

# Andy Klise's Orient Last Layer Guide

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**Green** = R U R' U' Family, **Blue** = R U R' U R U<sup>2</sup> R' Family, **Orange** = R F' R' F Family  
 ĩ = inverse, m̃ = mirror, R = reverse rotation, ~ = minimal difference, \*\* = this algorithm may be faster  
 Try to recognize each pattern by viewing the fewest number of faces

## All Edges Oriented Correctly

	<b>(R' U<sup>2</sup> R U R' U<sup>2</sup> R)</b> y (R U <sup>2</sup> R' U' R U' R')	ĩ	<b>(R' U<sup>2</sup> R U R' U<sup>2</sup> R)</b> y (R U R' U' R U <sup>2</sup> R')	
OCLL6 - 26 - Probability = 1/54			OCLL7 - 27 - Probability = 1/54	
	<b>(R U R' U)(R U' R' U)(R U<sup>2</sup> R')</b> (R' U' R U')(R' U R U')(R' U <sup>2</sup> R) y (R U <sup>2</sup> R')(U' R U R')(U' R U' R')		<b>R U<sup>2</sup> R<sup>2</sup> U' R<sup>2</sup> U' R<sup>2</sup> U<sup>2</sup> R</b> f (R U R' U') f' F (R U R' U') F'	
OCLL1 - 21 - Probability = 1/108			OCLL2 - 22 - Probability = 1/54	
	<b>x (R' U')(L U)(R U' L' U)</b> y <sup>2</sup> (r' U R' U')(r' F R F') y x' (R U R') D (R U' R') D' x		<b>(R' F)(R B')(R' F')(R B)</b> y F' (r' U R' U')(r' F R F') x' D (R U R') D' (R U' R') x	
OCLL4 - 24 - Probability = 1/54			OCLL5 - 25 - Probability = 1/54	
	<b>R<sup>2</sup> D (R' U<sup>2</sup> R) D' (R' U<sup>2</sup> R')</b> y <sup>2</sup> R <sup>2</sup> D' (R U <sup>2</sup> R') D (R U <sup>2</sup> R)		<b>Solved</b> OCLL8 - 58 - Probability = 1/216	
OCLL3 - 23 - Probability = 1/54				

## Corners Correct, Edges Flipped

	<b>(r' U R' U') M (U R U' r')</b> (r' U R' U') r' R (U R U' R') (M U M') U <sup>2</sup> (M U M')	ĩ	<b>(R U R' U') M' (U R U' r')</b> (R U R' U') r R' (U R U' r')	
E1 - 28 - Probability = 1/54			E2 - 57 - Probability = 1/108	

## P-Shapes

	<b>(R' U' F)(U R U' R') F' R</b> y' (F R' F' R) U R (U' R' U' R) U' R'	m̃	<b>(L U F')(U' L' U L) F L'</b> F U R U' F' (r' U R' U') r' y <sup>2</sup> R U B' (U' R' U R) B R'	
P1 - 31 - Probability = 1/54			P2 - 32 - Probability = 1/54	
	<b>F' (U' L' U L) F</b> y <sup>2</sup> f' (L' U' L U) f R' U' (F R' F' R) U R	m̃	<b>F (U R U' R') F'</b> y <sup>2</sup> f (R U R' U') f'	
P3 - 43 - Probability = 1/54			P4 - 44 - Probability = 1/54	

## W-Shapes

	<b>(R' U' R U')(R' U R U) x' (R U' R' U) x</b>	~R	<b>(R U R' U)(R U' R' U')(R' F R F')</b>	
W1 - 36 - Probability = 1/54			W2 - 38 - Probability = 1/54	

## Squares

	<b>(r' U<sup>2</sup> R U R' U r)</b>	R	<b>(r' U<sup>2</sup> R' U' R U' r')</b>	
S1 - 5 - Probability = 1/54			S2 - 6 - Probability = 1/54	

