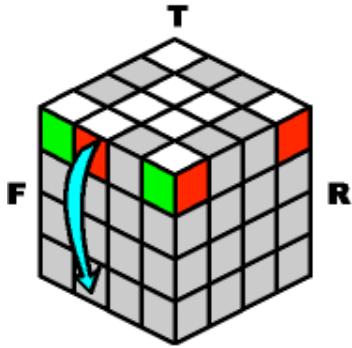
**[MN]- B- L- B+**  
**[MN]+ B- L+**

**[MN]- B+ R- B-**  
**[MN]+ B+ R+**

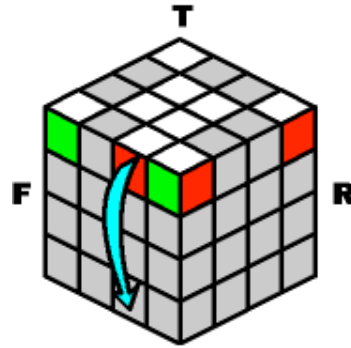
Moving a Pair from the Equator

### Knock Down:

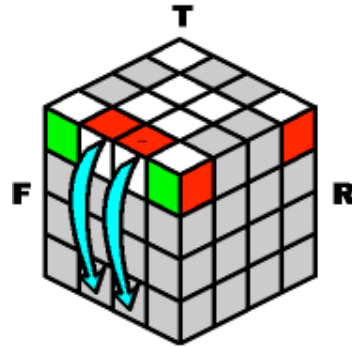
In this case, an edge-cube(s) is in the top layer, but on the wrong side. Use these sequences to to knock it/them back down to the bottom layer.



**M- B- M+**



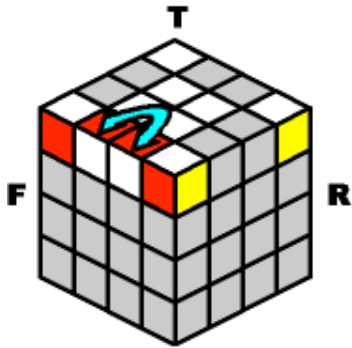
**N- B+ N+**



**[MN]- B- [MN]+**

**Invert:**

And finally, if you need to invert a pair that is already on top:



**[MN]- B2 [MN]+ B-  
[MN]- B+ [MN]+**

Go ahead and solve the other Top Edges. You will not disturb any of the others that are already in place. After arranging all 8 Top Edges, the entire top side should now be complete. Congratulations! Even just solving one side is enough to stun anyone in total awe. You can do three things at this point:

- Go to sleep
- Scramble the cube and re-do the top side again, as practice makes perfect.
- Continue on to the Middle Ages... I mean the [Middle Edges](#).

[@ Notation](#) / [@ Top Centers](#) @ [@ Top Corners](#) @ [@ Top Edges](#)  
[@ Middle Edges](#) @ [@ Bottom Corners](#) @ [@ Bottom Edges](#) @ [@ Middle Centers](#)

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# Rubik's Revenge

## IV. Solve the Middle Edges

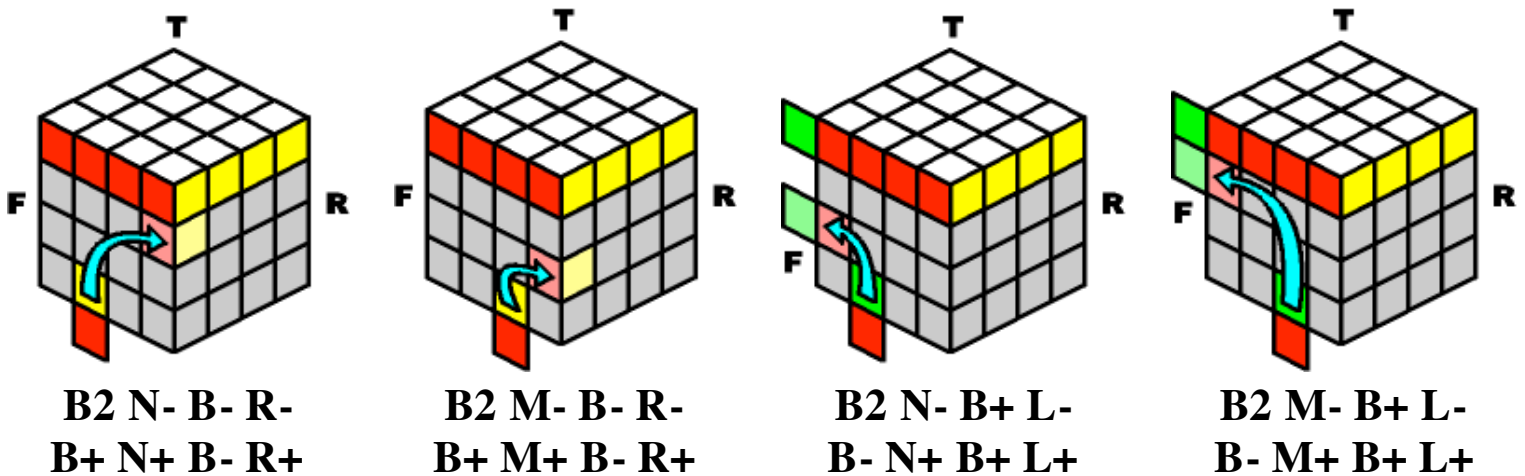
This has the same steps as the "Top Edges" section; move an edge or a pair from the bottom, knock down an edge or a pair to the bottom, and invert a pair of edges.

