

badmephisto's Speedcubing Guide

Arranged by Andy Klise of kungfoomanchu.com

First 2 Layers

You must solve the cross first. It can be done in 6 moves or less ~82% of the time and ≤7 moves 99.95% of the time. These are just optimal example solves; F2L should be solved *intuitively*.

Easy Cases (1-4)



U (R U' R')
Use (R' F R F') if no U face edges are oriented properly on final slot

y' U' (R' U R)
Use (F R' F' R) if no U face edges are oriented properly on final slot



y' (R' U' R)
Note – this image is blue and red because a cube rotation is required

(R U R')
Note – this image is green and red because no cube rotation is required

Reposition Edge (5-8)



(U' R U R') U² (R U' R')

d (R' U' R) U² (R' U R)
y' (U R' U' R) U² (R' U R)



U' (R U² R') U² (R U' R')

d (R' U² R) U² (R' U R)
y' U (R' U² R) U² (R' U R)

Reposition Edge and Flip Corner (9-14)



d (R' U' R U') (R' U' R)
y² U' (L U') d' (L' U' L)

U' (R U R' U) (R U R')



U' (R U² R') d (R' U' R)

d (R' U² R) d' (R U R')



d (R' U R U') (R' U' R)
y' U (R' U R U') (R' U' R)

U' (R U' R' U) (R U R')

Split Pair by Going Over (15-18)



y' (R' U R U') d' (R U R')
y (L' U L) U² y (R U R')

(R U' R' U) d (R' U' R)
(R U' R') U² (F' U' F)



(R U² R') U' (R U R')

y' (R' U² R) U (R' U' R)

Pair Made on Side (19-22)



U (R U² R') U (R U' R')

y' U' (R' U² R) U' (R' U R)



U² (R U R' U) (R U' R')

y' U² (R' U' R U') (R' U R)

Weird (23-24)



(R U R' U') U' (R U R' U') (R U R')
U² R² U² (R' U' R U') R²

y' (R' U' R U) U (R' U' R U) (R' U' R)
y' U² R² U² (R U R' U) R²



Corner in Place, Edge in U Face (25-30)



d' (L' U L) d (R U' R')
y U' (L' U' L) U (F U F')
U' (F' U F) U (R U' R')

U (R U' R') d' (L' U L)
U (R U' R') U' (F' U F)



(R U' R' U) (R U' R')

y' (R' U R U') (R' U R)
(R U' R') U² (F' U F)



y' (R' U' R U) (R' U' R)

(R U R' U') (R U R')



Edge in Place, Corner in U face (31-36)



(R U' R') d (R' U R)
(R U' R' U) (F' U F)

(R U R' U') (R U R' U') (R U R')



(U' R U' R') U² (R U' R')
y U' (L U' L') U² (L U' L)

U' (R U² R') U (R U R')
U (R U R') U² (R U R')
d (R' U R) U² (R' U R)



(U' R U R') d (R' U' R)
U² (R U' R') U' (F' U' F)

d (R' U' R) d' (R U R')
y U² (L' U L) U (F U F')



Edge and Corner in Place (37-42)



Solved Pair

(R U' R') d (R' U² R) U² (R' U R)
(R U R') U² (R U² R') d (R' U' R)



(R U' R') U' (R U R') U² (R U' R')
y (L' U' L) U² (L' U L U') (L' U' L)

(R U' R' U) (R U² R') U (R U' R')
(R U R') U² (R U' R' U) (R U R')

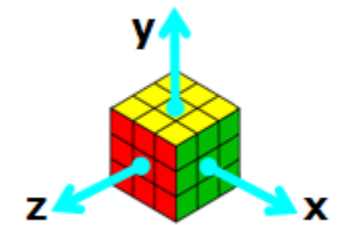


(R U' R') d (R' U' R U') (R' U' R)
y (L' U' L U) (L' U L) U² (F U F')

(R U' R') d² y (R' U' R U') (R' U R)
(R U R' U') (R U' R') U² (F' U' F)



Color Coding
Red = R U R' U' Family
Green = R U R' U Family
Blue = R F' R' F Family



Credits

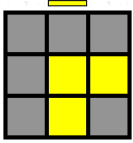
badmephisto - <http://www.badmephisto.com>
Andy Klise - <http://www.kungfoomanchu.com>
Josef Jelinek - <http://software.rubikscube.info/icube/>
And everyone else

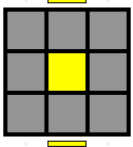
For great speedsolving video tutorials, visit -
<http://www.youtube.com/user/badmephisto>