## L Shapes

	<b>F (R U R' U')(R U R' U') F'</b>	m̃	<b>F' (L' U' L U)(L' U' L U) F</b> R' U' (R' F R F')(R' F R F') U R	
L2 - 48 - Probability = 1/54			L1 - 47 - Probability = 1/54	
	<b>(R B')(R<sup>2</sup> F) R<sup>2</sup> (B R<sup>2</sup>)(F' R)</b>	m̃	<b>(R' F)(R<sup>2</sup> B') R<sup>2</sup> (F' R<sup>2</sup>)(B R')</b>	
L3 - 49 - Probability = 1/54			L4 - 50 - Probability = 1/54	
	<b>r' U<sup>2</sup> (R U R' U') R U R' U r</b> y' r' U' R U' (R' U R U') R' U <sup>2</sup> r	R	<b>r' U<sup>2</sup> (R' U' R U) R' U' R U' r'</b> y r' U R' U (R U' R' U) R U <sup>2</sup> r' **	
L5 - 53 - Probability = 1/54			L6 - 54 - Probability = 1/54	

## Fish Shapes

	<b>(R' U' R) y' x' (R U' R' F)(R U R') x y</b> (R U R' U') R' F R <sup>2</sup> U R' U' F'		<b>(R U R') y (R' F R U')(R' F' R)</b> (R' U' R U) R B' R <sup>2</sup> U' R U B	
F1 - 9 - Probability = 1/54			F2 - 10 - Probability = 1/54	
	<b>(R U<sup>2</sup>')(R<sup>2</sup> F R F')(R U<sup>2</sup> R')</b>		<b>F (R U')(R' U' R U) R' F'</b> (F R' F' R)(U R U' R')	
F3 - 35 - Probability = 1/54			F4 - 37 - Probability = 1/54	

## Awkward Shapes

	<b>M U (R U R' U')(R' F R F') M'</b> y <sup>2</sup> (R' F R F')(R U <sup>2</sup> R') d' (L' U' L) y (R U R' U')(R U' R' F') U' (F R U R')		<b>F R' F R<sup>2</sup> U' (R' U' R U) R' F<sup>2</sup></b> F U (R U') x' (U R') D' (R U' R') x y <sup>2</sup> (R <sup>2</sup> U R') B' (R U' R <sup>2</sup> U)(R B R')	
A1 - 29 - Probability = 1/54			A2 - 30 - Probability = 1/54	
	<b>F (U R U' R') F' (R' U<sup>2</sup> R U R' U R)</b> F (U R U' R') F' U (R U R' U R U <sup>2</sup> R')	ĩ	<b>(R' U' R U' R' U<sup>2</sup> R) F (R U R' U') F'</b> y (R' U <sup>2</sup> R U R' U R <sup>2</sup> ) y (R U R' U') F'	
A3 - 41 - Probability = 1/54			A4 - 42 - Probability = 1/54	

## Lightning Bolts

	<b>(r' U R' U R U<sup>2</sup> r')</b>	R	<b>(r' U' R U' R' U<sup>2</sup> r)</b>	
B1 - 7 - Probability = 1/54			B2 - 8 - Probability = 1/54	
	<b>r U R' U (R' F R F') R U<sup>2</sup> r'</b> y' F' (L' U' L U) F U F (R U R' U') F' y <sup>2</sup> (r' R <sup>2</sup> U R' U)(R U <sup>2</sup> ')(R' U' R' r)	~R ~m̃ R	<b>r' U' R U' x' (R U' R' U) x R' U<sup>2</sup> r</b> y' F (R U R' U') F' U F (R U R' U') F' ** y <sup>2</sup> (r' R <sup>2</sup> U R' U)(R' U <sup>2</sup> ')(R U' R' r')	
B3 - 11 - Probability = 1/54			B4 - 12 - Probability = 1/54	
	<b>(L F')(L' U' L U) F U' L'</b> y <sup>2</sup> R B' (R' U' R U) B U R'	m̃	<b>(R' F)(R U R' U') F' U R</b>	
B5 - 39 - Probability = 1/54			B6 - 40 - Probability = 1/54	

