
The easy secret tutorial for magic cubes

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QiYi MoFangGe Science & Techology Industrial Co,.Ltd

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**Editor: Hu Yefeng**

Proofreaders: Dai Kaibo
Phil Yu, TheCubicle.us
Fu Junjie
Liao Zhiyuan
Zheng Mingshi
Zhang Xiaojing

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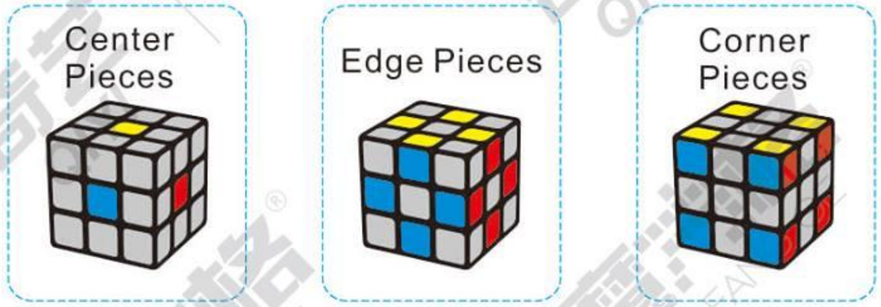
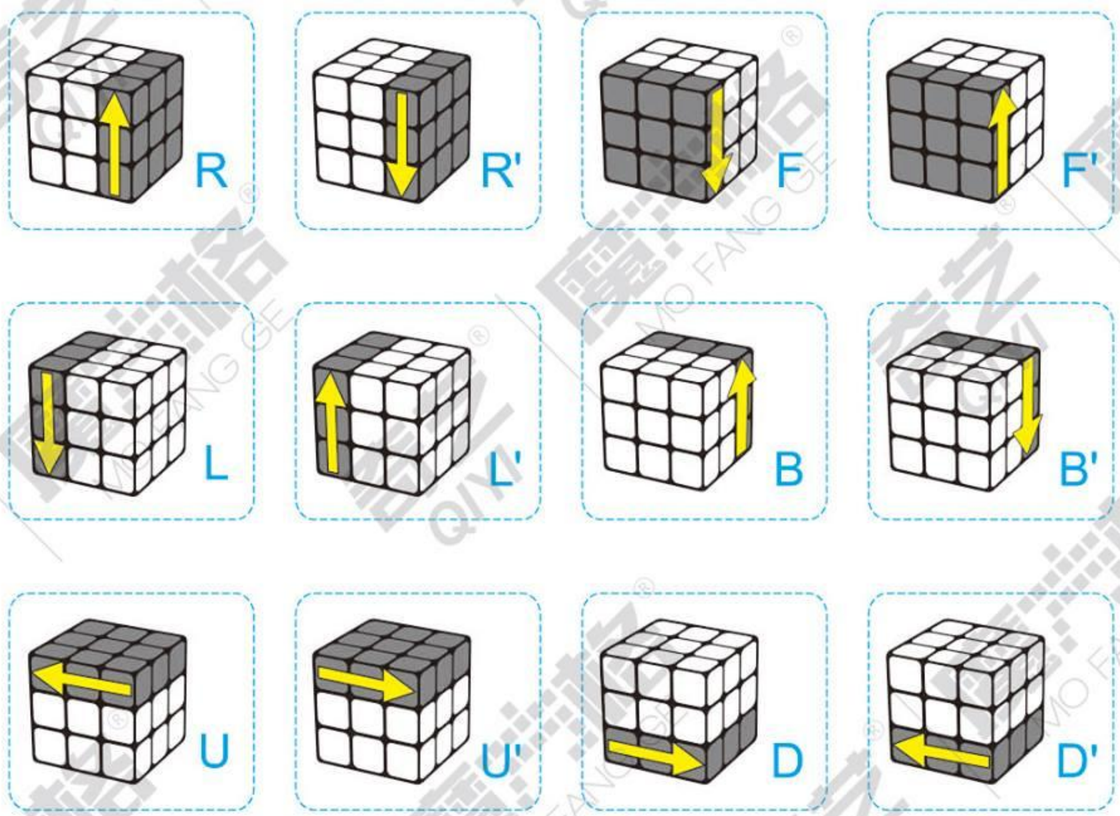
# 3×3×3 Cube Entry Tutorial

Name of each part:




**Rotation & Illustration & Notation**



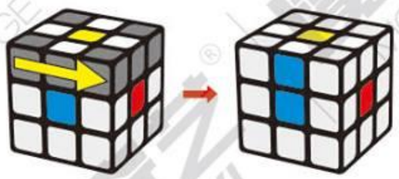
# Step 1 Solve the white cross on the bottom

Goal

①Place the cube with the yellow center piece facing up and the blue center facing you.

②Rotate all the white edges to the top face.

③ Rotate the top layer until the edge piece and the center piece are the same color.



④Rotate the face facing you to solve the blue and white edge piece.

⑤Rotate the top layer to make the side face the same color, then rotate the side face to solve the red and white edge piece.

Solve the green-white edge and the orange-white edge the same way.



# Step 2 Solve four corner pieces on the bottom layer

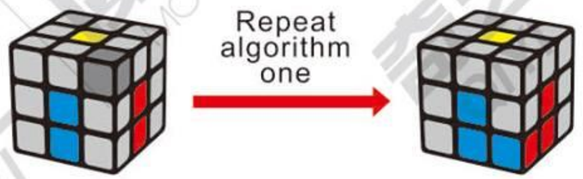
Goal

Take the blue-red-white corner piece for example.
Keep the yellow center up and the blue center facing you as illustrated in figure ①.
Then, find the blue-red-white corner and make it the same as illustrated in figure ② according to case 1 or case 2.

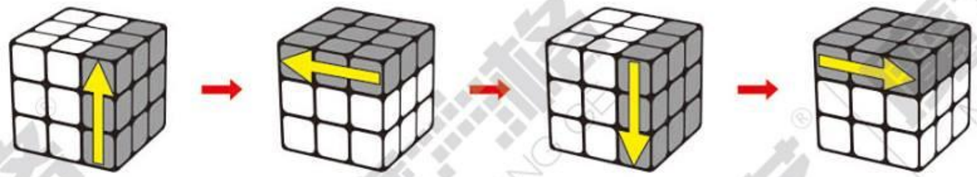

## Case 1

The blue-red-white corner is on the top layer.
As illustrated in the dark gray parts.

Rotate the top layer to turn the blue-red-white to the dark gray position.




Algorithm 1:RUR'U'

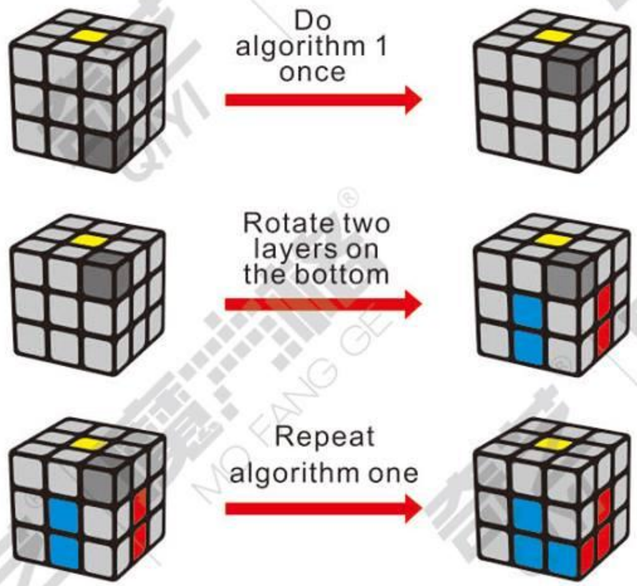


## Case 2

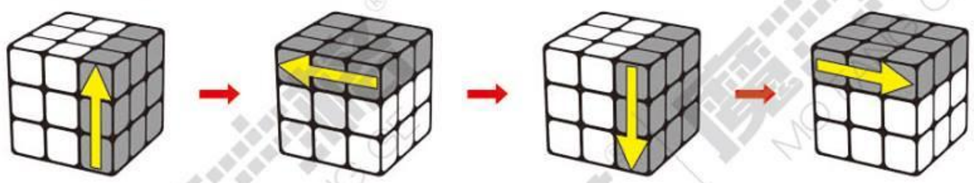
The blue-red-white corner is at the bottom.
As illustrated in the dark gray parts.

Goal

Always keep the yellow center facing up.
Spin the cube around in your hands until the blue-red-white corner matches the illustration




### Algorithm 1:RUR'U'



The red-green-white corner, the green-orange-white corner, and the orange-blue-white corner can be solved the same way.



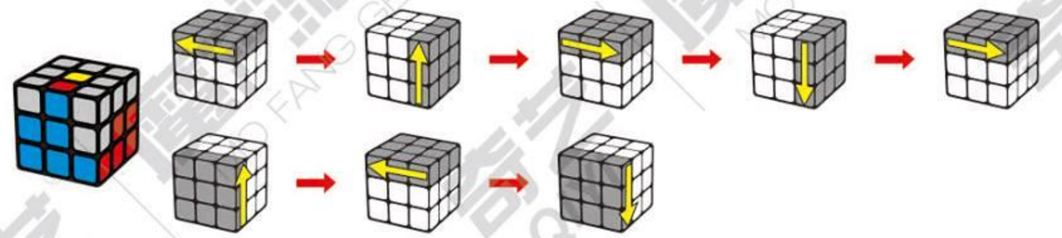
# Step 3 Solve four edge pieces in the middle layer

Goal

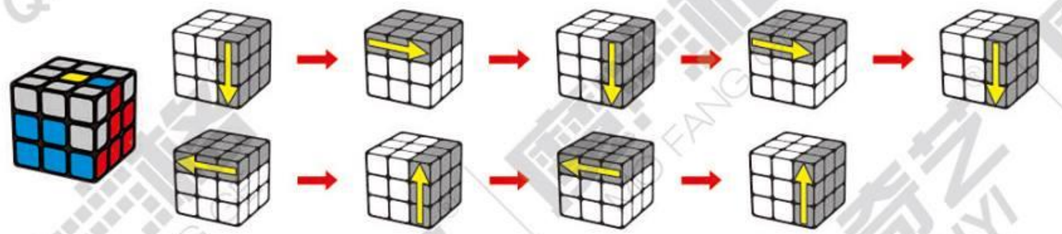
Take the blue-red edge for example. Place the blue center in front of you. There are three basic cases.

Rotate the top layer until it follows either case one or two.

### Case 1 Algorithm 2: URU'R'U'F'U'F

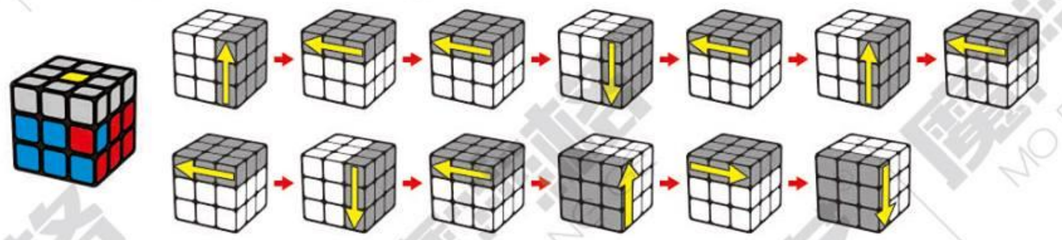


### Case 2 Algorithm 3: R'U'R'U'R'URUR



If the blue-red edge piece is not on the top layer, you can find it in the second layer.

### Case 3 Algorithm 4: RUUR'URUUR'UF'U'F



# Step 4 Orientation of the yellow edge pieces on the top face

**Goal**

In this step, orient the yellow edge pieces on the top face. Only think about the positions of the edge pieces. There are only three cases.

The first case

Do algorithm 5 once

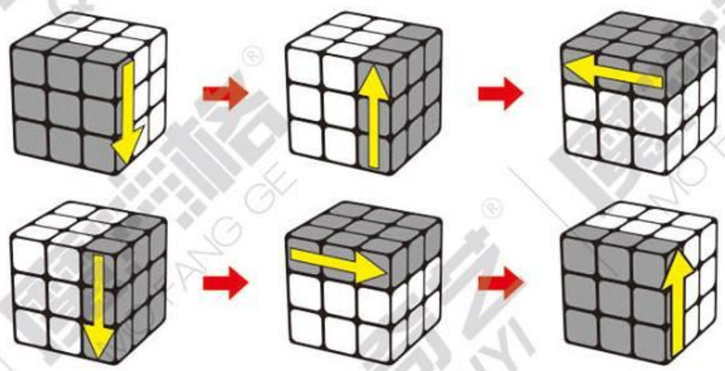
The second case

Do algorithm 5 twice.

The third case

Do algorithm 5 twice+ U + Do algorithm 5 once

Algorithm 5: FRUR'U'F



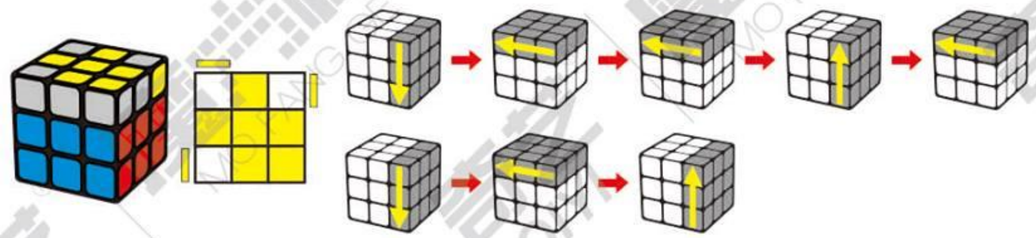


# Step 5 Orientation of the yellow corner pieces on the top face

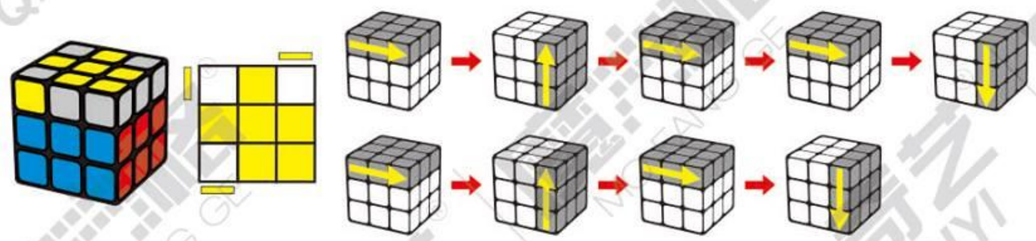
**Goal**

In this step, orient the yellow corner pieces on the top face. Only think about the positions of the corner pieces. There are only seven cases.

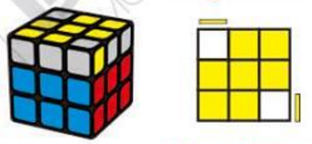
**Case 1** Algorithm 6: R'UURUR'UR



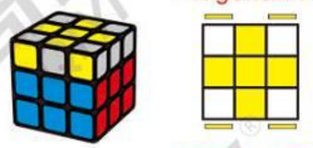
**Case 2** Algorithm 7: U'RU'U'R'U'RU'R



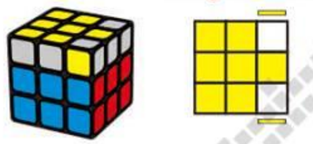
**Case 3** Algorithm 6 + Algorithm 7



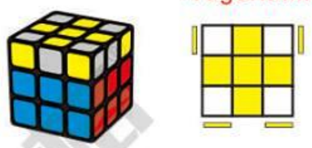
**Case 4** Algorithm 6 + Algorithm 6



**Case 5** Algorithm 7 + Algorithm 6



**Case 6** Algorithm 6+U' +Algorithm 7

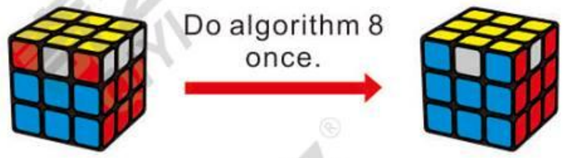


**Case 7** Algorithm 7+U2 +Algorithm 6

## Step 6 Permutation of the yellow corners on the top layer

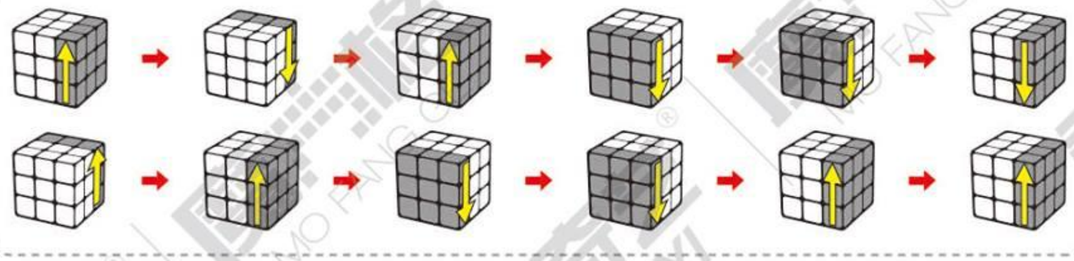
**Goal**

Rotate the top layer. First find out the corners of same color on the side as illustrated.
Take red color for example, do algorithm eight to complete step 6.




Rotate the top layer. If there are no corners in same color, do the following steps.


Algorithm 8: RB'RFFR'BRFFRR



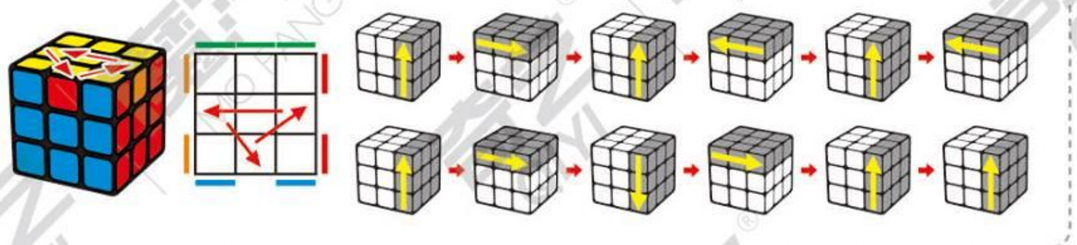


## Step 7 Permutation of the yellow edges on the top layer.

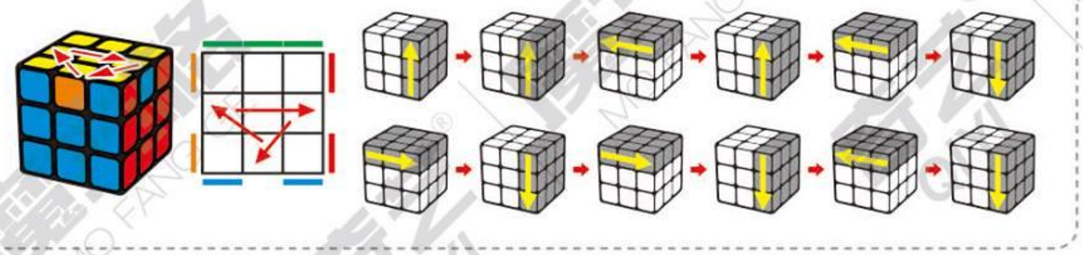
**Goal**

In this step, there are only 4 cases.

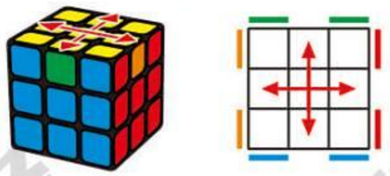
**Case 1** Algorithm 9: RU'RURURU'R'U'RR



**Case 2** Algorithm 10: RRURUR'U'R'U'R'UR'



**Case 3** Algorithm 9 + U + Algorithm 9 + U'



**Case 4** Algorithm 9 + U' + Algorithm 9 + U

# CFOP Algorithms Table

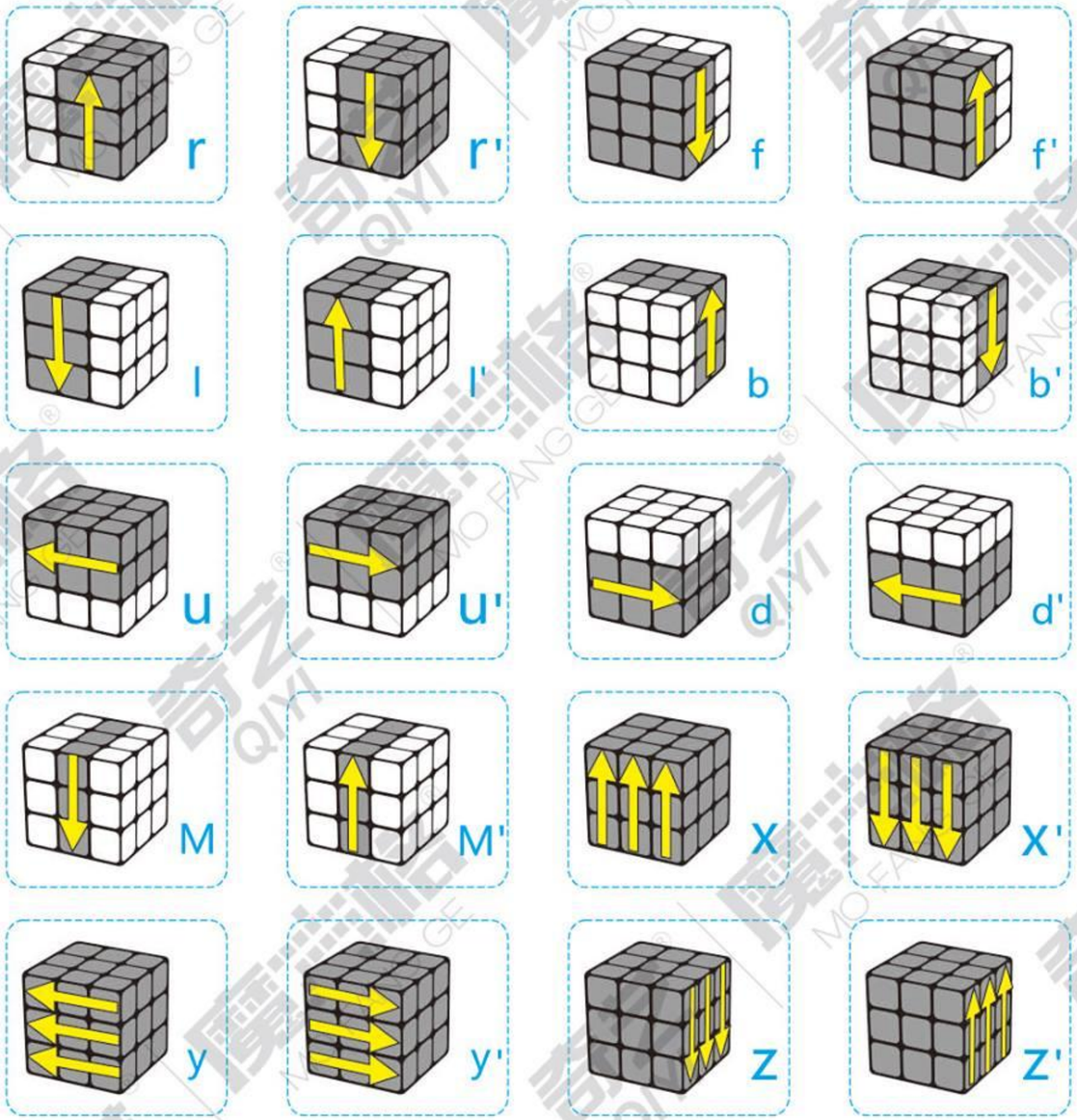
Rotation & Illustration & Notation

2 after the letters means to rotate twice.

Eg:U2=U U

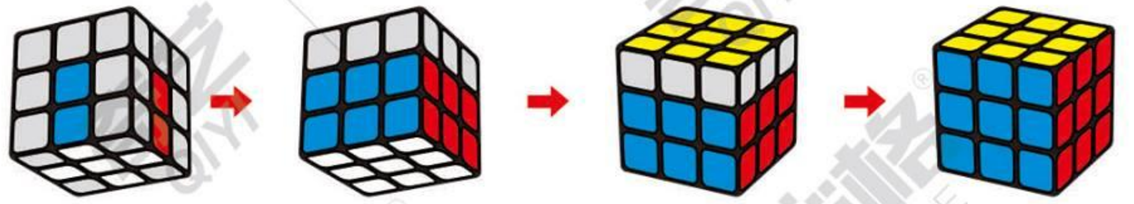
2 after the brackets means to do the step in the brackets twice.

