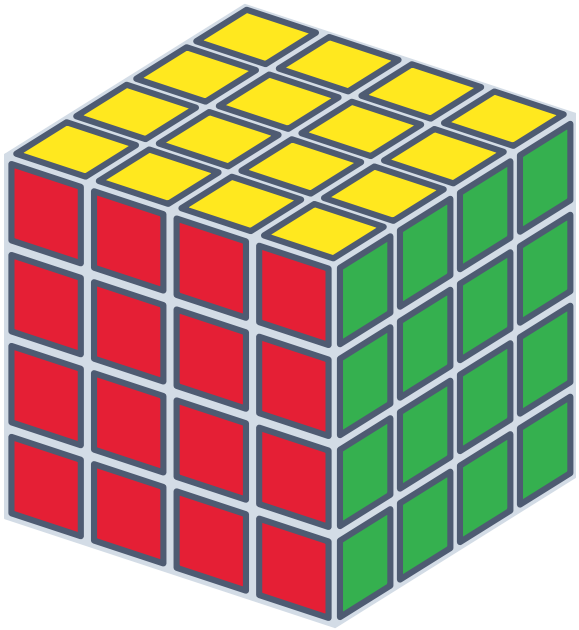
LEVEL 0 STORE

# 4x4 REDUCTION METHOD

**CENTERS · EDGES · AS A 3x3 · PARITIES**

RUBIK'S CUBE 4x4 · 4 STEPS · 9 CASES · WCA NOTATION



## PRINTABLE GUIDE TO THE VIDEO SERIES

First you turn the 4x4 into a 3x3: build the centres and pair the edges. From there it is solved with the 3x3 steps, outer layers only; the parities are the two cases a 3x3 never has. One case per page, with the same scenes as the videos.

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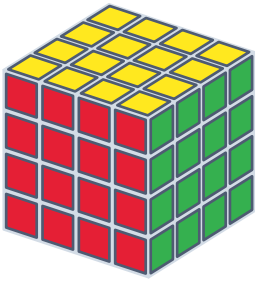
# HOW TO READ THIS GUIDE

## HOLD IT LIKE THIS

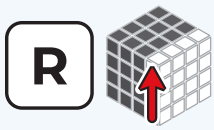


- yellow on top
- red: facing you
- green on the right
- white at the bottom

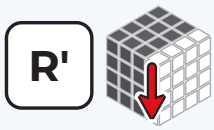
The 4x4 has 8 CORNERS (as on a 3x3), 24 EDGES that go in twos (the 3x3's 12 edges, each split in two halves) and 24 CENTRES, 4 per face. The centres are not fixed: you decide where each colour goes. Keep your cube's scheme (white opposite yellow, red opposite orange, green opposite blue, and the order round them): if two centres are swapped, the corners won't fit.
The drawings always use these colours; any others work the same.

## NOTATION (WCA)

As on a 3x3, each letter is a face: R right, L left, U up, D down, F front, B back. The letter alone turns the outer layer; lower case (r, u...) only the inner layer next to it; with w (Rw, Uw...) both together. The apostrophe (') is the opposite turn and 2 a half turn.



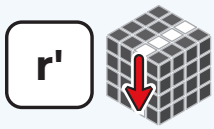

**RIGHT LAYER · UP**



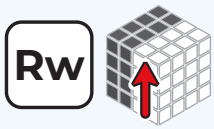

**RIGHT LAYER · DOWN**



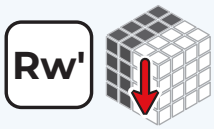

**INNER RIGHT SLICE · UP**



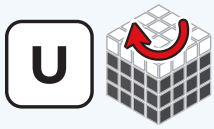

**INNER RIGHT SLICE · DOWN**



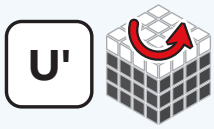

**RIGHT TWO LAYERS · UP**



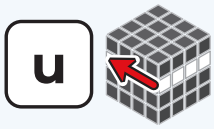

**RIGHT TWO LAYERS · DOWN**



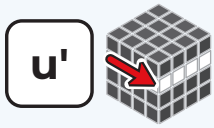

**TOP LAYER · LEFT**




**TOP LAYER · RIGHT**




**INNER TOP SLICE · LEFT**




**INNER TOP SLICE · RIGHT**




**TOP TWO LAYERS · LEFT**




**TOP TWO LAYERS · RIGHT**

## COLOUR AND GREY

The case's pieces: full colour, black outline.