It may be scary at first to do these moves, and to watch all your work go down the drain while you scramble the cube some more... but this is just temporary. Once you have completed a move correctly, the top side is still intact, with some Middle Edges in place, to boot!

*Hint: Try to match up a Middle Edge by merely rotating the middle horizontal layers first. Chances are, you should be able to finish one or two Middle Edges this way.*

### Move Up (Singles):

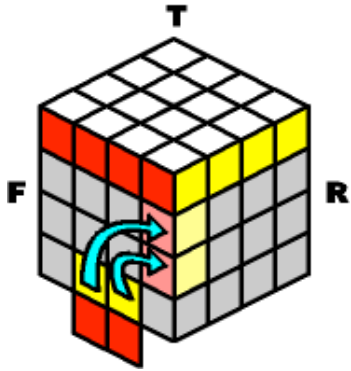
Rotate the bottom layer until the edge-cube appears in the front, and then get ready to climb it to the equator. Make sure the color patterns match before moving a single slice. Notice how the edge-cube (on the bottom, in the *starting* position) looks like it's mismatched with the front side.



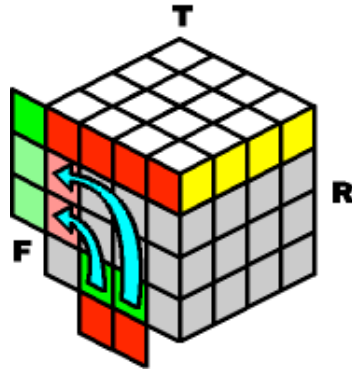
### Move Up (Doubles):

Once in a while, the 2 edge-cubes are already paired. You can still use the previous moves to place them one at a time, or you can use the shortcuts to get them on the equator much faster.



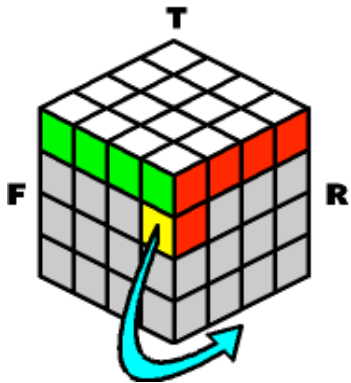


**B2 [MN]- B- R-  
B+ [MN]+ B- R+**

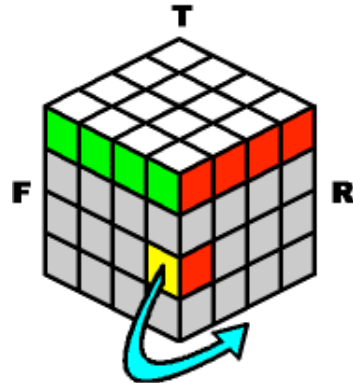


**B2 [MN]- B+ L-  
B- [MN]+ B+ L+**

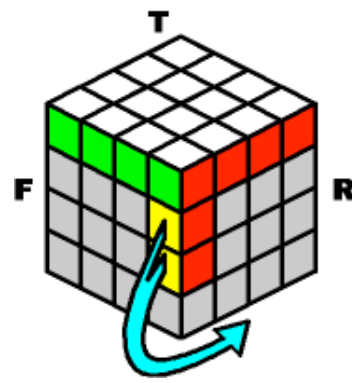
**Knock down:**



**N- B- R-  
B+ N+ B- R+**

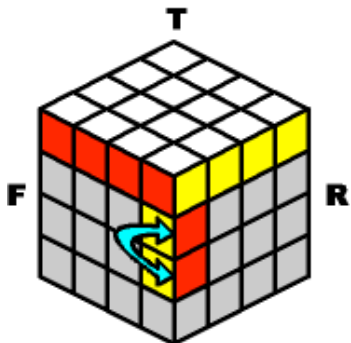


**M- B- R-  
B+ M+ B- R+**



**[MN]- B- R-  
B+ [MN]+ B- R+**

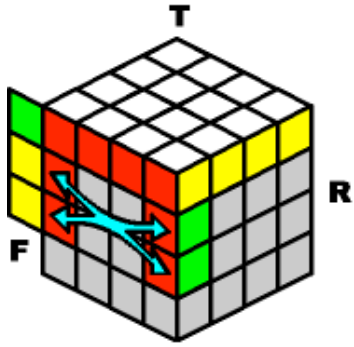
**Invert:**



**[MN]- B- R- B+  
[MN]+ B- R+ B-  
[MN]- B- R- B+  
[MN]+ B- R+**

**Swap:**

I know this is an odd-ball move, but I couldn't resist adding it. This swaps the two middle-edge pairs on the front side:



**F2 B2 F2 B2 F2**

---

After solving all 8 Middle Edges, then go ahead with the [Bottom Corners](#).