Eg: (RUR'U') 2= (RUR'U) (RUR'U')






The CFOP Method is the most commonly used method in speedsolving the magic cubes at present. There are 119 algorithms and 4 steps.

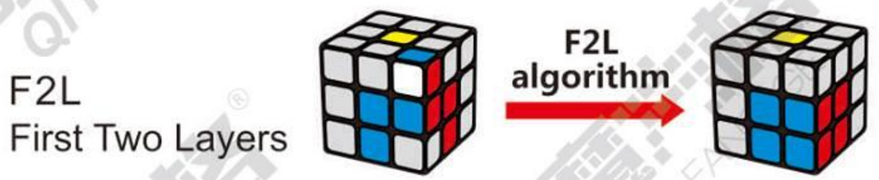


CROSS
The Cross

F2L
First Two Layers

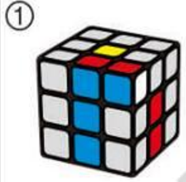
OLL
Orientation of the Last Layer

PLL
Permutation of the Last Layer



**Eg:** Take the blue-red-white corner and the blue and red edge for example


| | | | | |
|---|---|---|---|---|
| ①  y'(U'R'UR) | ②  (URU'R') | ③  (RUR') | ④  y'(R'U'R) | ⑤  U'(RUR'U) (RUR') |
| ⑥  y'U (R'U'RU') (R'U'R) | ⑦  y'(UR'U'R) (U'2R'UR) | ⑧  U'(RUR'U') (RU'2R') | ⑨  y'(UR'U2) (RU'2R'UR) | ⑩  U'(RU'2) (R'U2)(RU'R') |
| ⑪  y'(U'R'U2) (RU'R'UR) | ⑫  U(RU'2) (R'URU')R' | ⑬  (RU'R'U2) (RUR') | ⑭  y'(R'URU'2) (R'U'R) | ⑮  U'(RU'2R'U) (RUR') |
| ⑯  U'(RU'R') U2(RU'R') | ⑰  y'U(R'U'RU') y(RUR') | ⑱  U'(RUR'U) y'(R'U'R) | ⑲  (URU'R')3 | ⑳  U'(R'FRF') (RU'R') |
| ㉑  U'(RU'2R'U) y'(R'U'R) | | | | |





| | | | | |
|---|---|---|---|---|
| ㉒  y'U(R'URU') (R'U'R) | ㉓  RU'R'URU' R'U2RU'R' | ㉔  U'(RU'R'U) (RUR') | ㉕  RUR'U2R U'R'URU'R' | ㉖  (RU'R'U2) y'(R'U'R) |
| ㉗  (RU'R'U) (RU2) (R'URU'R') | ㉘  (RUR'U') (RU'2R'U') (RUR') | ㉙  (RU)F (RUR'U') F'R' | ㉚  (RU'R') (U'RU'R'U) y'(R'U'R) | ㉛  (RU'R'U)y' (R'U2RU'2) (R'UR) |
| ㉜  (URU'R'U') y'(R'UR) | ㉝  (R'F'RU) (RU'R'F) | ㉞  y'(R'U2) (RUR'U'R) | ㉟  RUR'U2 (RUR'U') RUR' | ㊱  (RU2R') (U'RUR') |
| ㊲  FU(RU'R'F') (RU'R') | ㊳  y'(R'U) (RU')(R'UR) | ㊴  (RUR'U') (RUR') | ㊵  (RU'R'U) (RU'R') | ㊶  y'(R'U'RU) (R'U'R) |
| | | | | |

Eg:


① RU'U'R'
U'RU'R'

② RUR'U
RU2R'

③ (RU'U')
(R'U'RUR'U')
(RU'R')

④ RU'U'(R'2U')
(R2U')R'2U'U'R

⑤ (r U R' U')
(r' F R F')

⑥ R2D'
(RU2R'D)
(RU2R)

⑦ F'(r U R' U')
(r' F R)

⑧ (R U'U')
(R2' F R F')
U2(R' F R F')

⑨ F(R U R'U')F'
f(R U R' U')f'

⑩ f(RU R' U')f' U'
F(R U R' U')F'

⑪ f(RU R' U')f' U
F(R U R' U')F'

⑫ (R U R' U)
(R' F R F')
U2(R' F R F')

⑬ (rUR'U)(RU'2r')
(r'U'RU')(R'U2r)

⑭ (r' R U)
(R U R' U' r)
(R'2 F R F')

⑮ (rUR'U')M'2
U(RU'R'U')M'

⑯ f(R U R' U')2 f'

⑰ (R'F'U'FU')
(RUR'UR)

⑱ (rUr')
(URU'R')2
(rU'r')

⑲ R'F(RURU')R2
F'R2U'R'URUR'

⑳ (r U' r' U')
(r U r')(F' U F)

㉑ (r' U'r)
(R'U'R U)
(r'U r)

㉒ R'FRURF'R
(FU'F')

㉓ (rUr')
(R U R'U')
(rU'r')

㉔ (R U R' U')
(R' F R F')

㉕ F (R U R' U') F'

㉖ (R U R' U')r
(R' U R U')r'

㉗ (r U R' U')
(r'R U)(R U' R')





㉘ (RUR'F'U'F)
U(RU2R')

㉙ (R'FRUR'U')
(F'UR)

㉚ (RUR2U')
(R'F)
(RURU')F'

㉛ (R' U')
R' F R F'
(U R)

㉜ (R' U' F)
(URU'R')F' R

㉝ (RU)(B' U')
(R' U R B R')

㉞ (B'U')
(R' URB)

㉟ f (RUR' U')f'

㊱ F(RU'R'U'RU)
(R' F')

㊲ R U'U'R'2 F R F'
(RU'U'R')

㊳ (r' U2)
(R U R'U)r

㊴ (r U'U')
(R' U' R U' r')

㊵ r' U' RU' R' U2 r

㊶ rUR'URU'U'r'

㊷ r'(R2 U R' U)
(R U' U' R' U)
(r R')

㊸ UF(RUR'U')F'
UF(RUR'U')F'

㊹ (R U R' U')
(R' F R2)
(U R' U') F'

㊺ (R U R' U)
(R' F R F')
(R U'U'R')

㊻ (r U'U')
(R'U'R U R' U')
(R U' r')

㊼ B'(R' U'R U)2 B

㊽ (r' U2)
(R U R'U')
(R U R'U)r

㊾ F (RUR' U')2 F'

㊿ (r' U)
(r2 U' r'2 U')
(r2 Ur')

(51) R B'(R2 F)
(R2 B)R2 F' R

(52) f (RUR'2 U')
(R'U) (R2 U'R')f'

(53) (RU R' U')
(RU'R'F'U'F)
(RUR')

(54) R'U'RU'R'U2
RFRUR'U'F'

(55) (R U R' U)
(R U'U')(R' F)
(R U R' U') F'

(56) (RU R'U)
(RU'R'U')
(R'F R F')

(57) R'U'R U'
R'U R U
I U'R'U

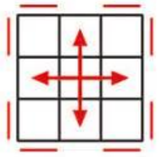
**Eg:**


① 

(RU'R)(URUR)
(U'R'U'R2)

② 

(R2 U)(RUR'U')
(R'U')(R'UR')

③ 

M2 U M2 U2
M2 U M2

④ 

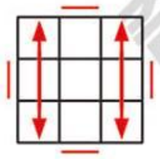
M'U(M'2 U)2
M'U2 M'2 U'

⑤ 

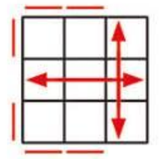
x'R2 D2(R'U'R)
D2(R'UR')

⑥ 

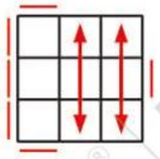
x'(RU'R)D2
(R'UR)(D2 R2)

⑦ 

x'(RU'R'D)
(RUR'D')(RUR'D)
(RU'R'D')x

⑧ 

(RUR'U')
(R'F)(R2 U'R'U')
(RUR'F')

⑨ 

(R'U'F')(RUR'U')
(R'F)(R2 U'R'U')
(RUR'UR)

⑩ 

(R'UR'd')
(R'F'R2 U')
(R'UR'FRF)





⑪ 

F(RU'R'U')
(RUR'F')(RUR'U')
(R'FRF')

⑫ 

z(U'RD')
(R2 UR'U')
R2 U(DR')

⑬ 

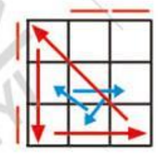
(RUR'F')
(RUR'U')(R'F)
(R2 U'R'U')

⑭ 

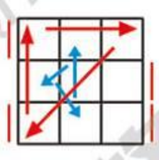
(R'U2)(RU2')
(R'FRUR'U')
(R'F'R2U')

⑮ 

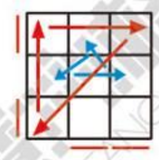
(RU'R'U')
(RURD)(R'U'RD')
(R'U2 R'U')

⑯ 

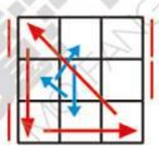
(R2' u'RU'R)
(UR'u)(R2fR'f')

⑰ 

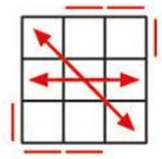
(RUR')y'
(R2 u'RU')
(R'UR'uR2)

⑱ 

(R2u)(R'UR'U')
(Ru')(R2'F'UF)

⑲ 

(R'd'F)(R2 u)
(R'U)(RU'Ru'R2')

⑳ 

(R'URU')
(R'F'U')(FRUR'F)
(R'F'RU'R)

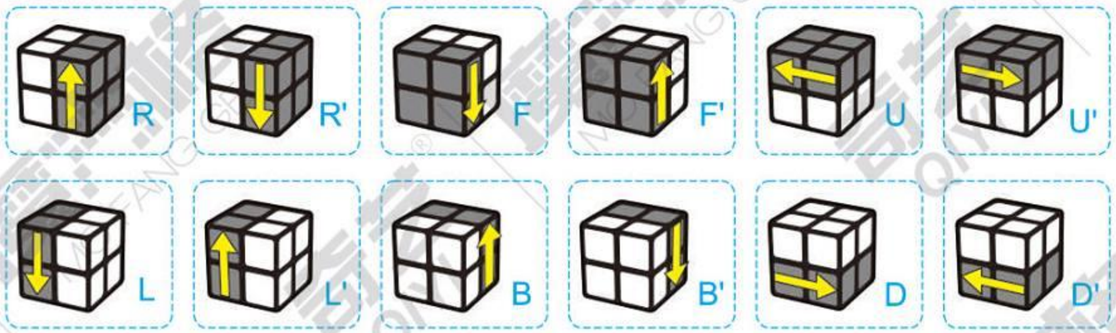
㉑ 

(RUR'U)(RUR'F')
(RUR'U')(R'F)
(R2 U'R'U2)(RU'R')

# 2x2x2 Cube Entry Tutorial

The 2×2×2 cube can be solved as per the solution for the 3×3×3 cube.

**Rotation & Illustration & Notation**




## Step 1: Solve the white face on the first layer

**Goal**

In this step, you only need to solve the white face. It is fairly easy and you can solve it intuitively.



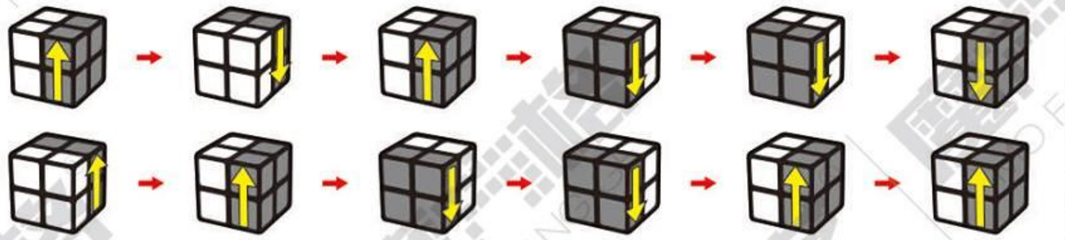
## Step 2: Solve four corners of the first layer.

**Goal**

Rotate the top layer, and first find out corners of same color on the same side of the top layer. Take red color for example. Place red in front of you, and do algorithm 1 once to complete step two.


Rotate the top layer. If there are no corners in the same color, do according to the step as follows.


Algorithm 1:R B' R F F R' B R F F R R

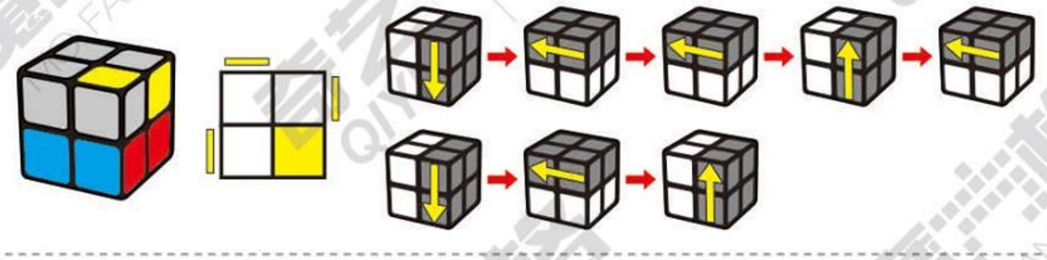


## Step 3: Orientation of yellow corners on the top Layer

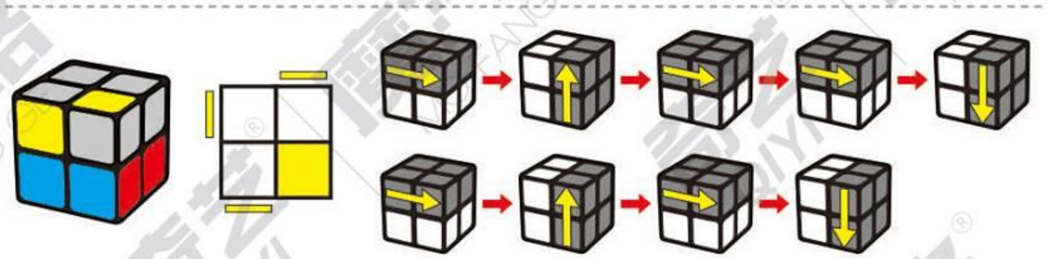
**Goal**

Iin this step, you only need to rotate the yellow corners to the top face.Take the corners' positions in consideration. There are only seven cases.

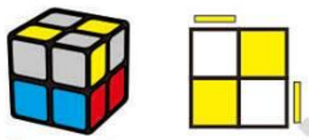
**Case 1** Algorithm 2:R' U U R U R' U R



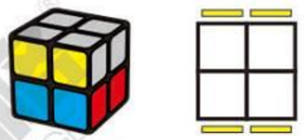
**Case 2** Algorithm 3:U' R U' U' R' U' R U' R'



**Case 3**
Algorithm 2+U2+Algorithm 3

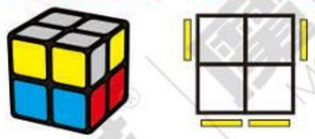


**Case 4**
Algorithm 2+Algorithm 2



**Case 5**
Algorithm 2+U+Algorithm 3

**Case 6**
Algorithm 2+U'+Algorithm 2



**Case 7**
Algorithm 2+U'+Algorithm 3



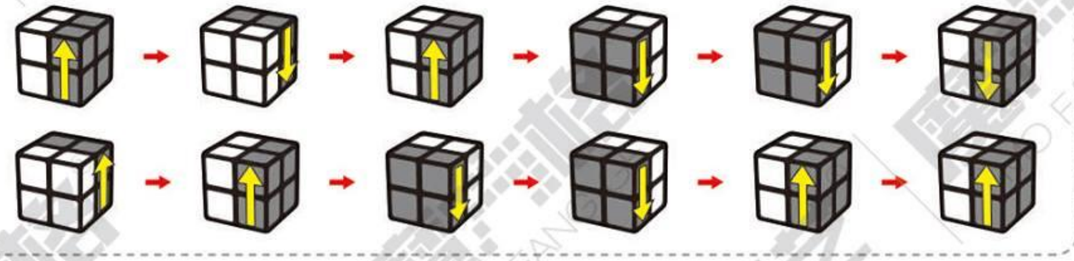
## Step 4: Solve four corners on the top layer.

**Goal**

Rotate the top layer, and first find corners of same color on the same side of the top layer. Take blue for example. Place the blue face in front of you and do algorithm 1 once to complete step three.

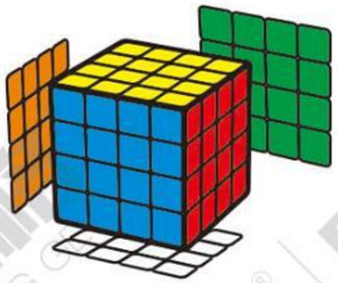

Rotate the top layer. If there're no corners in the same color, do according to the step as follows.


Algorithm 1:R B' R F F R' B R F F R R



# 4x4x4 Cube Entry Tutorial

Since the center faces can no longer be used for identification, you must correctly identify the relative positions of the colors.



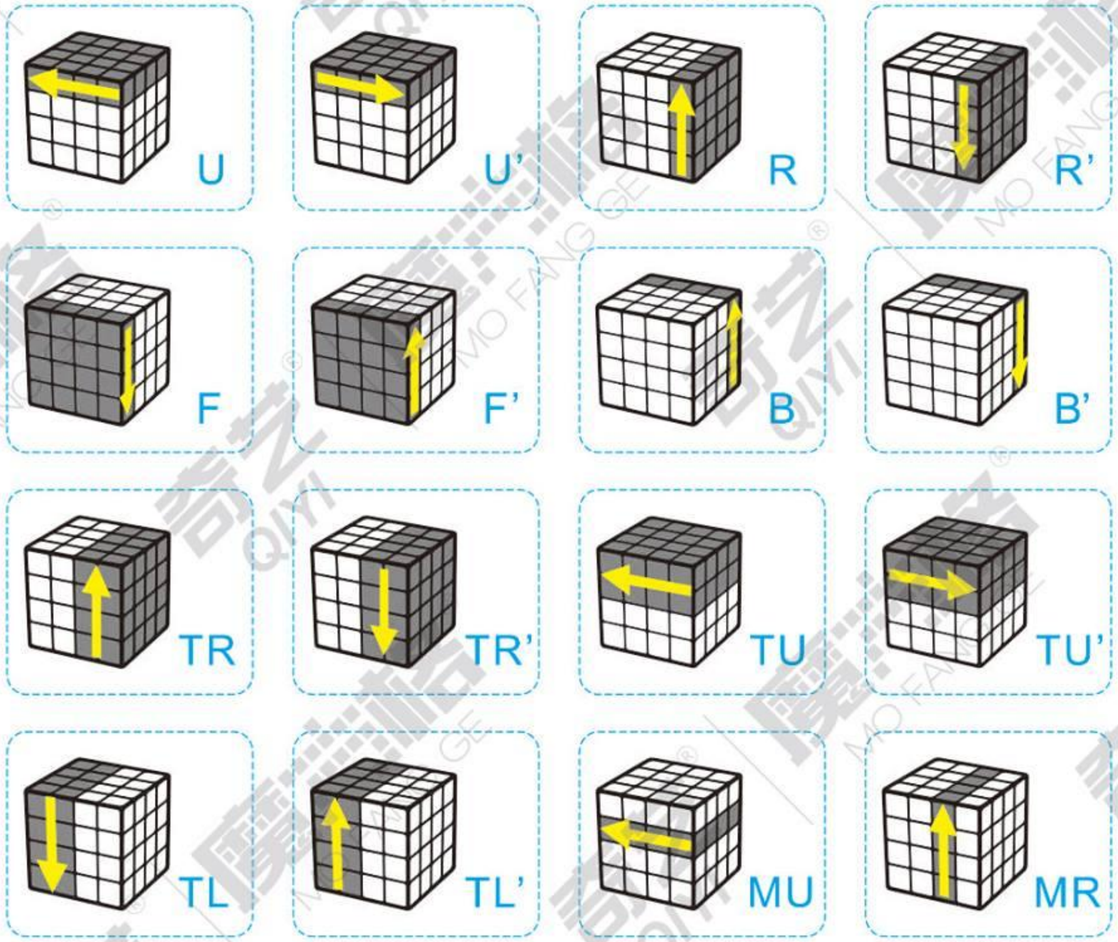
International standard color scheme

U: yellow D: white

F: blue B: green

L: orange R: red

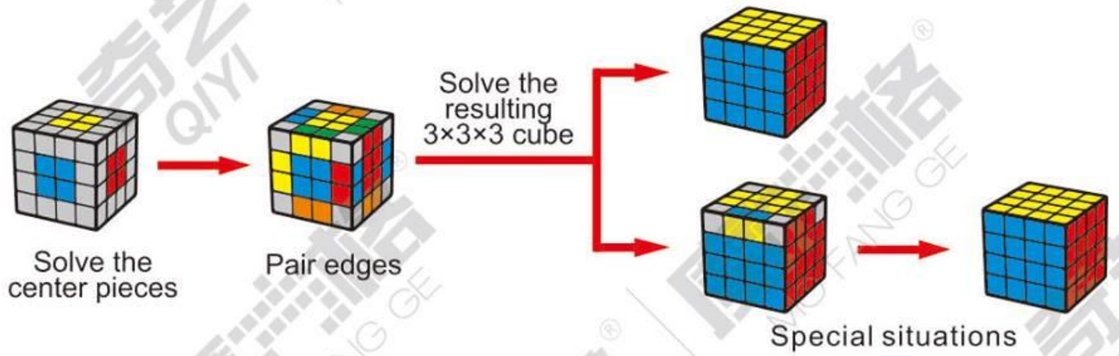
## Rotation & Illustration & Notation







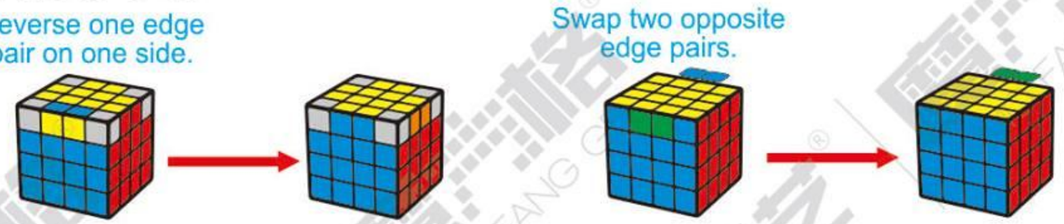
The method we use for 4×4×4 is reduction, which involves reducing the 4×4×4 to a 3×3×3. Then, solve the resulting 3×3×3 cube.




**Solve the center pieces:group four center pieces of common colors together. The resulting group is considered a center of a 3×3×3 cube.**

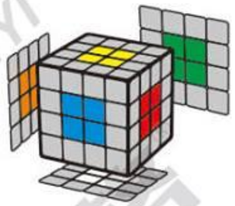
**Pair edges:Pair the two edge pieces of the same color. The resulting pair is considered an edge of a 3×3×3 cube.**

**Special situations: There are two possible cases not found on the 3×3×3.**

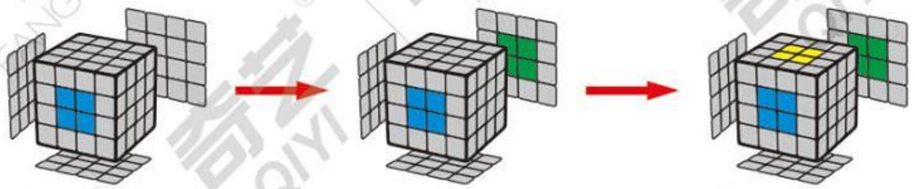


# Step 1: Group the four center pieces on six faces

**Goal**



The 4x4x4 Cube has no fixed center pieces. You must correctly identify the relative positions of the colors and solve them one side by one side.