Done, or a guide: in colour.

Don't matter yet: grey.

In the centres only the centres are in colour (in the first, only the yellow); while pairing, the centres and the case's edges. In the parities everything is in colour: the whole cube counts. Top right of each case is the video's diagram: the view from above, or the front with its neighbours.

# THE METHOD IN 4 STEPS

Reduction: first you make the 4x4 look like a 3x3 (each face with a one-colour centre, each edge with its two halves together). From there it is no longer a 4x4: it is solved as a 3x3.

## 4x4 PHASE

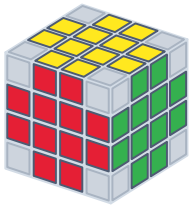
reduction: what is new on a 4x4



### 1 CENTERS

Build the 6 centres, each 4 stickers of one colour: bars of 2 lifted with an inner layer (r). The last two with r U2 r'.

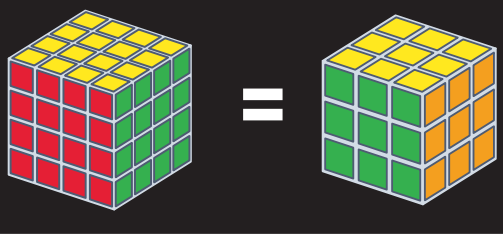
1a · FIRST CENTER · p. 4 · 1b · LAST 2 CENTERS · p. 5



### 2 EDGES

Join the two halves of each edge: Uw' joins them, R U R' stores the pair, Uw puts the centres back. The last two have their own algorithm.

2a · PAIR AN EDGE · p. 6 · 2b · LAST 2 EDGES · p. 7 · 2c · LAST 2 · ONE FLIPPED · p. 8



### HERE THE 4x4 IS A 3x3

One-colour centres + paired edges = a big 3x3. From here the next steps are the 3x3's: turn only the outer layers (R, U, F...), never the inner ones, and you don't break what you already built.

## 3x3 PHASE

the 3x3 steps you already know

### 3 AS A 3x3

Solve it with the 3x3 method you use: beginner's (cross, corners, second layer, last layer) or CFOP (cross, F2L, OLL, PLL). Our 3x3 guides, free on levelcero.com:

**Beginner's method**
7 steps, layer by layer

**F2L**
all 41 cases

**OLL**
all 57 cases

**PLL**
all 21 cases



### 4 PARITIES

Only if they show up, during OLL or PLL: one or three edges flipped (OLL) or a PLL a 3x3 never has, like two opposite edges swapped (PLL). Each has its algorithm.

4a · OLL PARITY · p. 10 · 4b · PLL PARITY · p. 11 · 4c · DOUBLE PARITY · p. 12

# 4x4 CENTERS

1a

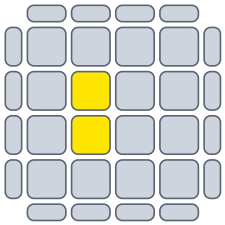
Video on YouTube
scan the QR
levelcero.com · drawings

LEVEL 0

## FIRST CENTER

### LIFT A BAR OF 2

Build each centre in bars of 2. With one yellow bar already on top, find the other on another face: F stands it up under the gap and r lifts it in. Nothing else matters yet (grey).





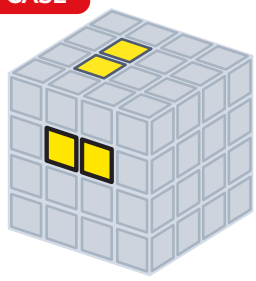
**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

Seen from above: the top layer and its sides. Thick outline: the case's pieces.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