For more printable guides just like this, visit -
<http://www.kungfoomanchu.com/>

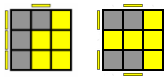
Orient Last Layer (Two Look)

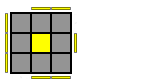
Step 1

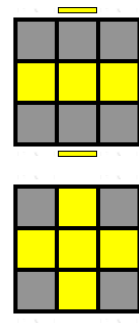
 $f (R U R' U') f'$
Probability = 1/2

 $[F (R U R' U') F'] [f (R U R' U') f']$
Probability = 1/8

Bonus

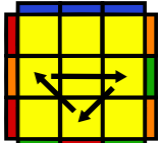
 $F (R U R' U') F'$
Probability = 1/4

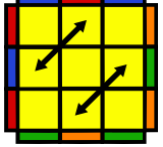
 **Move to Second Look**
Probability = 1/8

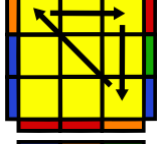


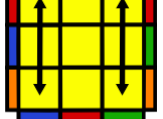
Permute Last Layer

Permutations of Edges or Corners Only

 $R^2 U (R U R' U') (R' U') (R' U R')$
Ub - Probability = 1/18

 $M^2 U M^2 U M' U^2 M^2 U^2 M' U^2$
 $U^2 (R U R' U') (R' U' R' U') (R' U' R' U') R^2 U R$
Z - Probability = 1/36

 $x [(R' U R') D^2] [(R' U R') D^2] R^2$
Aa - Probability = 1/18

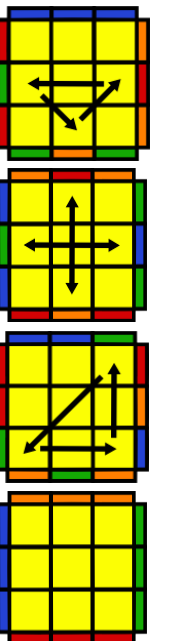
 $x' [(R' U R') D (R U R')] D' [(R U R') D (R' U R')] D'$
 $x' [(R' U R') D (R U R')] u^2 [(R' U R) D (R' U R)]$
E - Probability = 1/36

$(R' U') (R U) (R U) (R U) R' U' R^2$
Ua - Probability = 1/18

$M^2 U M^2 U^2 M^2 U M^2$
H - Probability = 1/72

$x' [(R' U R) D^2] [(R' U R) D^2] R^2$
Ab - Probability = 1/18

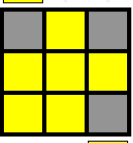
Solved
Probability = 1/72

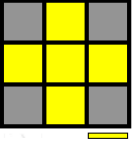


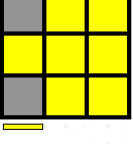
Orient Last Layer (Two Look)

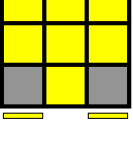
Step 2

All Edges Oriented Correctly

 $(R U R' U) R U^2 R'$
Probability = 4/27

 $[f (R U R' U') f'] [F (R U R' U') F']$
 $R U^2 R^2 U' R^2 U' R^2 U^2 R$
Probability = 4/27

 $(r U R' U') (r' F R F')$
Probability = 4/27

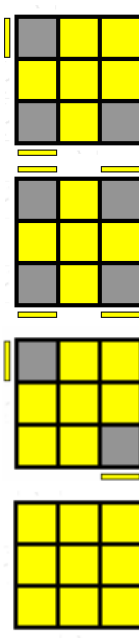
 $R^2 [D (R' U^2) R] [D' (R' U^2) R']$
Probability = 4/27

$R U^2 R' U' R U' R'$
Probability = 4/27

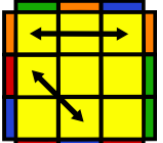
$F (R U R' U') (R U R' U') (R U R' U') F'$
 $y (R' U' R) U' (R' U R) U' (R' U^2 R)$
Probability = 2/27

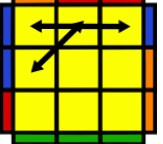
$F' (r' U R' U') (r' F R)$
Probability = 4/27

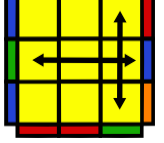
Solved
Probability = 1/27



Swap One Set of Adjacent Corners

 $(L U^2 L' U^2) (L F') (L' U' L U) (L F) L^2 U$
Ra - Probability = 1/18

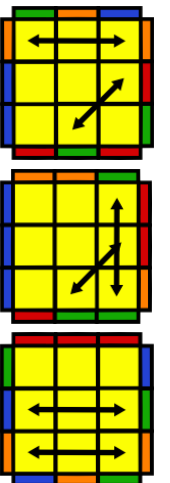
 $(R' U L') (U^2 R U' R' U^2) (R L U')$
Ja - Probability = 1/18