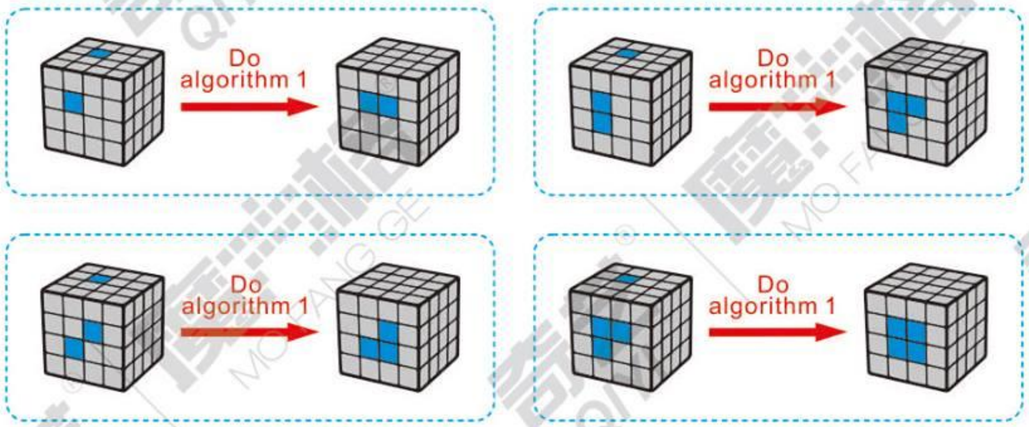






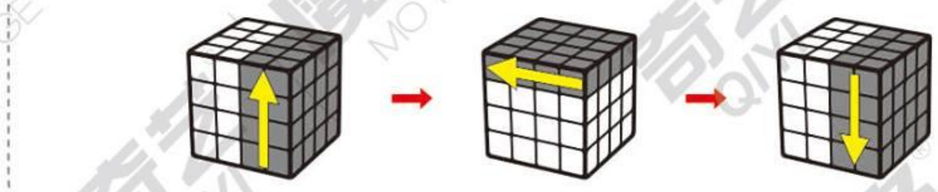
Take the blue center for example.

1.If the center pieces are on the sides next to each other, there will be four basic cases:

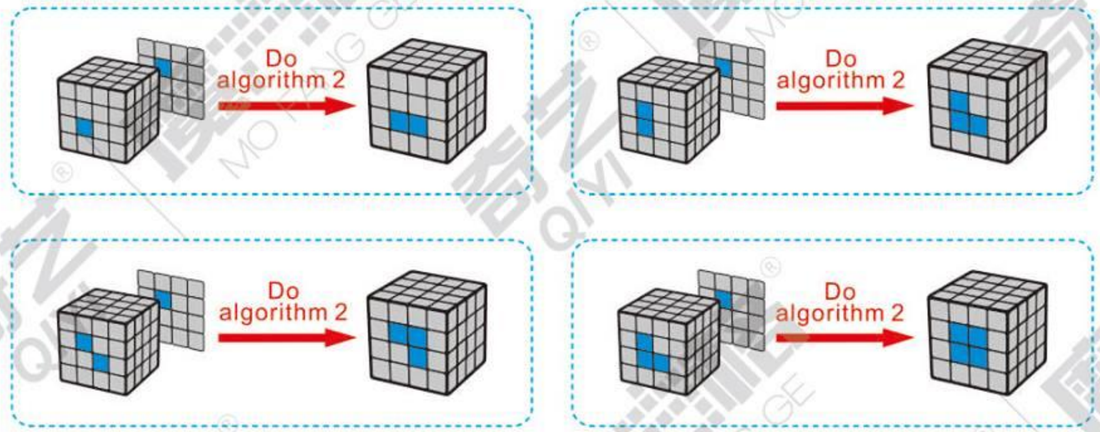




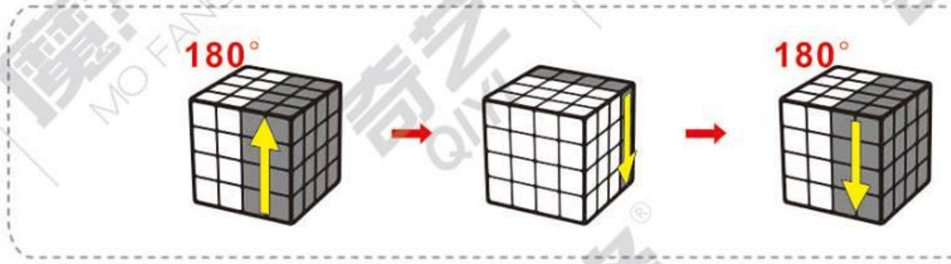

Algorithm 1:TR U TR'



2.If the center pieces are on the sides opposite each other, there will be four basic cases:



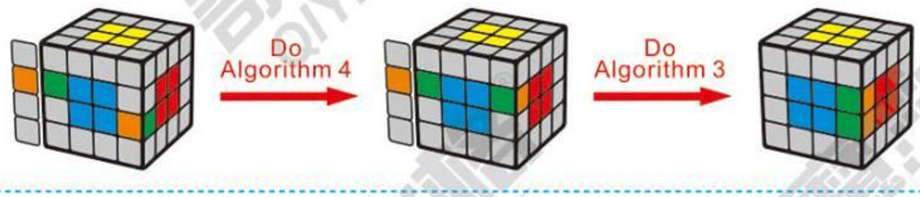

Algorithm 2:TR2 B' TR'2



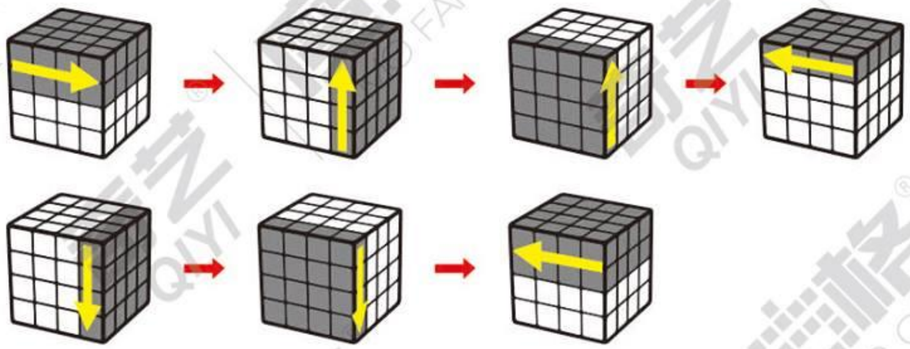
## Step 2: Pair edges

**Goal**

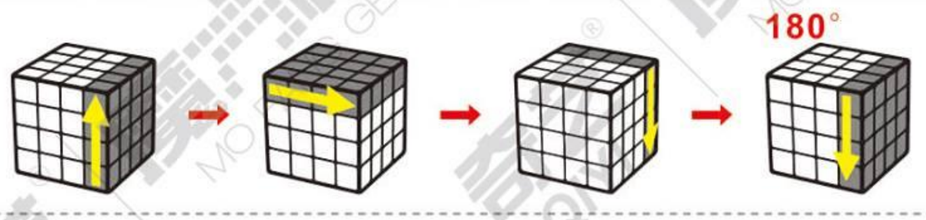
Pair twelve edge pieces in this step. First, rotate the outer layer to make the edges the same color to both sides of the front face. There are two basic cases:


Algorithm 3:TU' R F' U R' F TU



Algorithm 4:R U' B' R2





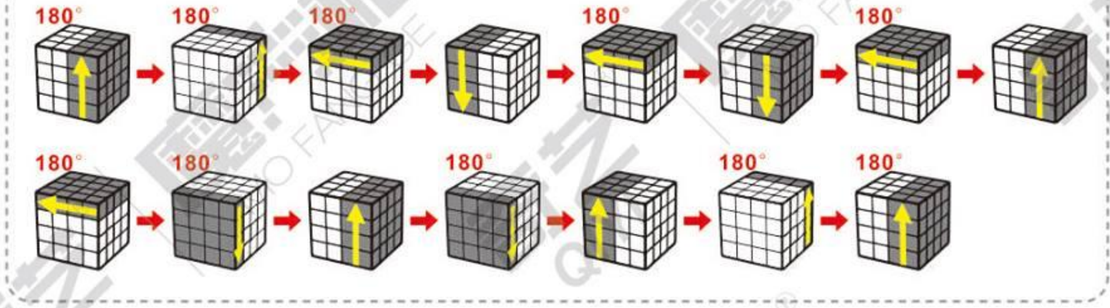

## Step 3: Solve the 4×4×4 Cube

Use the method for a 3×3×3 Cube to solve the 4×4×4 Cube. However, you may encounter certain positions that cannot be reached on a standard 3×3×3. There are two possible cases not found on the 3×3×3. Follow the steps below to solve them first and then continue the method for a 3×3×3 cube.

### The first one: reverse the edge pair

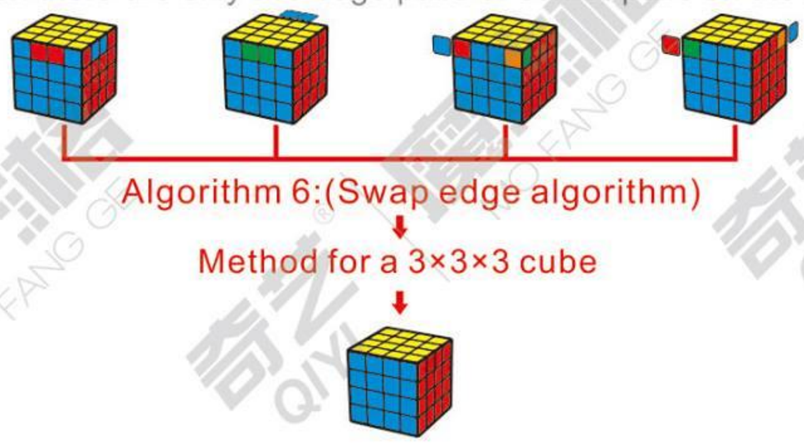
Use it when you cannot make the cross on the top layer.


Algorithm 5:TR2 B2 U2 TL U2 TR' U2 TR U2 F2 TR F2 TL' B2 TR2




### The second one: Swap the edge pairs

Use it when there are only two edge pairs or corner pairs on the top layer.



Algorithm 6:(Swap edge algorithm)

↓

Method for a 3×3×3 cube

↓

Algorithm 6:MR2 U2 MR2 TU2 MR2 MU2

# 5×5×5 Cube Entry Tutorial

The method we use for 5×5×5 is reduction, which is to reduce the 5×5×5 to a 3×3×3. Then, solve the resulting 3×3×3 cube.

Solve the center pieces　　Group the edge pieces　　Method for a 3×3×3 cube

## Solve the center pieces:

Group nine center pieces of same color. The resulting group is considered a center piece of a 3×3×3 cube.

## Group the edge pieces:

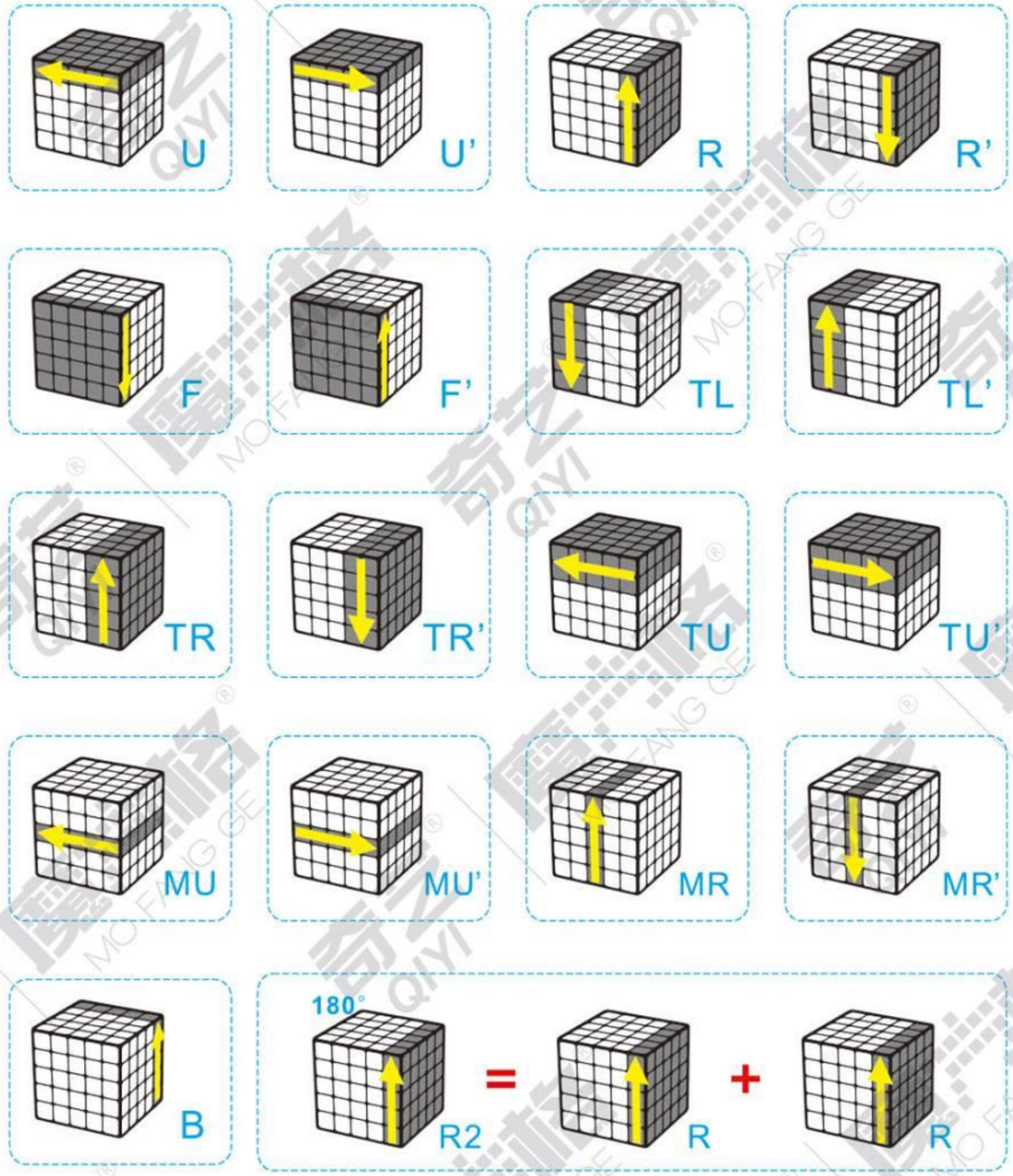
Group three edge pieces of same color. The resulting group is considered an edge piece of a 3×3×3 cube.

## Method for a 3×3×3 cube:

After grouping the edge pieces, use the method for a 3×3×3 cube to solve the 5×5×5.

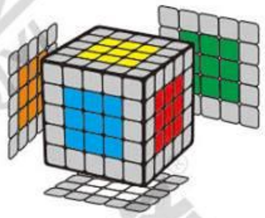


## Rotation & Illustration & Notation

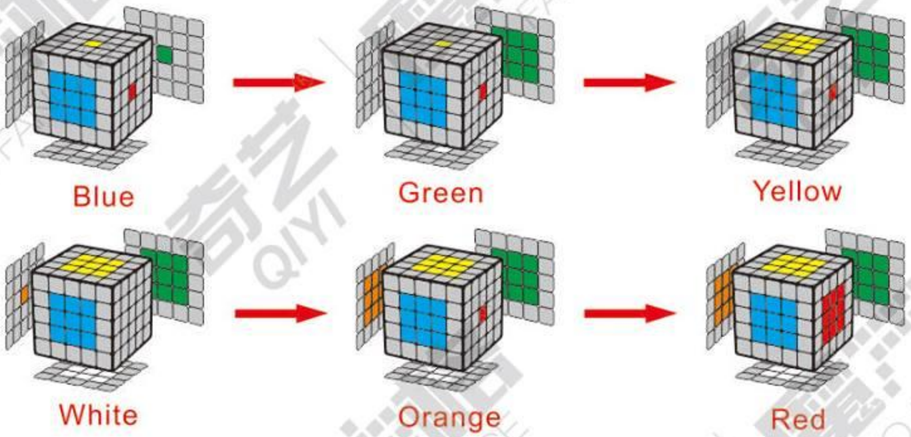


# Step 1: Solve nine center pieces on every face

Goal

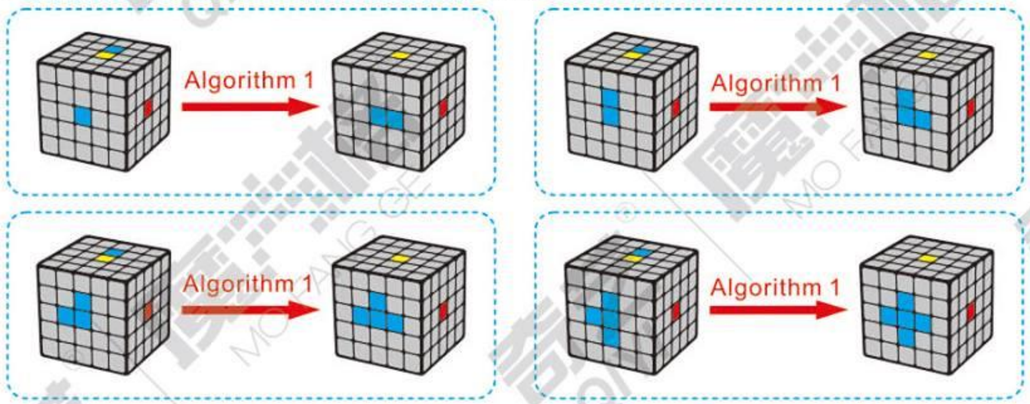


You must correctly identify the relative positions of the colors and solve them one side by one side.




Taker blue center pieces for example. Follow the steps below:

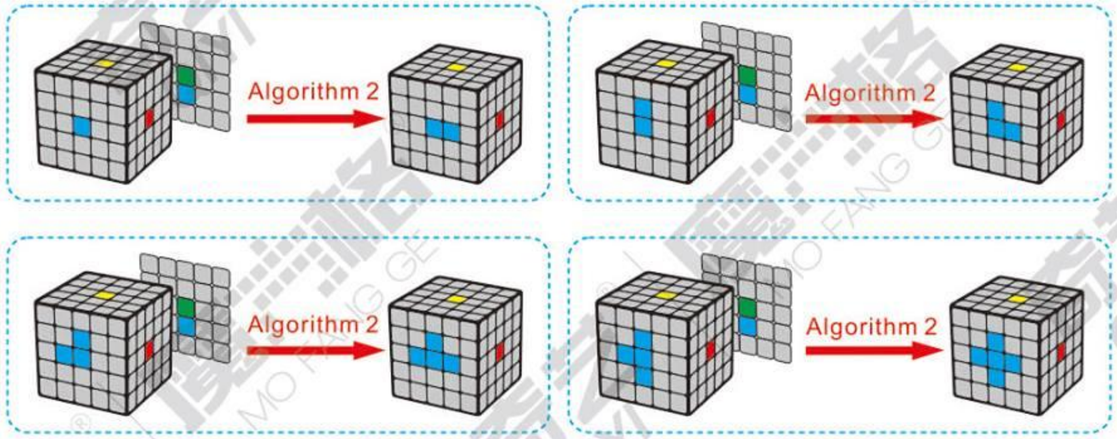

1.When making the center cross and the center pieces are on two faces next to each other, there are four basic cases:



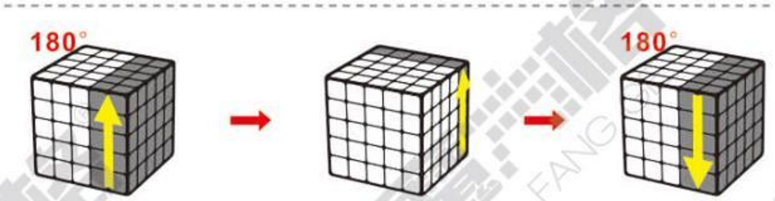



Algorithm 1:TR U TR'

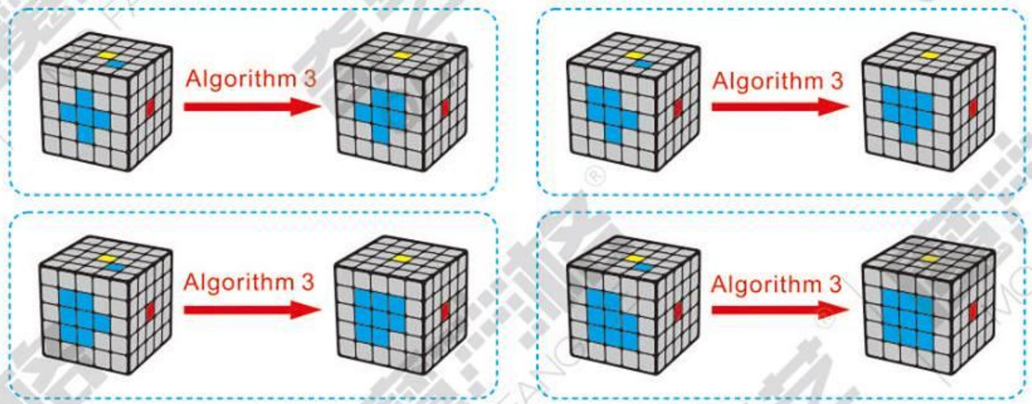
2.When making the center cross and the center pieces are on two opposite faces, there are four basic cases:



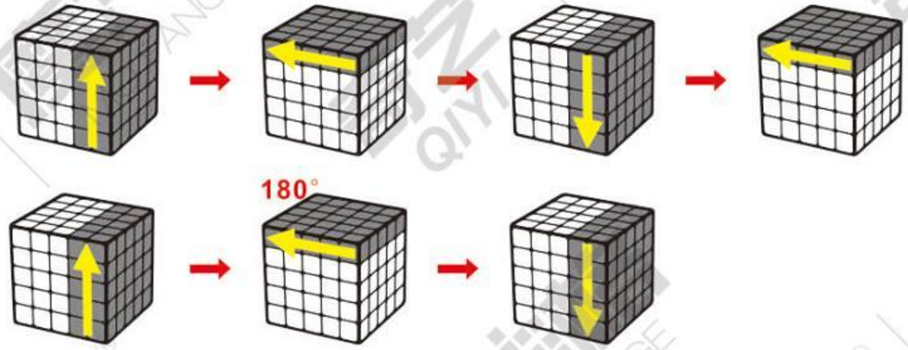

Algorithm 2:TR2 B TR' 2



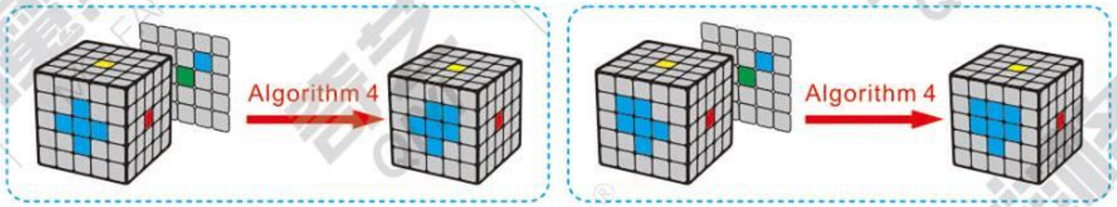

3.When making nine center pieces and the center pieces are on two faces next to each other, there are four basic cases:

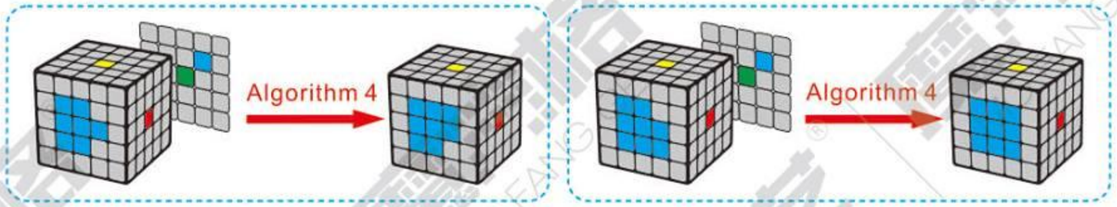


Algorithm 3:TR U TR' U TR U2 TR'