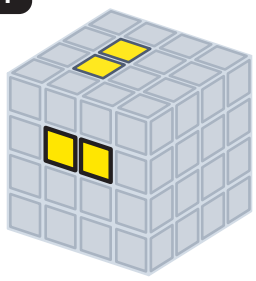
ALG **F** **r**

**CASE**



**LIFT A BAR OF 2**

**1**

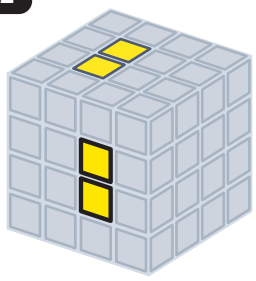


**F**



**FRONT · CLOCKWISE**

**2**

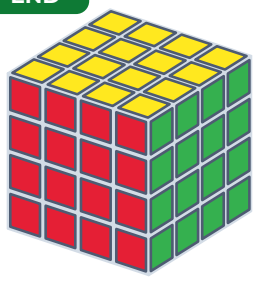


**r**



**INNER RIGHT SLICE · UP**

**END**



**CENTER DONE**

# 4x4 CENTERS

1b

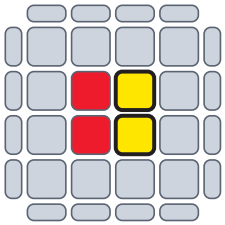
Video on YouTube
scan the QR
levelcero.com · drawings

LEVEL 0

## LAST 2 CENTERS

### SWAP A BAR OF 2

Two centres left: a bar of 2 is swapped between the front and the top. With the bar on the right, r U2 r' sends it home without breaking the other centres.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

The front face and, round it, each neighbour's row. Thick outline: the case's pieces.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

ALG **r** **U2** **r'**

CASE



**SWAP A BAR OF 2**

1



**r** 

**INNER RIGHT SLICE · UP**

2



**U2** 

**TOP LAYER · HALF TURN**

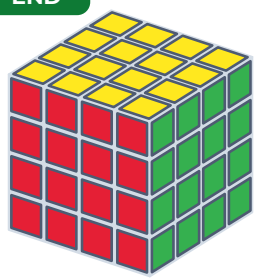
3



**r'** 

**INNER RIGHT SLICE · DOWN**

END



**CENTERS DONE**

# 4x4 EDGES

2a

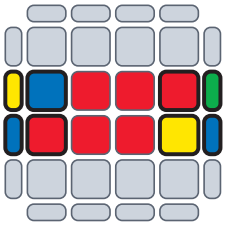
Video on YouTube
scan the QR
levelcero.com · drawings

LEVEL 0

## PAIR AN EDGE

### JOIN THE 2 HALVES

Put the two halves of an edge at the front left and front right. Uw' joins them, R U R' stores the pair on top and brings an unpaired one down, Uw puts the centres back. Repeat until 2 are left.





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- yellow on top
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The front face and, round it, each neighbour's row. Thick outline: the case's pieces.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

ALG **Uw' ( R U R' ) Uw**

**CASE**



**JOIN THE 2 HALVES**

**1**



**Uw'** 

**TOP TWO LAYERS · RIGHT**

**2**



**R** 

**RIGHT LAYER · UP**

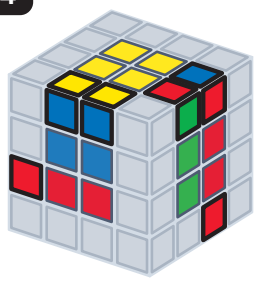
**3**



**U** 

**TOP LAYER · LEFT**

**4**



**R'** 

**RIGHT LAYER · DOWN**

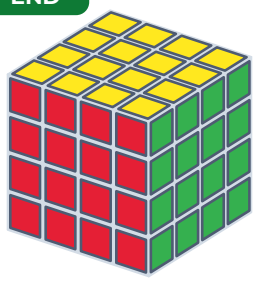
**5**



**Uw** 

**TOP TWO LAYERS · LEFT**

**END**



**EDGE PAIRED**

# 4x4 EDGES

2b

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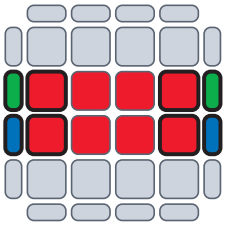
LEVEL 0

## LAST 2 EDGES

### PAIR THE LAST 2

The last two edges, at the front left and front right, their halves crossed. Uw' joins the halves, R U R' F R' F' R flips the right pair and Uw closes.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