 $(R U R' U') (R' F) (R^2 U' R') U' (R U R' F')$
T - Probability = 1/18

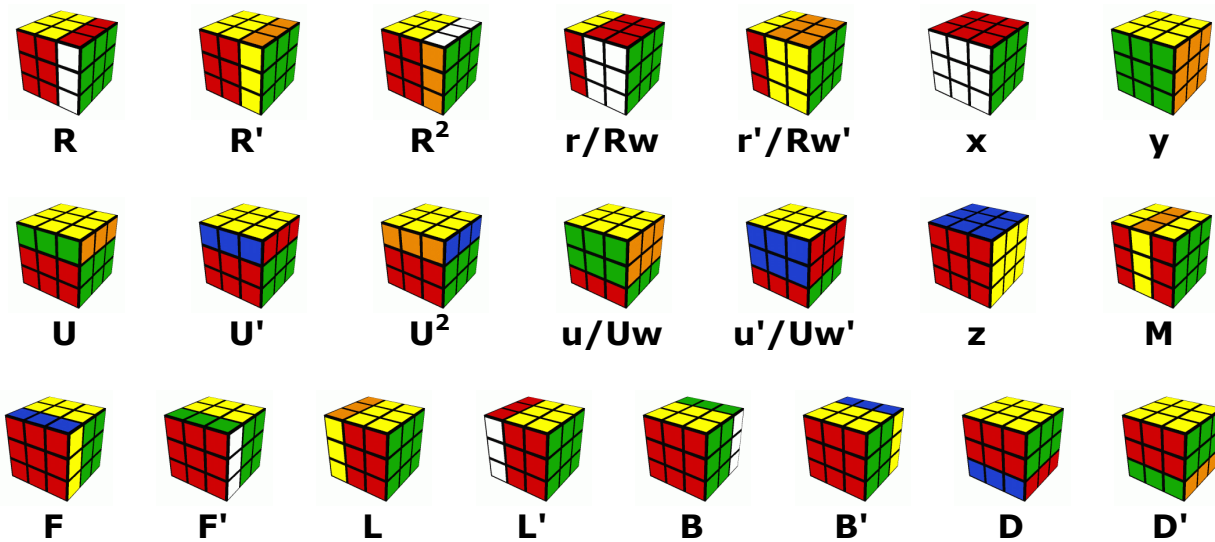
$(R' U^2 R U^2) (R' F) (R U R' U') (R' F') R^2 U'$
Rb - Probability = 1/18

$(R U R' F') [(R U R' U') (R' F) (R^2 U' R') U']$
Jb - Probability = 1/18

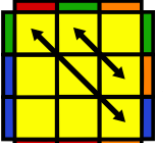
$(R' U^2 R' d') (R' F') (R^2 U' R' U) (R' F R U' F)$
F - Probability = 1/18

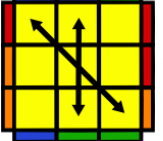


Notation



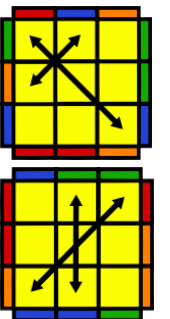
Swap One Set of Corners Diagonally

 $(R' U R' d') (R' F') (R^2 U' R' U) (R' F R F')$
V - Probability = 1/18

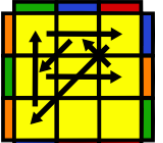
 $[(L' U' R) U^2 (L' U R')] [(L' U' R) U^2 (L' U R')] U$
 $y (R' U' R' U) (I U) (F' U' R' F') (R' U' R U) (I' U R')$
Na - Probability = 1/72

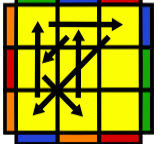
$F R U' R' U' (R U R' F') [(R U R' U') (R' F R F')]$
Y - Probability = 1/18

$[(R' U L') U^2 (R U' L)] [(R' U L') U^2 (R U' L)] U'$
Nb - Probability = 1/72



Double Spins

 $R^2 u' R' U' R' U' R u' R^2 (y' R' U' R)$
Ga - Probability = 1/18

 $(R U R') y' R^2 u' R' U' R' U' R u' R^2$
Gd - Probability = 1/18

$R^2 u' R' U' R' U' R u' R^2 (y' R' U' R')$
Gc - Probability = 1/18

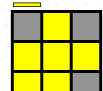
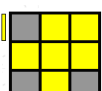
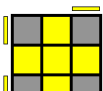
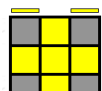
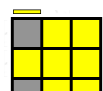



