

CFOP—三叶虫

(精选顺手公式，多用对称，减少公式记忆量)

魔方的魔力不在于复原它，在于更快的复原它，以及用各种方法征服魔方的各种衍生品

-----冬日 CM

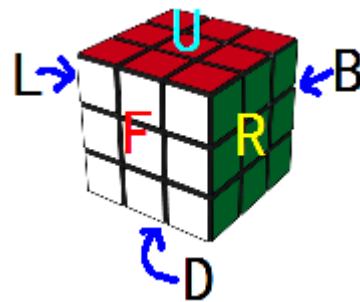
步骤介绍

CFOP 法共分四步：

- (1) 在底层架好十字(CROSS)
- (2) 完成前两层(F2L)
- (3) 顶面颜色统一(OLL)
- (4) 完成顶层(PLL)

字母介绍

F,B,L,R,U,D 分别代表魔方的前,后,左,右,上,下六个面(与颜色无关，只表示位置)



即：英文的 Front,Behind,Left,Right,Up,Down。

拧法介绍

- (1) 顺时针用字母表示，如 U 表示上层顺时针旋转 90 度。
 - (2) 逆时针用一撇表示，如 U' 表示上层逆时针旋转 90 度。
 - (3) 180 度用 2 来表示，如 U2 表示上层顺时针旋转 180 度，U'2 表示上层逆时针旋转 180 度。
 - (4) 相应的小写字母 f、b、l、r、u、d 代表转动两层。
 - (5) x(整个魔方以 R 的方向转动)，y(整个魔方以 U 的方向转动)，z(整个魔方以 F 的方向转动)。
- 注：顺、逆指面对该面看时的转向，故对于 B、B'、L、L'、D、D' 的转向要特别小心。

第一步、底层架十字(CROSS)

这一步较简单，自己领悟。



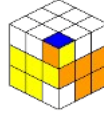
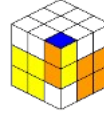
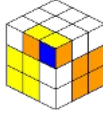
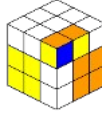
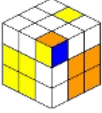
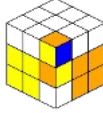
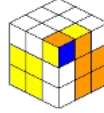
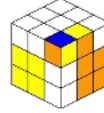
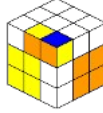
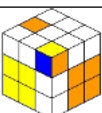
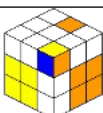
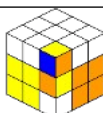
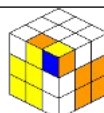
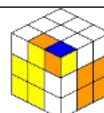
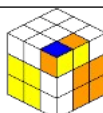
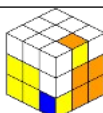
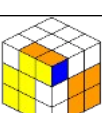
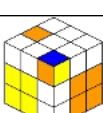
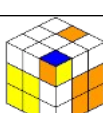
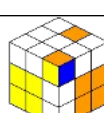
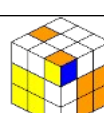
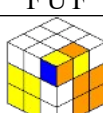
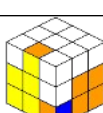
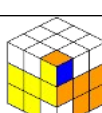
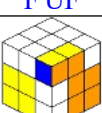
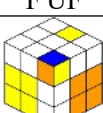
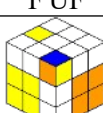
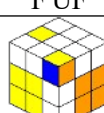
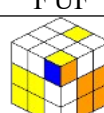
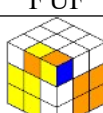
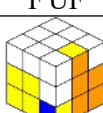
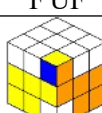
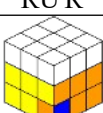
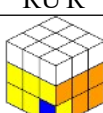
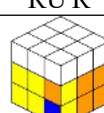
4个棱块复位后是这样的

不要是这样



第二步、完成前两层(F2L)

共有 41 种情况

 U'F'UF URU'R'	 URU'R' U'F'UF	 (RU2R'U')2 F'UF	 (RUR'U')2 RUR'	 RU'R' F'U2F		 RBL U' L'B'R'	 F'L'B' U BLF
 RUR'	 U2RU'R'U' RUR'	 UF'U'FU' RUR'	 U'RU'R'U' RUR'	 RU'2R'U' RUR'	 RUR'U'2 RUR'U' RUR'	 U' RUR'U' RUR'	
 F'UF	 U'2F'UFU F'UF	 U'RUR'U' F'UF	 UF'UFU' F'UF	 F'U2FU F'UF	 F'U'FU2 F'U'FU F'UF	 U F'UFU F'UF	
 U' F'UF	 U'F'U2FU' F'UF	 U2F'U'FU' F'UF	 UF'U2FU2 F'UF	 UF'U'FU2 F'UF	 (F'UFU')2U' F'UF	 F'UFU' F'UF	 U F'UFU'2 F'UF
 U RU'R'	 URU'2R'U' RU'R'	 U2RUR'U' RU'R'	 U'RU'2R'U'2 RU'R'	 U'RUR'U'2 RU'R'	 (RU'R'U')2U RU'R'	 RU'R'U' RU'R'	 U'RU' R'U'2 RU'R'
	 RUR'U'2 RU'R'U' RUR'	 F'U'FU2 F'UFU' F'UF	 RUR'U' RU'R'U'2 F'UF	 F'U'FU F'UFU'2 RUR'			

