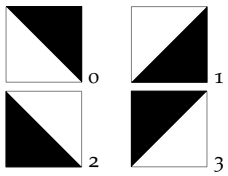
TRUCHET BOOK (I)

4X4 PATTERNS WITH ROTATIONAL SYMMETRY

Current printing, January 2025

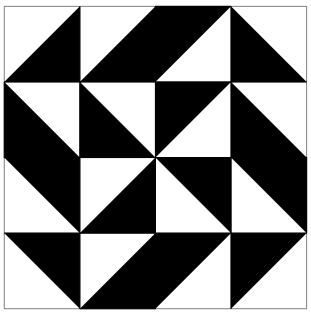
Introduction

This booklet presents a complete listing of 4*x*4 Truchet tile patterns with rotational symmetry. Truchet tiles are, traditionally, square tiles that are divided by a diagonal line, and coloured with two colours with a different colour on either side of the diagonal. Each tile can be rotated to one of four positions. Patterns are formed by placing tiles next to each other, often rotating tiles to create repeated motifs.



Each 4*x*4 Truchet tile pattern with rotational symmetry has a core 2*x*2 pattern in one of its quadrants that is rotated to produce the overall pattern. In this booklet, the core pattern is assumed to be in the lower left. Each pattern can identified as a sequence of 4 digits *abcd* that list the rotational positions of each tile in the lower left quadrant.

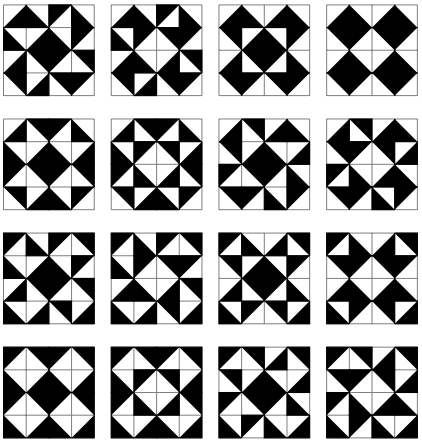
a	q	ɔ	ɐ
ɔ	p	p	q
b	d	d	ɔ
a	c	b	ɐ



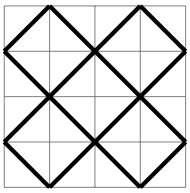
The 0011 pattern

Pattern families

We can group the 4x4 Truchet tile patterns with rotational symmetry into families where tile patterns are considered to be in the same family if they would look the same without colour – if each corresponding tile shares the same diagonal direction. The sequence that represents the family of a tile pattern can be found by taking the sequence of the tile pattern *modulo* 2. So, for example, the 16 tile patterns below are all members of the 0110 family.

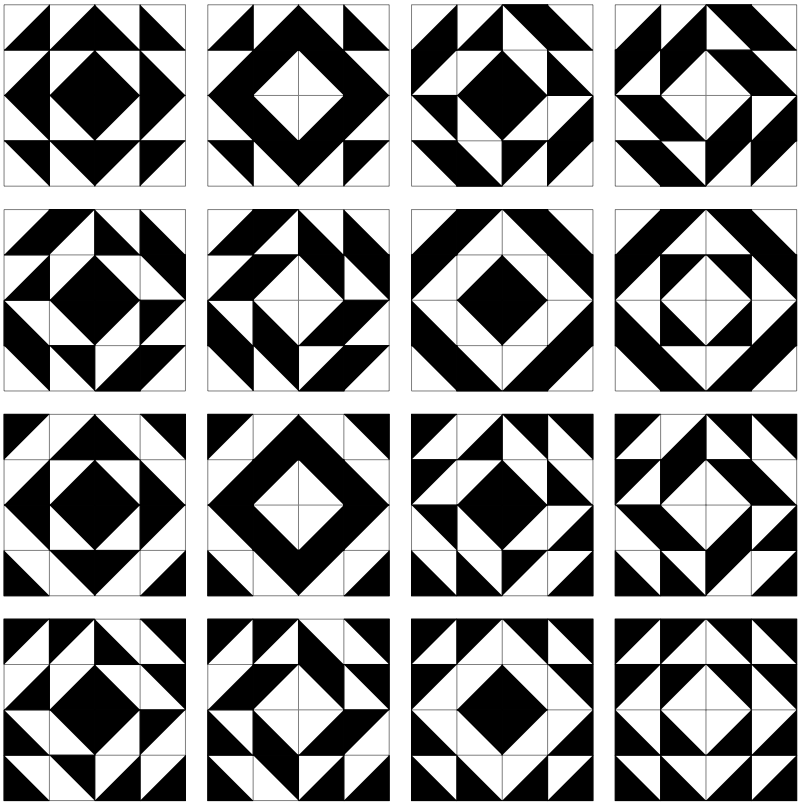


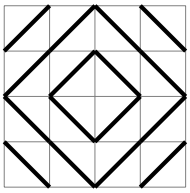
The 0110 pattern family



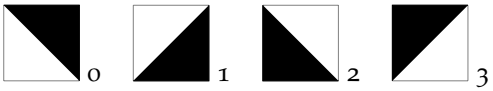
The 0110 family pattern

0000



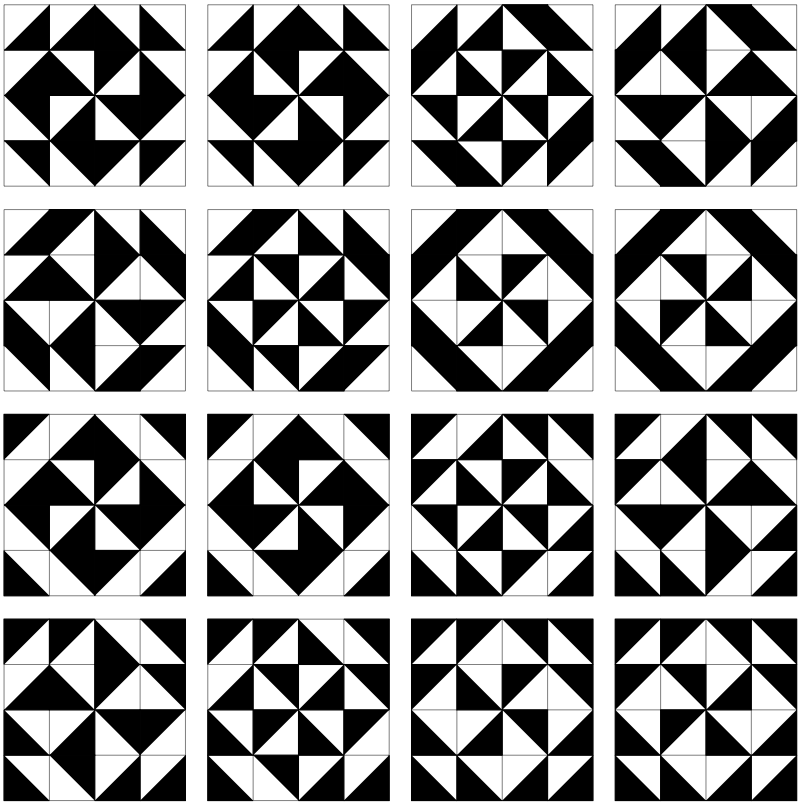


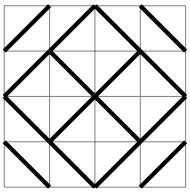
0000 0002 0020 0022
0200 0202 0220 0222
2000 2002 2020 2022
2200 2202 2220 2222



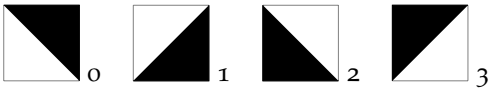
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0001



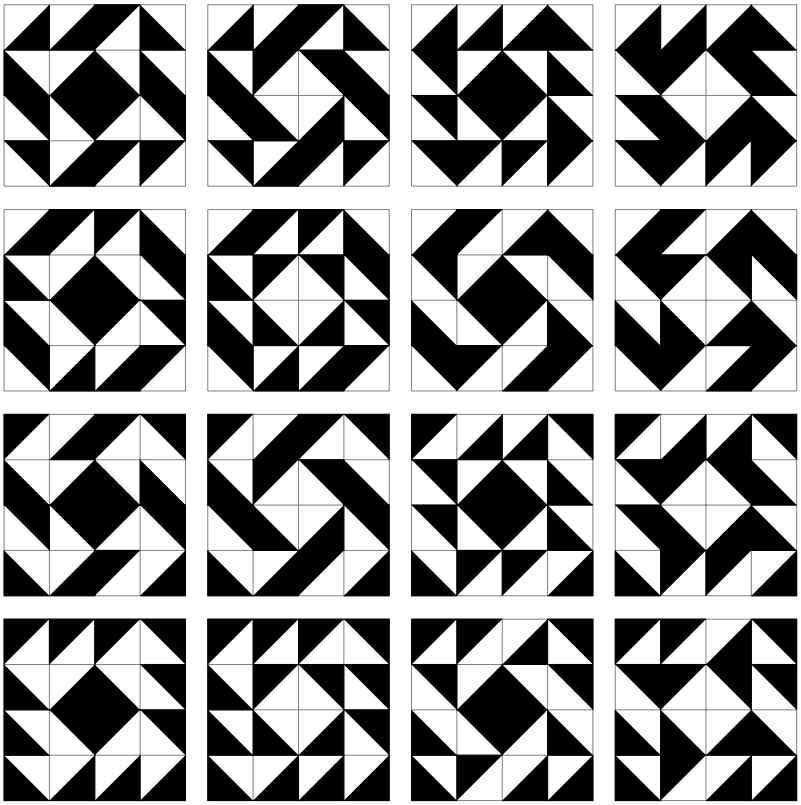


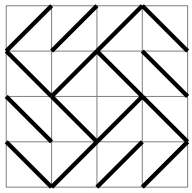
0001	0003	0021	0023
0201	0203	0221	0223
2001	2003	2021	2023
2201	2203	2221	2223



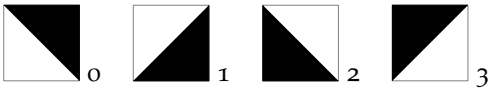
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0010



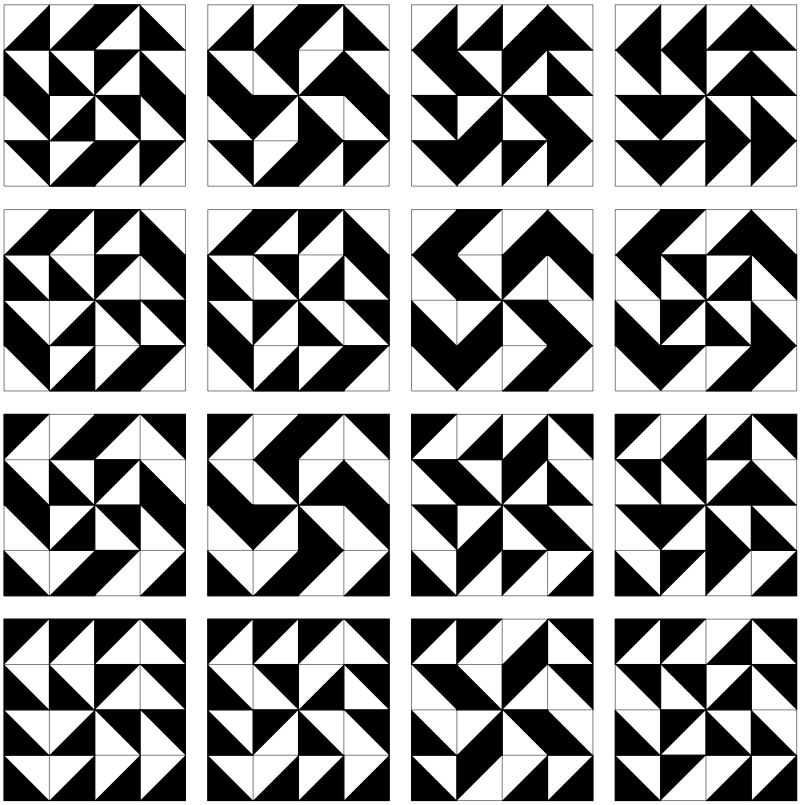


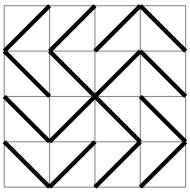
0010	0012	0030	0032
0210	0212	0230	0232
2010	2012	2030	2032
2210	2212	2230	2232



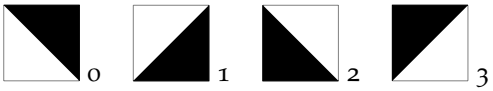
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0011



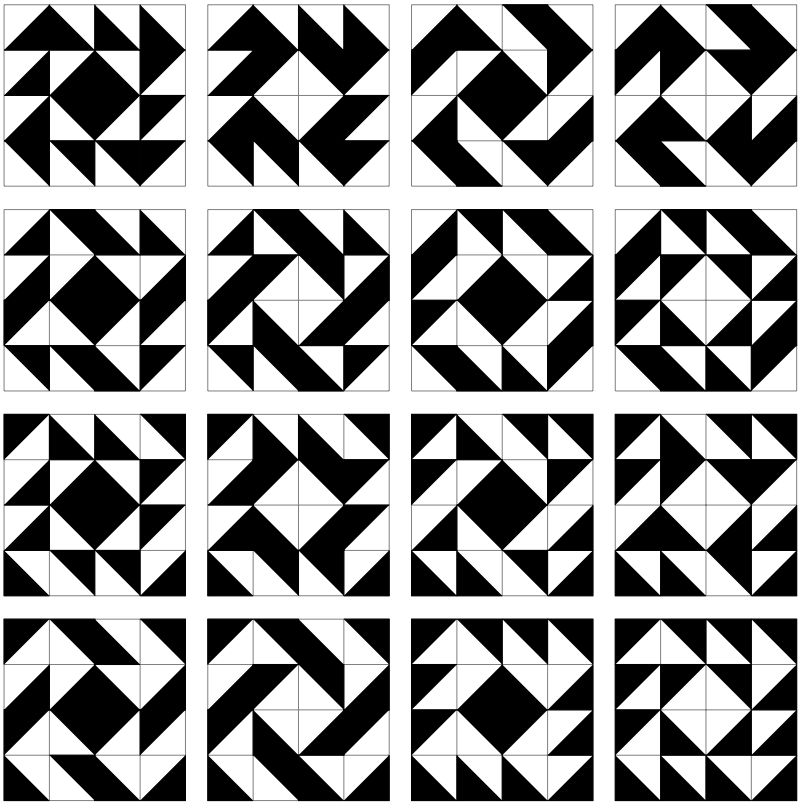


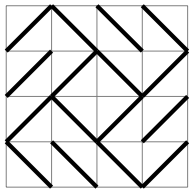
0011	0013	0031	0033
0211	0213	0231	0233
2011	2013	2031	2033
2211	2213	2231	2233



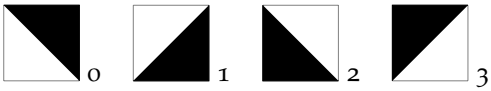
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0100



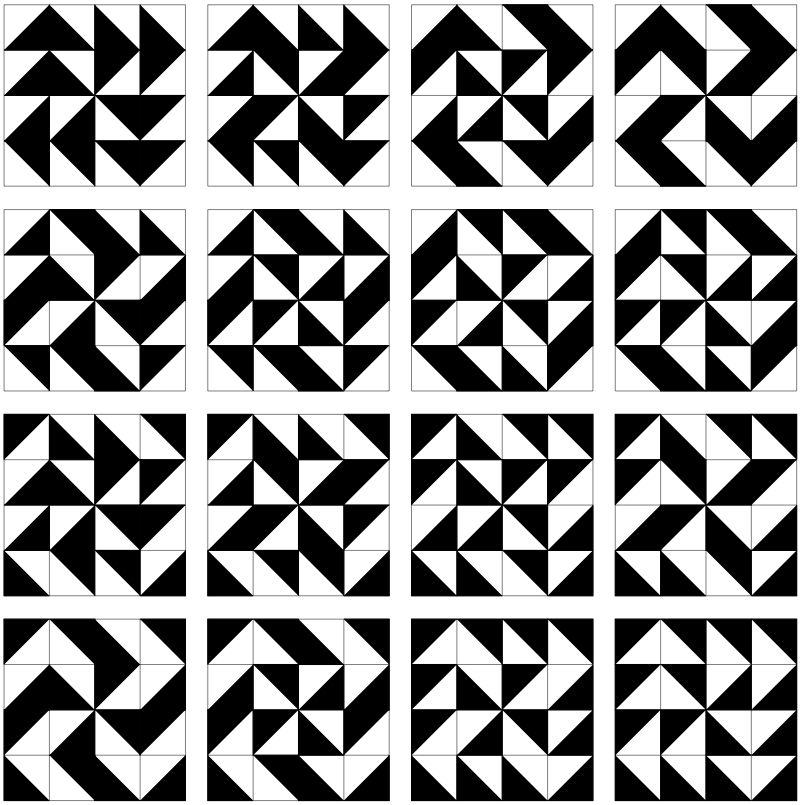


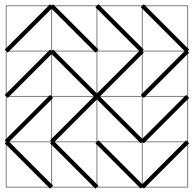
0100	0102	0120	0122
0300	0302	0320	0322
2100	2102	2120	2122
2300	2302	2320	2322