$(R' U' R) y' R^2 u' R' U' R' U' R u' R^2$
Gb - Probability = 1/18



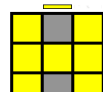
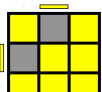
Orient Last Layer

Red = R U R' U' Family, Green = R U R' U Family, Blue = R F' R' F Family
 Try to recognize each pattern by viewing the fewest number of faces



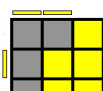
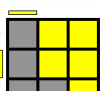
All Edges Oriented Correctly (OCLL1-OCLL8) (second part of three look last layer)

 $(R U R' U) R U^2 R'$ OCLL1 - 27 - Probability = 1/54	$R U^2 R' U' R U' R'$ OCLL2 - 26 - Probability = 1/54	
 $[f (R U R' U') f'] [F (R U R' U') F']$ $R U^{2a} R^{2a} U' R^{2a} U' R^{2a} U^2 R$ OCLL3 - 22 - Probability = 1/54	$F (R U R' U') (R U R' U') (R U R' U') F'$ $y (R' U' R) U' (R' U R) U' (R' U^2 R)$ OCLL4 - 21 - Probability = 1/108	
 $(r U R' U') (r' F R F')$ OCLL5 - 24 - Probability = 1/54	$F' (r U R' U') (r' F R)$ OCLL6 - 25 - Probability = 1/54	
 $R^2 [D (R' U^2) R] [D' (R' U^2) R']$ OCLL7 - 23 - Probability = 1/54	Solved OCLL8 - 58 - Probability = 1/216	

Corners Correct, Edges Flipped (E1-E2)

 $(R U R' U') M' (U R U' r')$ E1 - 57 - Probability = 1/108	$M' U M U^2 M' U M$ E2 - 28 - Probability = 1/54	
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P-Shapes (P1-P4)

 $f (R U R' U') f'$ P1 - 44 - Probability = 1/54	$f' (L' U' L U) f$ P2 - 43 - Probability = 1/54	
 $R U B' U' R' U' R B R'$ $R d L' d' R' U' R B R'$ P3 - 32 - Probability = 1/54	$R' U' F U R U' R' F' R$ $y^2 L' d' R d L U' L' B' L$ P4 - 31 - Probability = 1/54	


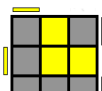
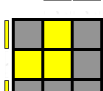


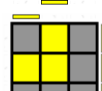
W-Shapes (W1-W2)

 $(R U R' U) (R U' R' U') (R' F R F')$ W1 - 38 - Probability = 1/54	$(L' U' L U) (L' U L U) (L F' L' F)$ W2 - 36 - Probability = 1/54	
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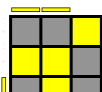
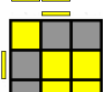

Squares (S1-S2)

 $r U^2 R' U' R U' r'$ S1 - 6 - Probability = 1/54	$r' U^2 (R U R' U) r$ S2 - 5 - Probability = 1/54	
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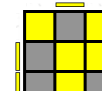



L Shapes (L1-L6)

 $F (R U R' U') (R U R' U') F'$ L1 - 48 - Probability = 1/54	$F' (L' U' L U) (L' U' L U) F$ L2 - 47 - Probability = 1/54	
 $[f' U' L U' L' U L U' L' U^2 I]$ $y^2 r' U' R U' R' U' R U' R' U^2 r$ L3 - 53 - Probability = 1/54	$(r U R' U) R U' R' U R U^2 r'$ L4 - 54 - Probability = 1/54	
 $(R' F R' F') R^2 U^2 y (R' F R F')$ L5 - 49 - Probability = 1/54	$R' F R^2 B' R^2 F' R^2 B R'$ L6 - 50 - Probability = 1/54	



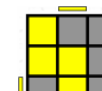
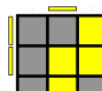

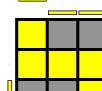
Fish Shapes (F1-F4)

 $(R' U' R) y' x' (R U') (R' F) (R U R')$ $(R U R' U') R' F R^2 U' R' U' F'$ F1 - 9 - Probability = 1/54	$R U R' y R' F R U' R' F' R$ $(R U R' U) (R' F R F') R U^2 R'$ F2 - 10 - Probability = 1/54	
 $(R U^2 R') (R' F R F') (R U^2 R')$ F3 - 35 - Probability = 1/54	$F R U' R' U' R U' R' F'$ F4 - 37 - Probability = 1/54	