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[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

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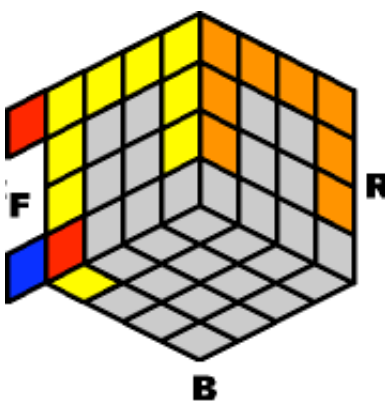
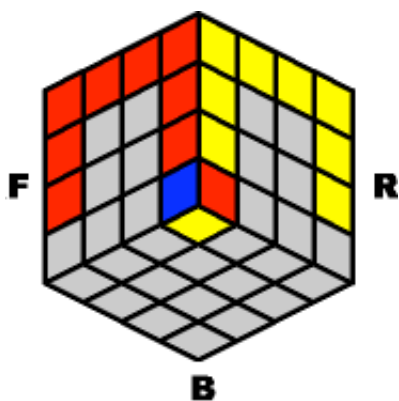
# Rubik's Revenge

## V. Solve the Bottom Corners

By now, all 4 bottom corners are in the bottom layer. There are only 8 corner pieces, and the first 4 are already on the top, forcing the last 4 to the bottom. The first step is to arrange them in the correct positions:

**Turn the bottom layer until at least one bottom cube is in place**

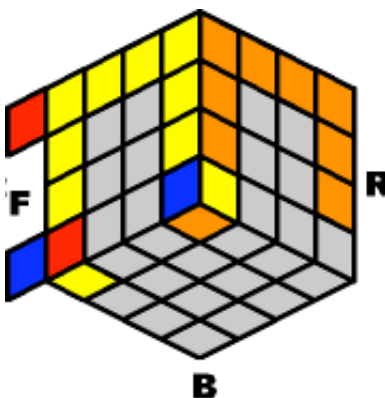
**Now rotate the entire puzzle to place the fixed corner at the lower-left front.**

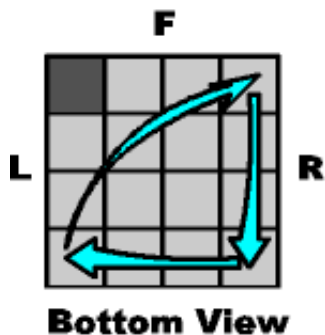


**Repeat this sequence:**

**...until both lower front corner cubes are in place.**

**R- B+ L- B-  
R+ B+ L+ B-**





**What the move does:**  
**It swaps the other**  
**3 corner cubes on the**  
**bottom layer clockwise.**

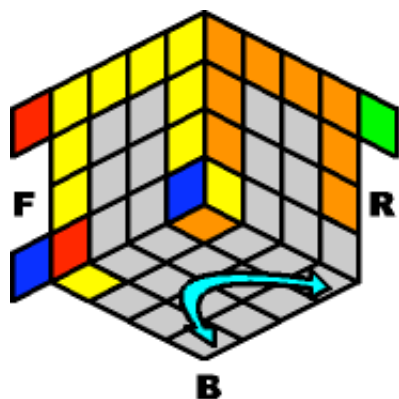
You may have to repeat the sequence **twice** to fix the front bottom corners in place.

**Variations:**

For you experts, there are variations to the prior sequence that yield powerful results. There is no need to memorize these, but if you want to save a few moves, here they are:

Sequence:	Result:
<b>B- R- B+ L- B- R+ B+ L+ B2</b>	The same 3 corners are swapped counter-clockwise.
<b>B2 R- B+ L- B- R+ B+ L+</b>	The (bottom) right 2 corner cubes are swapped.
<b>B+ R- B+ L- B- R+ B+ L+ B+</b>	The (bottom) back 2 corner cubes are swapped.

The two front (bottom corner) cubes should now be in place. The back ones may also be in place; but if they are not, **swap** them with the following move:



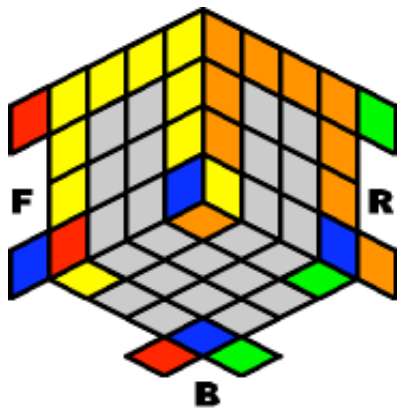
**Swap the lower back corners**

**B+ R- B+ L-**  
**B- R+ B+ L+**  
**B+**

You only have to do the sequence **once** to swap the rear bottom corners in place.