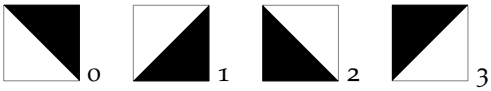
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0101



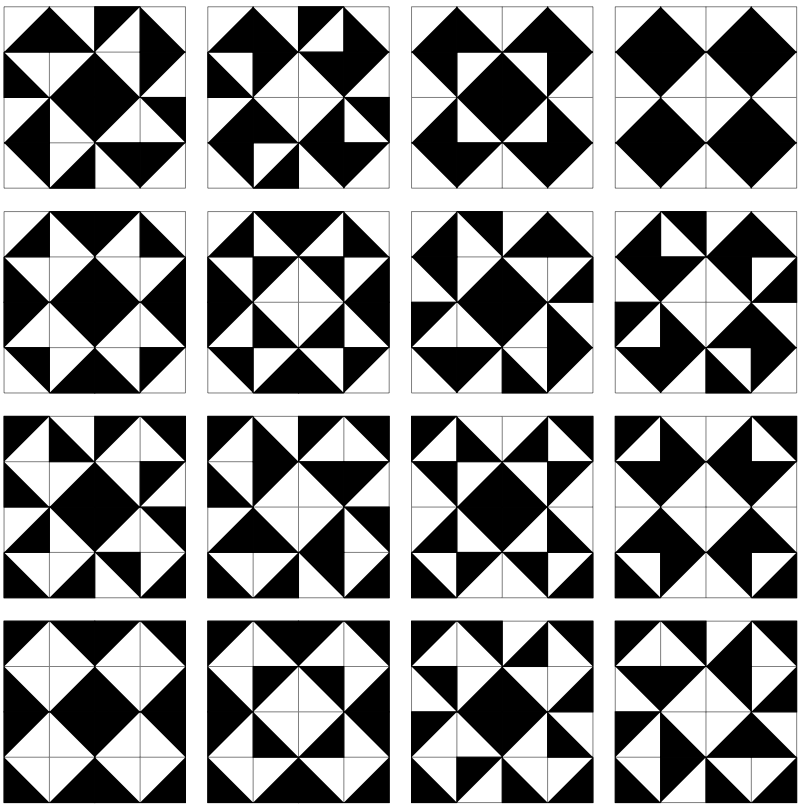


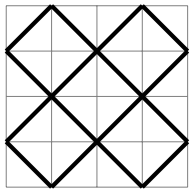
0101	0103	0121	0123
0301	0303	0321	0323
2101	2103	2121	2123
2301	2303	2321	2323



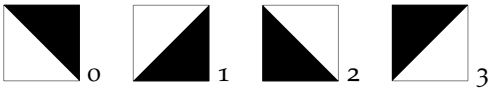
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0110



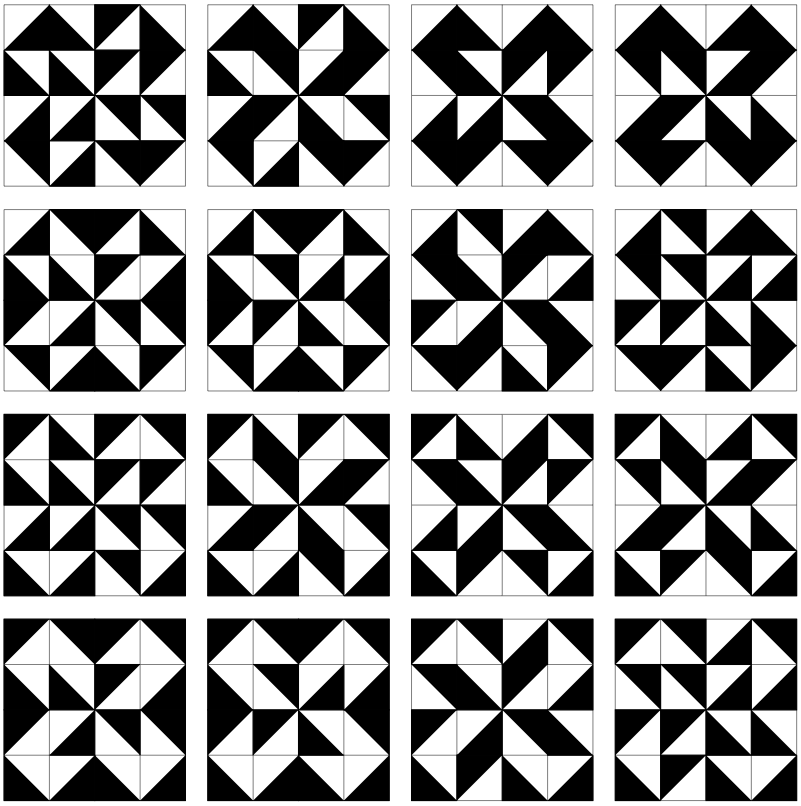


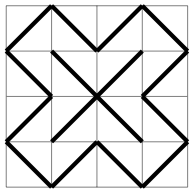
0110 0112 0130 0132
0310 0312 0330 0332
2110 2112 2130 2132
2310 2312 2330 2332



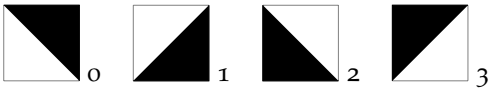
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

0111



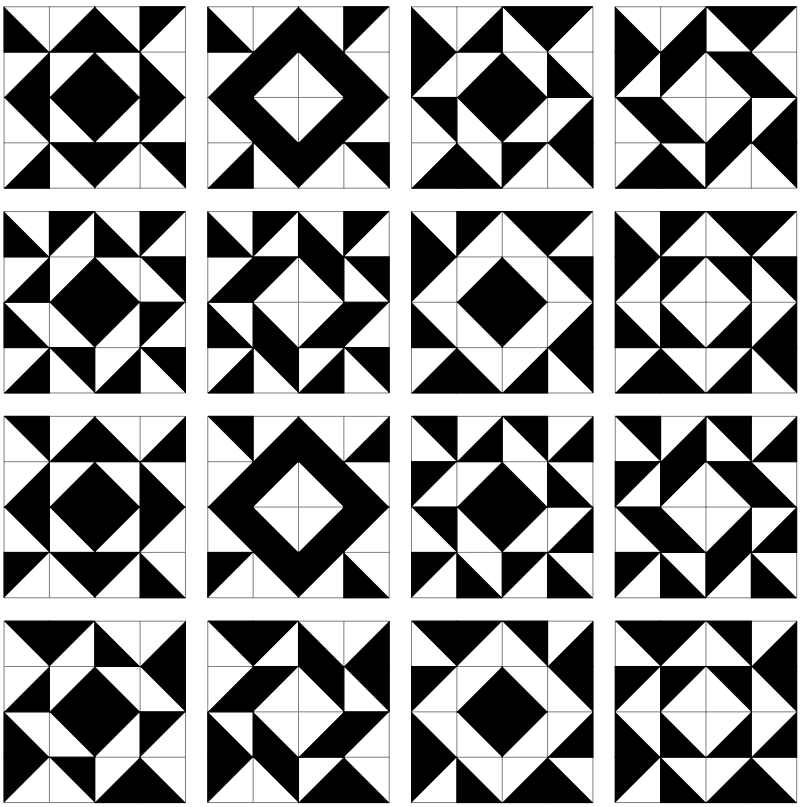


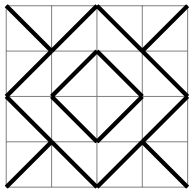
0111 0113 0131 0133
0311 0313 0331 0333
2111 2113 2131 2133
2311 2313 2331 2333



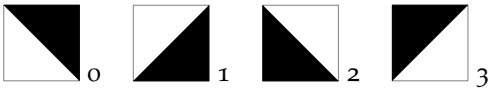
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1000



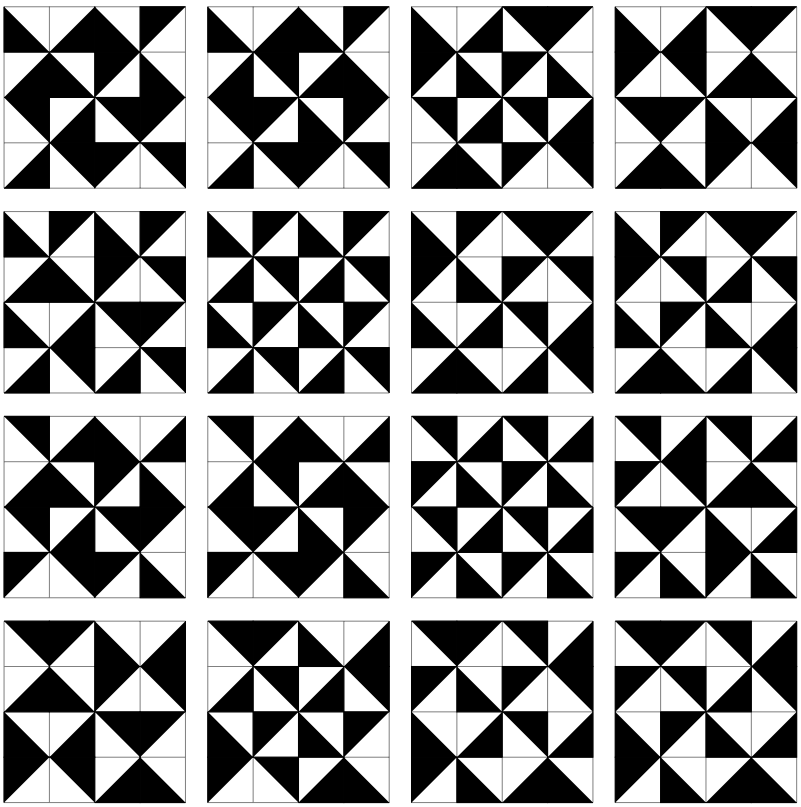


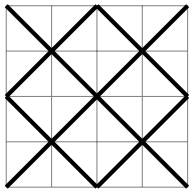
1000	1002	1020	1022
1200	1202	1220	1222
3000	3002	3020	3022
3200	3202	3220	3222



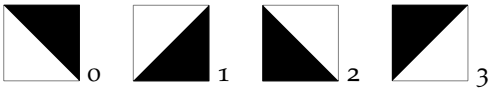
a	q	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1001



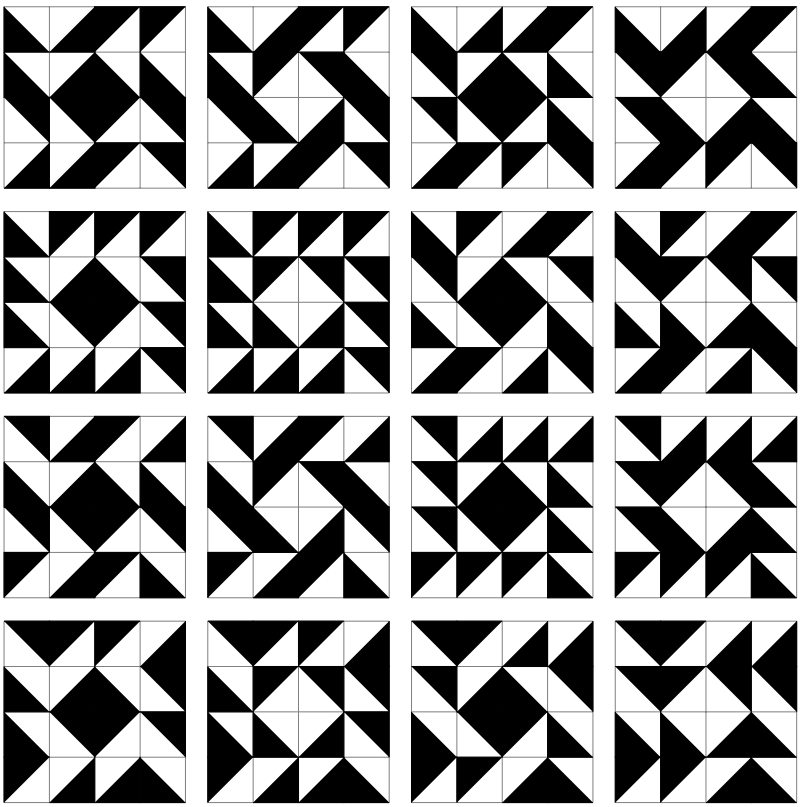


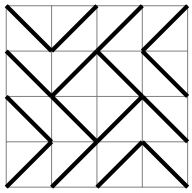
1001	1003	1021	1023
1201	1203	1221	1223
3001	3003	3021	3023
3201	3203	3221	3223



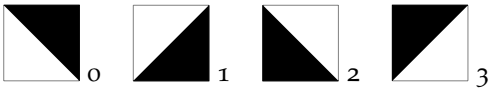
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1010



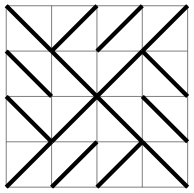


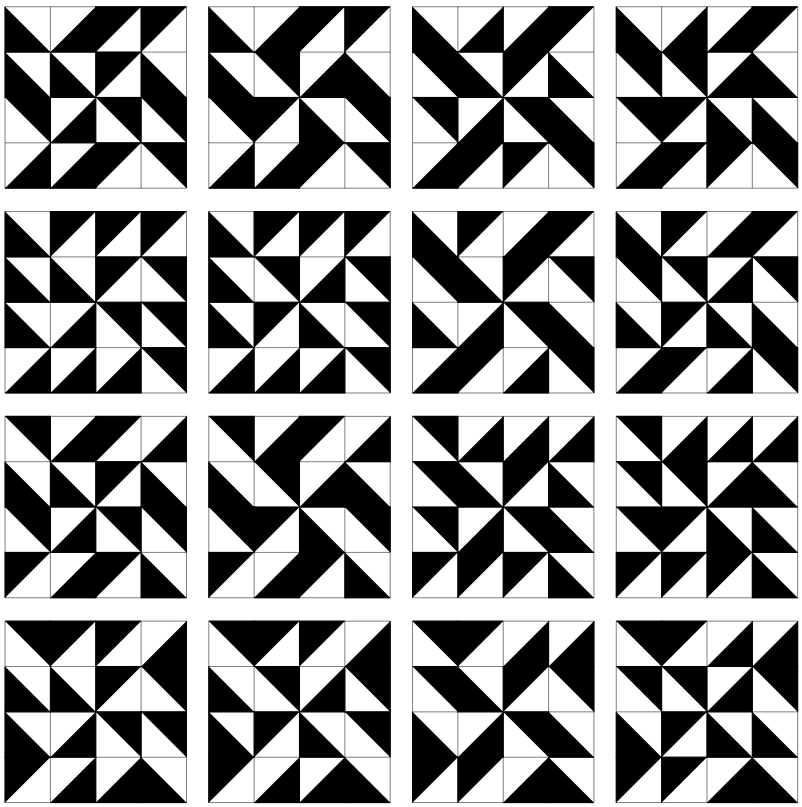
1010 1012 1030 1032
1210 1212 1230 1232
3010 3012 3030 3032
3210 3212 3230 3232



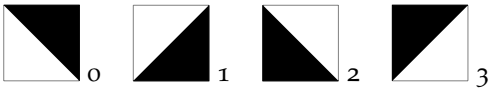
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1011