The front face and, round it, each neighbour's row. Thick outline: the case's pieces.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

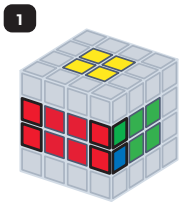
**ALG** Uw' ( R U R' ) ( F R' F' R ) Uw

**CASE**



PAIR THE LAST 2

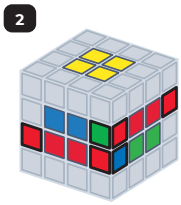
**1**



Uw' 

TOP TWO LAYERS · RIGHT

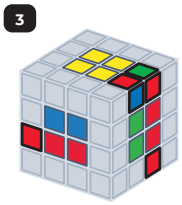
**2**



R 

RIGHT LAYER · UP

**3**



U 

TOP LAYER · LEFT

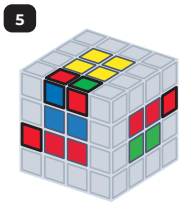
**4**



R' 

RIGHT LAYER · DOWN

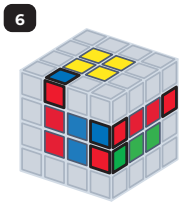
**5**



F 

FRONT · CLOCKWISE

**6**



R' 

RIGHT LAYER · DOWN

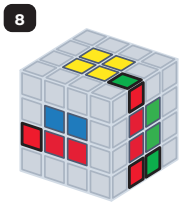
**7**



F' 

FRONT · COUNTER-CLOCKWISE

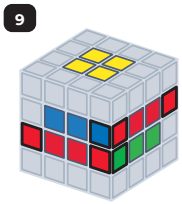
**8**



R 

RIGHT LAYER · UP

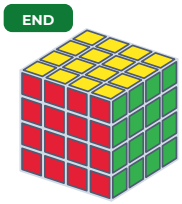
**9**



Uw 

TOP TWO LAYERS · LEFT

**END**



**EDGES PAIRED**

→ now it is a 3x3

## DONE: NOW IT IS A 3x3

Centres built and edges paired: go on with the 3x3 steps, outer layers only (step 3, p. 9).

# 4x4 EDGES

2c

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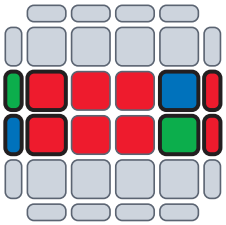
LEVEL 0

## LAST 2 · ONE FLIPPED

### ONE IS FLIPPED

If the halves won't join, one edge is flipped: R U R' F R' F' R flips it first, then the usual algorithm.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

The front face and, round it, each neighbour's row. Thick outline: the case's pieces.

1 · CENTERS | **2 · EDGES** | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

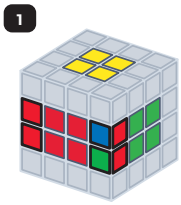
**ALG** (R U R') (F R' F' R) Uw' (R U R') (F R' F' R) Uw