---

All 4 bottom corner cubes are now in place. The next step is to rotate each corner so that their bottom sides are the correct color. In the worst-case scenario, no corner cube has a bottom side with the correct color. In this case, do the following move:



**R- B- R+ B-  
R- B2 R+ B2**

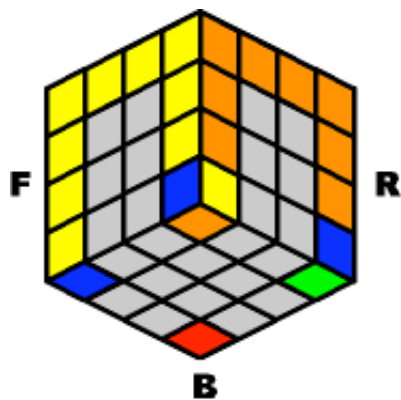
You only have to do this **once**. Now there is at least **ONE** corner cube is finished, with the right color on the bottom side.

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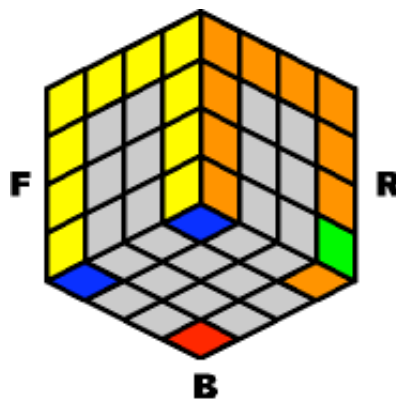
**Rotate the entire puzzle so that one of the finished corners is in the lower-left front**

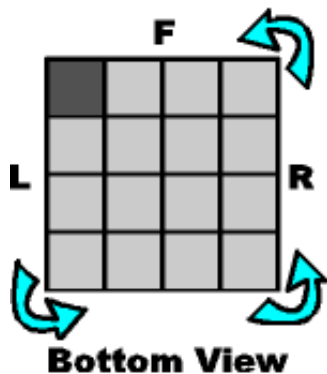
**Repeat the move:**

**...until both front corners are done.**



**R- B- R+ B-  
R- B2 R+ B2**





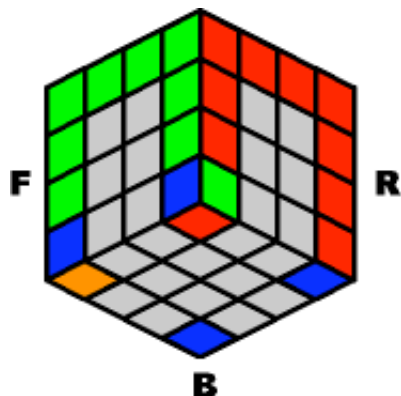
What the move does:  
It twists each of the  
other 3 corner cubes  
counter-clockwise.

You may have to repeat the sequence **twice** to finish the front bottom corners.

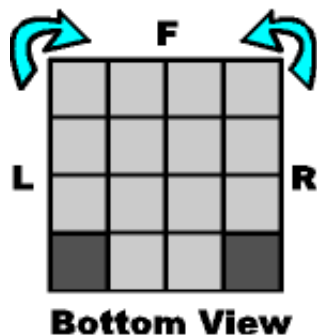
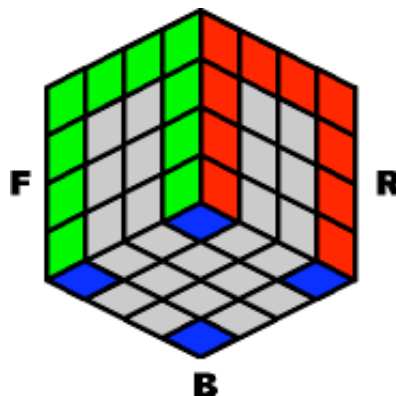
Rotate the entire  
puzzle so that the  
finished corners  
are in the back

Repeat the move:

...until all four  
corners are done.



R- B- R+ B-  
R- B2 R+ B2  
L- B+ L+ B+  
L- B2 L+ B2



What the move does:  
It turns one corner  
clockwise, and turns  
the other corner cube  
counter-clockwise.

You may have to repeat the sequence **twice** to finish all four corners.

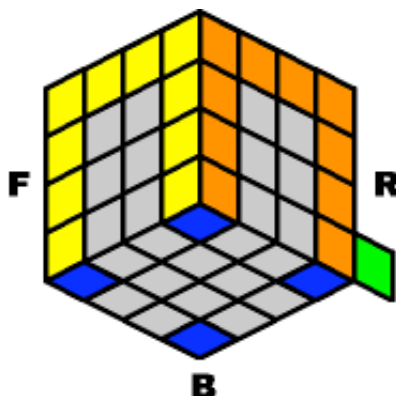
It is now time to solve the [Bottom Edges](#).

[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

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# Rubik's Revenge

## VI. Solve the Bottom Edges



All 8 bottom edges are in the bottom layer, and chances are they are pretty much scrambled. The first step is to arrange them in the correct positions. Randomly choose a front side, and proceed to solve the back edges; starting with the back-left edge first and the back-right second.