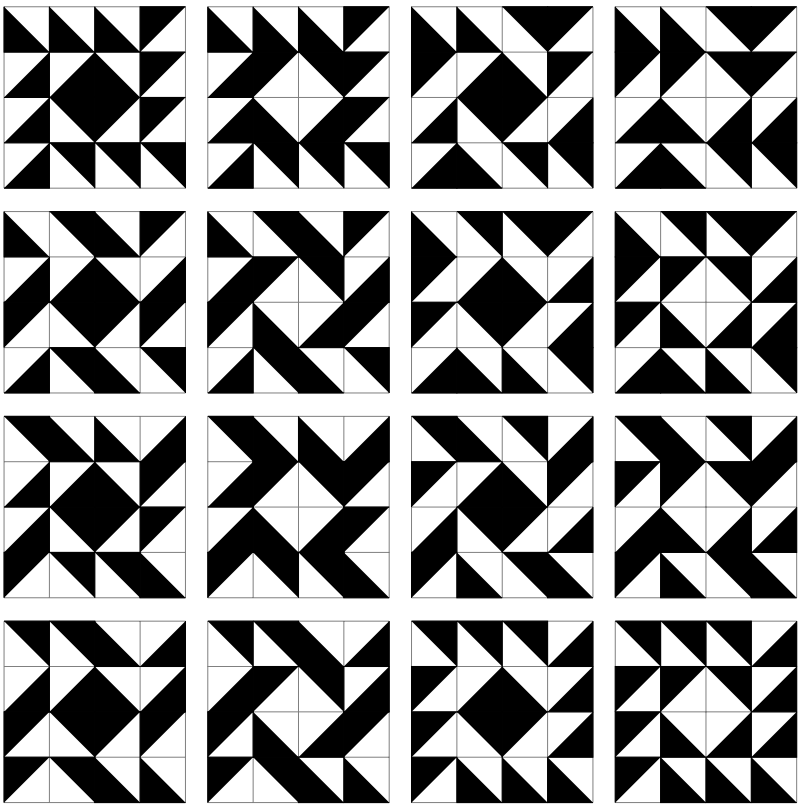


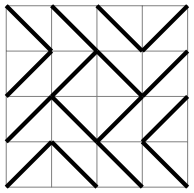
1011	1013	1031	1033
1211	1213	1231	1233
3011	3013	3031	3033
3211	3213	3231	3233



a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1100





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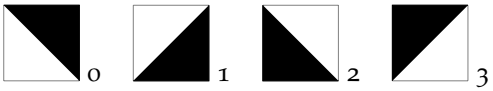
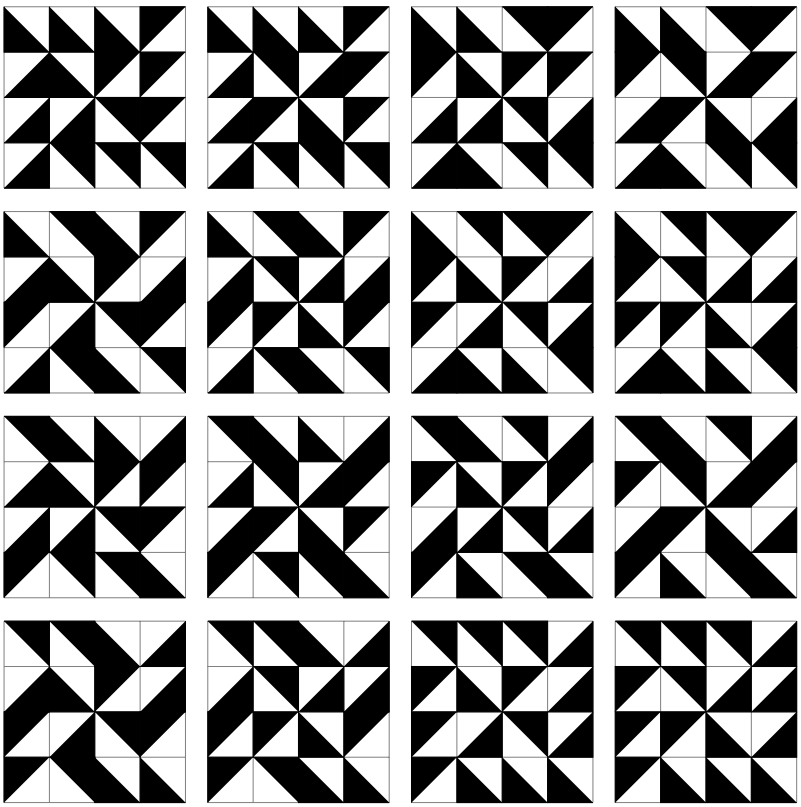
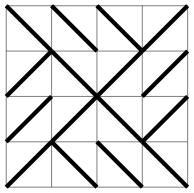
1300	1302	1320	1322
3100	3102	3120	3122
3300	3302	3320	3322



a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1101





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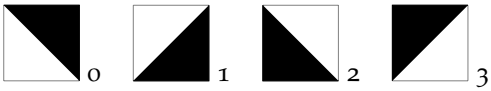
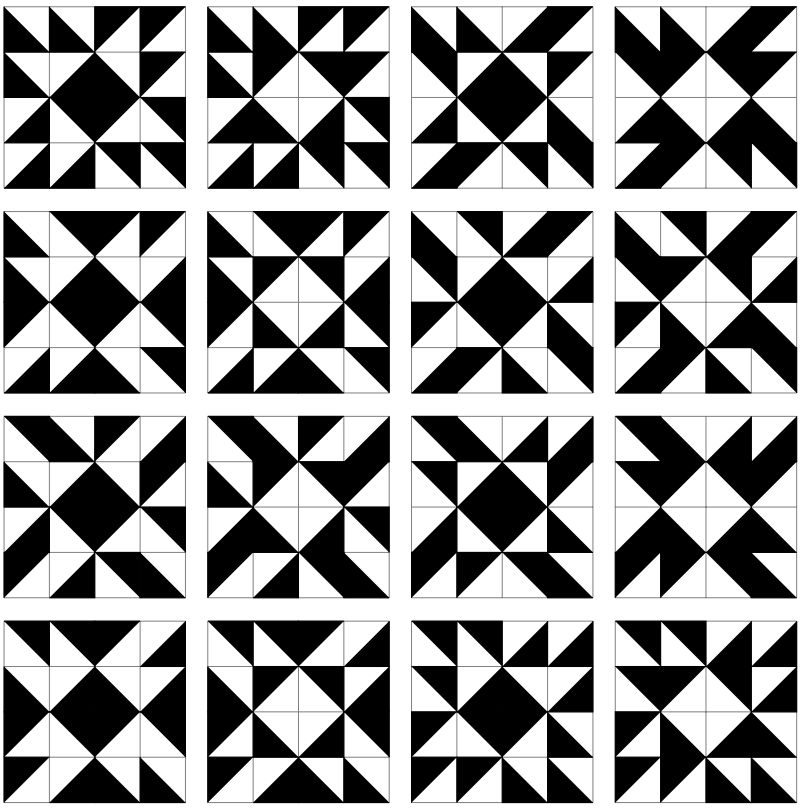
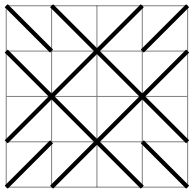
1301	1303	1321	1323
3101	3103	3121	3123
3301	3303	3321	3323



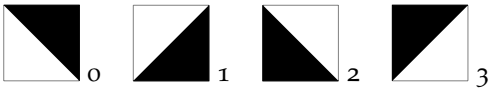
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1110



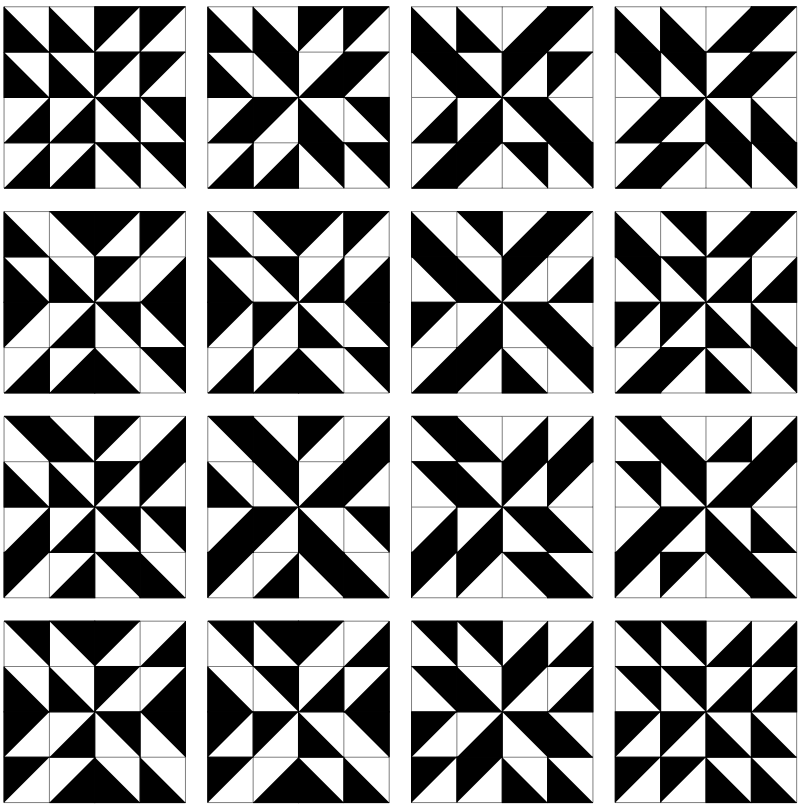


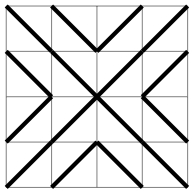
1110 1112 1130 1132
1310 1312 1330 1332
3110 3112 3130 3132
3310 3312 3330 3332



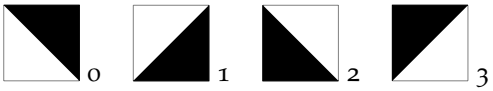
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