**CASE**



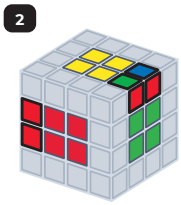
ONE IS FLIPPED

**1**



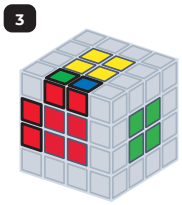
R — RIGHT LAYER · UP

**2**



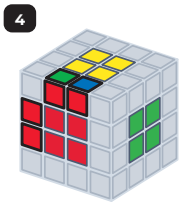
U — TOP LAYER · LEFT

**3**



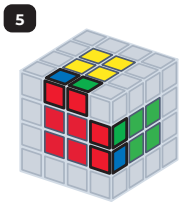
R' — RIGHT LAYER · DOWN

**4**



F — FRONT · CLOCKWISE

**5**



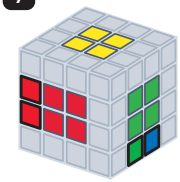
R' — RIGHT LAYER · DOWN

**6**



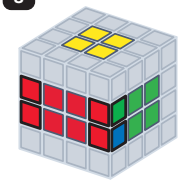
F' — FRONT · COUNTER-CLOCKWISE

**7**



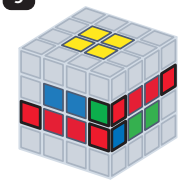
R — RIGHT LAYER · UP

**8**



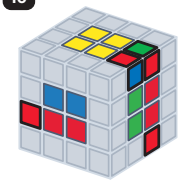
Uw' — TOP TWO LAYERS · RIGHT

**9**



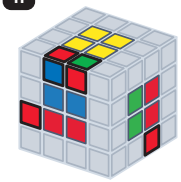
R — RIGHT LAYER · UP

**10**



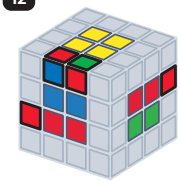
U — TOP LAYER · LEFT

**11**



R' — RIGHT LAYER · DOWN

**12**



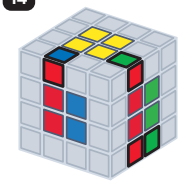
F — FRONT · CLOCKWISE

**13**



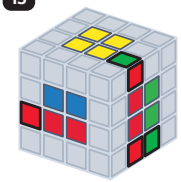
R' — RIGHT LAYER · DOWN

**14**



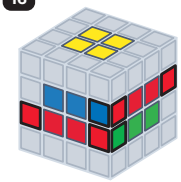
F' — FRONT · COUNTER-CLOCKWISE

**15**



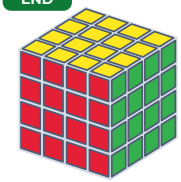
R — RIGHT LAYER · UP

**16**



Uw — TOP TWO LAYERS · LEFT

**END**



EDGES PAIRED

→ now it is a 3x3

**DONE: NOW IT IS A 3x3**

Centres built and edges paired: go on with the 3x3 steps, outer layers only (step 3, p. 9).

# 4x4 REDUCED

3

Video on YouTube
scan the QR
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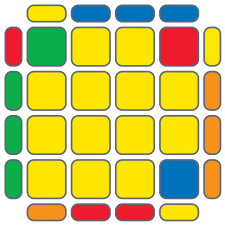
LEVEL 0

## AS A 3x3

### OUTER LAYERS ONLY

One-colour centres and paired edges: it is a 3x3 now. Solve it with the 3x3 steps you already know, turning only the outer layers (R, U, F...). Here, a Sune as an example.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

Seen from above: the top layer and, round it, its sides.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | **3 · AS A 3x3** | 4 · PARITIES

**ALG** R U R' U R U2 R'

**CASE**



OUTER LAYERS ONLY

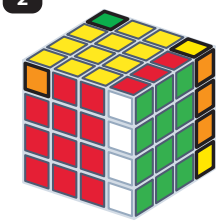
**1**



R 

RIGHT LAYER · UP

**2**



U 

TOP LAYER · LEFT

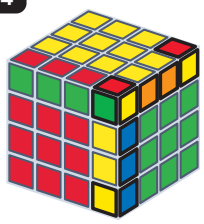
**3**



R' 

RIGHT LAYER · DOWN

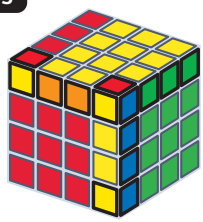
**4**



U 

TOP LAYER · LEFT

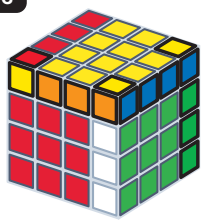
**5**



R 

RIGHT LAYER · UP

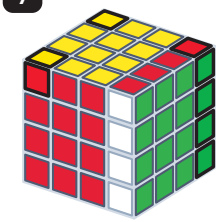
**6**



U2 

TOP LAYER · HALF TURN

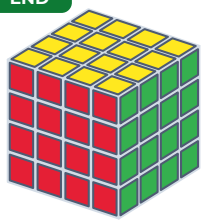
**7**



R' 

RIGHT LAYER · DOWN

**END**



CUBE SOLVED

# 4x4 PARITY

4a

Video on YouTube
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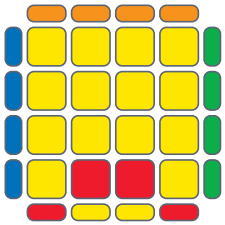
LEVEL 0