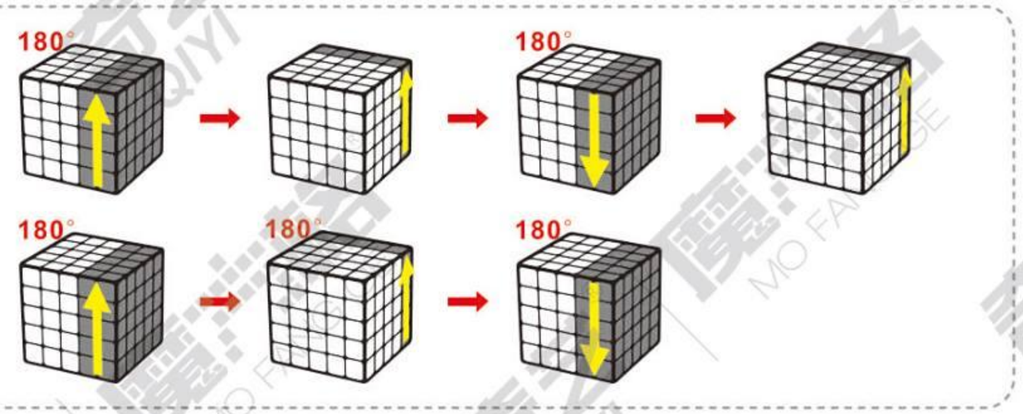



4.When making nine center pieces and the center pieces are on two opposite faces, there are four basic cases:




Algorithm 4:TR2 B TR'2 B TR2 B2 TR'2

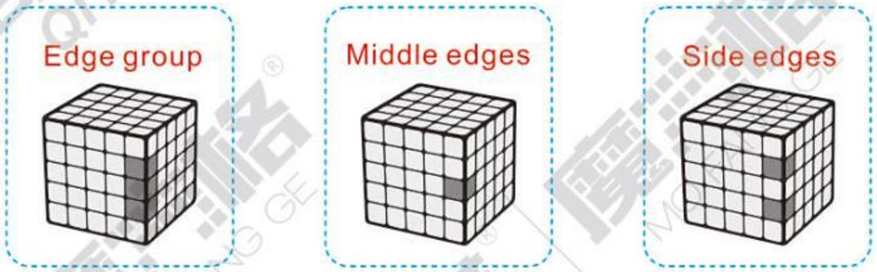





## Step 2: Group edge pieces

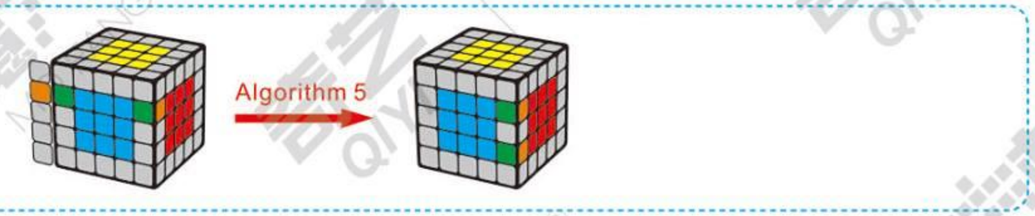
**Goal**

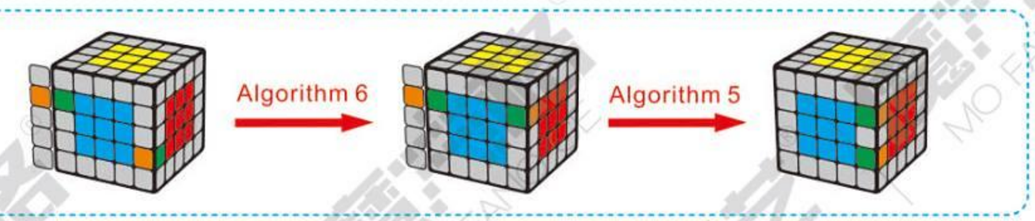
In this step, you need to solve twelve edge groups. A group is a middle edge and two side edges. As illustrated:



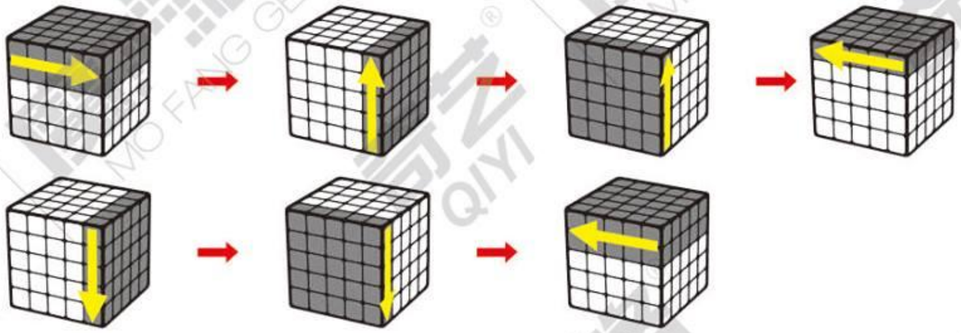

**Steps:**
First solve two side edges and then the middle edge to make the edge group.


**Solve the side edges**
Rotate the outer layer to make the side edges of same color on the left and right side of the front face. There are two basic cases:



Algorithm 5:TU' R F' U R' F TU



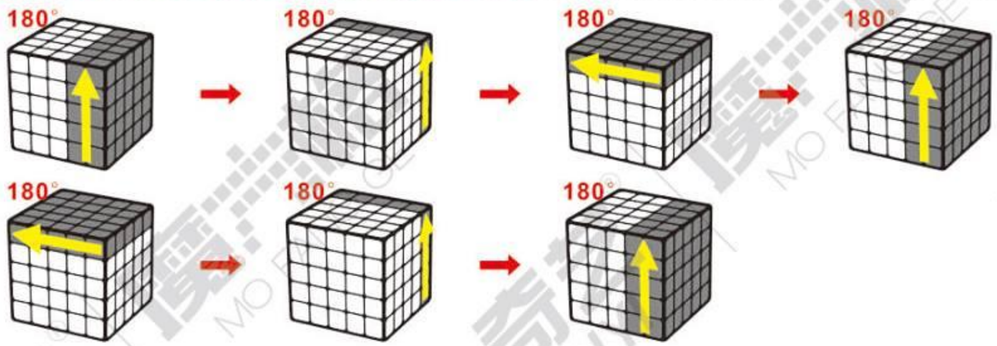
Algorithm 6:R U' B' R2


## Group the edge pieces

Rotate the outer layer to make two side edges and the middle edge of same color on the front and back side of the top face. There are two basic cases:

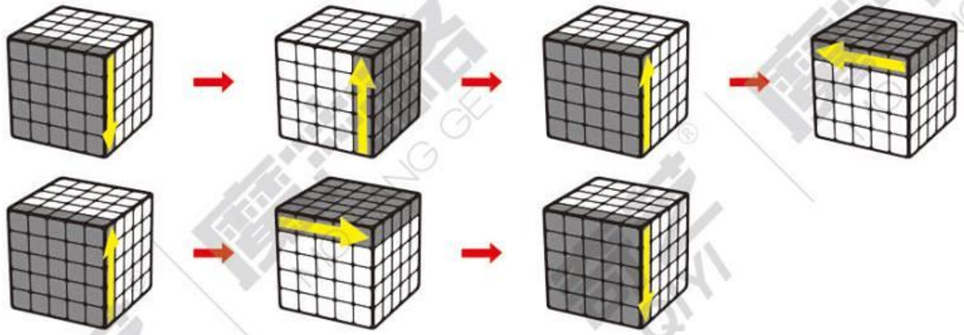


Algorithm 7:TR2 B2 U2 TR2 U2 B2 Tr2





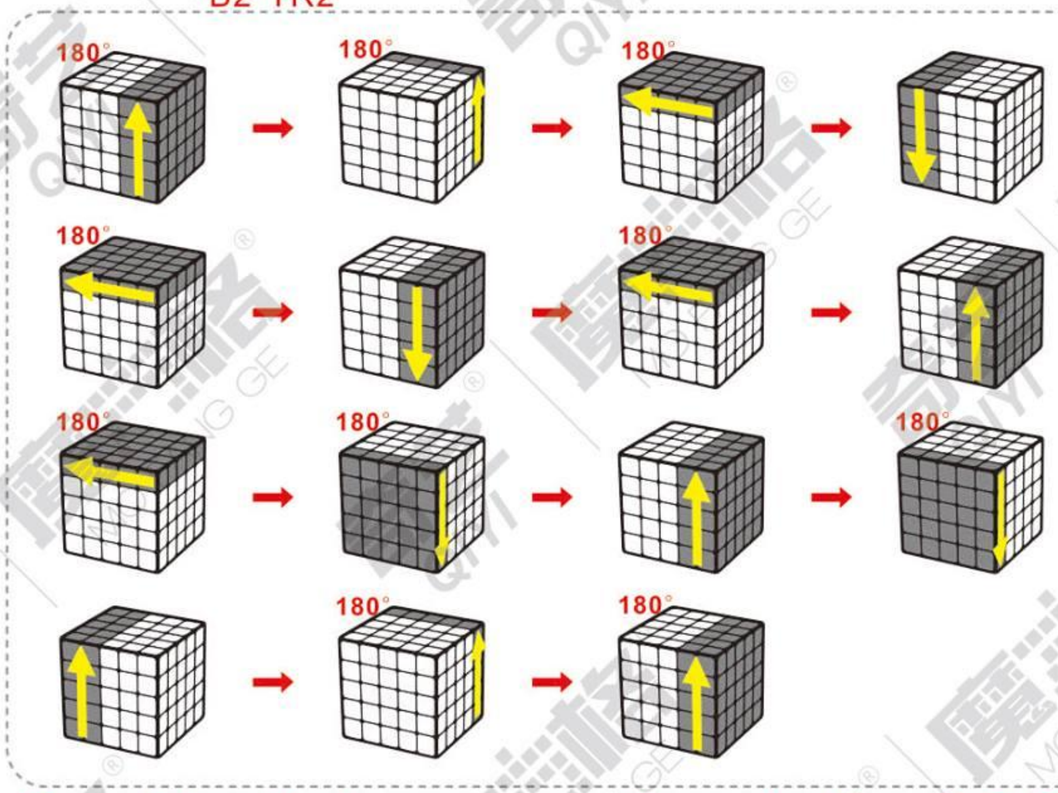

Algorithm 8:F R F' U F' U' F



## Special situations

When the last edge group is to be solved, there may be a special situation as illustrated below. The side edges and the middle edge are not the same color. Use algorithm 9 to solve it.


Algorithm 9:TR2 B2 U2 TL U2 TR' U2 TR U2 F2 TR F2 TL' B2 TR2

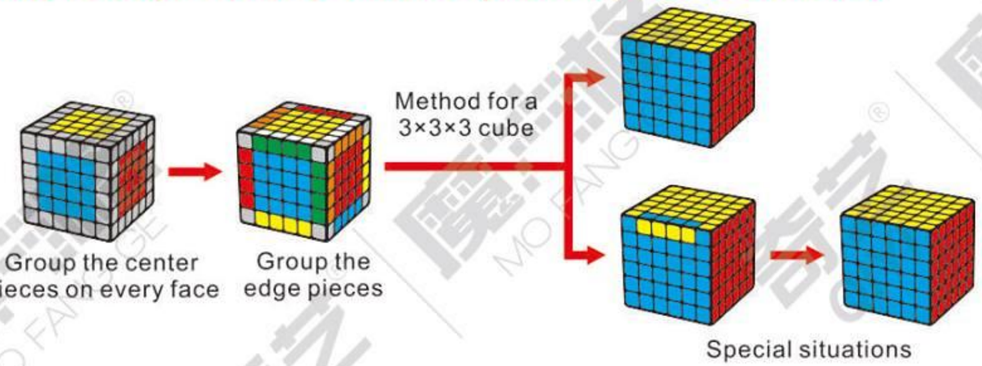



After solving all edge groups, use the method for a 3×3×3 cube to solve the 5×5×5.

# 6×6×6 Cube Entry Tutorial

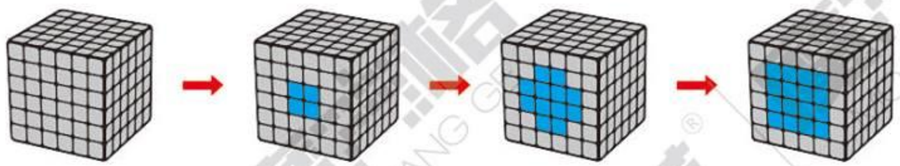
We also use reduction to solve the 6×6×6. Reduction means to reduce the cube of higher layers to a 3×3×3 cube.
The method for the 6×6×6 is almost the same as the 4×4×4. Please refer to the solution for the 4×4×4.

Solution steps for the 6×6×6 proceeds as follows:

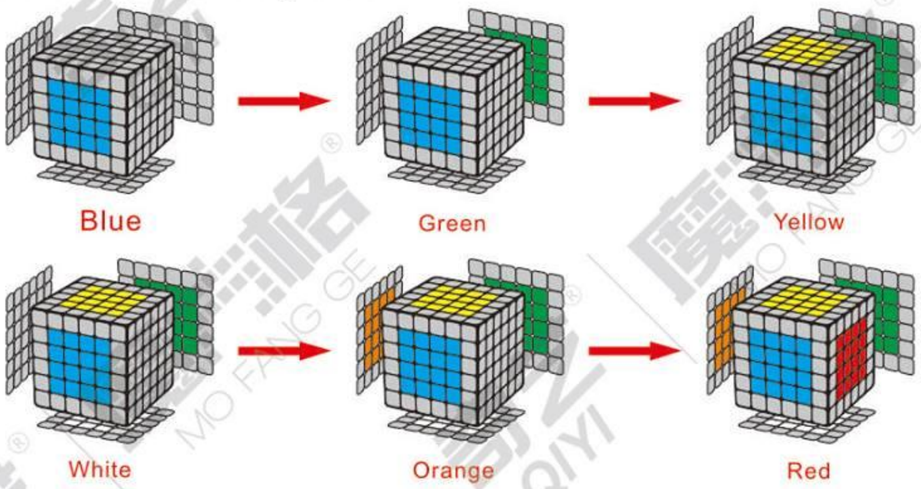



## 1: Group the center pieces on every face.

①Solution steps for the center pieces on one face.



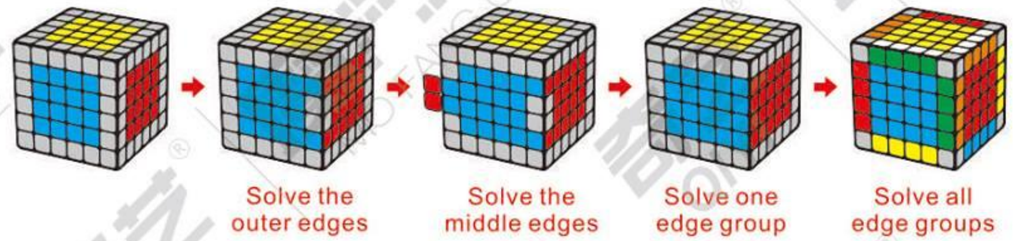
②The 6x6x6 cube has no fixed center pieces. You must correctly identify the relative positions of the colors (up: yellow, down: white, front: blue, back: green, left: orange, right: red) and solve the sides one by one.






## 2: Group the edge pieces.

In this step, you need to solve twelve groups of edges. A group is two middle edges and two outer edges. Steps as follows:




## 3: Solve the 6×6×6

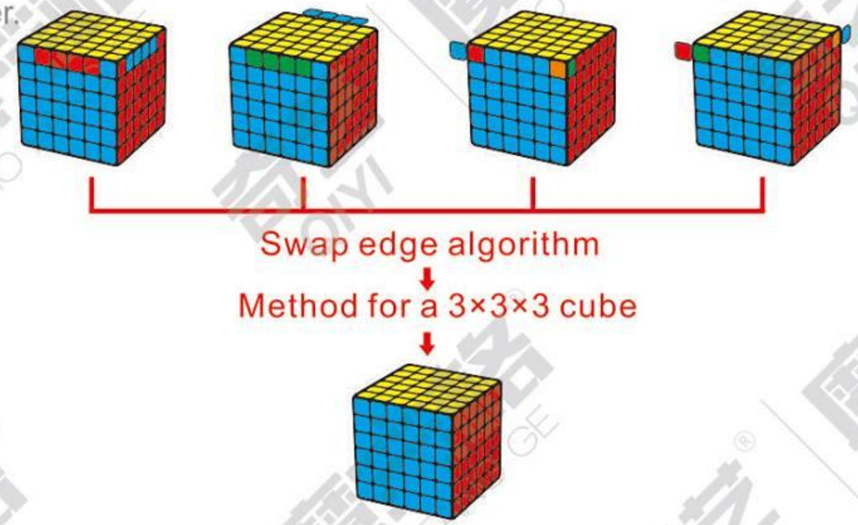
Use the methods for a 3×3×3 Cube to solve the 6×6×6 Cube. However, you may encounter certain positions that cannot be solved on a standard 3×3×3 cube. There are two possible cases not found on the 3×3×3. Follow the steps below to solve them first and then continue the method for a 3×3×3 cube.

**The first one: reverse the edge groups**

Use this when you cannot make the cross on the top layer.


**The second one: Swap the edge groups**

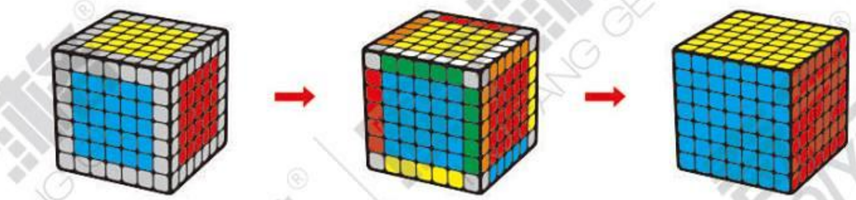
Use this when there are only two edge groups or corner pairs on the top layer.



# 7×7×7 Cube Entry Tutorial

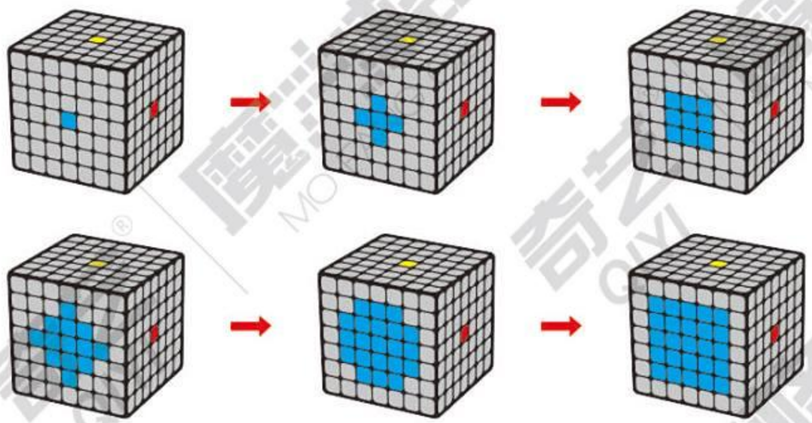
We also use reduction to solve 7×7×7. Reduction means to reduce the cube of higher layers to a 3×3×3 cube.The method for the 7×7×7 is almost same as the 5×5×5. Please refer to the solution for the 5×5×5.

## Solution steps for the 7×7×7 proceeds as follows:

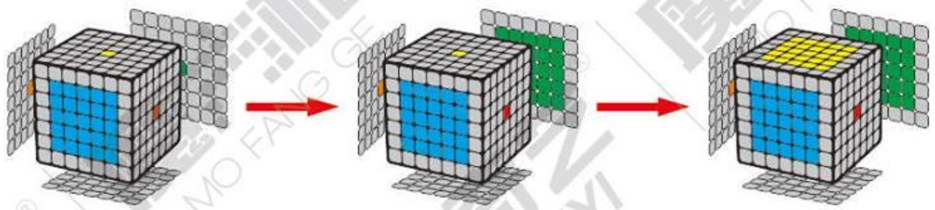



## 1.Group the center pieces on every face

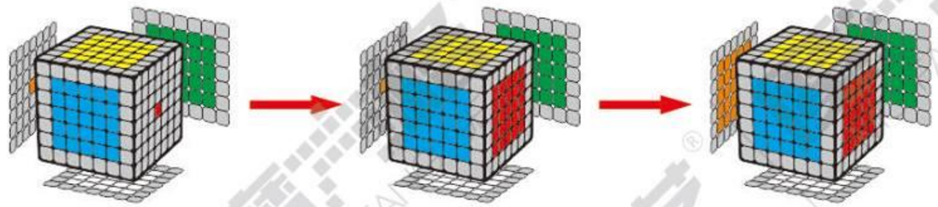
①Solution steps for the center pieces on one face



②Follow the steps below to solve the center pieces of the 7×7×7 one side by one side:

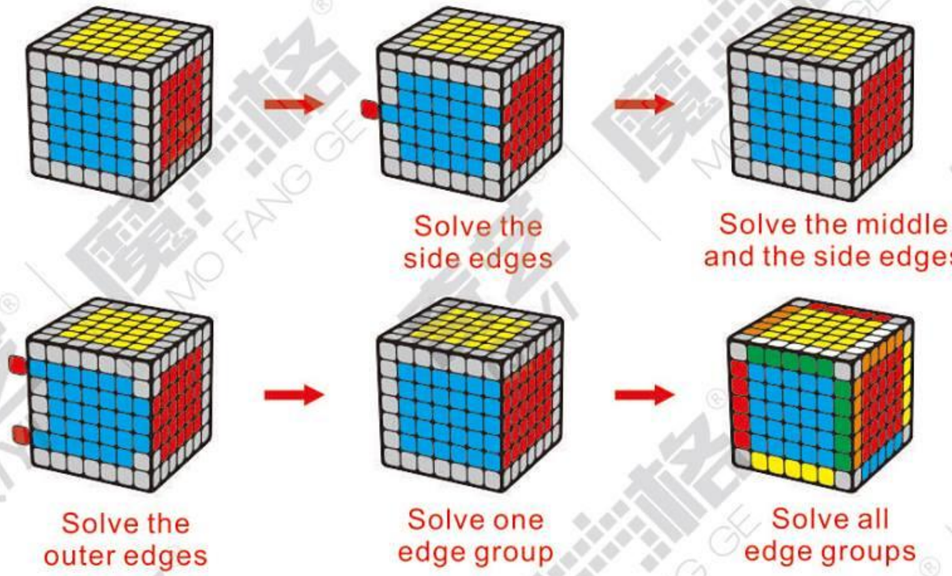




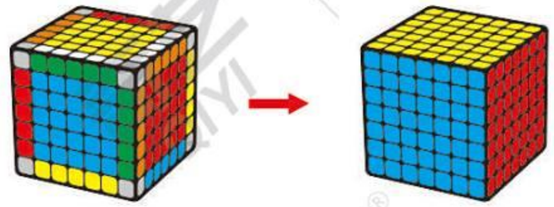

## 2.Group the edge pieces

In this step, you need to solve twelve edge groups. A group is one middle edge, two side edges and two outer edges. Steps proceed as follows.




## 3.Solve the 7×7×7

Now use the method for a 3×3×3 cube to solve the 7×7×7.