Note: these diagrams look strange. The first one appears to take 4 edges and cram them into one. What the first diagram actually means is that if an edge cube is coming from ANY edge-side, then you must repeat the sequence until it appears in the back-left edge. You may have to repeat this sequence **four** times before that happens.

The second diagram represents any edge from the front moving to the back-left edge. You may have to repeat that squence **twice** before it lands there. The dark squares on both diagrams are edges cubes that do not move at all during the process.

---

Now continue to...

~~~ **Move an edge to the back-left** ~~~

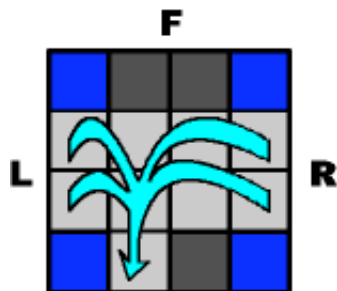
---

**Move an edge  
from either side**

**Repeat the  
sequence:**

**...until the edge lands  
on the back-left**





**Bottom View**

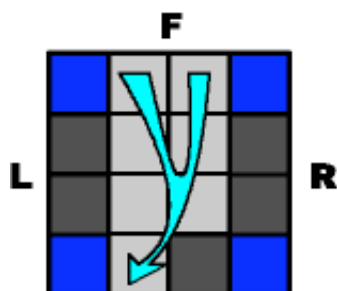
**M- B- M+ B2  
M- B- M+**

**You may have to  
repeat the sequence  
as many as 4 times.**

**Move an edge  
from the front**

**Repeat the  
sequence:**

**...until the edge lands  
on the back-left**



**Bottom View**

**M- B2 M+ B-  
M- B- M+  
N- B2 N+ B+  
N- B+ N+**

**You may have to  
repeat the sequence  
as many as 2 times.**

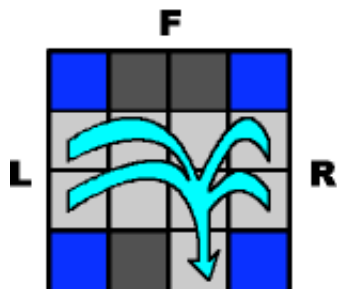
Now continue to...

**~~~ Move an edge to the back-right: ~~~**

**Move an edge  
from either side**

**Repeat the  
sequence:**

**...until the edge lands  
on the back-right**



**Bottom View**

**N- B+ N+ B2  
N- B+ N+**

**You may have to  
repeat the sequence  
as many as 4 times.**

**Move an edge**

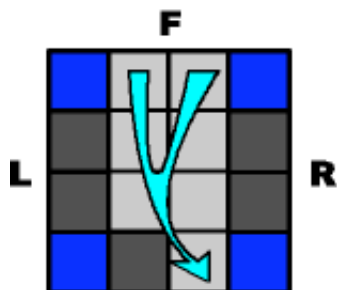
**Repeat the**

**...until the edge lands**

from the front

sequence:

on the back-right



**N- B2 N+ B+**  
**N- B+ N+**  
**M- B2 M+ B-**  
**M- B- M+**

You may have to repeat the sequence as many as 2 times.

**Bottom View**

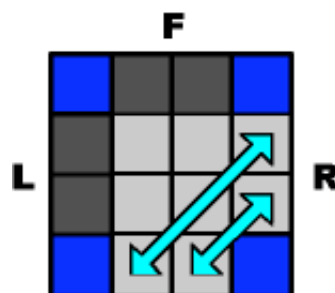
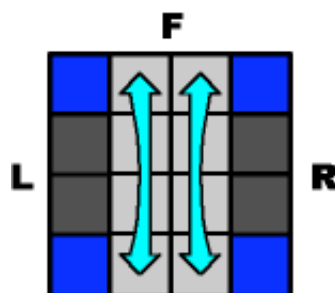
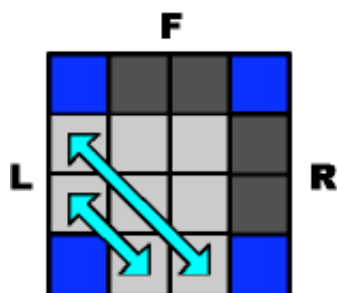
If you are lucky, the edges going to the back are already paired. You can still move them one at a time, or you can use these shortcuts:

~~~ Move an edge-pair ~~~

...from the left:

...from the front:

...from the right:



**Bottom View**

**Bottom View**

**Bottom View**

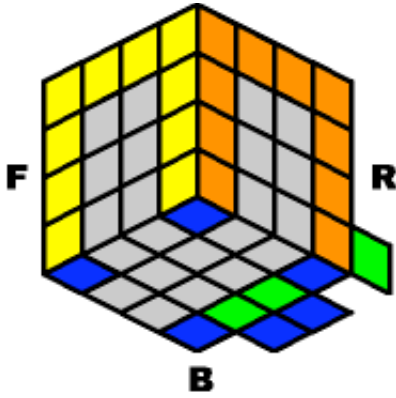
**N- B+ N+ B2**  
**N- B+ N+**  
**M- B- M+ B2**  
**M- B- M+**