## OLL PARITY

### 1 EDGE FLIPPED

It shows up in OLL: one or three edges flipped, which a 3x3 never has. With a flipped one at the top front, this algorithm flips it alone; then go on with your OLL.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

Seen from above: the top layer and, round it, its sides. Arrow: where each piece goes.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

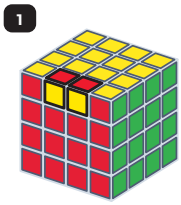
**ALG** r2 B2 U2 l U2 ( r' U2 r ) U2 F2 r F2 l' B2 r2

CASE



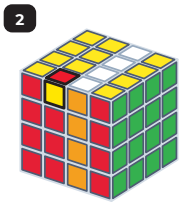
1 EDGE FLIPPED

1



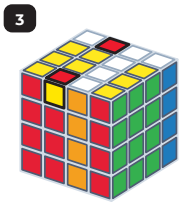
r2 — INNER RIGHT SLICE · HALF TURN

2



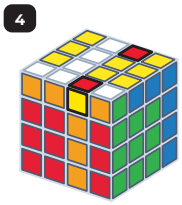
B2 — BACK LAYER · HALF TURN

3



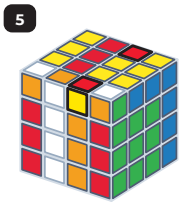
U2 — TOP LAYER · HALF TURN

4



l — INNER LEFT SLICE · DOWN

5



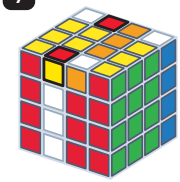
U2 — TOP LAYER · HALF TURN

6



r' — INNER RIGHT SLICE · DOWN

7



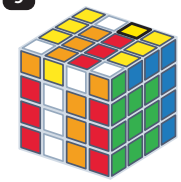
U2 — TOP LAYER · HALF TURN

8



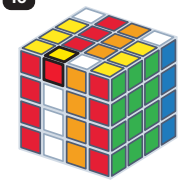
r — INNER RIGHT SLICE · UP

9



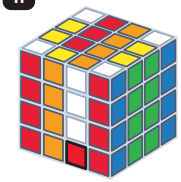
U2 — TOP LAYER · HALF TURN

10



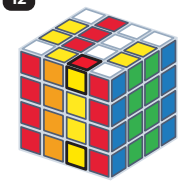
F2 — FRONT · HALF TURN

11



r — INNER RIGHT SLICE · UP

12



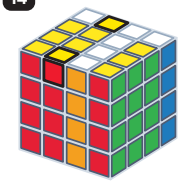
F2 — FRONT · HALF TURN

13



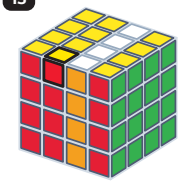
l' — INNER LEFT SLICE · UP

14



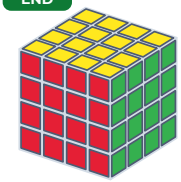
B2 — BACK LAYER · HALF TURN

15



r2 — INNER RIGHT SLICE · HALF TURN

END



CUBE SOLVED

# 4x4 PARITY

4b

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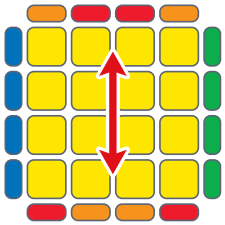
LEVEL 0

## PLL PARITY

### 2 OPPOSITE EDGES

It shows up in PLL: a case a 3x3 never has, like just two opposite edges swapped. This algorithm swaps the top front and top back edges.