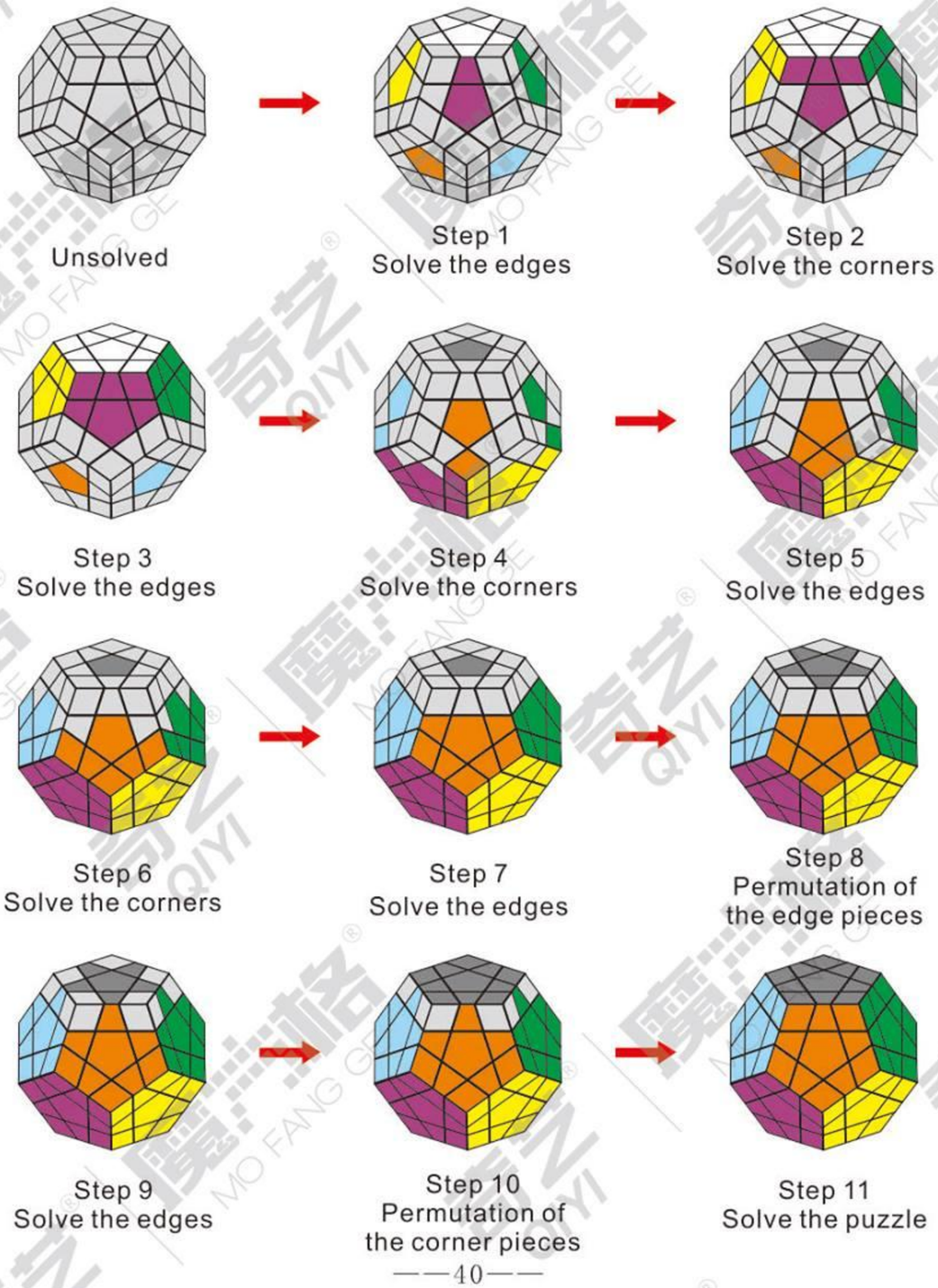


Higher order cubes beyond the 6×6×6 and 7×7×7 are all based on the 4×4×4 and 5×5×5. Understanding the 4×4×4 and 5×5×5, and you can easily grasp larger puzzles. Concepts that are used to solve big cubes are also commonly found in other areas of puzzle solving.

# Megaminx Entry Tutorial

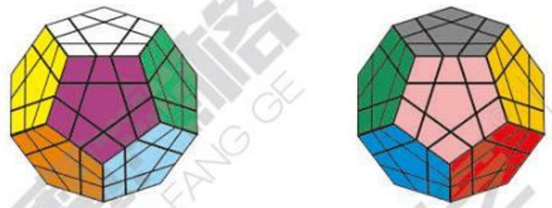
It will be easier to solve the megaminx if you know how to solve the 3×3×3.

Solution steps for the Megaminx as follows:

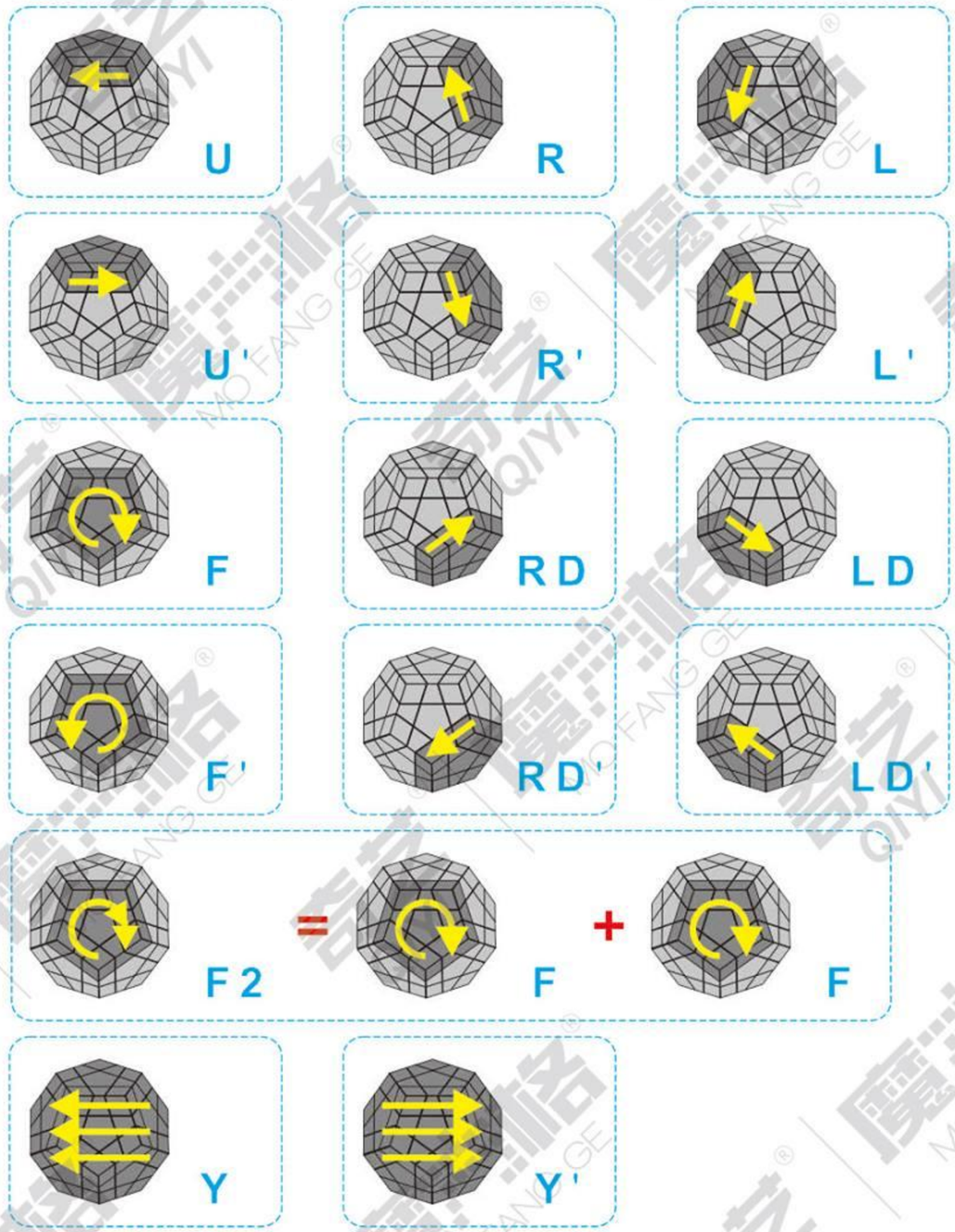





There are twelve faces on the Megaminx. The colors are as follows:




## Rotation & Illustration & Notation



## Step 1: Solve the edges

**Goal**

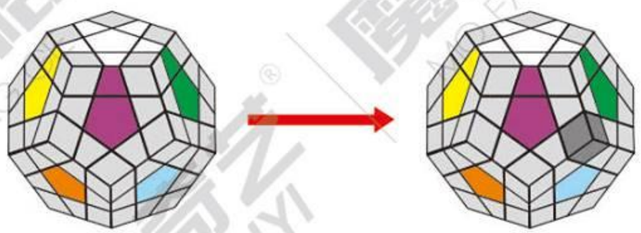
In this step, you need to solve all the five edges on the white face. There are no fixed steps. You can solve it by yourself intuitively.

## Step 2: Solve the corners

**Goal**

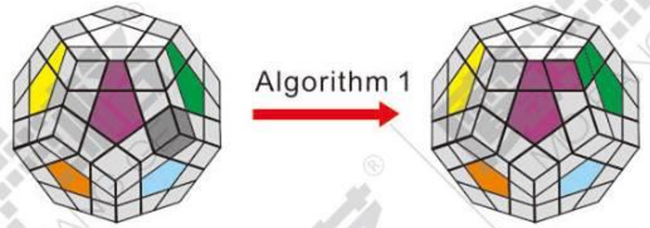
We only need to remember one algorithm in this step. The goal is to solve five corner pieces. Let us take the white-purple-green corners for example:

Find out the white-purple-green corner and rotate it to the grey position.

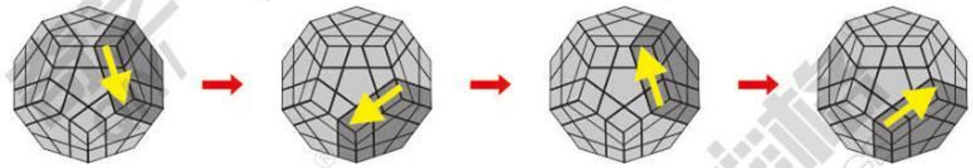




Repeat algorithm 1 until we get it as illustrated on the right.




Algorithm 1:R' RD' R RD



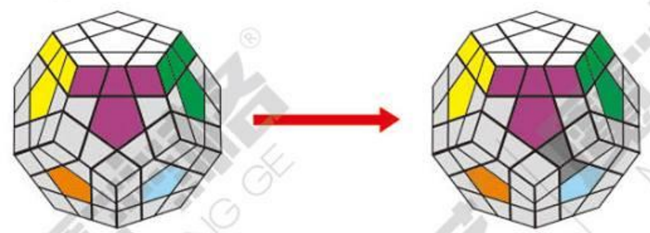
After solving all the white-purple-green corner pieces, you can use the same method for other white-green-red, white-red-blue, white-blue-yellow and white-yellow-purple corner pieces.

## Step 3: Solve the edges

**Goal**

We only need to remember two algorithms in this step. The goal is to solve five edge pieces. Let us take the purple-green edge for example:

Find out the purple-green edge and rotate it to the grey position.

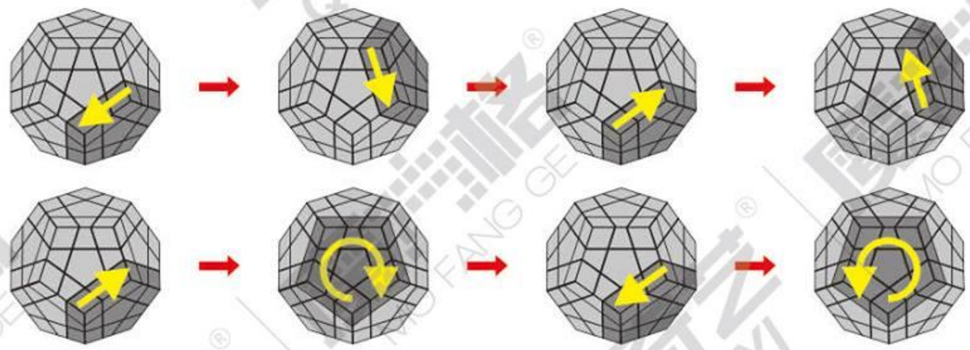


**There will be two cases:**

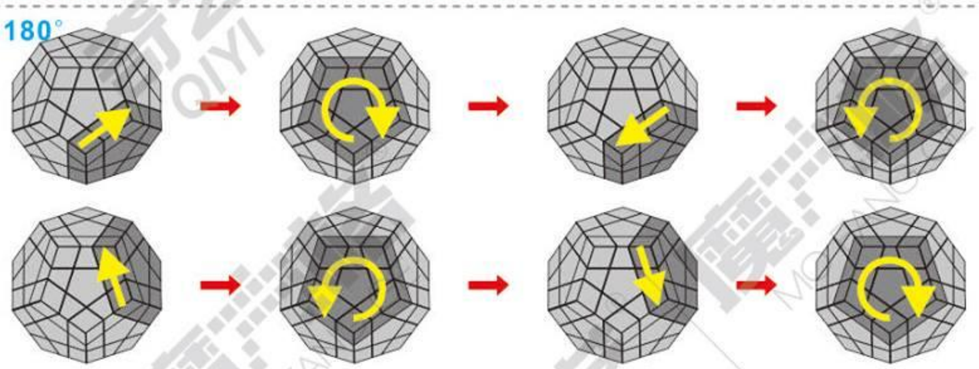
The first case:


The second case:


Algorithm 2:RD' R' RD R RD F RD' F'



Algorithm 3:RD2 F RD' F' R F' R' F



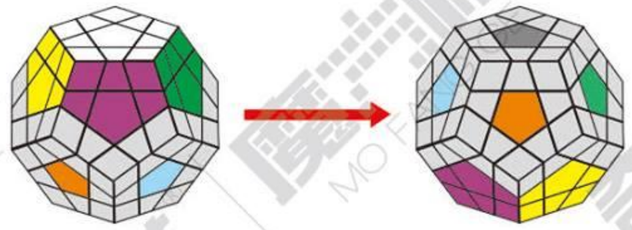

After solving all the purple-green edge pieces, you can use the same method for other green-red, red-blue, blue-yellow, and yellow-purple edge pieces.



## Step 4: Solve the corners

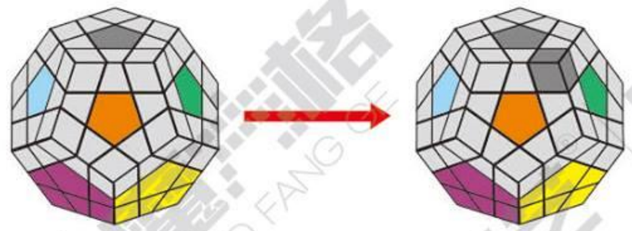
**Goal**

Spin the cube around in your hands
Place the white face on the bottom.
Place the orange center in front of you.



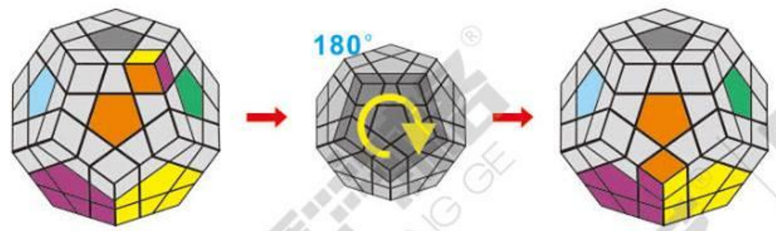
The goal is to solve five corner pieces in this step. Let us take the orange-yellow-purple corner piece for example:

Find the purple-orange-yellow corner and rotate it to the grey position.

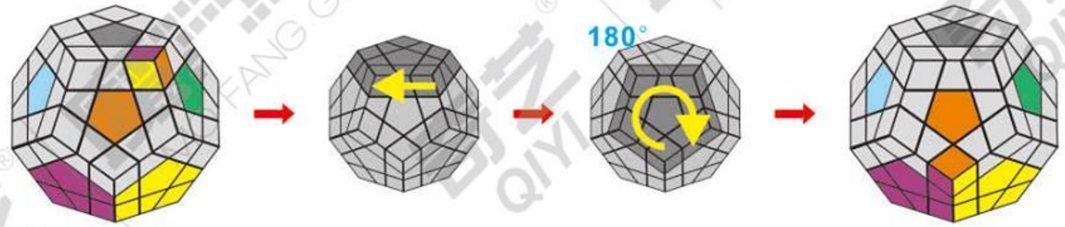


**There will be three cases:**

The first case:



The second case:




The third case:

After solving the orange-yellow-purple corner piece, you can use the same method for all other corner pieces in this position.

## Step 5: Solve the edges

**Goal**

In this step, you need to solve two edge pieces on one face. There are ten edge pieces in total. Let us take the orange-yellow and the orange-purple edges for example. Steps proceed as follows:




### 1.Solve the orange-yellow edge:

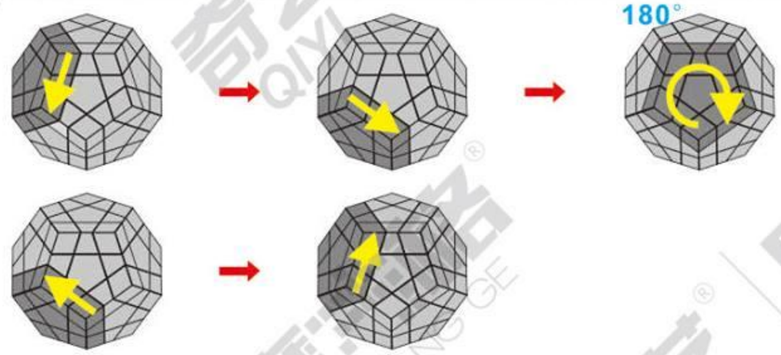
Find out the orange-yellow edge and rotate it to the grey position.

**There will be two cases**

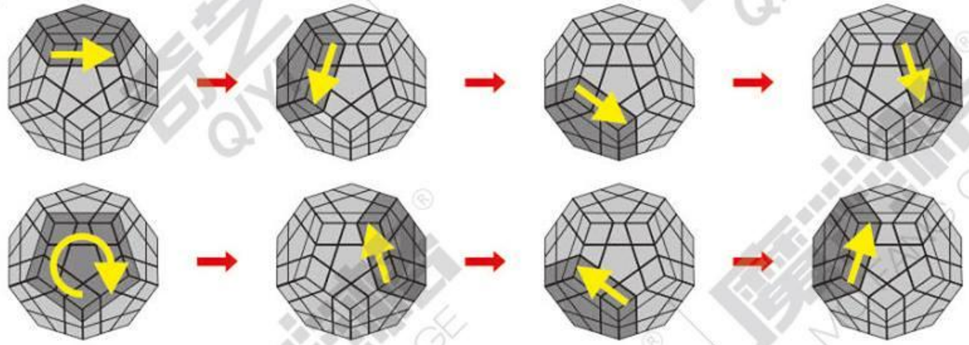
The first case:


The second case:


Algorithm 4:L LD F2 LD' L'

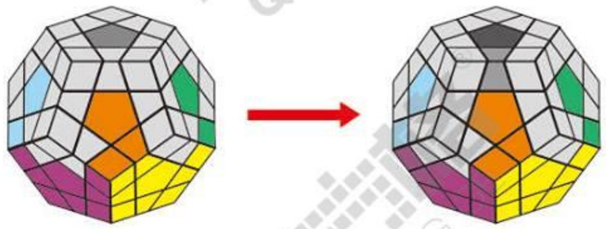


Algorithm 5:U' L LD R' F R LD' L'



## 2.Solve the orange-purple edge:

Find out the orange-purple edge and rotate it to the grey position.



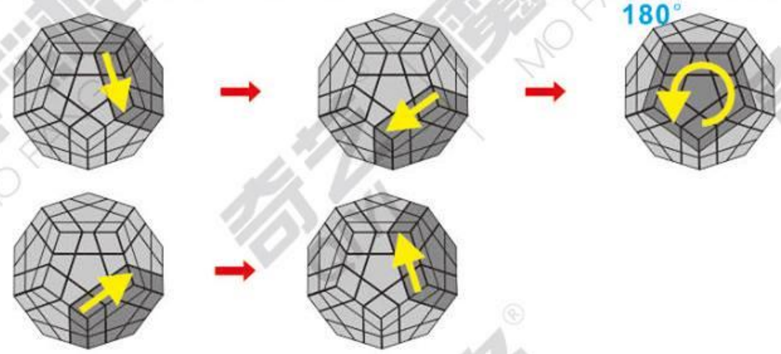
**There will be two cases**

The first case:

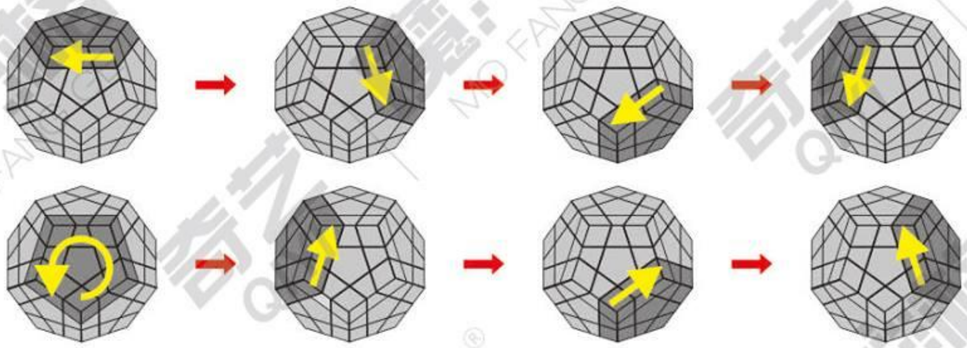

The second case:




Algorithm 6:R' RD' F' 2 RD R




Algorithm 7:U R' RD' L F' L' RD R



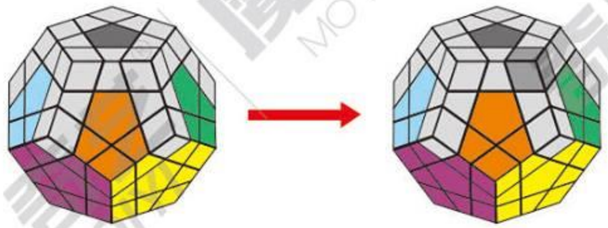
After solving the two orange edges, you can use the same method for the 8 edges on the other four faces.

# Step 6: Solve the corners

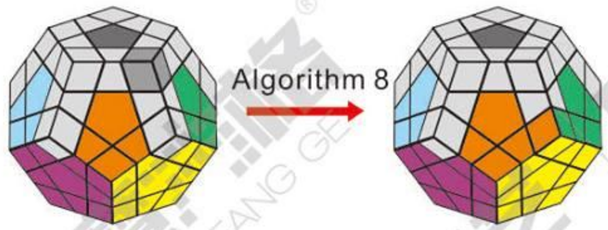
**Goal**

In this step, use one algorithm to solve all five corners.Let us take the orange-green-yellow corners for example, steps proceed as follows:

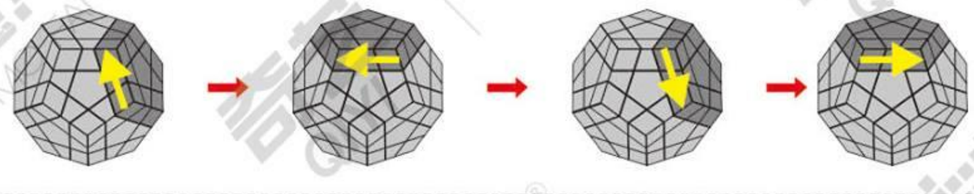
Find the orange-green-yellow corner and rotate it to the grey position.



Repeat algorithm 8 until it is the same as the illustration on the right.




Algorithm 8:R U R' U'



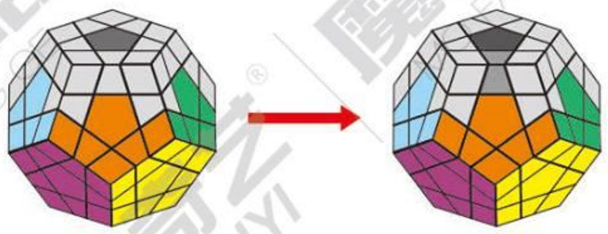
After solving the orange-green-yellow corner, you can use the same method for the other corners.

## Step 7: Solve the edges

**Goal**

In this step, use two algorithms to solve all five edges. Let us take the orange and green edges for example. There will be two cases. Step proceed as follows:

Find out the orange-green edge and rotate it to the grey position.



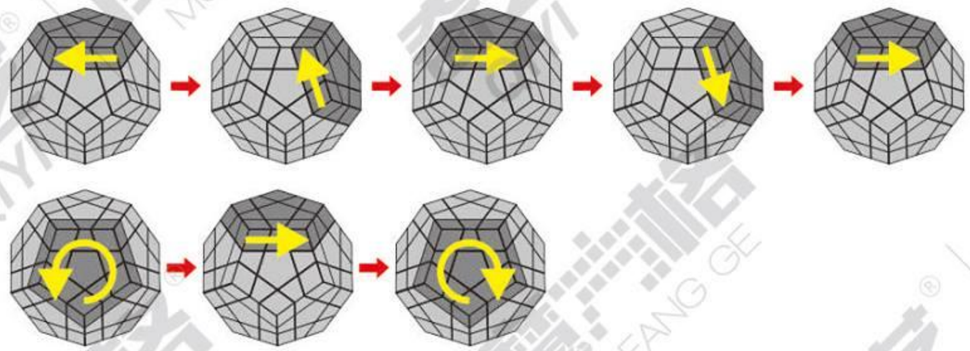


**Now there will be two cases:**

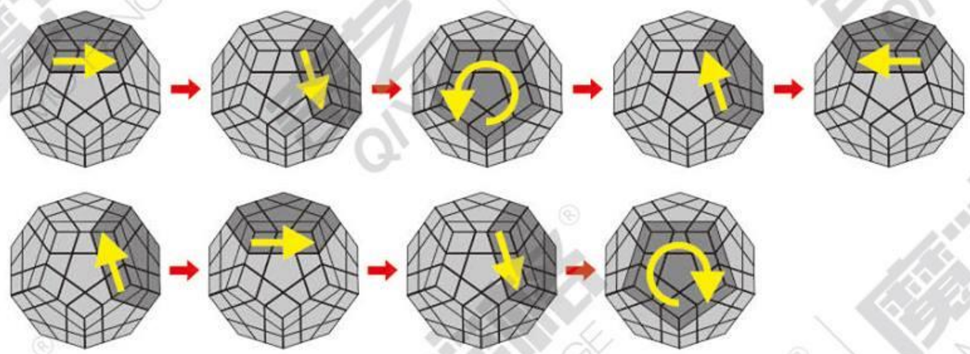
The first case:


The second case:


Algorithm 9:U R U' R' U' F' U' F



Algorithm 10:U' R' F' R U R U' R' F



After solving the orange-green edge, you can use the same method for the other edges.