紫色 为需要首先记住的基本公式。

蓝色 为 4 种基本情况，首先掌握。

红色 为 2 个特殊公式

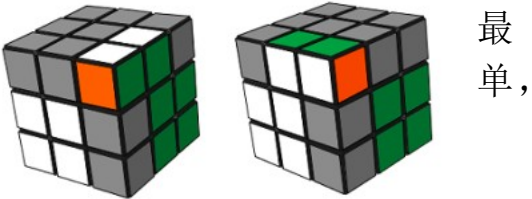
每一行为一组(第一行除外)，这一组每个公式最后的步骤与本行的第一个公式相同(分组原则)。

第 2 行与第 3 行上下对应的是对称的情况。

第 4 行与第 5 行上下对应的是对称的情况。

第 6 行与 4、5 行归为一类(装不下了…)

注：这一步给出的公式中有部分并不是对应的情况的简公式，只是便于理解和顺手的公式。本步其实非常简



不要一看到有这么多公式就头疼。需要理解这些公式的原理：让角块和棱块通过转动后组合到一起(右图)，然后把它们放到正确的位置。

第三步、顶面颜色统一(OLL)

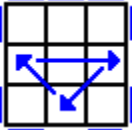
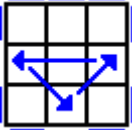
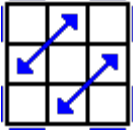
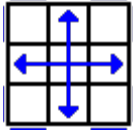
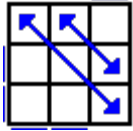
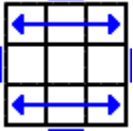
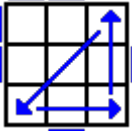
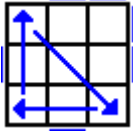
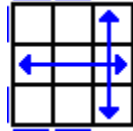
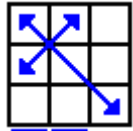
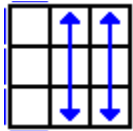
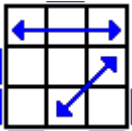
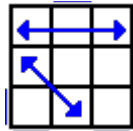
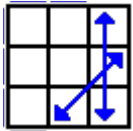
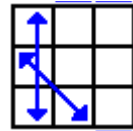
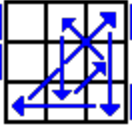
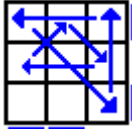
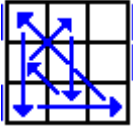
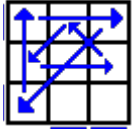
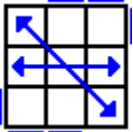
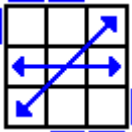
共有 57 种情况