1111

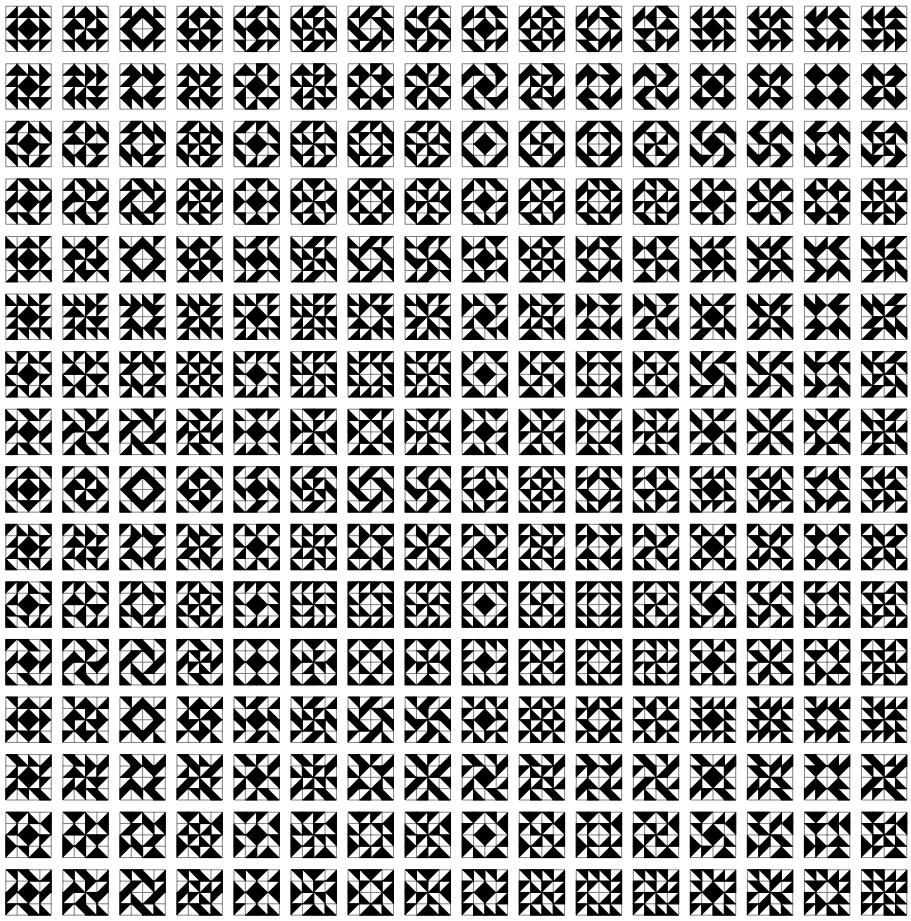




1111	1113	1131	1133
1311	1313	1331	1333
3111	3113	3131	3133
3311	3313	3331	3333



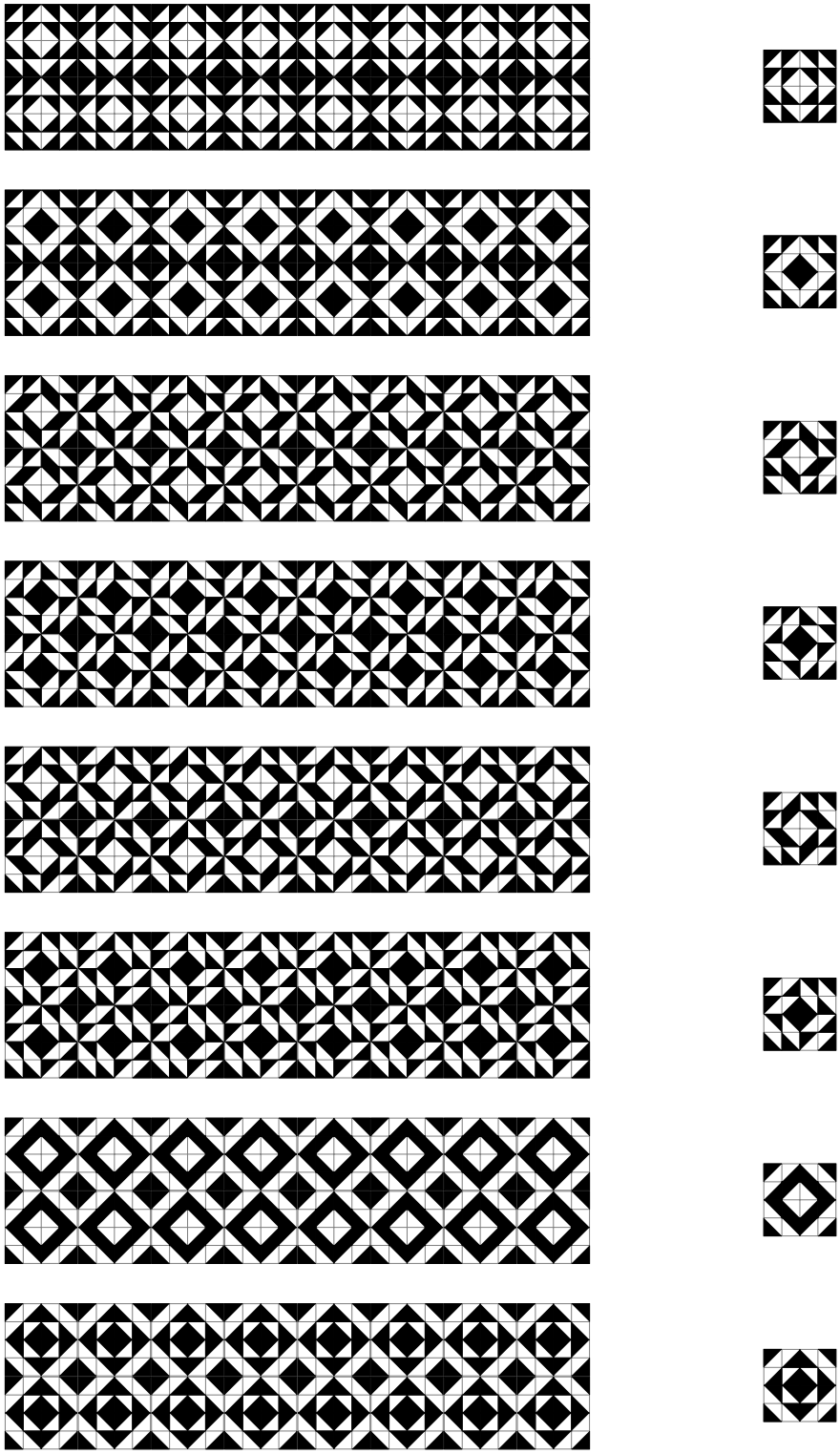
a	b	c	a
c	d	p	q
b	d	d	c
a	c	b	a

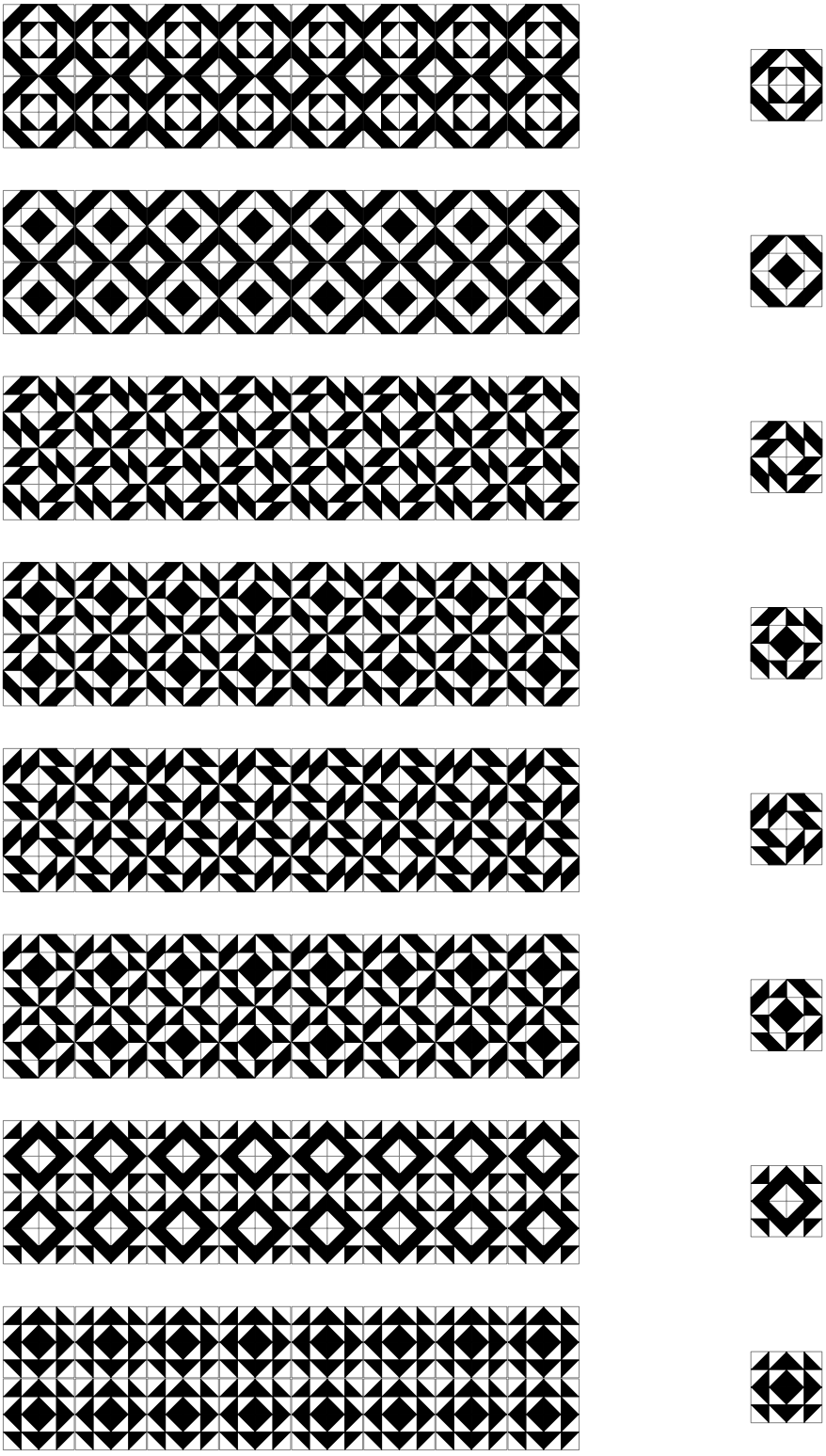


Friezes of Truchet patterns

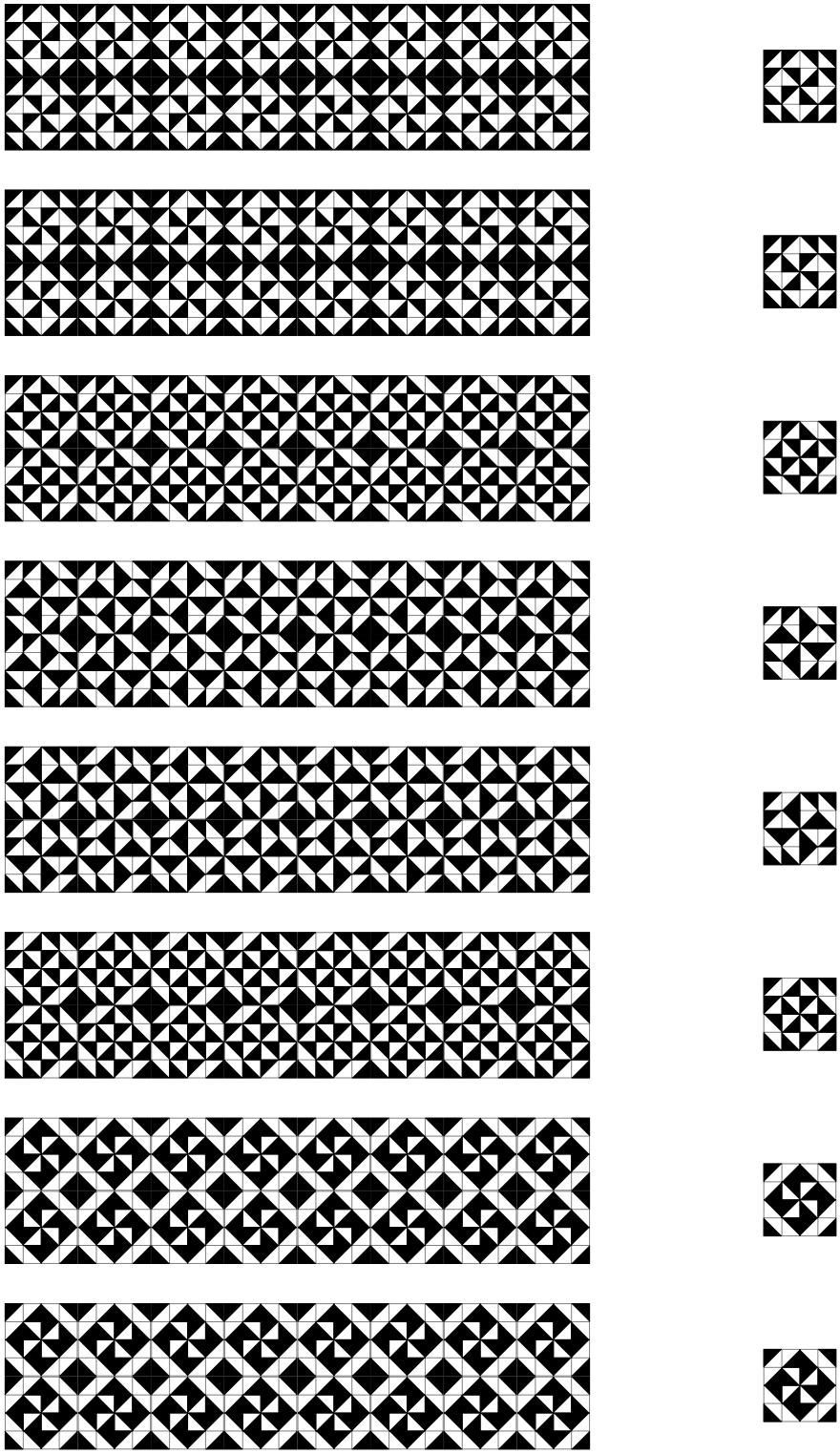
Each 4x4 Truchet pattern can be treated like a tile and used in a larger pattern. A *frieze* is a horizontal strip of tiles. Laying each of the 256 tiles in a frieze of the same tiles reveals other symmetrical patterns.