# Step 8: Solve the star on the top layer

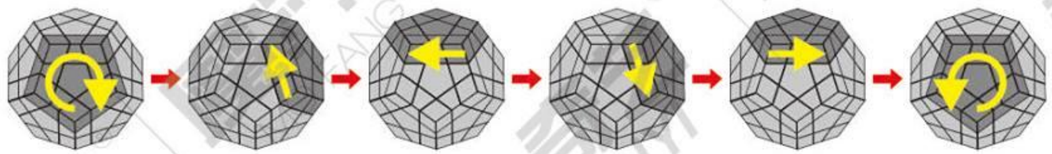
**Goal**

There will be three cases and use two algorithms to solve the star on the top layer.
The first case:


The second case:


The third case:


Algorithm 11:F R U R' U' F'



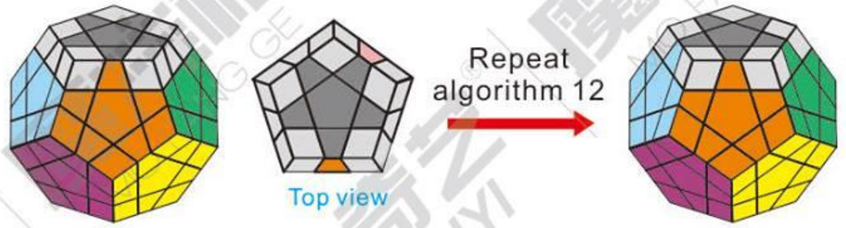


# Step 9: Permutation of the star edges

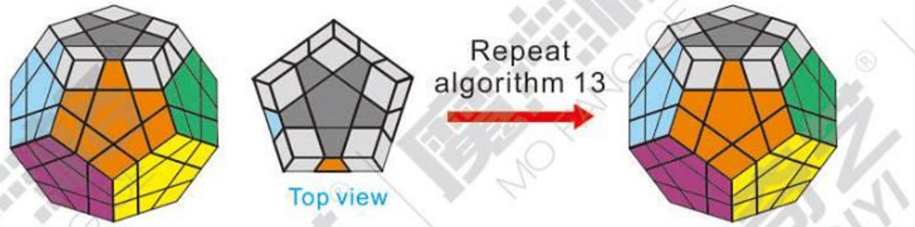
**Goal**

There will be two basic cases, which can be solved by algorithm 12 and 13. If there is a special case, do the algorithm once to arrive at the basic cases.

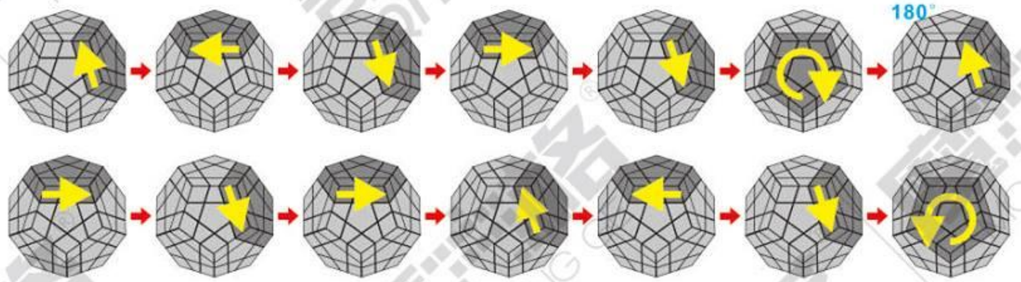
Basic case 1: two edges and the center of the side are the same color and two edges are opposite one another. Repeat the algorithm until it is solved as illustrated:



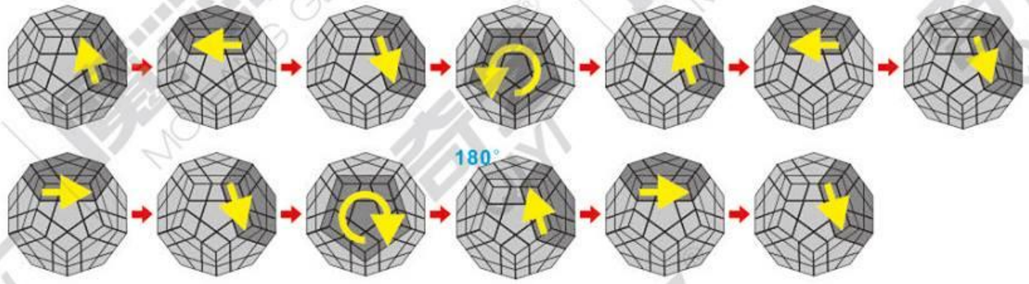

Basic case 2: two edges and the center of the side are the same color and two edges are on the adjacent to one another. Repeat the algorithm until it is solved as illustrated:




Algorithm 12:R U R' U' R' F R2 U' R' U' R U R' F'



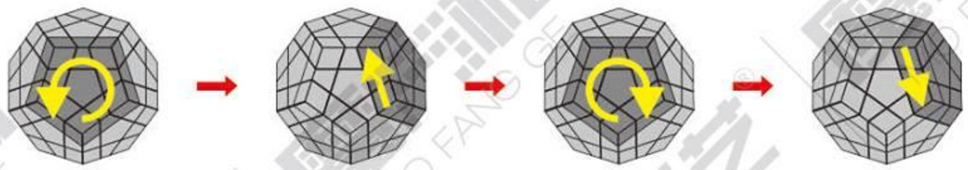
Algorithm 13:R U R' F' R U R' U' R' F R2 U' R'



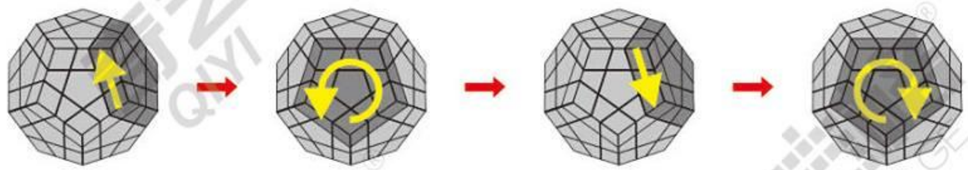

## Step 10: Solve the grey top

Goal

Algorithm 14:F' R F R'



Algorithm 15:R F' R' F



Rotate the unsolved grey corner to the black position as illustrated. Now there will be two cases:



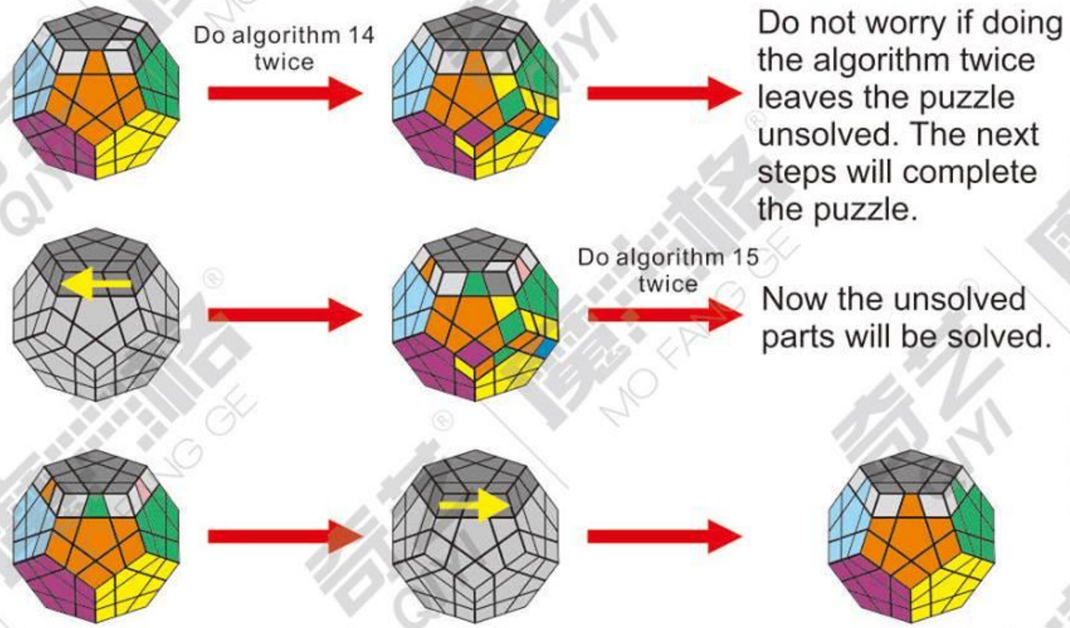
### Case 1

The grey portion of the corner is facing to the right. Do algorithm 14 twice.

### Case 2

The grey portion of the corner is facing to the front side. Do algorithm 15 twice.

In this step, we use a cube state as an example:

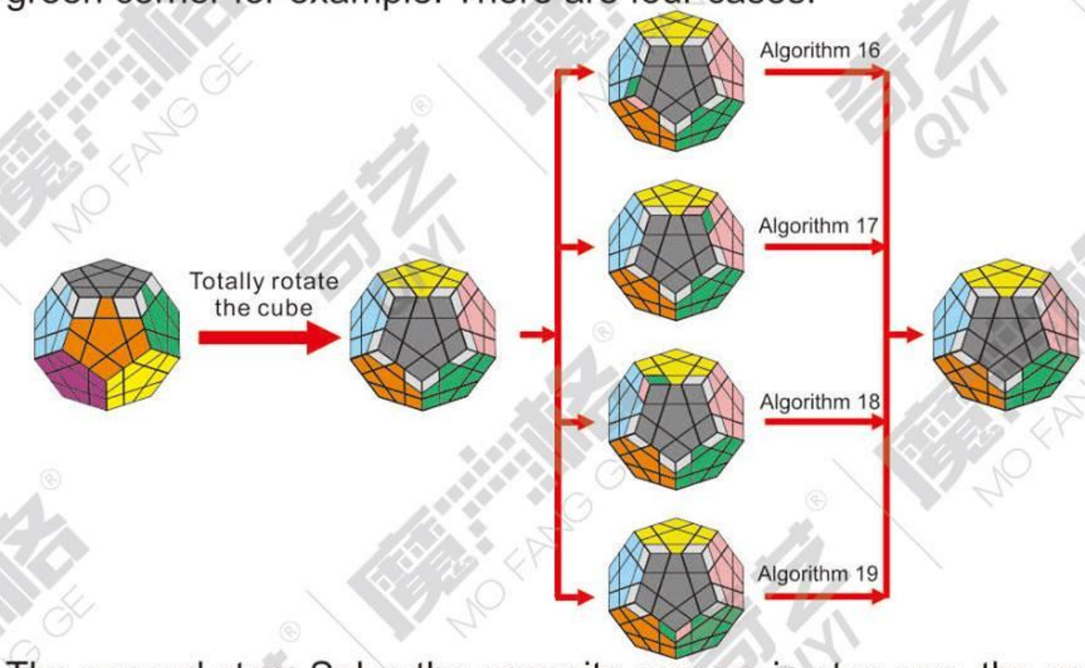



In other cube states, rotate the unsolved corner to the grey position step by step. Then, use different algorithms for different cases. Some pieces may become unsolved while you are executing this step. Proceed carefully through the steps and they will be solved again.

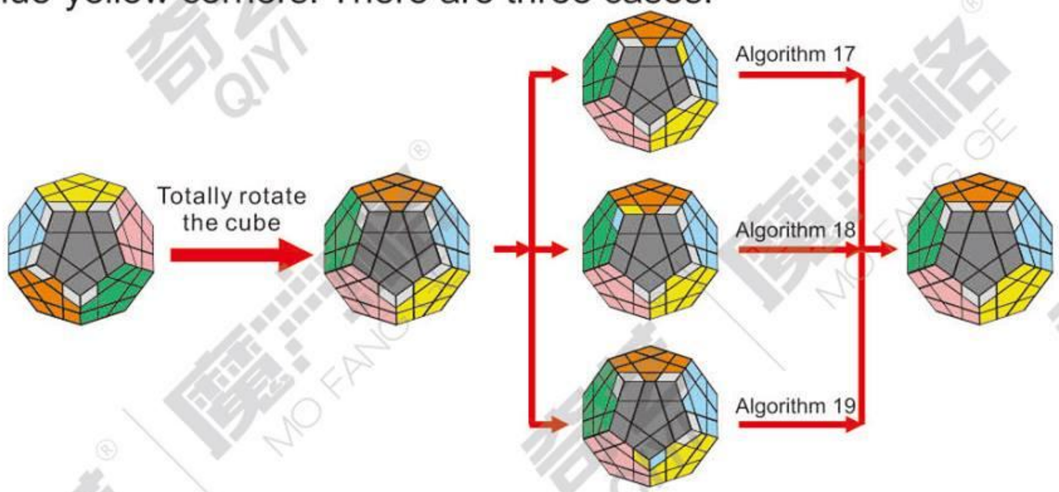
## Step 11: Solve the cube

**Goal**

In this step, we do it in three small steps:
The first step: Solve any a corner piece. Let's take the grey-pink-green corner for example. There are four cases:



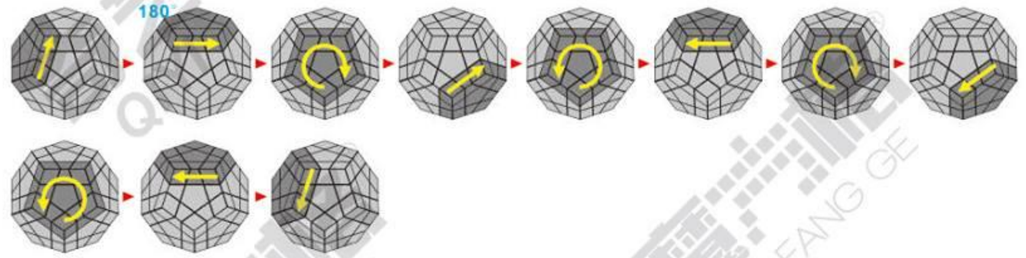

The second step: Solve the opposite corners in step one, the grey-blue-yellow corners. There are three cases:



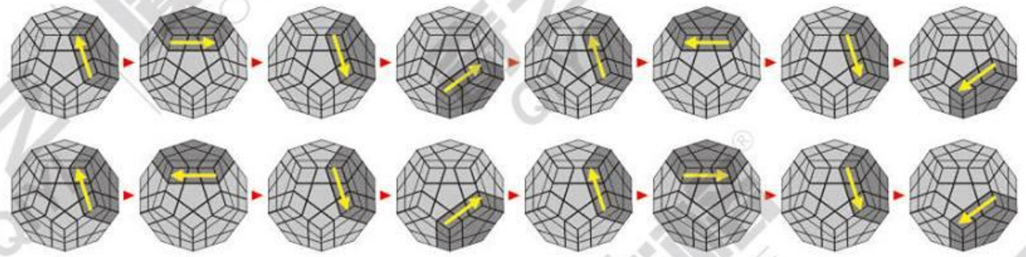



The third step: To solve the last three corners, only repeat algorithm 16

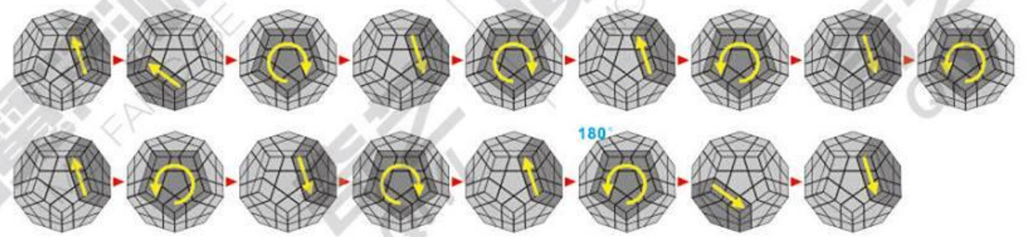

Algorithm 16:L' U'2 F RD F' U F RD' F' U L



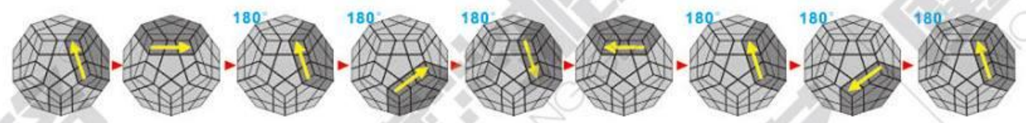

Algorithm 17:R U' R' RD R U R' RD' R U R' RD R U' R' RD'



Algorithm 18:R LD' F R' F R F' R' F' R F' R' F R F'2 LD R'

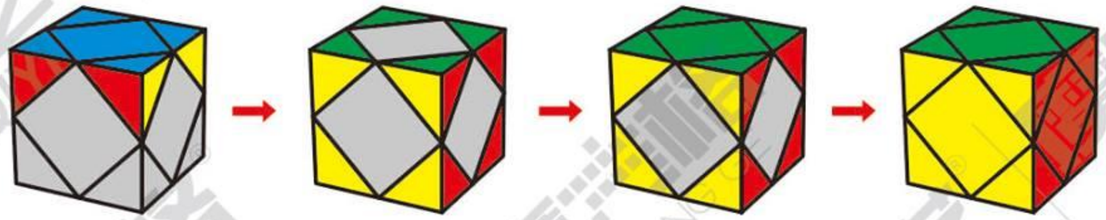



Algorithm 19:R U' R2 RD2 R'2 U R2 RD'2 R2



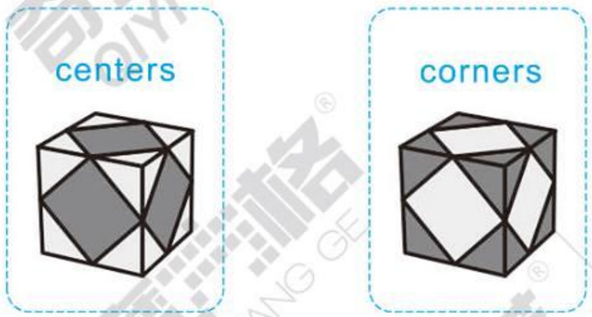
# Skewb Cube Entry Tutorial

## Solution & Illustration

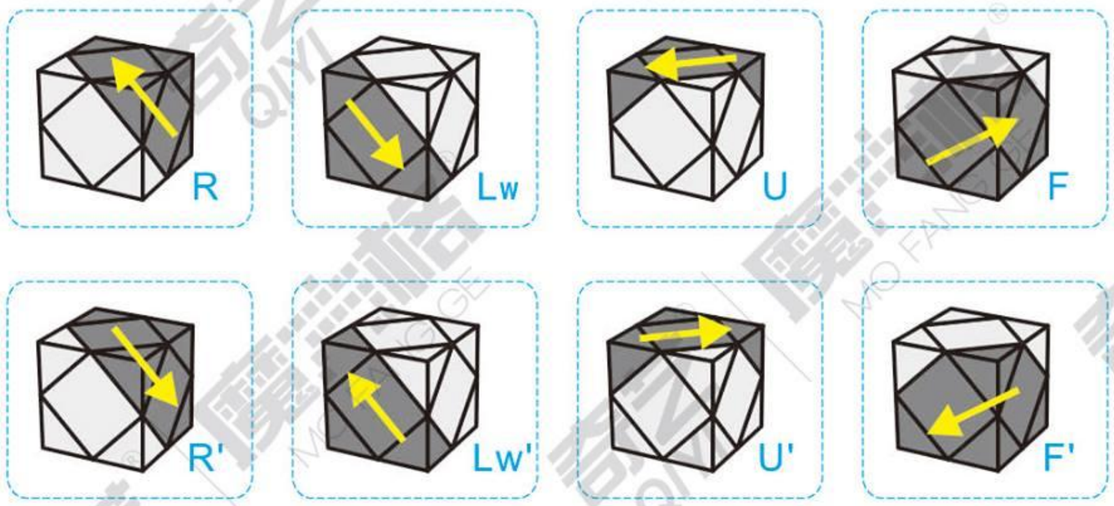


Solve the blue face　Solve the green corners　Solve the green face　Solve the cube

Name of each part:




## Rotation & Illustration

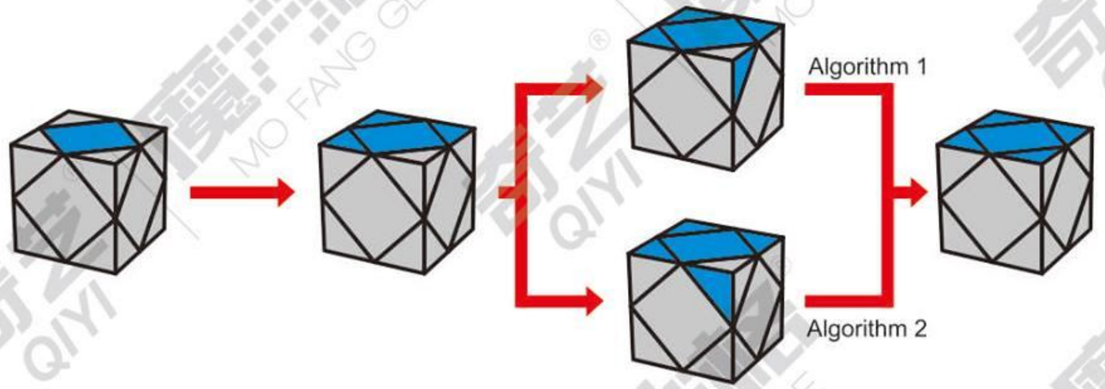





# Step 1: Solve the blue face

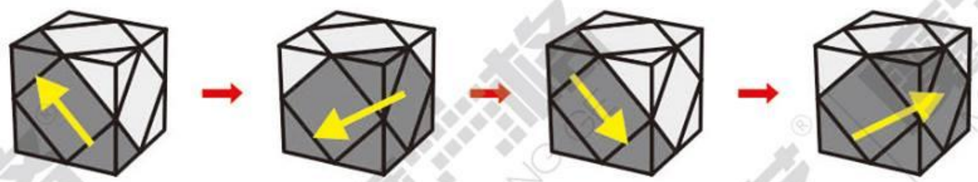
**Goal**

Take the blue face for example, find out the blue center and place it on top.
There is no fixed method to solve the first three blue corner pieces. You can do this by yourself intuitively.
There are two basic cases for the forth corner piece, and it can be solved with algorithms.




Algorithm 1:F' Lw' F Lw

Algorithm 2:Lw' F' Lw F



## Step 2: Solve the green corners

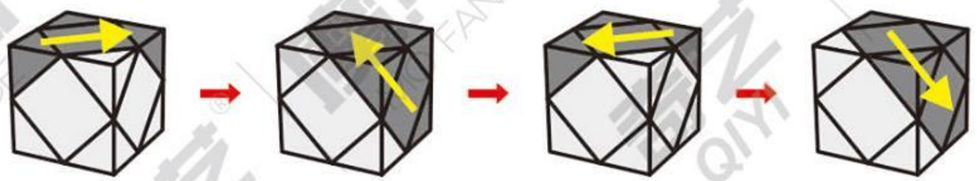
**Goal**

After solving the blue face, place it to the bottom. There are only two cases for the green corner pieces on top.