23 R2D' RU'2 R'D RU'2R	21 RU'2 R'U'RUR'U' RU'R'	22 RU'2 R2U' R'2U' R2U'2R	24 rUR'U' r'FR F'	25 F' rUR'U' r'FR	26 R'U'RU' R'U'2R	27 RUR'U RU'2R'	
45 F (RUR'U') F'	44 f (RUR'U') f'	43 f' (L'U'LU) f	2 F(RUR'U')F' f(RUR'U')f'	3 f(RUR'U')f' U' F(RUR'U')F'	4 f'(L'U'LU)f U F'(L'U'LU)F	12 FRUR'U'F' U FRUR'U'F'	11 F'L'U'LUF U' F'L'U'LUF
48 F (RUR'U')2 F'	47 F' (L'U'LU)2 F	51 f (RUR'U')2 f'	1 RU'2 R'2FRF' U2(R'FRF')	17 RUR'U R'FRF'U2 R'FRF'	18 F(RUR'd) R'U2 R'FRF'	19 r'(RU)2 R'U'r R'2 FRF'	20 r'(RU)2 (R'U' r'2R'2) (URU')r'
49 F'RU'2RU'2 R'F2RF'	50 FL'U'2LU'2 LF2L'F	33 RUR'U' R'FRF'	46 R'U' R'FRF' UR	37 F(RU'R'U') RUR'F'	35 RU'2R'2 FRF' RU'2R'	57 RUR'U'r R'URU'r'	28 rUR'U' r'RU RU'R'
34 R'U'RU' y(rUR'U') r'R	52 R'U'RU' R'd R'URB	55 R U'2R'2 U'RU'R'U'2 FRF'	56 F(RUR'U') RF' rUR'U'r'	6 r U'2 R'U'RU' r'	5 I'U2 LUL'U I'	7 rUR'U RU'2 r'	8 I'U'LU' L'U2 I
40 R' (FRUR'U'F') UR	39 L (F'L'U'LUF) U'L'	14 R'FRUR' F'R FU'F'	13 LF'L'U'L FL' F'UF	54 rU'2 R'U'RUR'U' RU'r'	53 I'U2 LUL'U'LU L'U I	29 R'FRF' RU'2R'd' L'U'L	30 LF'L'F L'U2Ld RUR'
10 RUR'U R'FRF' RU'2R'	9 L'U'LU' LF'L'F L'U2L	38 RUR'U RU'R'U' R'FRF'	36 L'U'LU' L'ULU LF'L'F	16 rUr' RUR'U' rU'r'	15 I' U' I L'U'LU I' U I	32 (RU)(B'U') (R'U RBR')	31 (L'U')(BU) (LU' L'B'L)
41 RU'R'U2 RUyRU'	42 L'ULU'2 L'U'yL'U						

R'U'F'	LUF						
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第四步、完成顶层(PLL)

共有 21 种情况

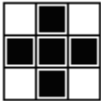
 U:b L'U(L'U'L'U'L') ULUL2	 U:a RU'(RURUR) U'R'U'R'2	 Z U(R'U'RU')(RUR) U'R' URUR2 U'R'U	 H L2(I'2U) L2(I'2U2) L2(I'2U)L212	 V R'UR'U' yx2 R'UR'U' R 1 U'R'URU
 E x UR'U'LURU'r'2 U'RULU'R'U	 A:b x' RU'RD2 R'URD2 R'2	 A:a x L'UL'D2 LU'L'D2 L2	 T RUR'U'R'F R2U'R'U' RUR'F'	 Y F R'UR'U' RUR'F' RUR'U' R'FRF'
 F U'R'URU'R'2 y L'U'LU y'x RUR'U'R2	 R:b R'U2 RU'2 R'F RUR'U' R'F'R2U'	 R:a LU'2 L'U2 LF' L'U'LU LFL'2U	 J:b RUR'F' RUR'U' R'FR2U'R'U'	 J:a L'U'LF L'U'LU LF'L'2 ULU
 G:d LdF' L'2u' LU'L'UL'u L2	 G:c L'2u' LU'LUL'u L2 z' FLF'	 G:b R'd'F R2u R'URU'Ru' R'2	 G:a R2u R'UR'U'Ru' R'2 z F'RF	注： 利用对称，一个公式 就可变为两个。这里， 加空格、括号和分成 多行是为了便于记 忆。
 N:b R'URU' R'F'U'F RUR'F R'F'RUR	 N:a LU'L'U LFUF' L'U'LF' LFL'UL'			

新手初学时第三步 (OLL) 可以先分下面两步完成，再逐步学会 OLL 的全部公式：

第三步、顶面颜色统一(OLL)

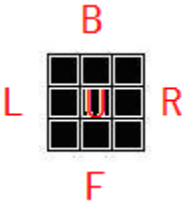
OLL-1(顶面出“十”字)

结果：

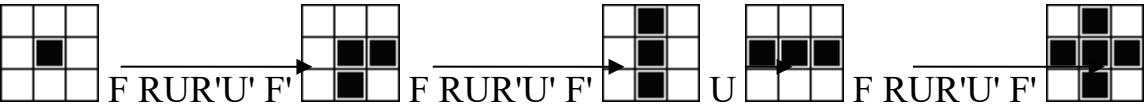


方法一：共有 3 种情况，三个公式

fRUR'U'f'	FRUR'U'F'	FRUR'U'F' fRUR'U'f'



方法二：只背一个公式



OLL-2(顶面颜色统一)

结果：



共有 7 种情况

RU'2R'U'RU R'U'RU'R'	RU'2(R2U')2 R2U'2R	R2D'RU'2 R'DRU'2R	rUR'U' r'FR F'	F' rUR'U' r'FR	R'U'RU' R'U'2R	RUR'U RU'2R'

第四步(PLL) 必须首先掌握的是 U:b, U:a, A:b, A:a。