**M- M- B2**  
**M- M- B2**  
**M- M-**

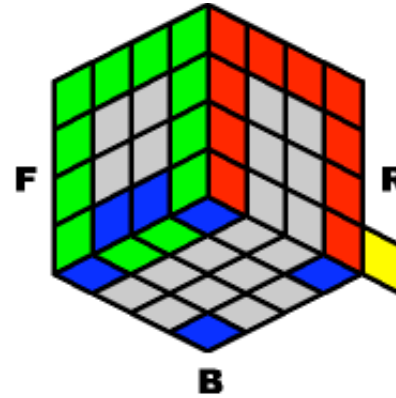
**M- B- M+ B2**  
**M- B- M+**  
**N- B+ N+ B2**  
**N- B+ N+**

All sequences only have to be performed **once** to accomplish the move.

Both back edges should now be in place....



...rotate the entire puzzle so that the fixed edges are in the front...



...and solve the "other" back side.

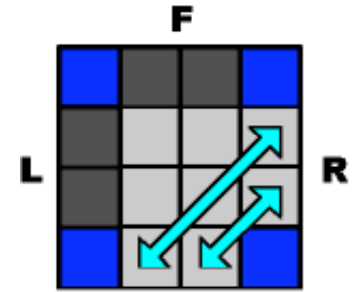
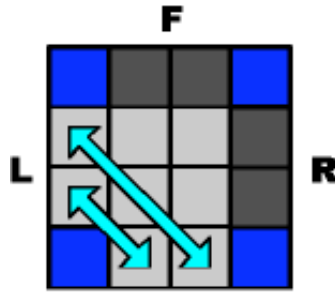
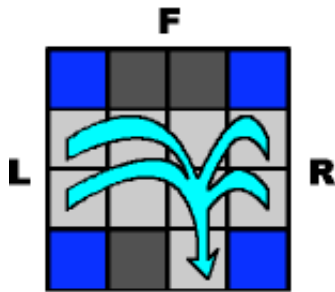
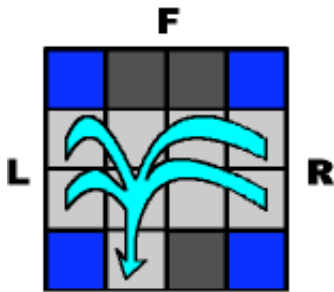
Once again, you have to use the same sequences as before, except this time, the edges are coming from the sides only.

Move a single edge to the back-left:

Move a single edge to the back-right:

Swap the left pair of edges with the back pair of edges:

Swap the right pair of edges with the back pair of edges:



**Bottom View**

**Bottom View**

**Bottom View**

**Bottom View**

M- B- M+ B2  
M- B- M+

N- B+ N+ B2  
N- B+ N+

N- B+ N+ B2  
N- B+ N+  
M- B- M+ B2  
M- B- M+

M- B- M+ B2  
M- B- M+  
N- B+ N+ B2  
N- B+ N+

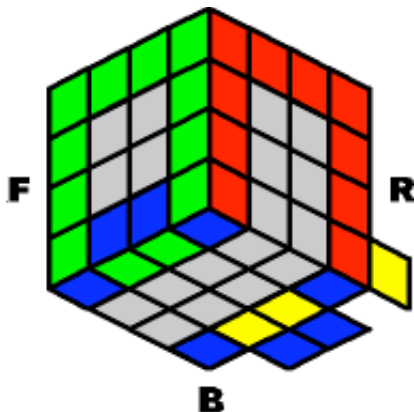
(4 times max.)

(4 times max.)

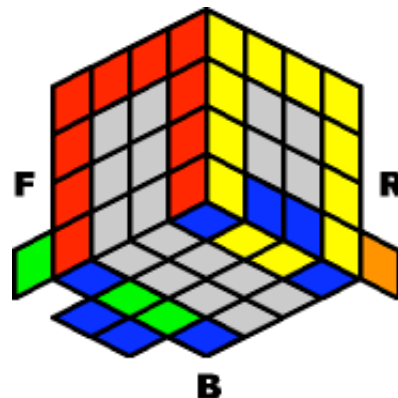
(1 time only)

(1 time only)

The back and front edges are now in place....



...rotate the entire puzzle so that the fixed edges are on the sides...



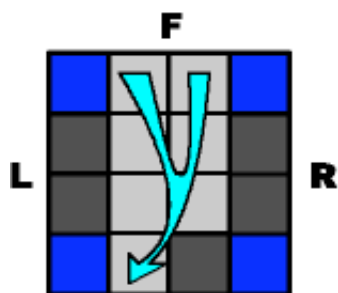
...and solve the back side again.