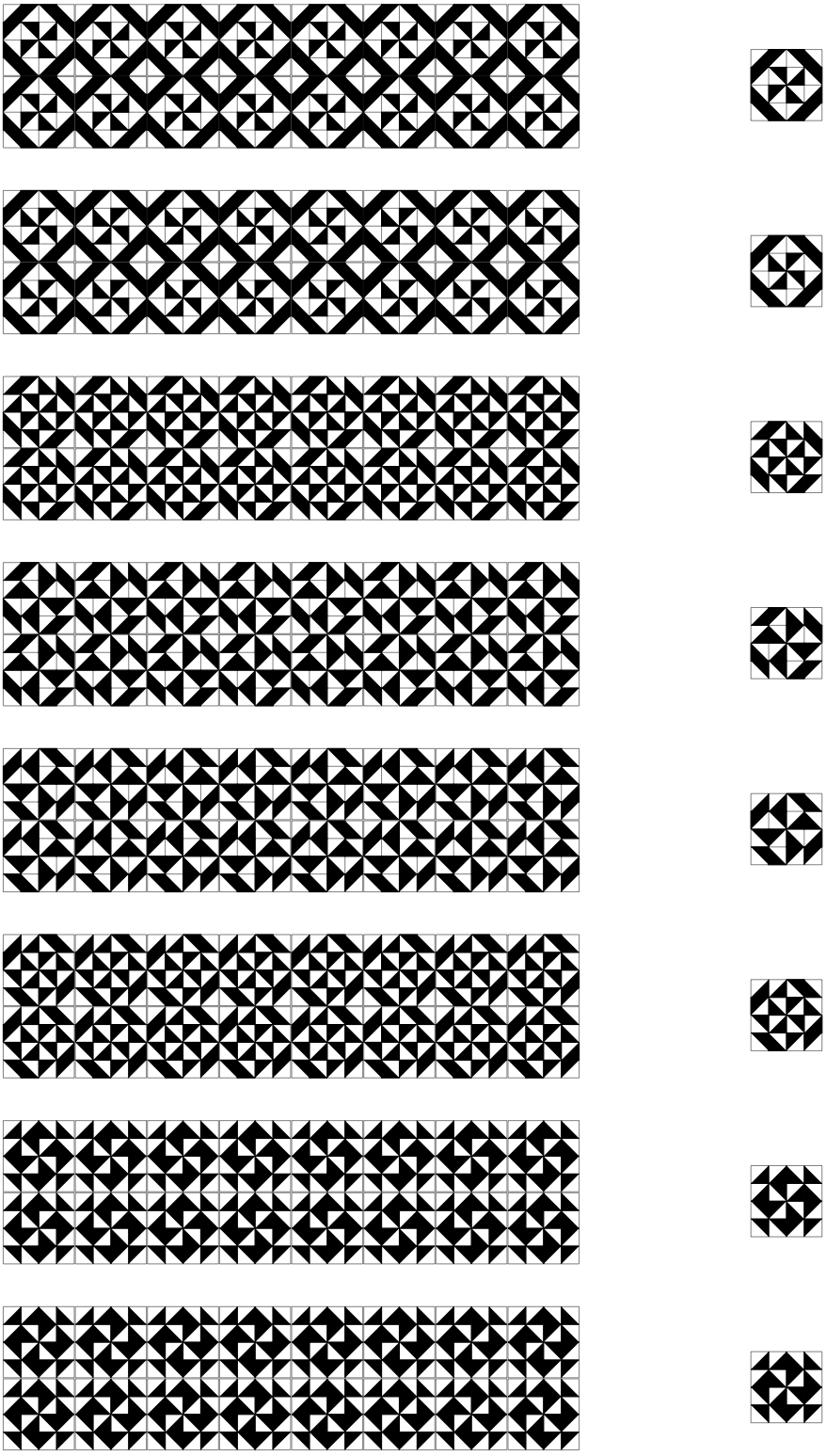
Frieze patterns for family oooo



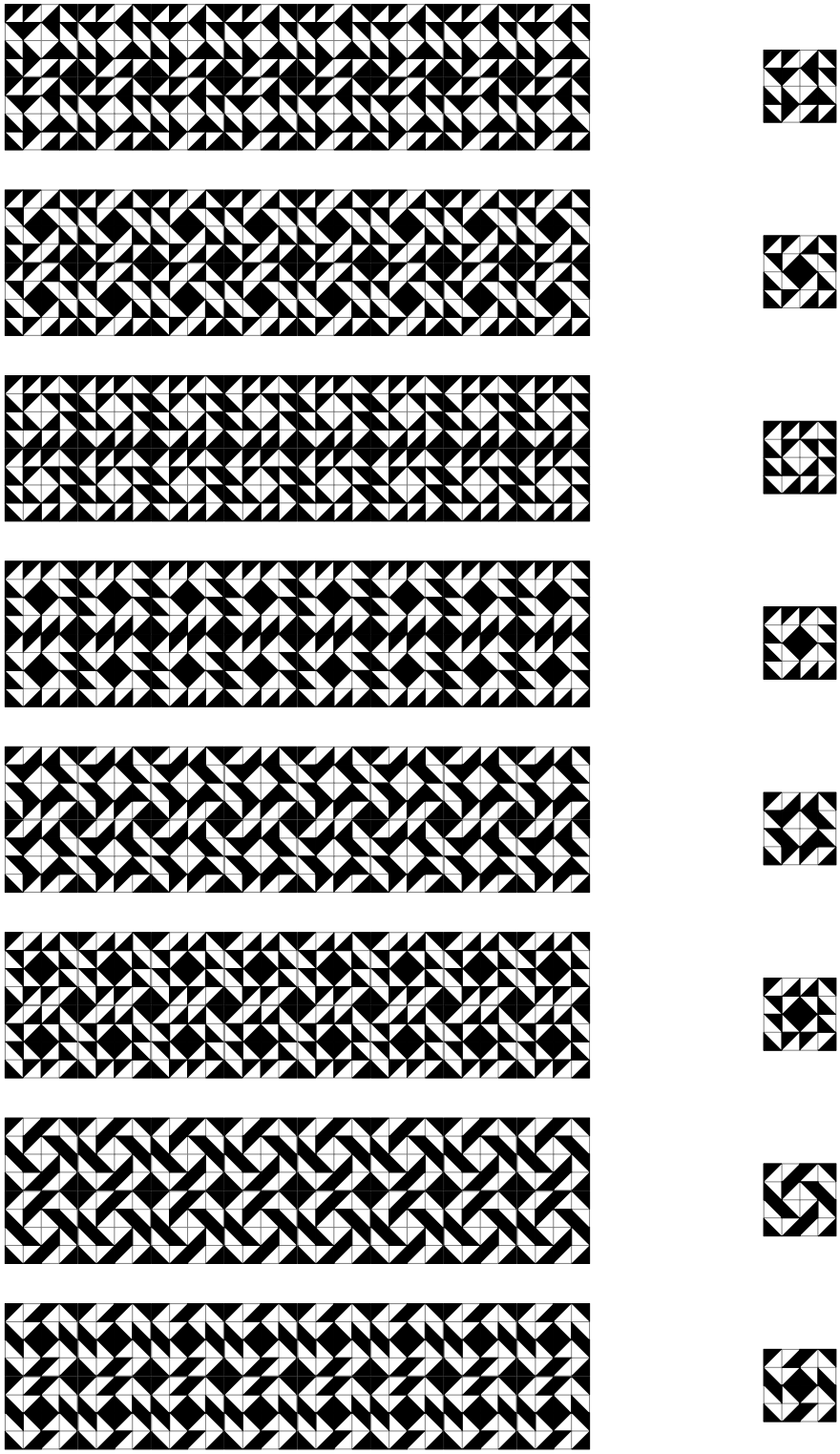


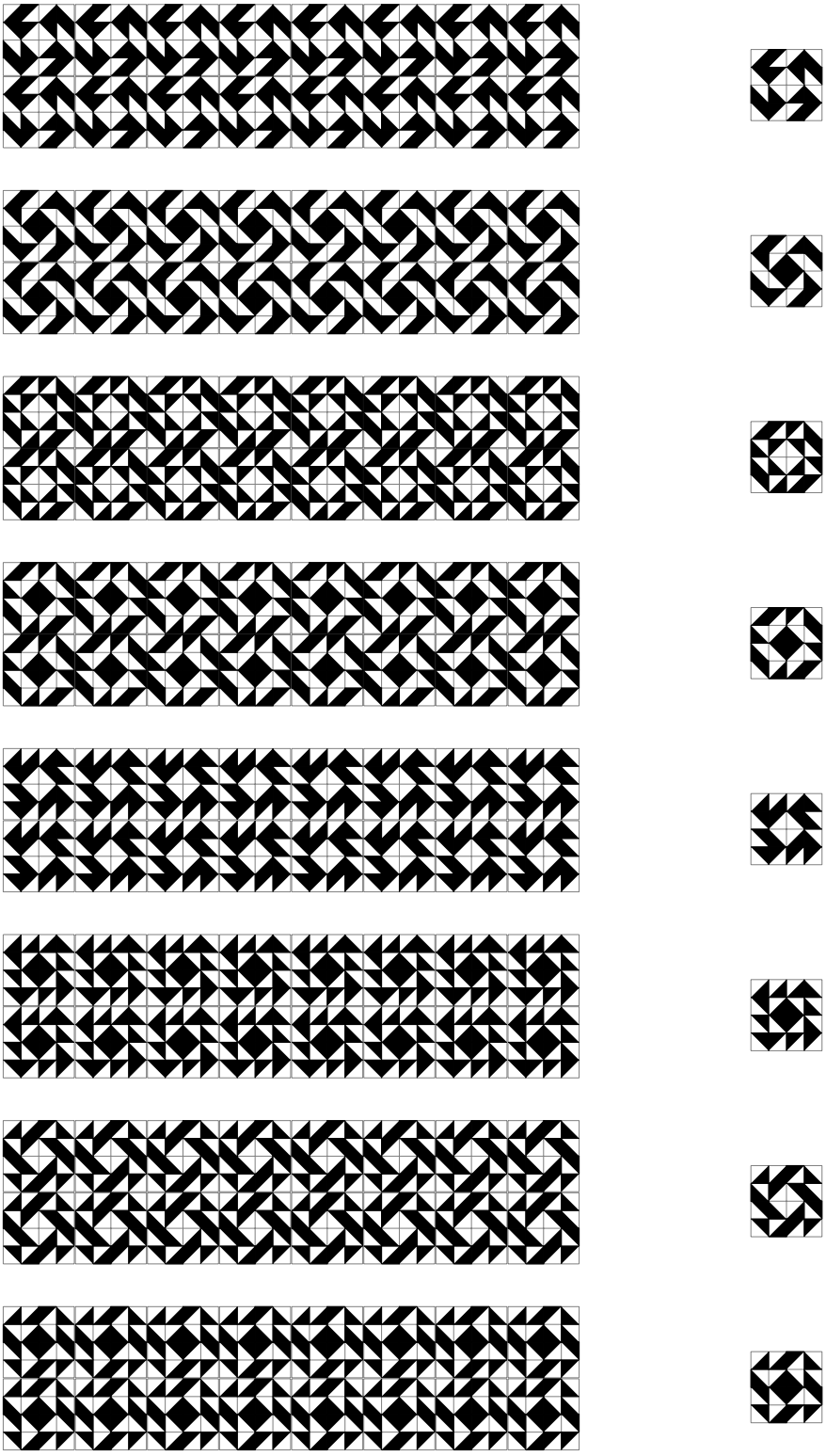
Frieze patterns for family 0001



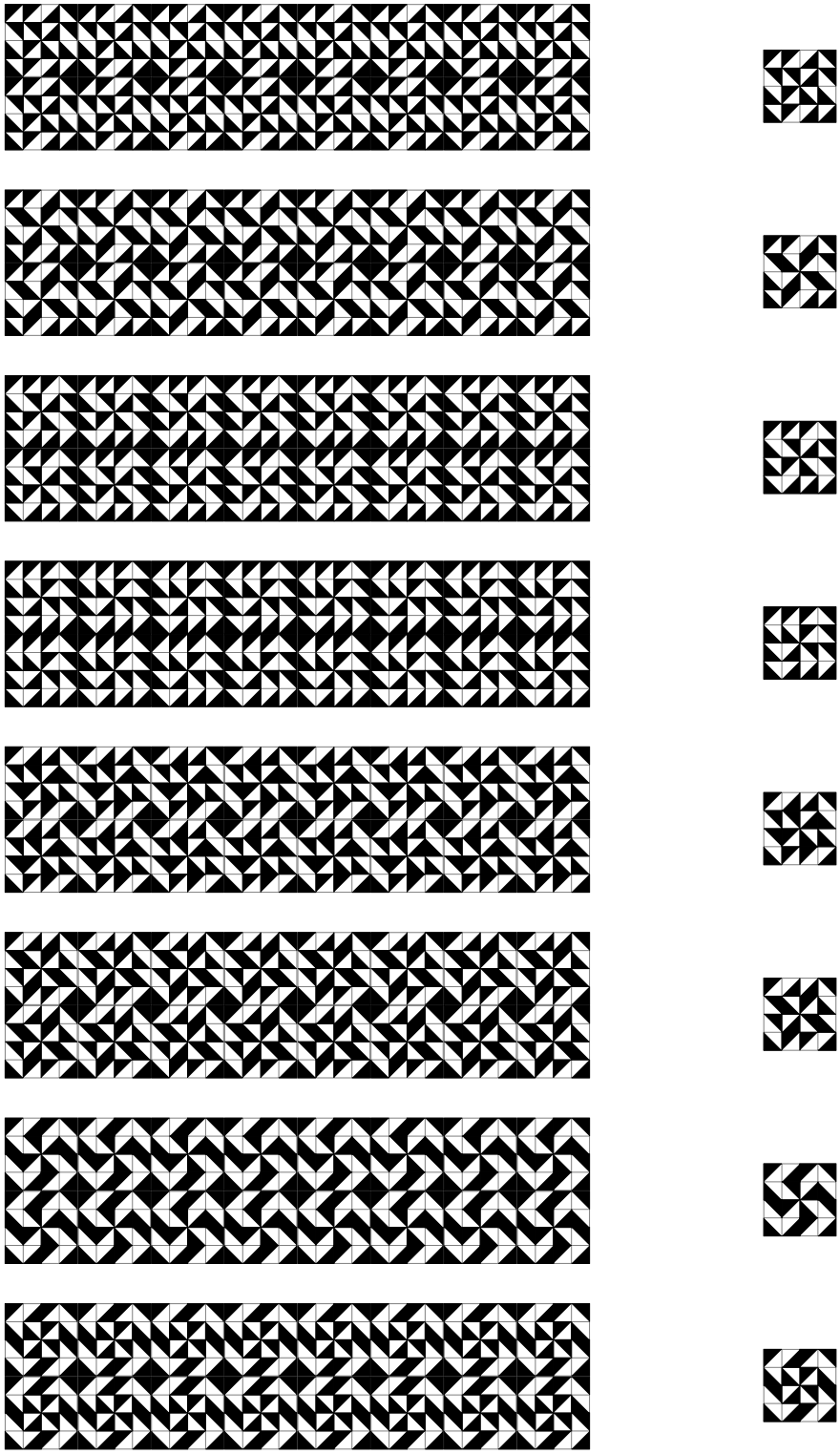


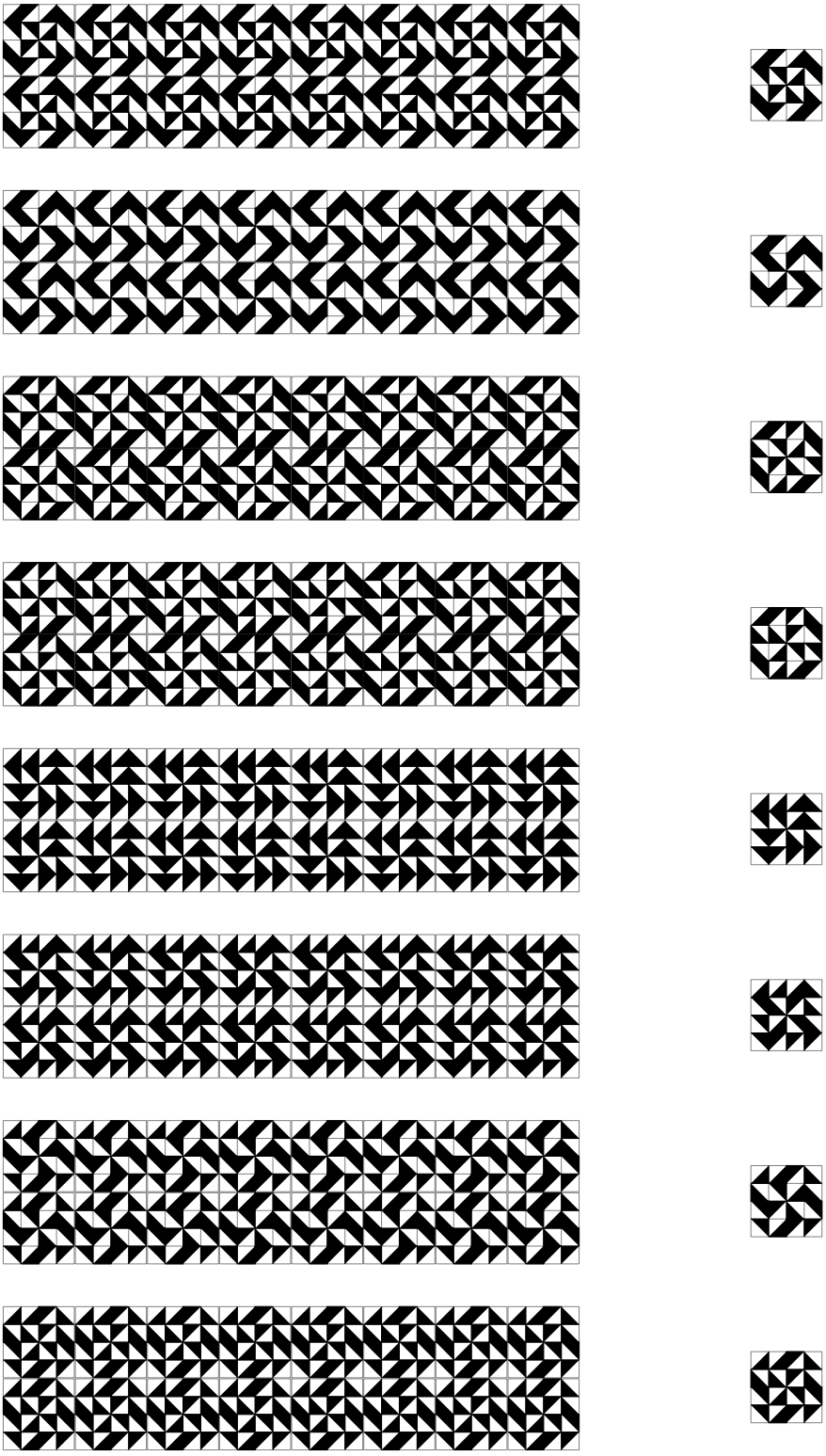