The first case:


The second case:


Algorithm 3:U' R U R'



## Step 3: Solve the green face

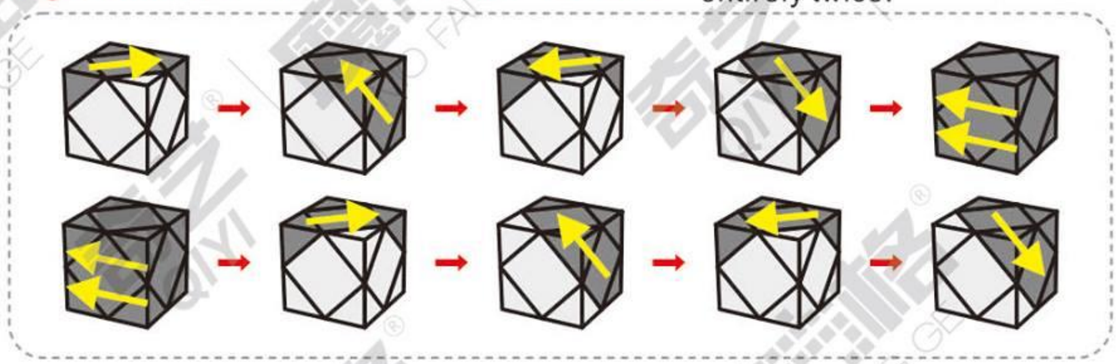
**Goal**

Now the green center will only be on one of the four sides. Rotate the green center to face you and then solve it as illustrated.




Algorithm 4:U' R U R' Y2 U' R U R'

Y2 means to rotate the cube entirely twice.



## Step 4: Solve the cube

**Goal**

There are only two cases now. Complete this step to solve the cube.

The first case: There are only three centers to be solved.

Place the blue face on the left and the green face on the right. Then, place another solved face on the bottom and then solve it as illustrated.


The second case: There are four centers to be solved:

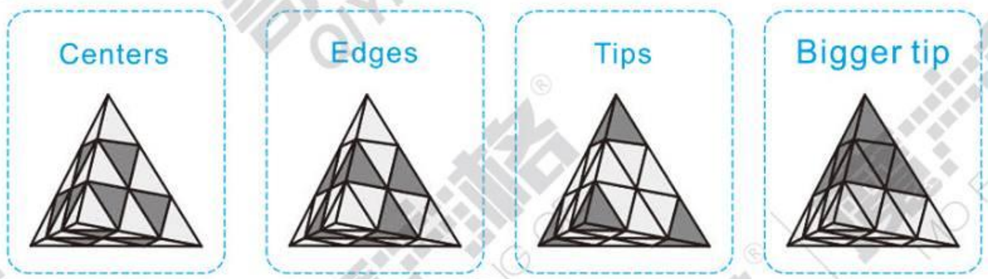
Place the blue face on the left and the green face on the right and do algorithm 4 once. This will result in the case where three centers need to be solved. Then solve the cube as per the first case.

# Pyraminx Entry Tutorial

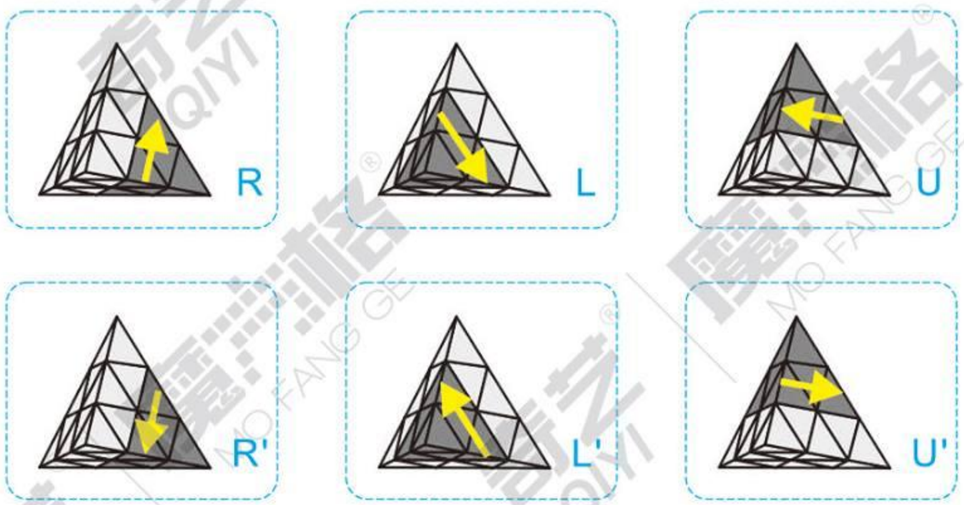
## Solution & Illustration

Unsolved | Solve the corners | solve the edges on the bottom | solve the cube

## Name of each part:




## Rotation & Illustration






# Step 1: Solve the corners

**Goal**

In this step, you need to make the small tips on every face same color as its center pieces.

1.Rotate the tips and make it same color as its center pieces.

2.Rotate the bigger tip and make tips on every face same color as its center pieces.

# Step 2: Solve the edges on the bottom

**Goal**

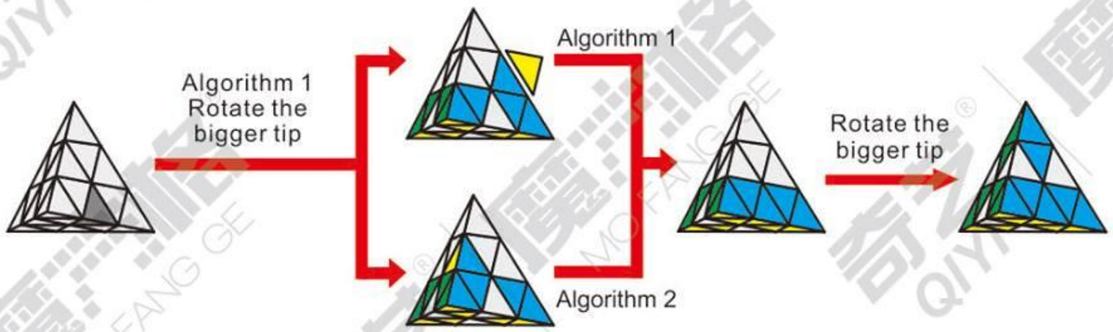
In this step, place the yellow face of the tips and center pieces on the bottom. We will solve the blue-yellow, red-yellow, and green-yellow edges.

Take blue-yellow edge for example. There are three cases:

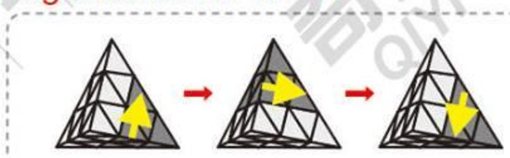
The first case: Rotate the bigger tip and make the blue-yellow edge on the right.

The second case: Rotate the bigger tip and make blue-yellow edge on the left.

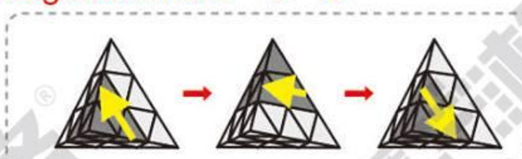

The third case: When the blue-yellow edge piece is on the bottom and it is still not solved, do the algorithm once and then rotate the bigger tip and make it same as case one or case two:




Algorithm 1:R U' R'



Algorithm 2:L' U L



## Step 3: Solve the cube

**Goal**

Now only the edge pieces in the middle layer need to be solved.
There are two basic cases:

The first case: Only two edge pieces need to be solved

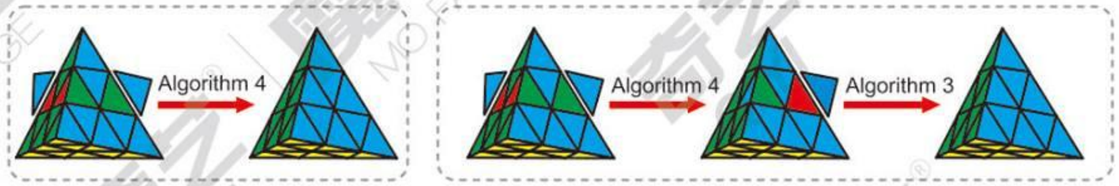

The second case: Three edge pieces need to be solved



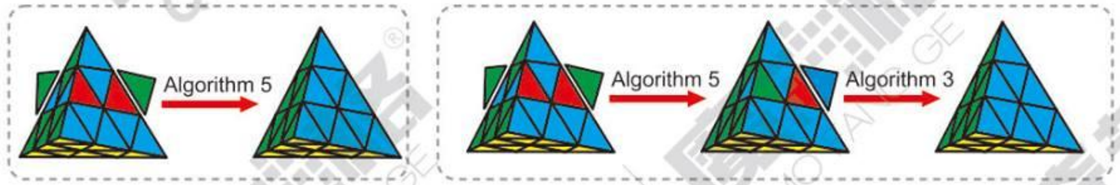
First do algorithm 4 or 5 once to solve three edge pieces clockwise or counterclockwise respectively.
Now there will be two cases:

① The cube is already solved.
② It becomes the first case, do algorithm 3 once to solve the cube.

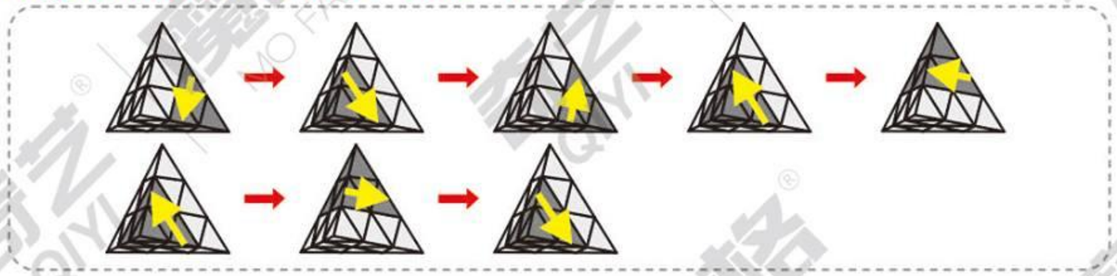
clockwise:



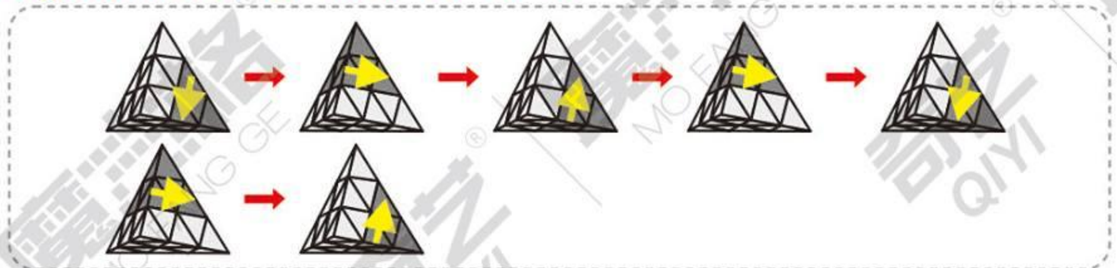

逆时针：



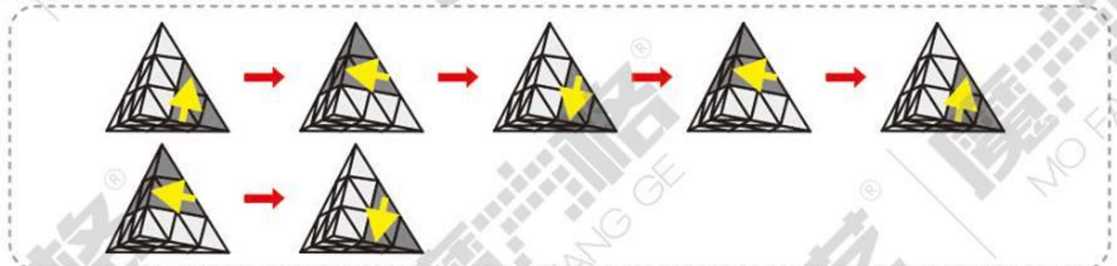

Algorithm 3:R' L R L' U L' U' L



Algorithm 4:R' U' R U' R' U' R



Algorithm 5:R U R' U R U R'



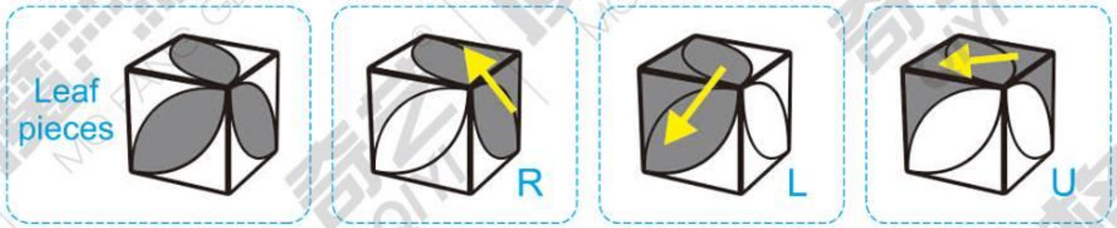
# Ivy Cube Entry Tutorial

The Ivy Cube has no center pieces. You have to be aware of the color scheme to solve it.

International standard color scheme

F: Blue B: Green
U: Yellow D: White
L: Orange R: Red

## Name of each part & Rotation & Illustration




## Step 1: solve the blue face

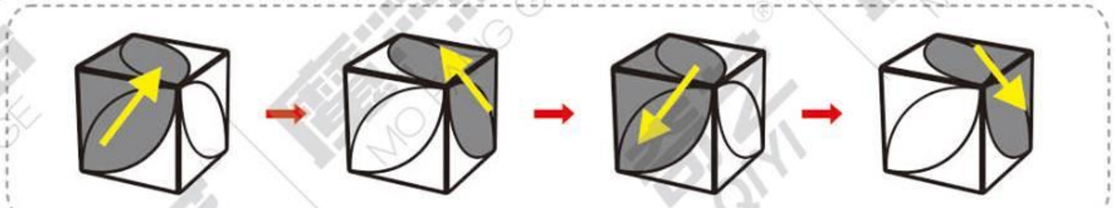
**Goal**


Fig. 1 Fig. 2



Take the blue face for example. Find two blue corner pieces and rotate them as shown in figure 1. Find the blue leaf piece and rotate it as shown in figure 2. Then, do algorithm 1 to solve the blue face.

Algorithm 1:L' R L R'



## Step 2: solve the green face

**Goal**

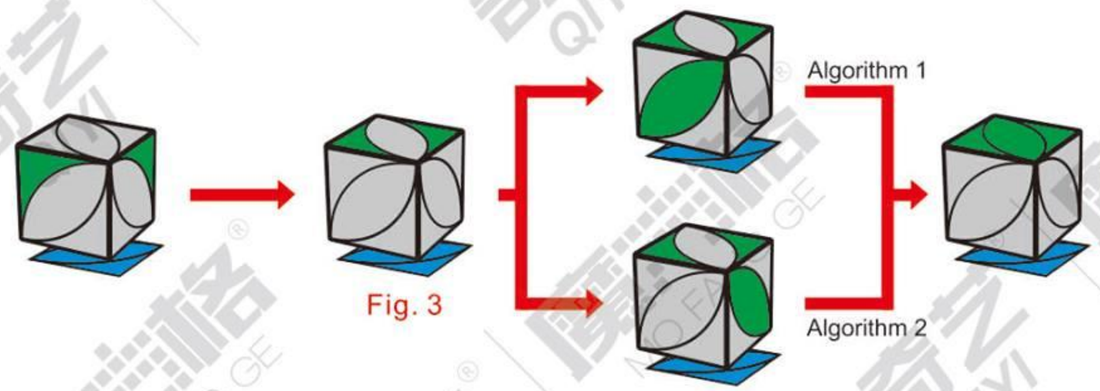
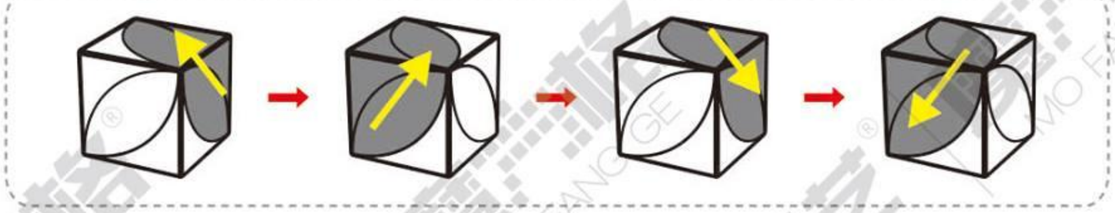



Fig. 3

Find two green corner pieces and rotate then as shown in figure 3, and then do the algorithm that corresponds with the diagram to solve the green face.

Algorithm 2:R L' R' L



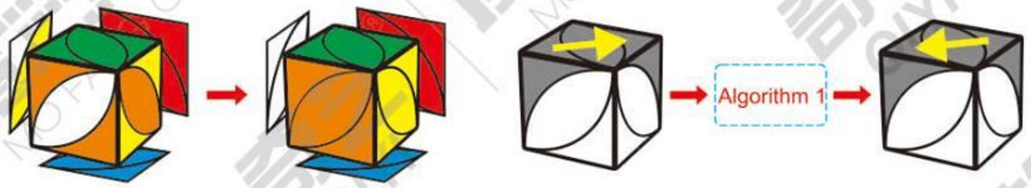
## Step 3: solve the whole cube

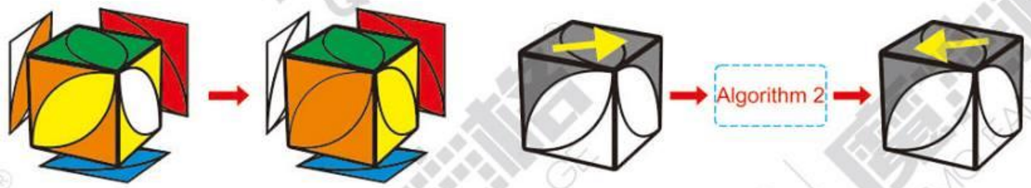
**Goal**

There are three or four leaves to be solved to complete the whole cube.

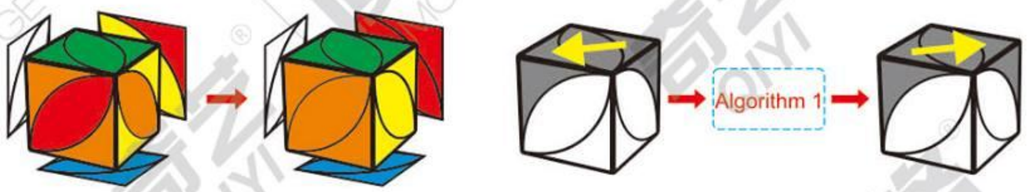
1. There are three leave to be solved:

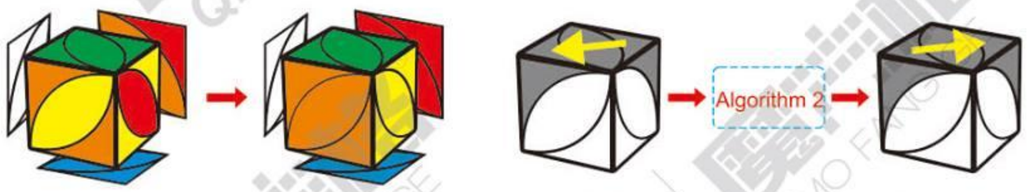
The leaf piece on the back has been solved. There will be two basic cases for the three remaining leaves.




The leaf piece on the left has been solved. There will be two basic cases for the three remaining leaves.



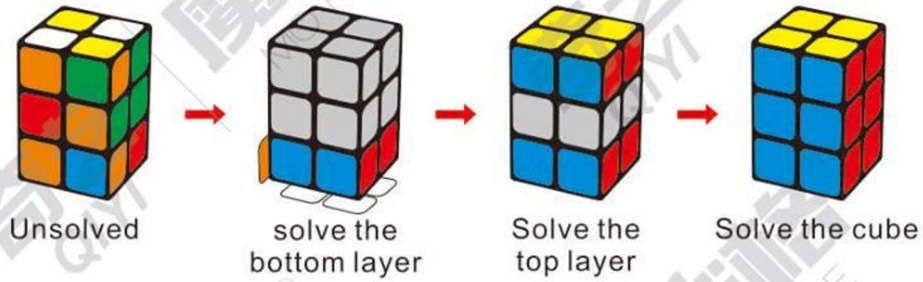

2. There are four leaves to be solved:

The four leaves must be solved. Do any algorithm arbitrarily, which will result in a three-leaf case. Then, solve it according to the four basic cases.

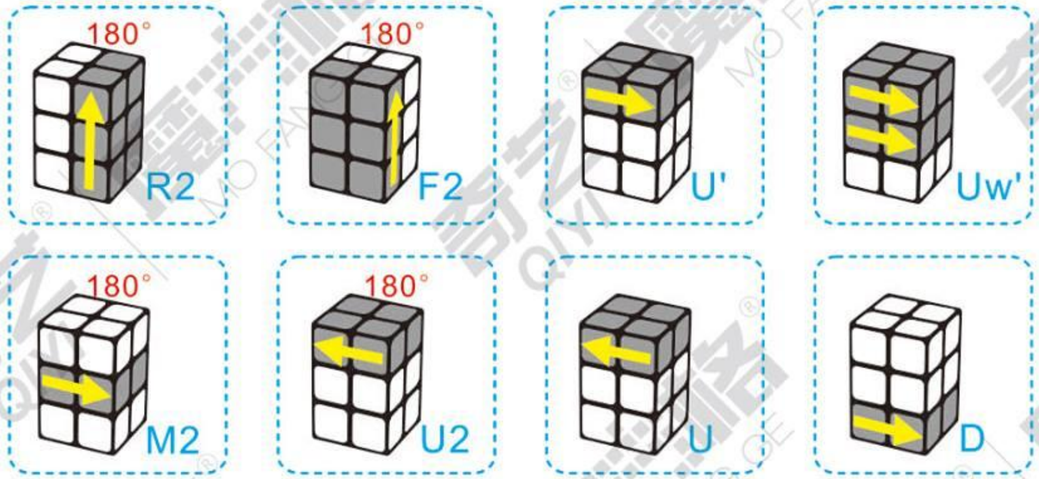


# 223 Cube Entry Tutorial

### Solution & Illustration




### Rotation & Illustration




## Step 1: Solve the bottom layer

**Goal**

There is no fixed method in this step. You can solve this step by yourself intuitively.

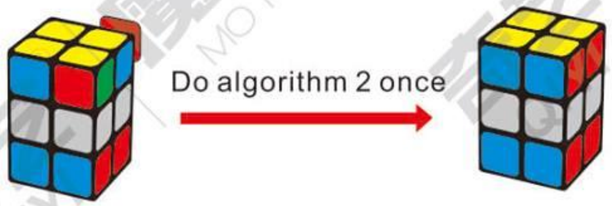
## Step 2: Solve the top layer

**Goal** 

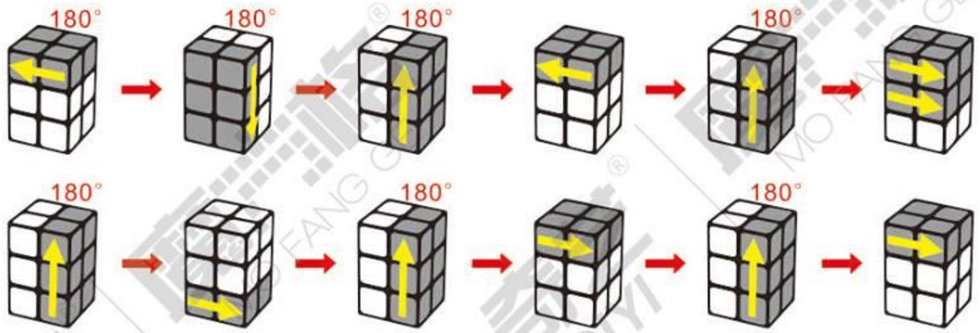
After solving the bottom layer, there will be only two cases for the top layer:
The first is an opposite swap of corner pieces:


Algorithm 1:R2 U D R2 U


The second is an adjacent swap of corner pieces:




Algorithm 2:U2 F2 R2 U R2 Uw' R2 D R2 U' R2 U'





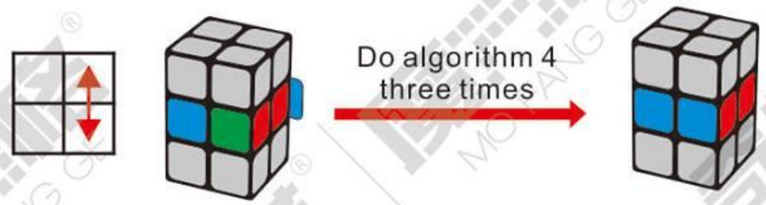

## Step 3: Solve the cube

**Goal** 

After solving the top layer, only the middle layer remains to be solved. There are two basic cases:
The first is a swap of two edge pieces:


Algorithm 3:R2 M2 R2


The second is a swap of one edge piece:




Algorithm 4:R2 U2


If there are any other situations, repeat algorithm 3 and 4 until the puzzle is solved.