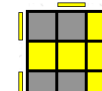
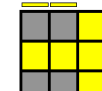
Awkward Shapes (A1-A4)

 $R^2 U R' B' R U' R^2 U R B R'$ A1 - 30 - Probability = 1/54	$(R U R' U') R U' R' F' U' F R U R'$ $[F (R U R' U') F'] U^2 [(R U R' U') (R' F R F')]$ A2 - 29 - Probability = 1/54	
 $[(R U R' U) R U^2 R'] [F (R U R' U') F']$ A3 - 41 - Probability = 1/54	$[R' U^2 (R U R' U) R] y [F (R U R' U') F']$ $(R' F R F') (R' F R F') (R U R' U') (R U R')$ A4 - 42 - Probability = 1/54	

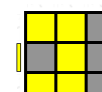
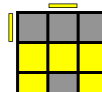
Lightning Bolts (L1-L6)

 $(r U R' U) R U^2 r'$ L1 - 7 - Probability = 1/54	$r' U' R U' R' U^2 r$ L2 - 8 - Probability = 1/54	
 $[F' (L' U' L U) F] y [F (R U R' U') F']$ $y (r U R' U) (R' F R F') R U^2 r'$ L3 - 11 - Probability = 1/54	$[F (R U R' U') F'] U [F (R U R' U') F']$ L4 - 12 - Probability = 1/54	
 $R B' R' U' R U B U' R'$ $y^2 L F' (L' U' L U) F U' L'$ L5 - 39 - Probability = 1/54	$R' [F (R U R' U') F'] U R$ L6 - 40 - Probability = 1/54	

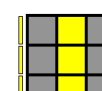
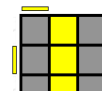
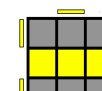
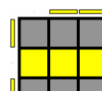
T-Shapes (T1-T2)

 $F (R U R' U') F'$ T1 - 45 - Probability = 1/54	$(R U R' U') (R' F R F')$ T2 - 33 - Probability = 1/54	
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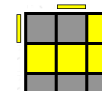
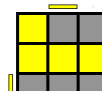
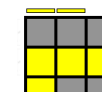
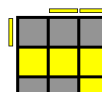
C-Shapes (C1-C2)

 $R' U' (R' F R F') U R$ C1 - 46 - Probability = 1/54	$(R U R^2 U') (R' F) (R U) (R U') F'$ $(R U R' U') x D' R' U R U' D x'$ C2 - 34 - Probability = 1/54	
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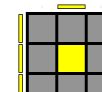
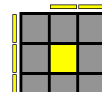
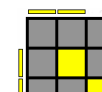
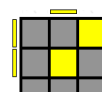

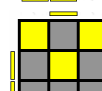

I Shapes (I1-I4)

 $R' U^2 R^2 U R' U R U^2 x' U' R' U$ I1 - 55 - Probability = 1/108	$(R U R' U) R d' R U' R' F'$ $R' U' R U' R' d R' U R B$ I2 - 52 - Probability = 1/54	
 $F (R U R' U') R F' (r U R' U') r'$ I3 - 56 - Probability = 1/108	$f (R U R' U') (R U R' U') f'$ I4 - 51 - Probability = 1/54	

Knight Move Shapes (K1-K4)

 $(r U r') (R U R' U') (r U' r')$ K1 - 16 - Probability = 1/54	$(l' U' l) (L' U' L U) (l' U' l)$ K2 - 15 - Probability = 1/54	
 $F U R U' R^2 F' R (U R U' R')$ K3 - 13 - Probability = 1/54	$R' F R U R' F' R y' R U' R'$ K4 - 14 - Probability = 1/54	

No Edges Flipped Correctly (O1-O8)

 $R U^2 R' (R' F R F') U^2 (R' F R F')$ O1 - 1 - Probability = 1/108	$[F (R U R' U') F'] [f (R U R' U') f']$ O2 - 2 - Probability = 1/54	
 $[f (R U R' U') f'] U' [F (R U R' U') F']$ O3 - 3 - Probability = 1/54	$[f (R U R' U') f'] U [F (R U R' U') F']$ O4 - 4 - Probability = 1/54	
 $[F (R U R' U) F'] y' U^2 (R' F R F')$ O5 - 18 - Probability = 1/54	$M U (R U R' U') M' (R' F R F')$ O6 - 19 - Probability = 1/54	
 $(R U R' U) (R' F R F') U^2 (R' F R F')$ O7 - 17 - Probability = 1/54	$M U (R U R' U') M^2 (U R U' r')$ O8 - 20 - Probability = 1/216	