Frieze patterns for family 0010



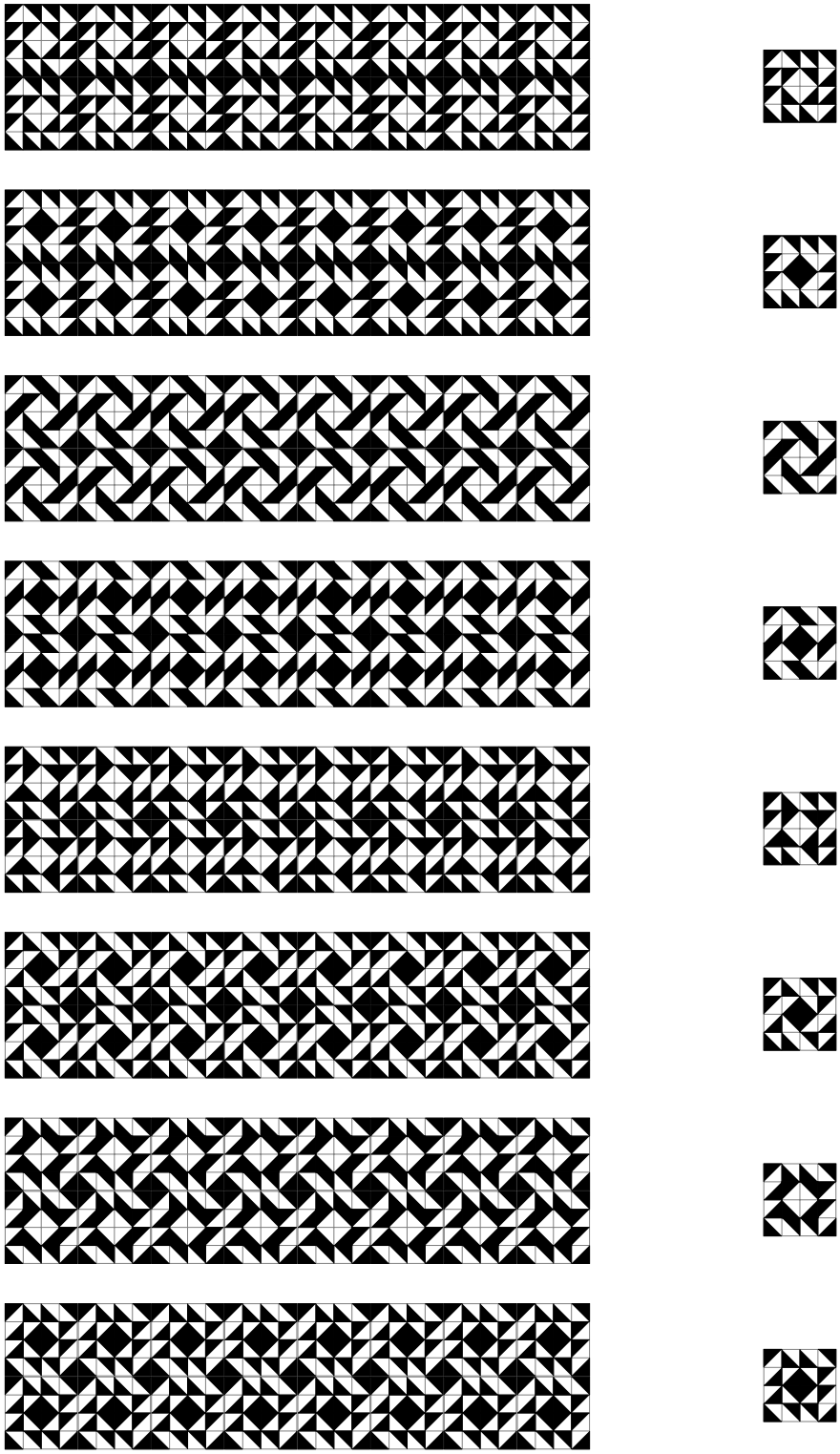


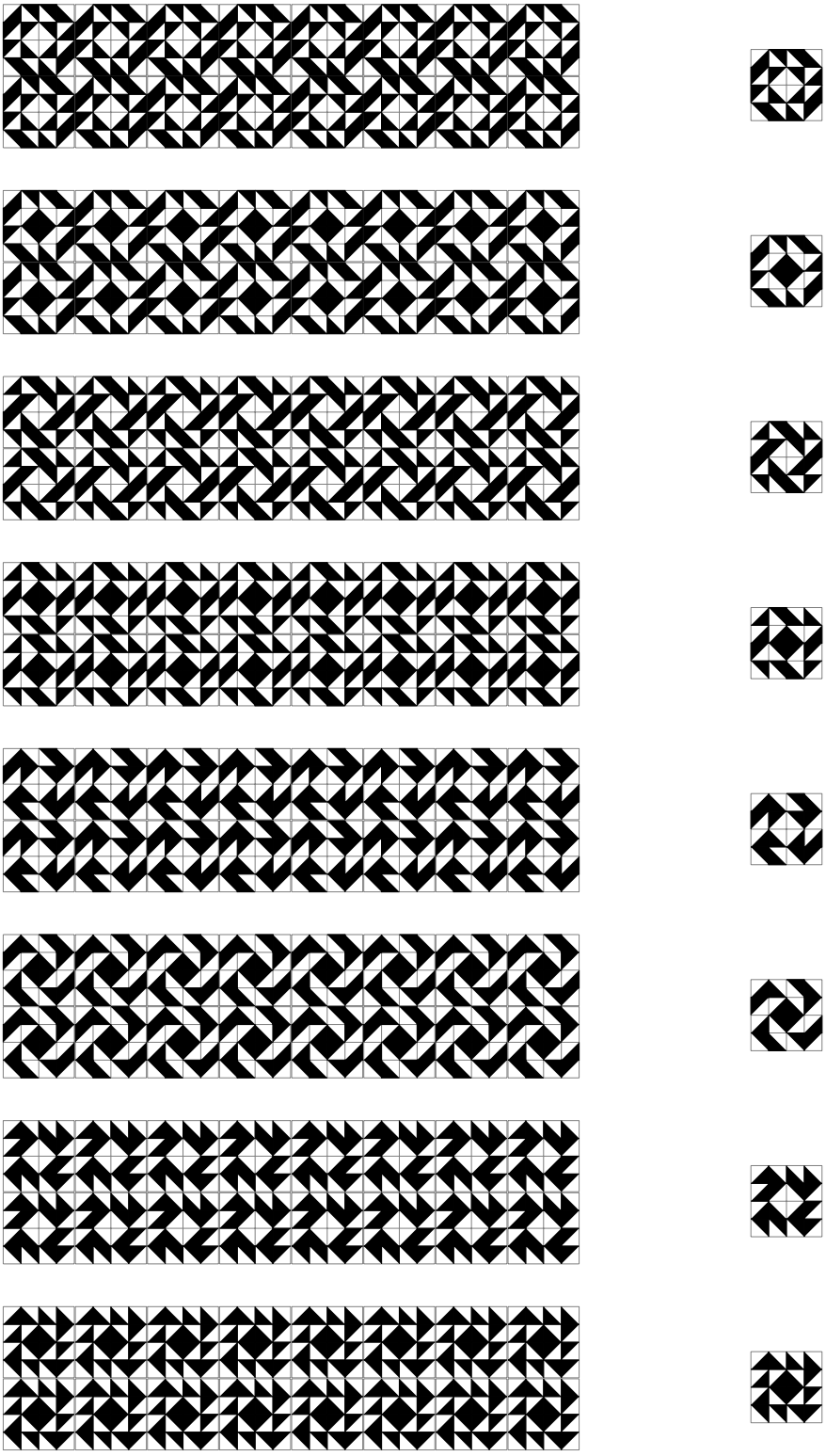
Frieze patterns for family 0011



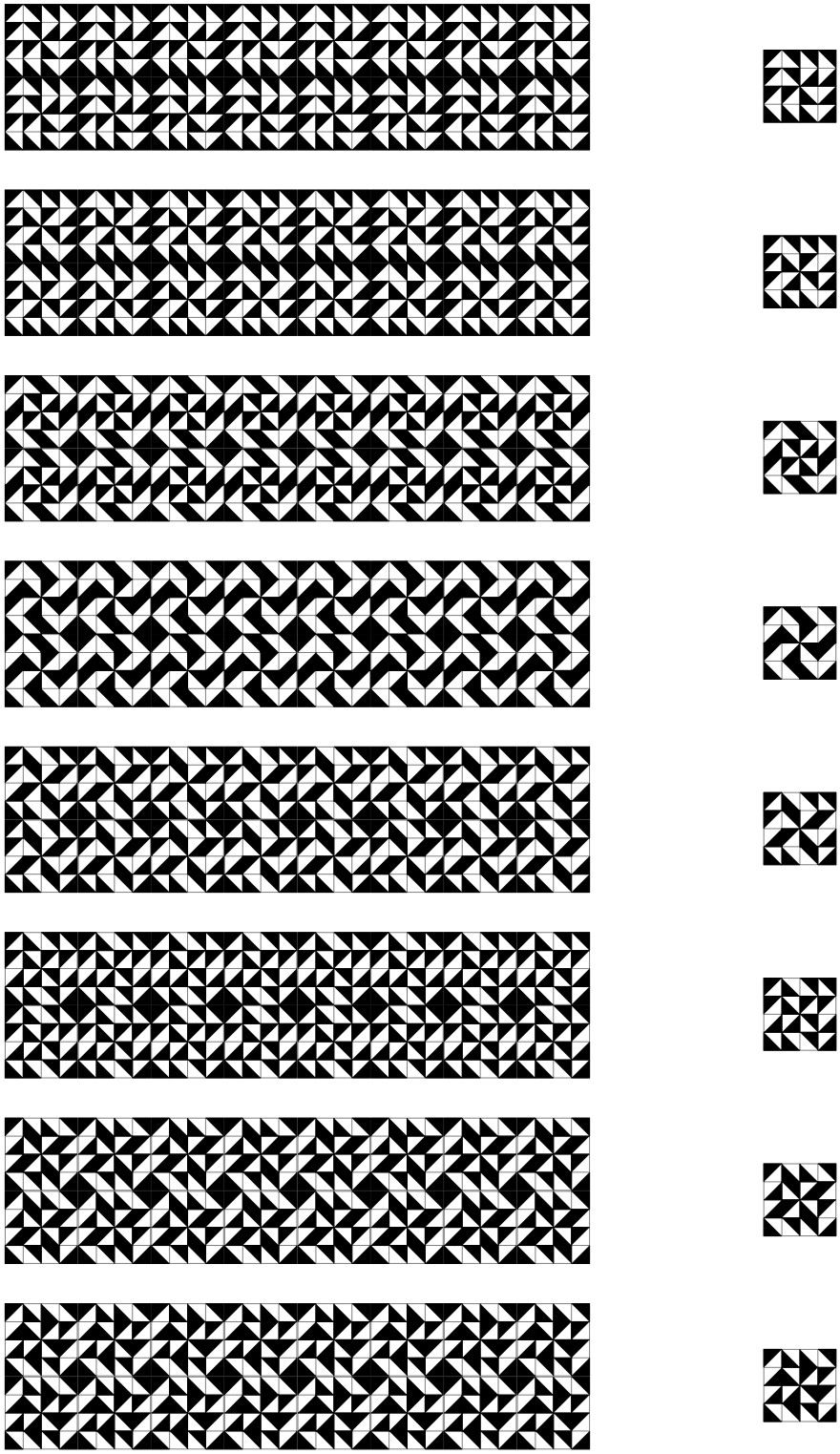


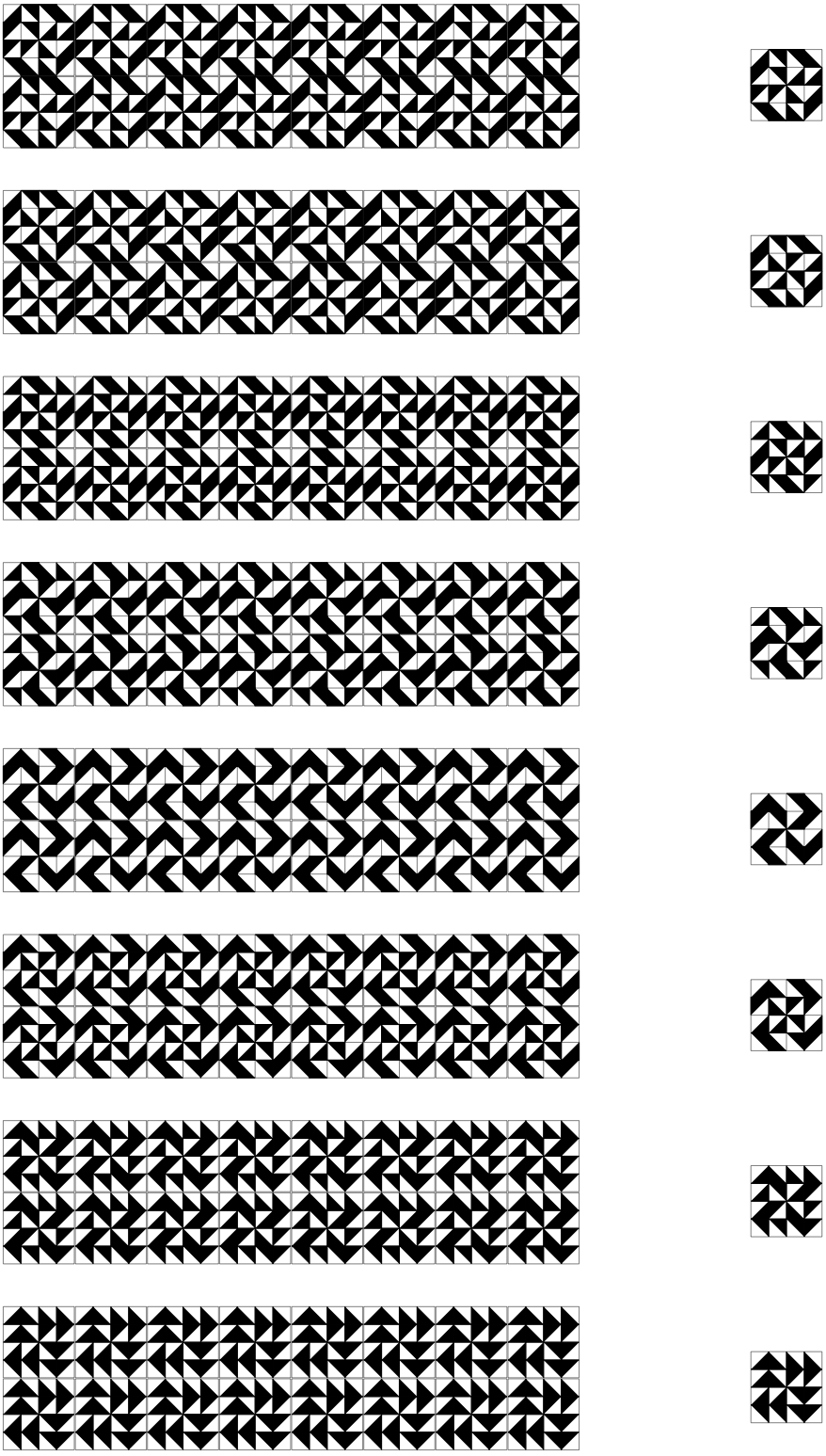
Frieze patterns for family 0100