This time, you only have to use the sequences that move the edges from the front to the back:

Move a single edge to the back-left:

Move a single edge to the back-right:

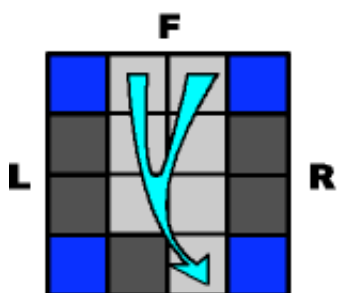
Swap the front pair of edges with the back pair of edges:



Bottom View

M- B2 M+ B-  
M- B- M+  
N- B2 N+ B+  
N- B+ N+

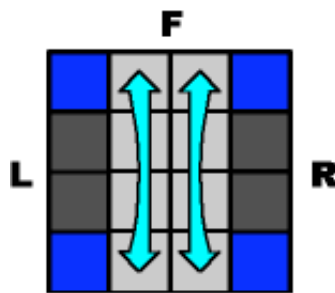
(2 times max.)



Bottom View

N- B2 N+ B+  
N- B+ N+  
M- B2 M+ B-  
M- B- M+

(2 times max.)



Bottom View

M- M- B2  
M- M- B2  
M- M-

(1 time only)

Once you solve the back side (for the third time), the remaining 2 edge cubes are forced in the front side, where they belong! Therefore, all 8 bottom edges are in place. Now for the next step: inverting.

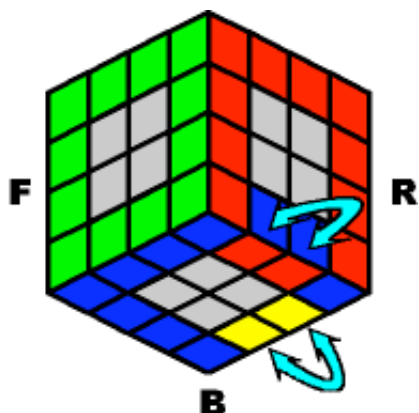
## Inversion

There are 5 different inversion schemes:

1. Invert 2 edge-pairs on adjacent sides
2. Invert 2 edge pairs on opposite sides
3. Invert 4 edge pairs
4. Invert 3 edge pairs
5. Invert 1 edge pair

For each inversion scheme, you must rotate the entire puzzle so that the inverted pairs are positioned exactly like the ones in the diagrams, *before* attempting the sequence of moves!

~~~ Case #1: Invert two adjacent edge-pairs ~~~



[MN]- B- [MN]+ B-  
 [MN]- B2 [MN]+ B2  
 [MN]- B- [MN]+ B-  
 [MN]- B2 [MN]+ B2

**Result:**

The bottom edges are solved.

~~~ Case #2: Invert two opposite edge-pairs ~~~



[MN]- B- [MN]+ B-  
 [MN]- B2 [MN]+ B2  
 [MN]- B- [MN]+ B-  
 [MN]- B2 [MN]+ B2

**Result:**

Two adjacent edge-pairs are still inverted. Go back to Case #1, do the sequence, and the bottom edges are solved.

~~~ Case #3: Invert four edge-pairs ~~~



[MN]- B- [MN]+ B-  
 [MN]- B2 [MN]+ B2  
 [MN]- B- [MN]+ B-

**Result:**

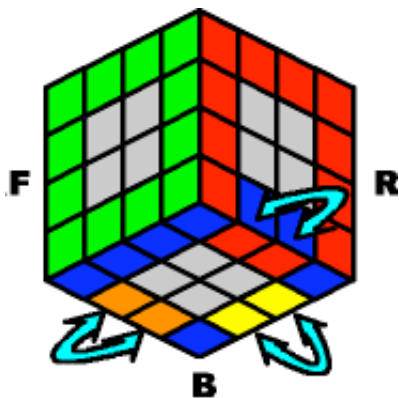
Two adjacent edge-pairs are still inverted. Go back to Case #1,



**[MN]- B2 [MN]+ B2**

do the sequence, and the bottom edges are solved.