# Mirror Cube Entry Tutorial

The mirror cube is a twisty puzzle and shape modification of the standard 3×3×3. And the solution is almost same. Before solving the mirror cube, you must know how to solve a regular 3×3×3.

In this tutorial, the blue color represents solved parts on the same face.

## Overall goal

Unsolved

Solved mirror cube

States equivalent to those of the 3×3×3

Unsolved

Solved cube

## Step 1: Solve the cross on the first layer

Unsolved

Solve the cross on the first layer

Unsolved 3×3×3

White cross on the first layer of a 3×3×3



## Step 2: Solve the corners of the first layer

Unsolved

Solve four corners on the first layer

White cross on the first layer of a 3×3×3

White face on the first layer of a 3×3×3

## Step 3: Solve the edges on the second layer

Solve four corners on the first layer

Solve four edges on the second layer

Rotate the whole cube in 180 degrees

White face on the first layer of a 3×3×3

Four edges on the second layer of a 3×3×3

## Step 4: Solve the cross on the third layer

Solve four edges on the second layer

Solve the cross edge on the third layer.

Four edges on the second layer of a 3×3×3

The yellow cross on the third layer of a 3×3×3

## Step 5: Solve the top face of the third layer

Solve the cross edge on the third layer

Solve the top face of the third layer

The yellow cross on the third layer of a 3×3×3

The yellow face on the top layer of a 3×3×3



## Step 6: Solve the corners on the third layer

Solve the top face of the third layer

Solve the corners on the third layer

The yellow face on the top layer of a 3×3×3

Four corners on the third layer of a 3×3×3

## Step 7: Solve the edges on the third layer

Solve the corners on the third layer

Solve the edges on the third layer (Solve the mirror cube)

Four corners on the third layer of a 3×3×3

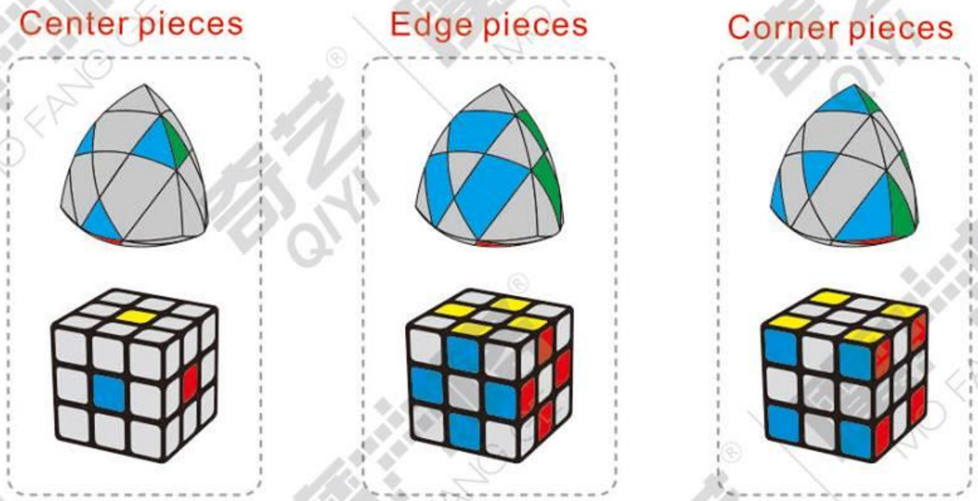
Solve the whole 3×3×3

# Mastermorphix Entry Tutorial

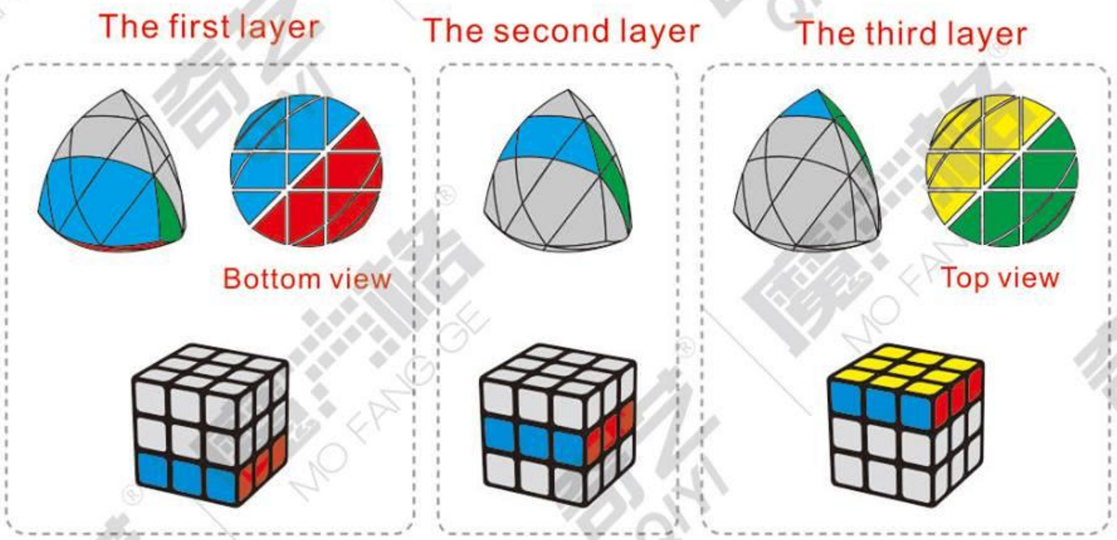
Mastermorphix is a tetrahedral puzzle similar to the 3×3×3. Their solutions are almost identical. We recommend learning the 3×3×3 before the Mastermorphix.

The Mastermorphix is a puzzle with an unusual shape. Please pay attention to its edge pieces, corner pieces, center pieces and their positions during the solution.

**Name of each part equivalent to the parts of the 3×3×3:**

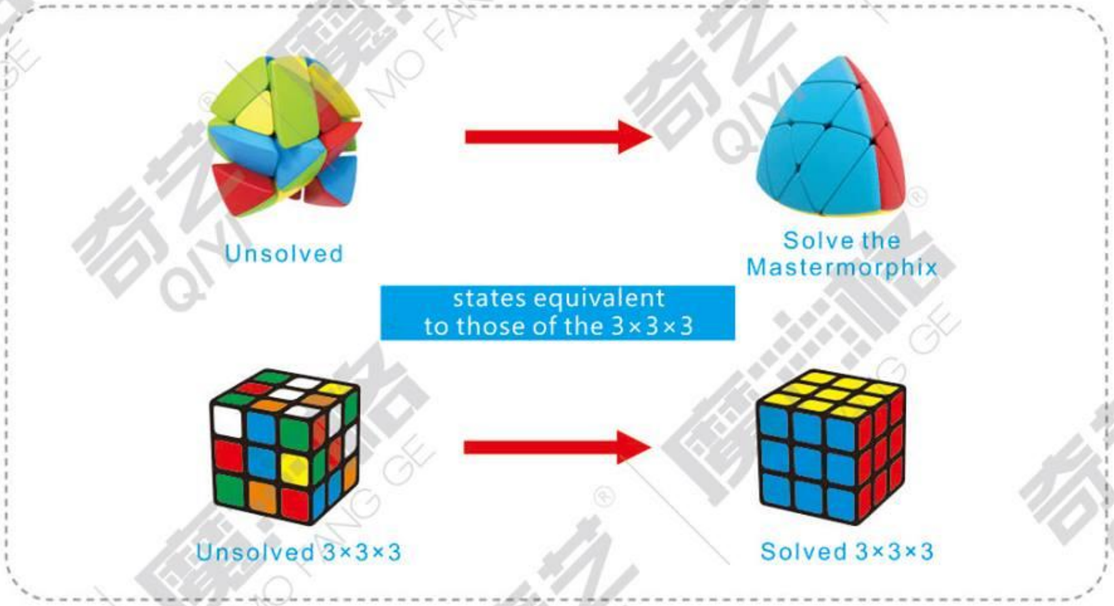



**Layers equivalent to those of the 3×3×3:**

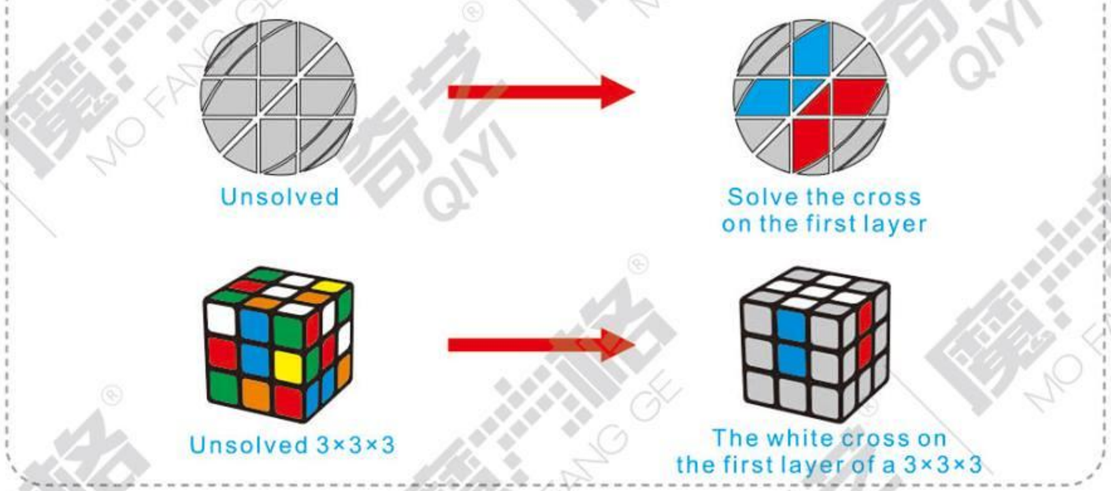





# Overall Goal




# Step 1: Solve the cross on the first layer



## Step 2: Solve the corners on the first layer


## Step 3: Solve the edges on the second layer


## Step 4: Solve the cross of the third layer


## Step 5: Solve the top face of the third layer




## Step 6: Permutation of the corners on the third layer


## Step 7: Permutation of the edges on the third layer

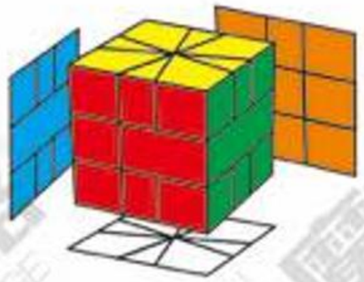

## Step 8: Solve the centers

In the last step, there are only center pieces to be solved, as illustrated below


Algorithm 1:R U R' U

# SQ-1 Entry Tutorial

The SQ-1 puzzle is solved by rotating the edge pieces and corner pieces by degrees. You must always remember the characteristics of the edge pieces and the corner pieces.



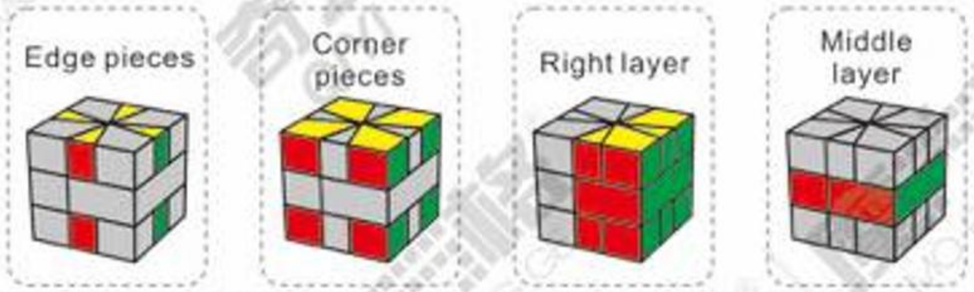
Color positions of SQ-1 puzzle

Front: Red Back: Orange

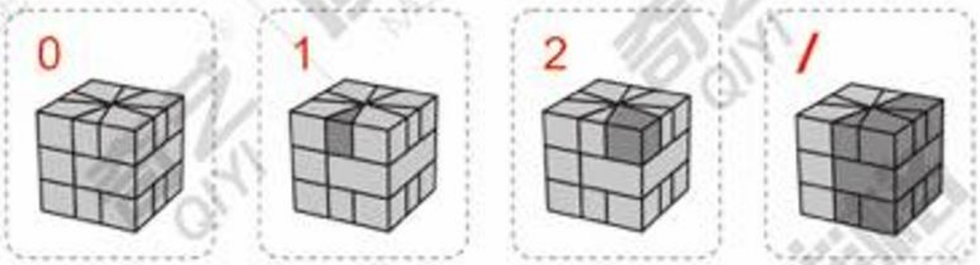
Up: Yellow Down: White

Left: Blue Right: Green

**Name of each part**




The algorithms of SQ-1 puzzle are numbers and symbols. The basic notations are as follows:




0 means no rotation
1 means to rotate the top or bottom layer 30°, and turn one edge piece clockwise
2 means to rotate the top or bottom layer 60°, and turn one corner piece or two edge pieces clockwise.
3 means to rotate the top or bottom layer 90°, and turn one corner piece and one edge piece or three edge pieces
And so on
- means to rotate counterclockwise
/ means to rotate the right layer 180°
() means one step in the algorithm

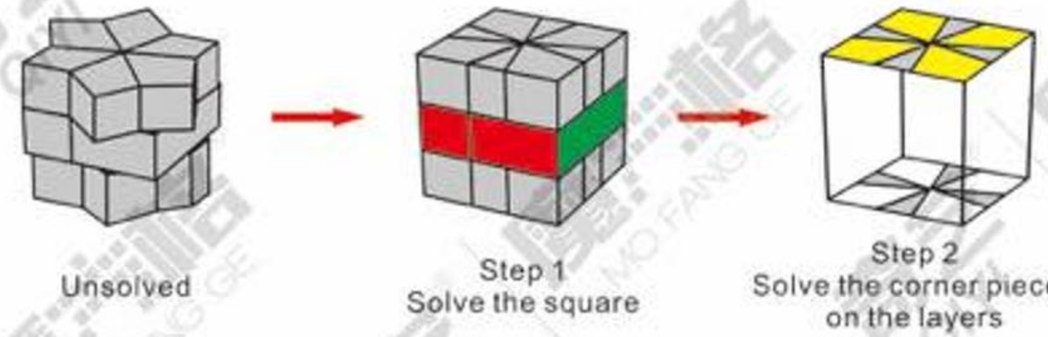


# For example:

Algorithm: /(2,4)/(-2,-1)

Means
To rotate the right layer 180°
the top layer 60°clockwise, the bottom layer 120°clockwise
the right layer 180°
the top layer 60°counterclockwise and the bottom layer 30° counterclockwise

# How to solve the puzzle



Unsolved

Step 1
Solve the square

Step 2
Solve the corner pieces on the layers

Step 3
Solve the edge pieces on the layers

Step 4
Permutation of the corners

Step 5
Permutation of the edges

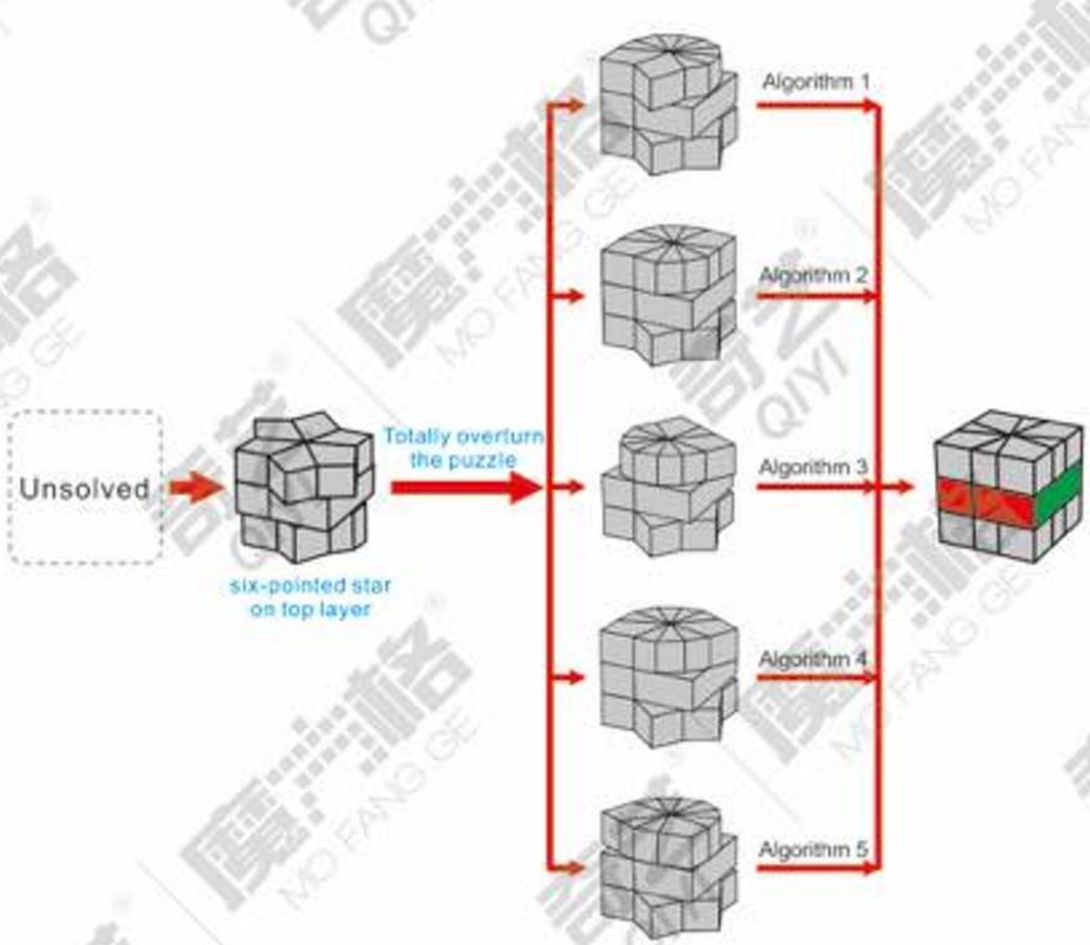
## Step 1: Solve the cube shape

**Goal**

When the SQ-1 puzzle is scrambled, its shape is irregular, and we must solve it into a cube shape

Steps proceed as follows:

There is are no algorithms to make the top layer as six-pointed star. We recommend solving this step intuitively.






Algorithm 1 /(2,4)/(-2,-1)/(3,3)/

Algorithm 2 /(2,2)/(-2,-1)/(3,3)/

Algorithm 3 /(2,2)/(1,0)/(2,2)/(1,0)/(-1,0)/(0,-3)/

Algorithm 4 /(0,2)/(1,0)/(2,2)/(1,0)/(-1,0)/(0,-3)/

Algorithm 5 /(2,4)/(4,-1)/(-3,0)/(-1,1)

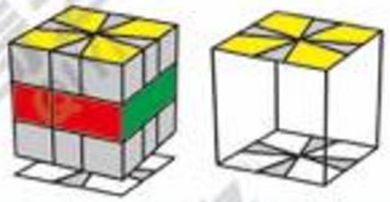
Now there may be only the middle layer unsolved. Use algorithm 6 to solve it.

Middle layer unsolved

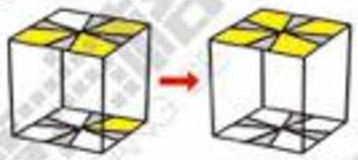

Algorithm 6 /(6,0)/(6,0)/(6,0)

## Step 2: Solve the corner pieces on the layers

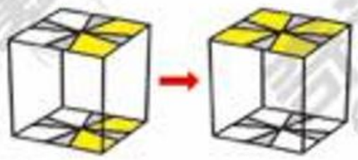
**Goal**



Rotate the corner pieces of the same color to its matching face. There are two basic cases. The other corner case can be solved by the repetition of these two basic algorithms.



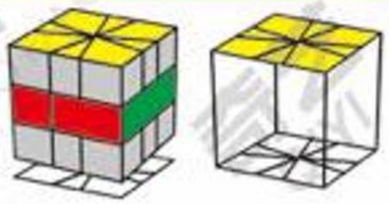
(1,0)/(3,0)/(-1,0)



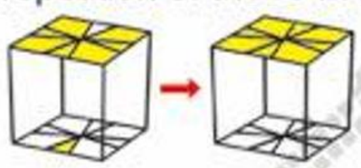
(-5,0)/(-1,0)

## Step 3: Solve the edge pieces on the layers

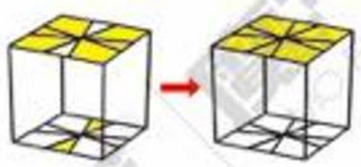
**Goal**



Rotate the edge pieces in the same color to the same face. There are two basic cases. The other edge case can be solved by the repetition of these two basic algorithms.



(0,-1)/(-3,0)/(4,1)/(-4,-1)/(3,0)/(0,1)



(1,0)/(-1,-1)/(0,-1)

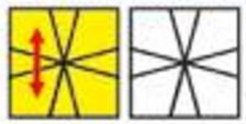


## Step 4: Permutation of corner pieces

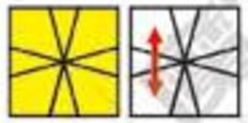
**Goal**

Solve the corner pieces of the top and bottom layers as illustrated,There are eight basic cases:

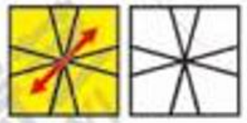
Top view Bottom view



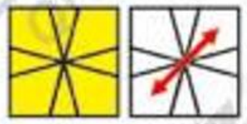
/(0,3)/(0,-3)/(0,3)/(-3,0)/(3,-3)/



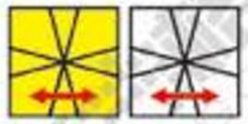
/(-3,0)/(3,0)/(-3,0)/(0,3)/(3,-3)/



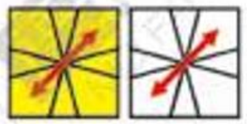
/(3,3)/(-3,0)/(3,3)/(-3,0)/(3,3)/



/(3,3)/(0,-3)/(3,3)/(0,-3)/(3,3)/

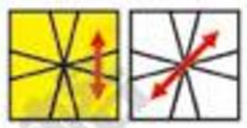


/(-3,0)/(3,3)/(0,-3)/



/(-3,3)/(3,-3)/

/(-3,0)/(3,0)/(-3,0)/(3,0)/



/(0,3)/(0,-3)/(0,3)/(0,-3)/

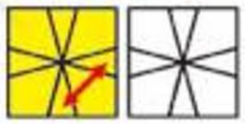
# Step 5: Permutation of edge pieces

## Goal

Solve the edge pieces of the top and bottom layers as illustrated:

There are five basic cases. The other cases can be solved by the repetition of these five basic algorithms.

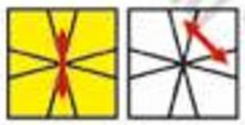
Top view Bottom view



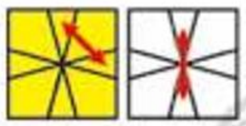
/(-3,0)/(0,3)/(0,-3)/(0,3)/(2,0)/(0,2)/(-2,0)/
(4,0)/(0,-2)/(0,2)/(-1,4)/(0,-3)/

(1,0)/(0,3)/(-1,-1)/(1,-2)/(-1,0)

(1,0)/(5,-1)/(-5,1)/(-1,0)



(1,0)/(0,-1)/(0,-3)/(5,0)/(-5,0)/(0,3)/(0,1)/(-1,0)



(1,0)/(3,0)/(-3,0)/(2,-1)/(1,1)/(-3,0)/(3,0)/(-3,0)/(-1,0)

After this step, the puzzle is solved!



# 233 Cube Entry Tutorial

## Solution & Illustration

unsolved | Solve the cross edge on the bottom layer | Solve the corner pieces on the bottom layer | Solve the corners pieces on the top layer | Solve the edges on the top layer. (Solve the cube)

## Name of each part:


## Rotation & Illustration & Notation