## T-Shapes

	<b>(R U R' U')(R' F R F')</b>		<b>F (R U R' U') F'</b>	
T1 - 33 - Probability = 1/54			T2 - 45 - Probability = 1/54	

## C-Shapes

	<b>(R U R' U') B' (R' F R F') B</b> (R U R' U') x D' (R' U R U') D x'		<b>R' U' (R' F R F') U R</b> (R U) x' (R U' R' U) x (U' R')	
C1 - 34 - Probability = 1/54			C2 - 46 - Probability = 1/54	

## I Shapes

	<b>f (R U R' U')(R U R' U') f'</b> y <sup>2</sup> F (U R U' R')(U R U' R') F'		<b>r' U' (r' U' R' U)(R U' R' U) M U r</b> r' U' (r' U' R' U)(R U' R' U)(R r') U r F (R U R' U') R F' (r' U R' U') r'	
I1 - 51 - Probability = 1/54			I4 - 56 - Probability = 1/108	
	<b>(R U R' U)(R U') y (R U' R' F') y'</b>		<b>R U<sup>2</sup> R<sup>2</sup> U' (R U' R' U<sup>2</sup>)(F R F')</b> R' U <sup>2</sup> R <sup>2</sup> U (R' U R U <sup>2</sup> ) x' (U' R' U)	
I2 - 52 - Probability = 1/54			I3 - 55 - Probability = 1/108	

## Knight Move Shapes

	<b>x' (R U' R')(F' R U R') x y (R' U R) y'</b> y <sup>2</sup> F U R U <sup>2</sup> (R' U' R U) R' F'		<b>(R' F R)(U R' F' R) y' (R U' R')</b>	
K1 - 13 - Probability = 1/54			K2 - 14 - Probability = 1/54	
	<b>(r' U r')(R U R' U')(r U' r')</b> (L F L')(R U R' U')(L F L')	R m̃	<b>(r' U' r)(R' U' R U)(r' U r)</b> y <sup>2</sup> (R' F R)(L' U' L U)(R' F R) (L' B' L)(R' U' R U)(L' B L)	
K4 - 16 - Probability = 1/54			K3 - 15 - Probability = 1/54	

## No Edges Flipped Correctly

	<b>(R U<sup>2</sup>')(R<sup>2</sup> F R F') U<sup>2</sup> (R' F R F')</b>		<b>F (R U R' U') F' f (R U R' U') f'</b>	
O1 - 1 - Probability = 1/108			O2 - 2 - Probability = 1/54	
	<b>f (R U R' U') f' U' F (R U R' U') F</b> y <sup>2</sup> F (U R U' R') F' R y (R U R' U') F' y'	~	<b>f (R U R' U') f' U F (R U R' U') F'</b> f (R U R' U') f' U R y (R U R' U') F' y'	
O3 - 3 - Probability = 1/54			O4 - 4 - Probability = 1/54	
	<b>(r' U R' U R U<sup>2</sup> (r<sup>2</sup>) U' R U' R' U<sup>2</sup> r)</b> y <sup>2</sup> F (R U R' U) F' y' U <sup>2</sup> (R' F R F')		<b>M U (R U R' U') r (R<sup>2</sup> F R F')</b> (r' U <sup>2</sup> R U R' U (r <sup>2</sup> ) U <sup>2</sup> R' U' R U' r)	
O6 - 18 - Probability = 1/54			O7 - 19 - Probability = 1/54	
	<b>(R U R' U)(R' F R F') U<sup>2</sup> (R' F R F')</b>		<b>M U (R U R' U') M<sup>2</sup> (U R U' r')</b> (r' R) U (R U R' U')(r <sup>2</sup> R <sup>2</sup> )(U R U' r') (M' U <sup>2</sup> M') U <sup>2</sup> (M' U M) U <sup>2</sup> (M U <sup>2</sup> M)	
O5 - 17 - Probability = 1/54			O8 - 20 - Probability = 1/216	