~~~ Case #4: Invert three edge-pairs ~~~

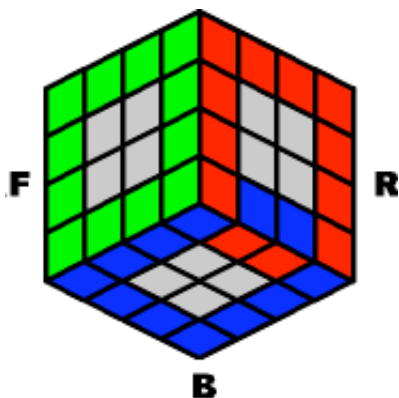


**M- B- M- B2  
M- B2 M+ B+ M+  
N- B- N- B2  
N- B2 N+ B+ N+  
M- B- M- B2  
M- B2 M+ B+ M+**

**Result:**

The bottom edges are solved.

~~~ Case #5: Invert one edge-pair ~~~



**M- B- M- B2  
M- B2 M+ B+ M+  
N- B- N- B2  
N- B2 N+ B+ N+  
M- B- M- B2  
M- B2 M+ B+ M+**

**Result:**

Two adjacent edge-pairs are still inverted. Go back to Case #1, do the sequence, and the bottom edges are solved.

As it turns out, only two different sequences were used throughout all five cases. Now that the bottom edges are solved, the only thing left are the [Middle Centers](#).

[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

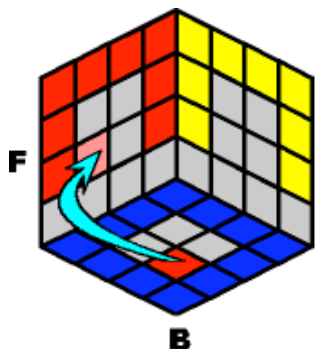
[Return to Mathematica](#)

# Rubik's Revenge

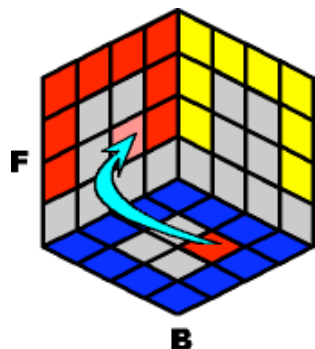
## VII. Solve the Middle Centers

### Swap:

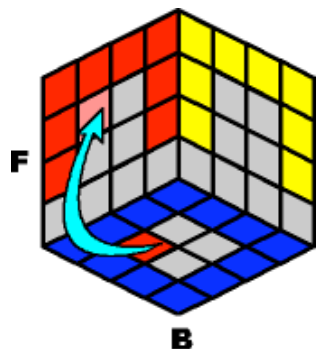
The end is near. Use either of the four moves below to place a center face from the bottom to one of the vertical sides. You may have to rotate the bottom layer first to get everything set. Do not attempt to solve an entire side at a time; just keep climbing a center face somewhere from the bottom side to its proper side. What happens to the square that it lands on? It gets sent down to the bottom layer, so each of these four moves can also be used as **knock-downs**.



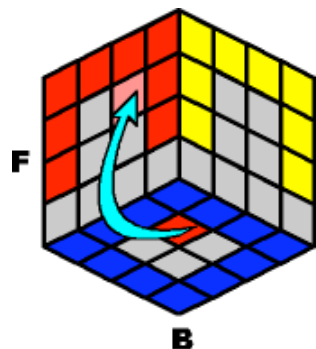
**M- B- N- B+**  
**M+ B- N+**



**N- B+ M- B-**  
**N+ B+ M+**



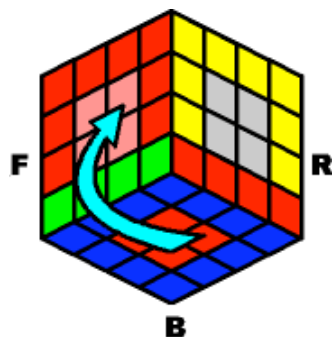
**M- B+ N- B-**  
**M+ B+ N+**



**N- B- M- B+**  
**N+ B- M+**

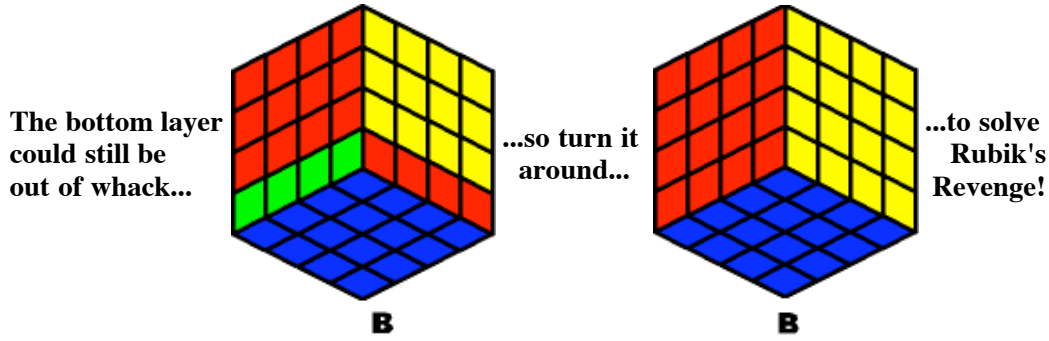
*Hint: try not to knock down any center face that has the same color as the bottom face. If you do, then the bottom face will fill up and force you to do more knock-downs later on, which is unnecessary.*

**Shortcut:** Move all 4 faces from the bottom side to the front side:



**M- B- N- B+**  
**M+ B2 M- B+**  
**N+ B2 N- B+**  
**M+ B2 M- B+**  
**N+ B- M+**

After finishing all of the vertical sides, the last 4 center faces are automatically forced to the bottom layer, where they belong anyway!



---

**Wean me, Mama!**  
**THE END**

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[@ Notation / Top Centers @ Top Corners @ Top Edges](#)  
[@ Middle Edges @ Bottom Corners @ Bottom Edges @ Middle Centers](#)

[Return to Mathematica](#)