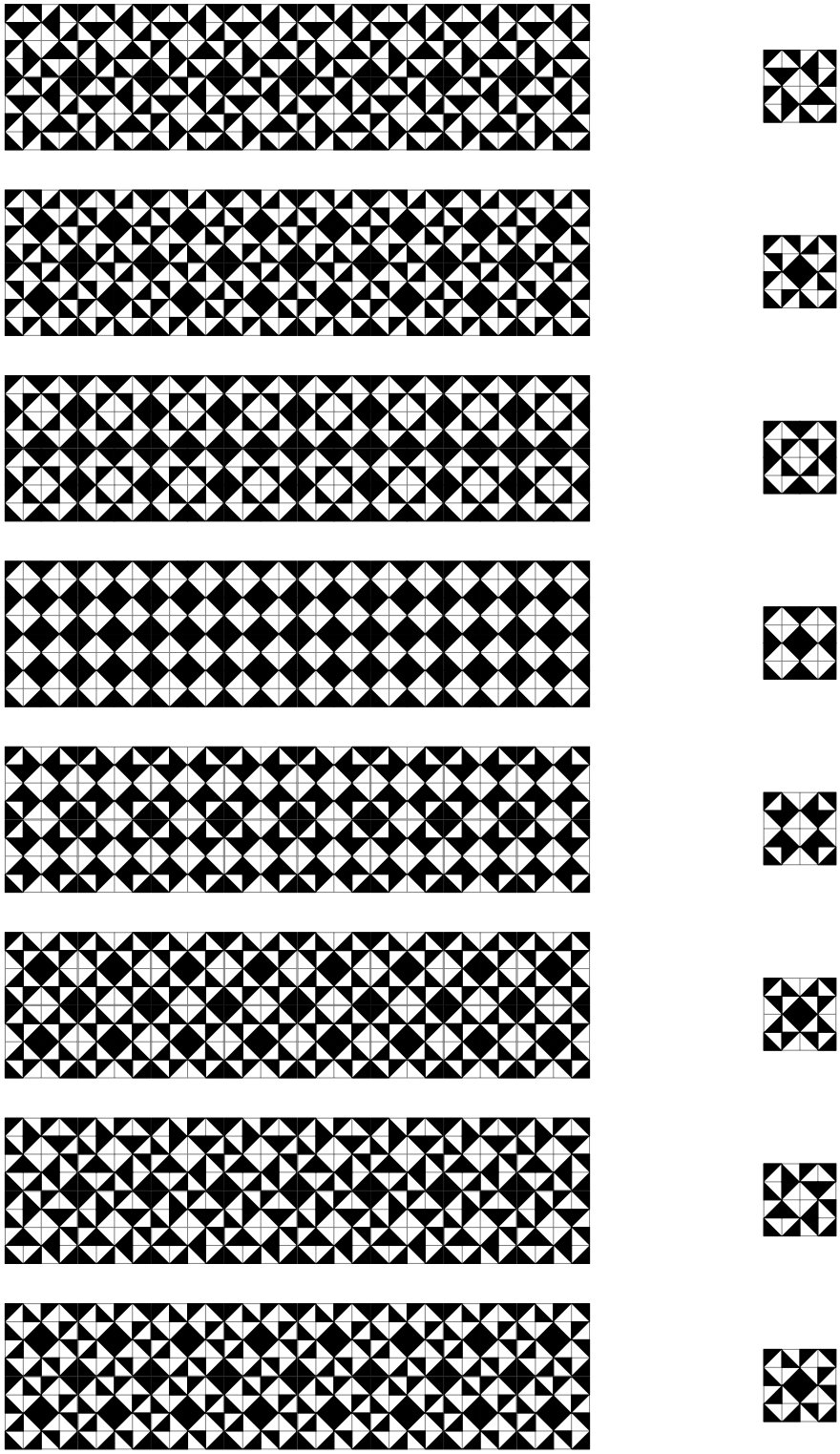


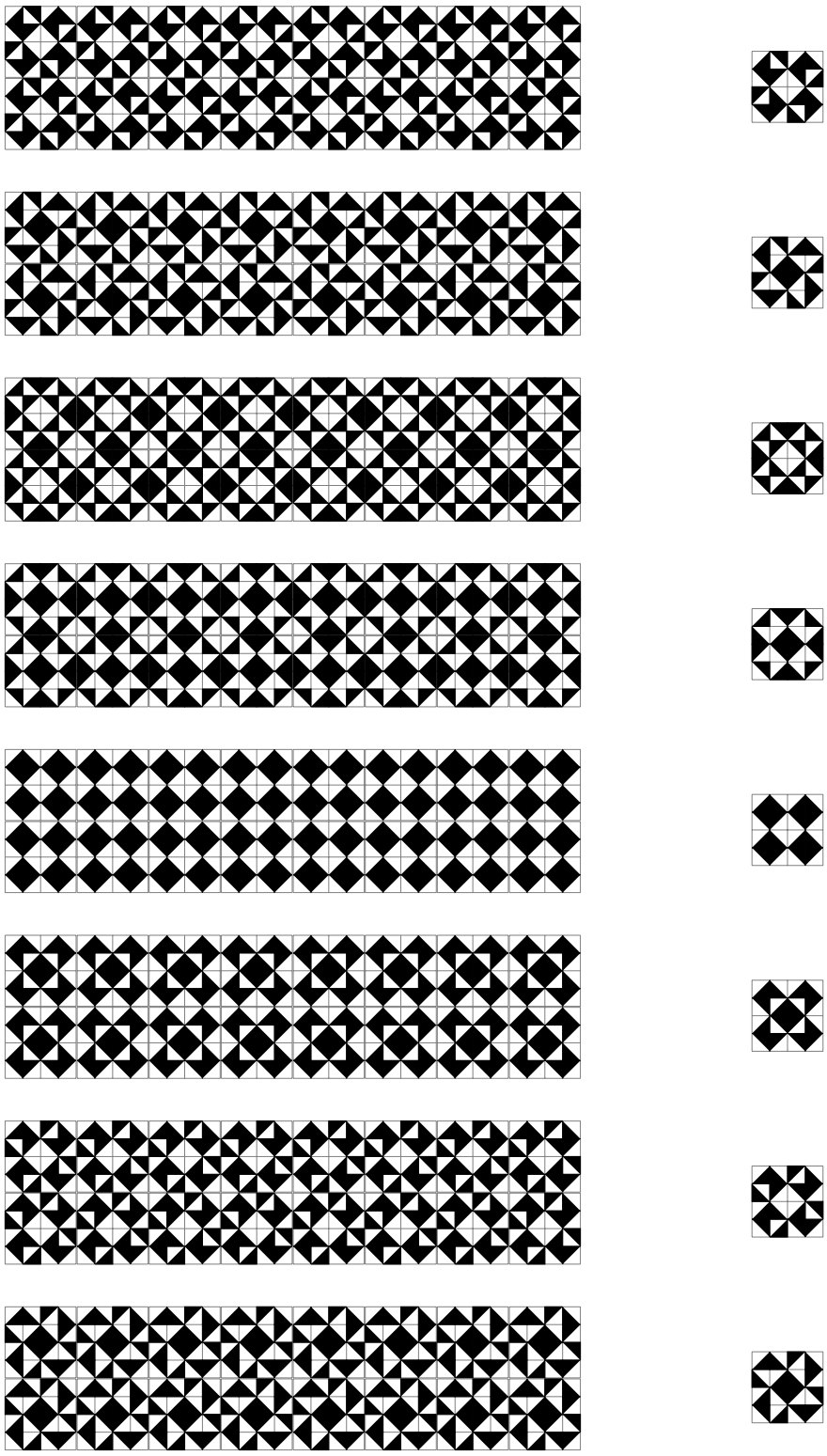
Frieze patterns for family 0101



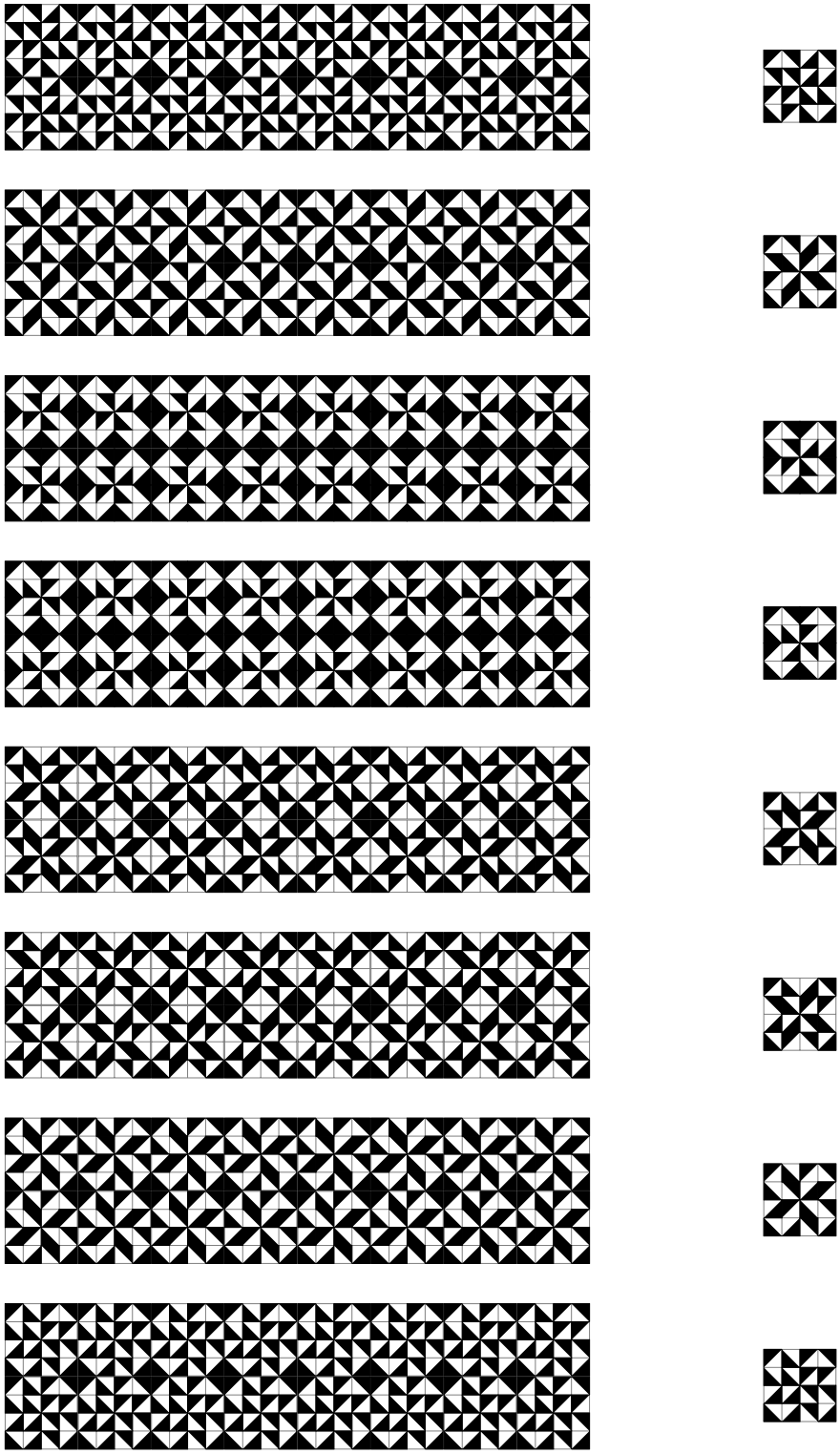


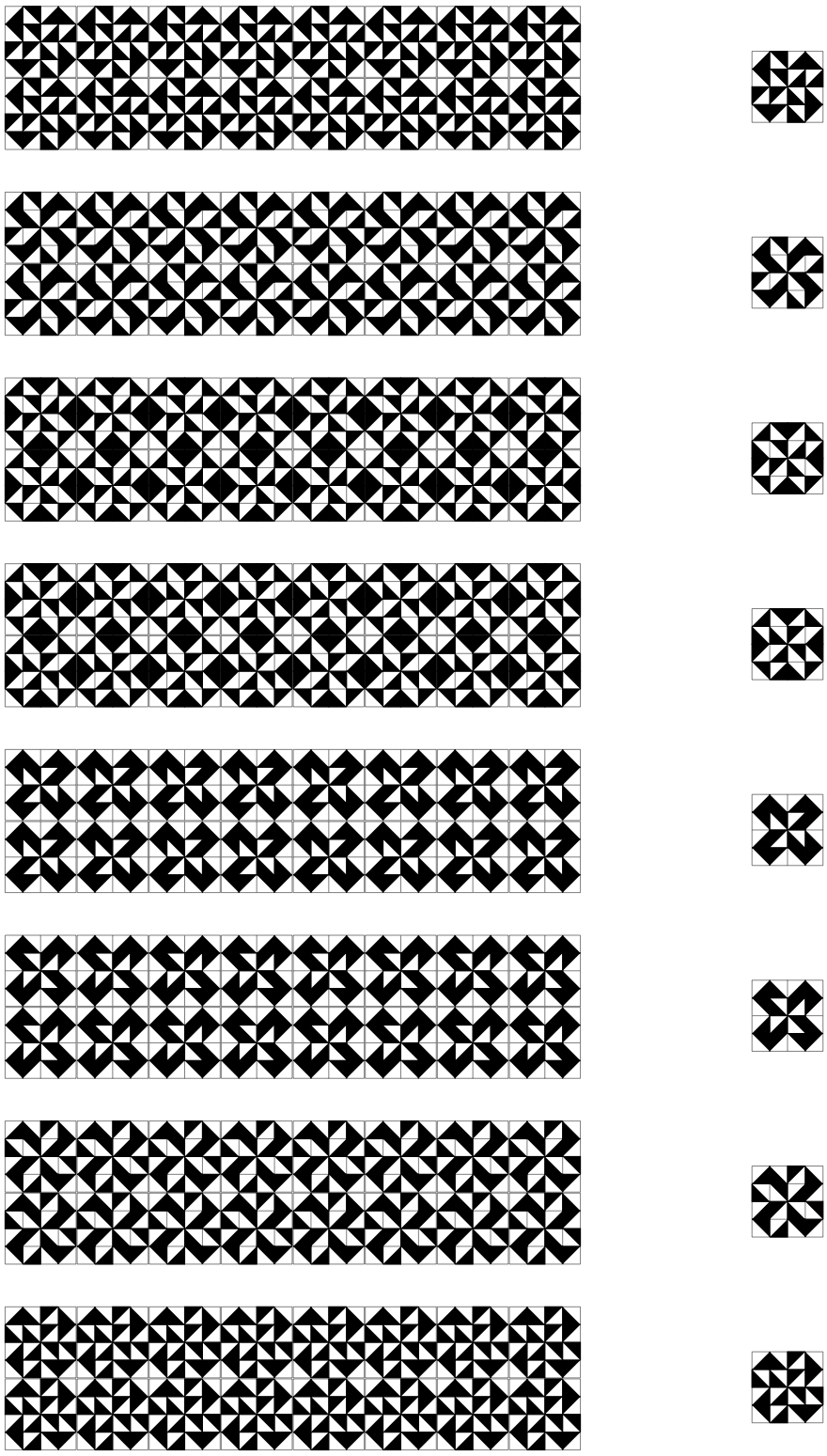
Frieze patterns for family 0110



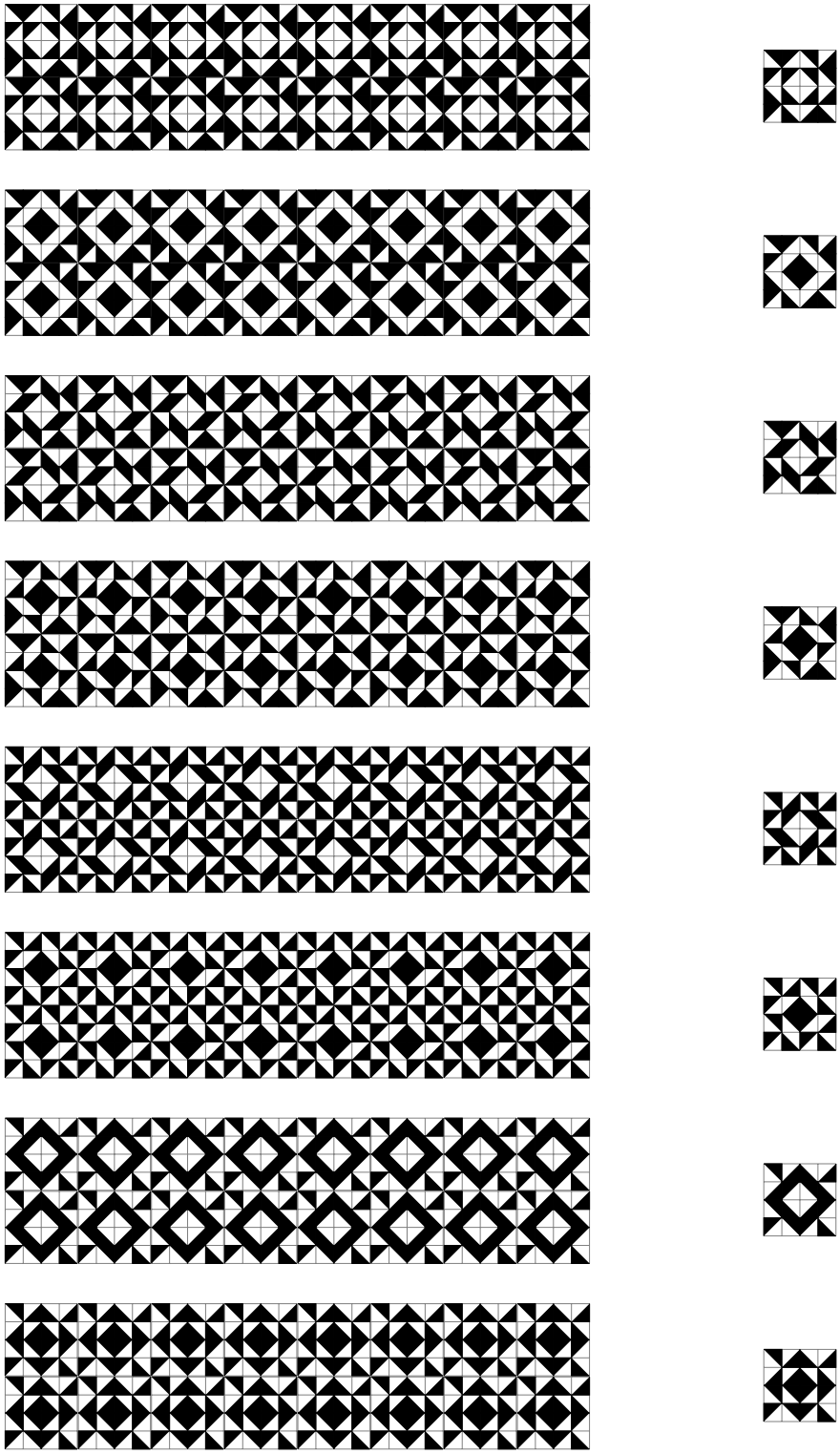


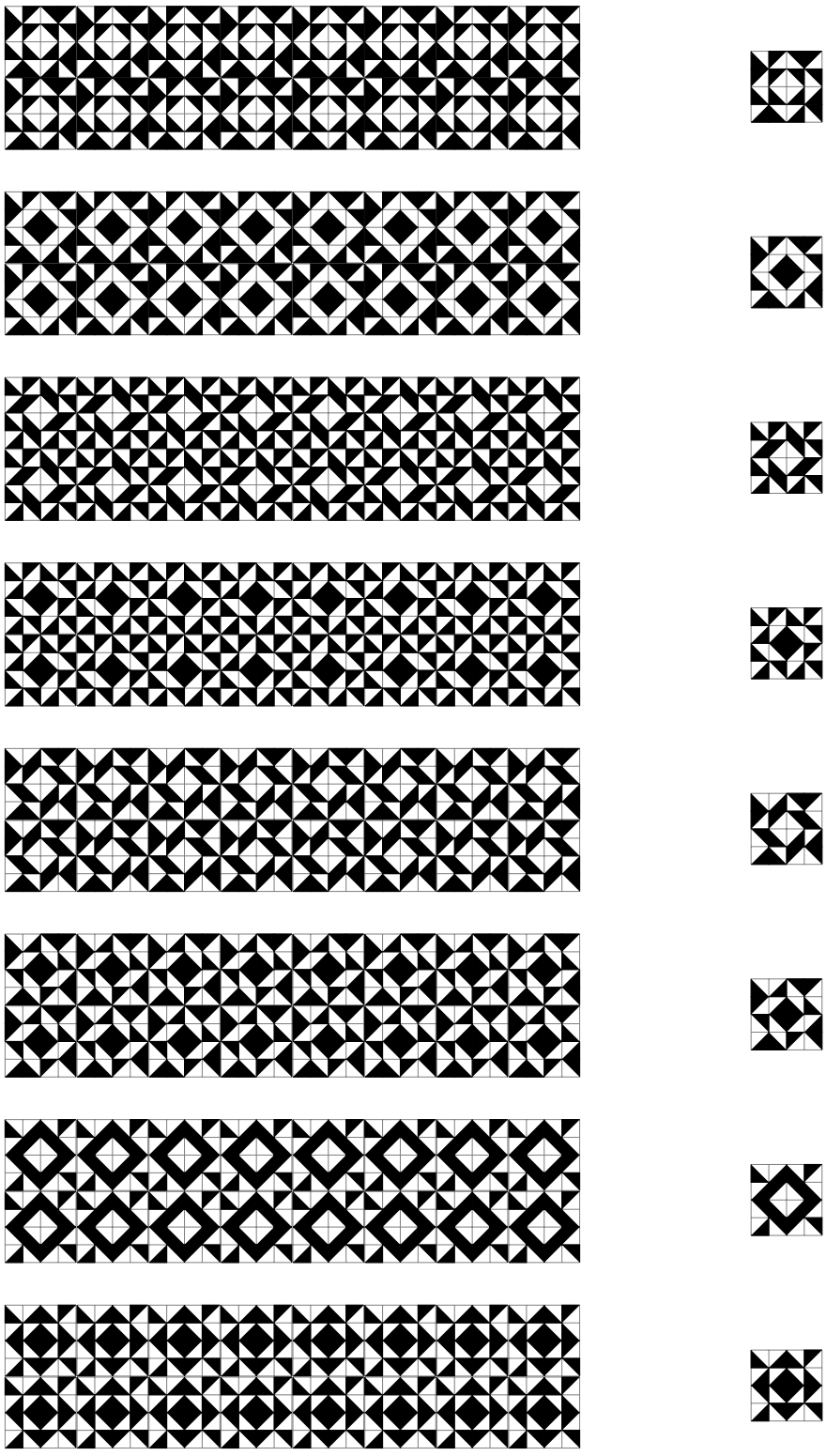