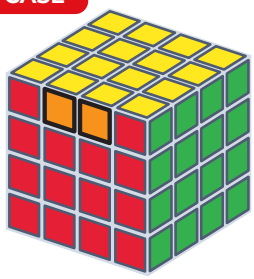
**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

Seen from above: the top layer and, round it, its sides. Arrow: where each piece goes.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | 4 · PARITIES

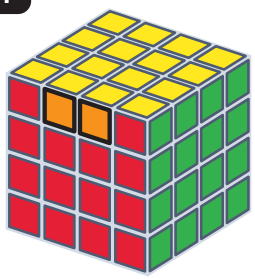
ALG **r2 U2 r2 Uw2 r2 u2**

CASE



**2 OPPOSITE EDGES**

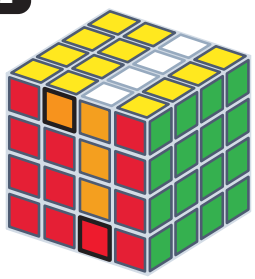
1



r2 

**INNER RIGHT SLICE · HALF TURN**

2



U2 

**TOP LAYER · HALF TURN**

3



r2 

**INNER RIGHT SLICE · HALF TURN**

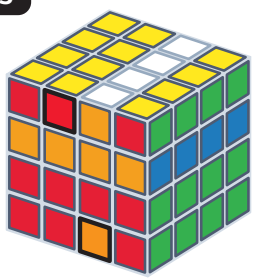
4



Uw2 

**TOP TWO LAYERS · HALF TURN**

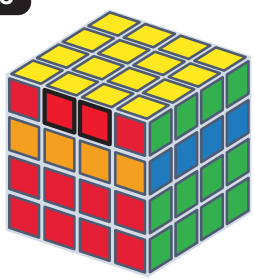
5



r2 

**INNER RIGHT SLICE · HALF TURN**

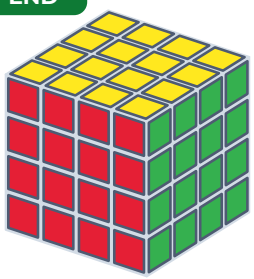
6



u2 

**INNER TOP SLICE · HALF TURN**

END



**CUBE SOLVED**

# 4x4 PARITY

4c

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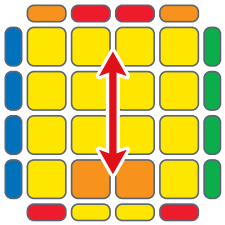
## DOUBLE PARITY

### OLL FIRST, THEN PLL

Both at once: first the OLL parity algorithm, then the PLL one.





**HOLD IT** (example colours)
- yellow on top
- red: facing you
- green on the right

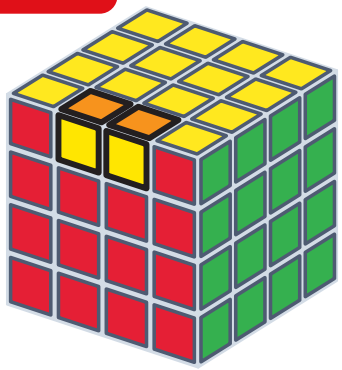
Seen from above: the top layer and, round it, its sides. Arrow: where each piece goes.

1 · CENTERS | 2 · EDGES | NOW A 3x3 → | 3 · AS A 3x3 | **4 · PARITIES**

**OLL** r2 B2 U2 l U2 ( r' U2 r ) U2 F2 r F2 l' B2 r2

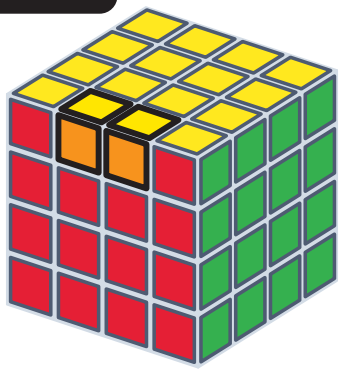
**PLL** r2 U2 r2 Uw2 r2 u2

**CASE**



**OLL FIRST, THEN PLL**

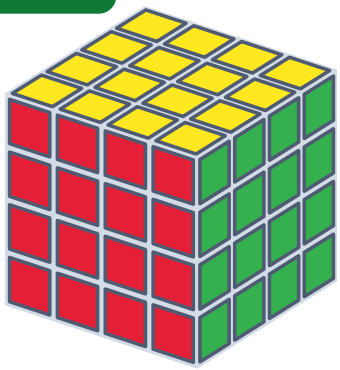
**OLL**



**AFTER THE OLL PARITY: THE PLL ONE IS LEFT**

→ 4a, p. 10 · 4b, p. 11

**END**



**CUBE SOLVED**