Frieze patterns for family 0111



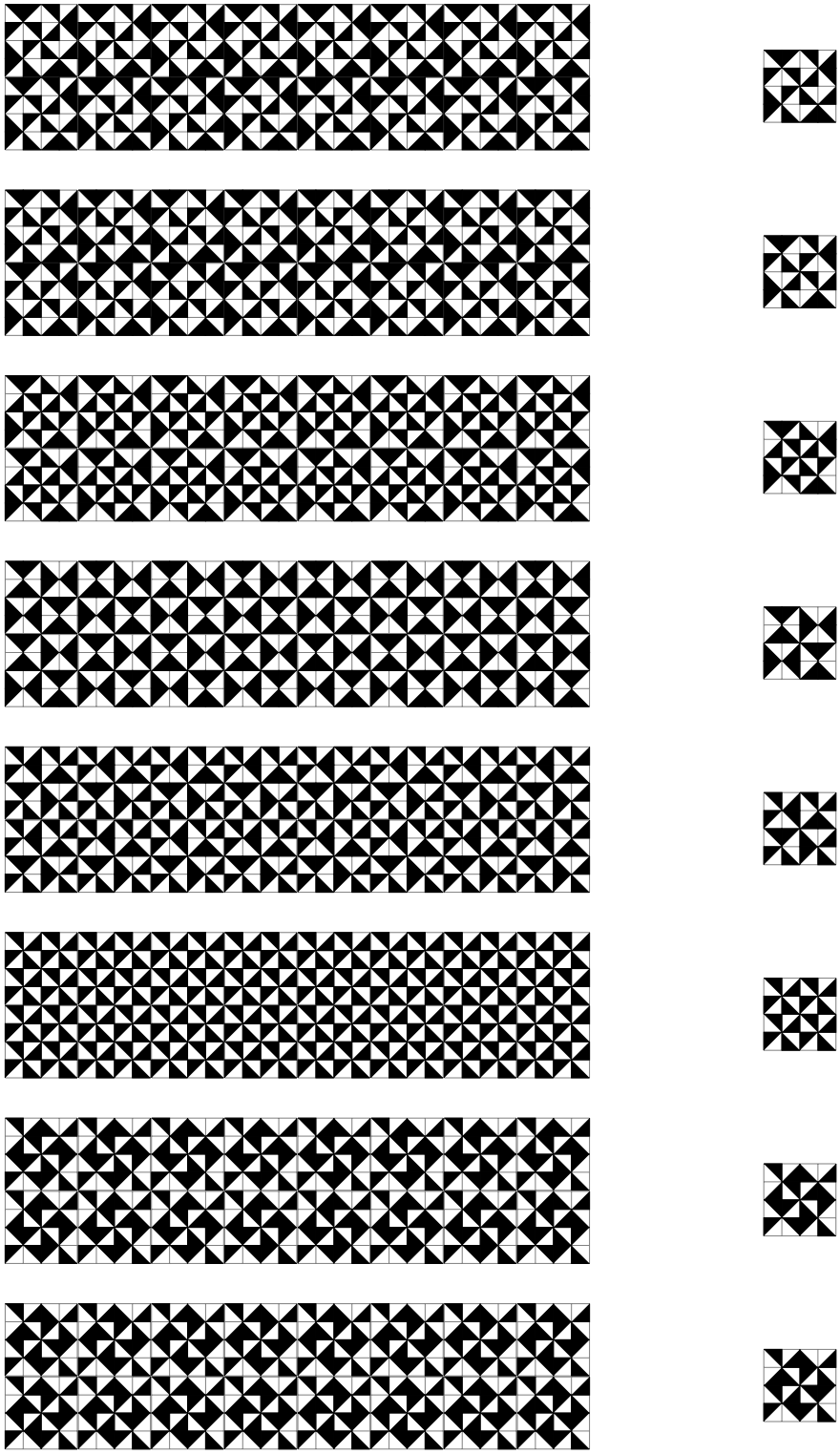


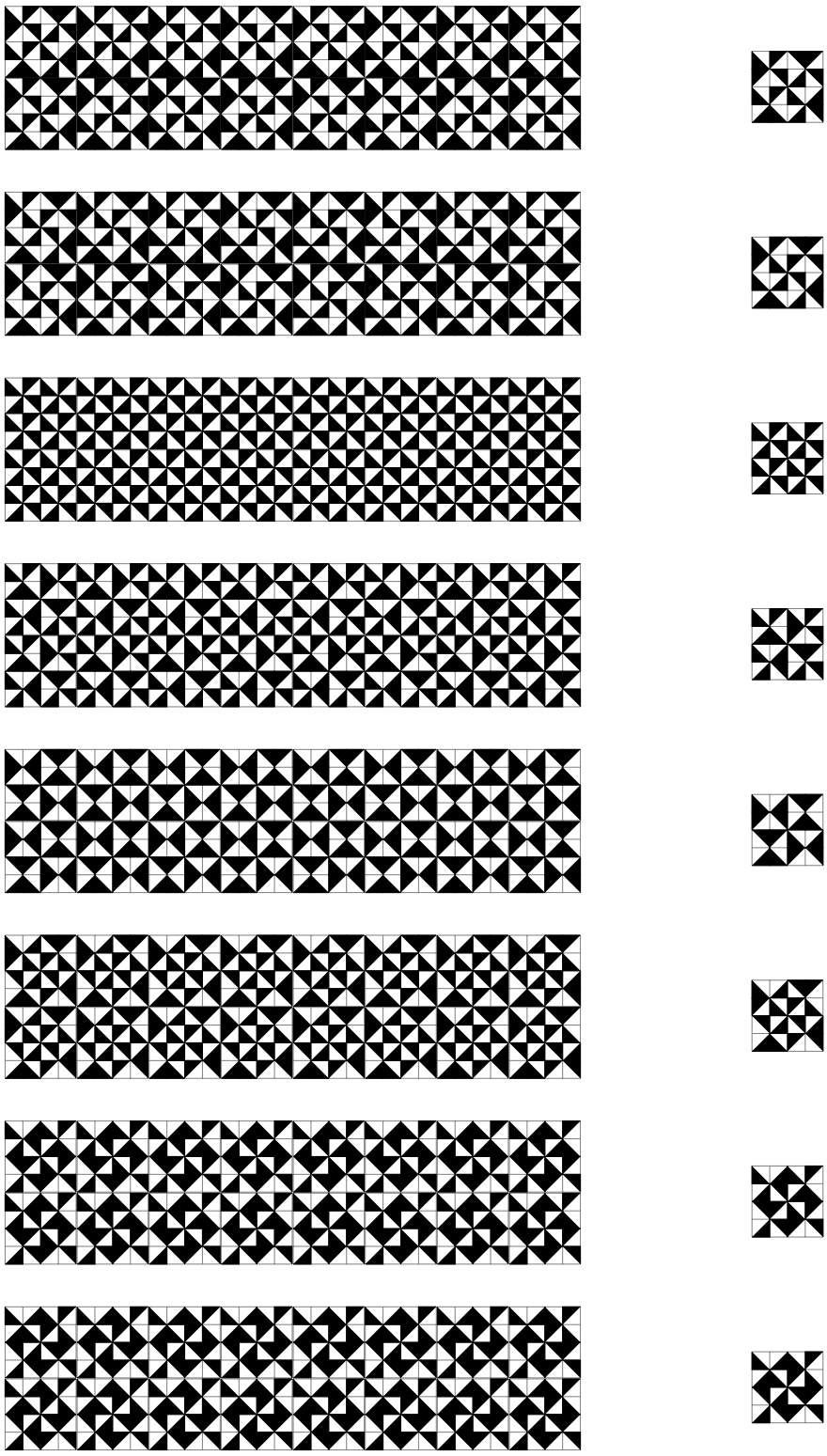
Frieze patterns for family 1000



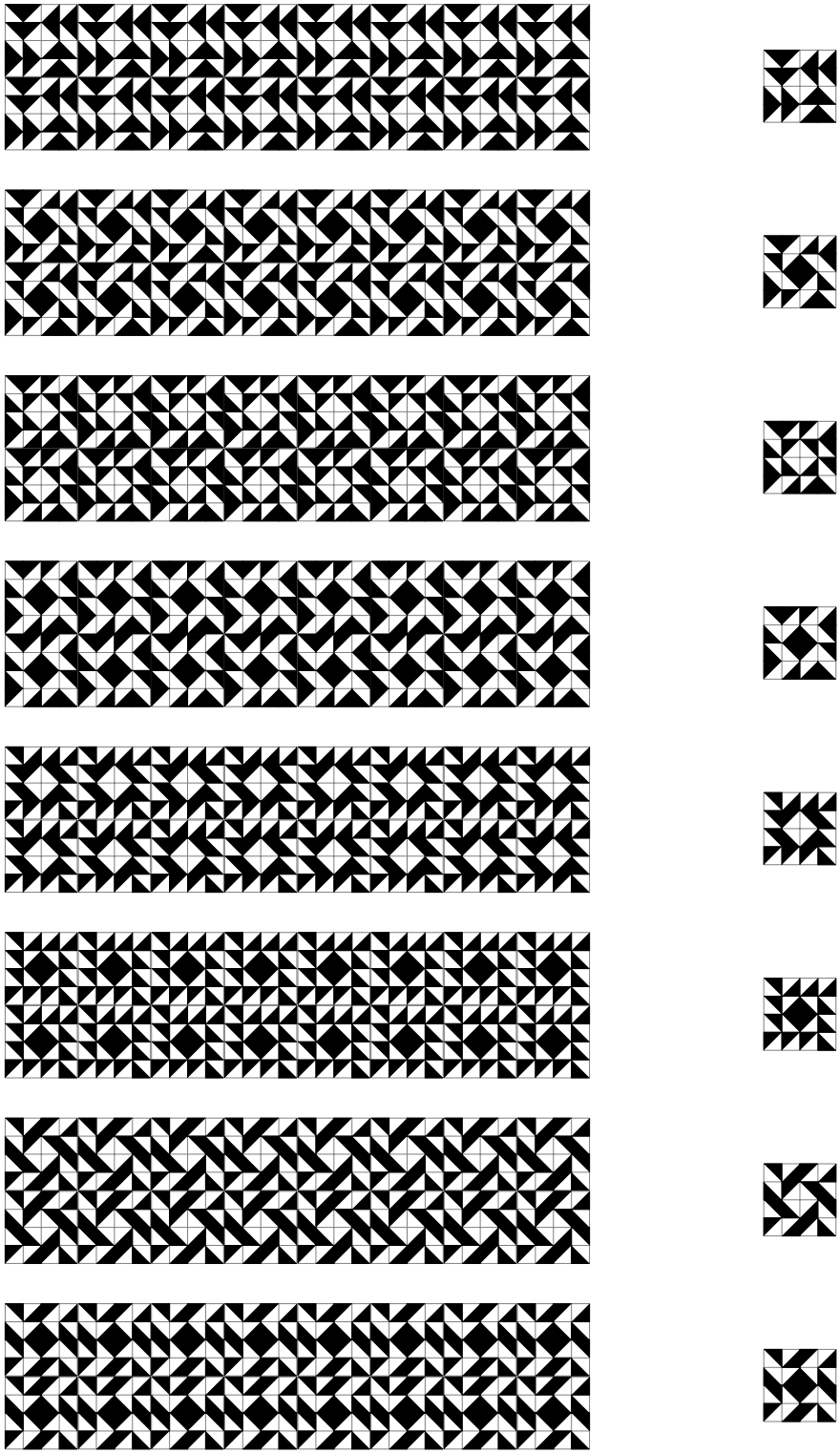


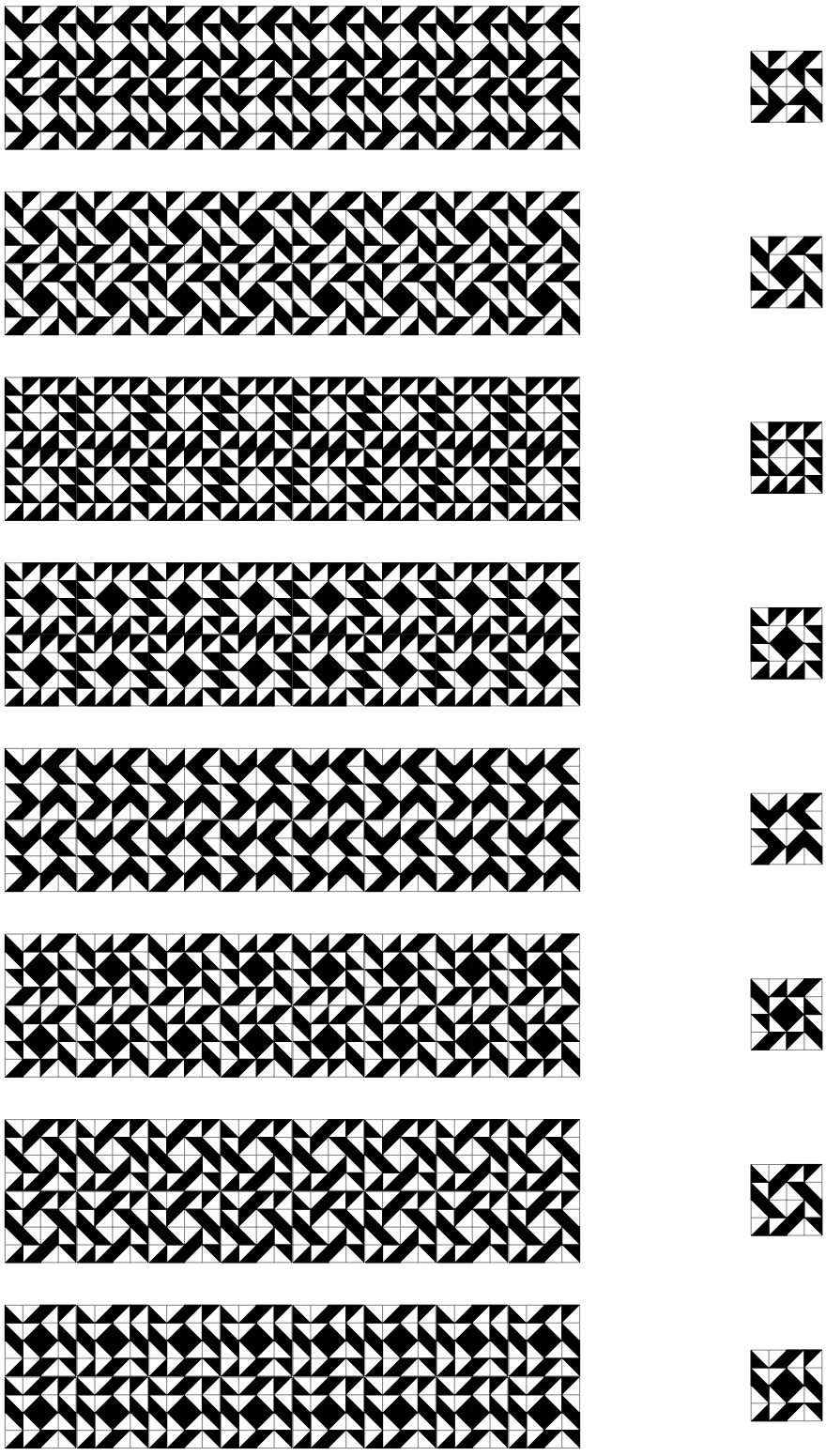
Frieze patterns for family 1001



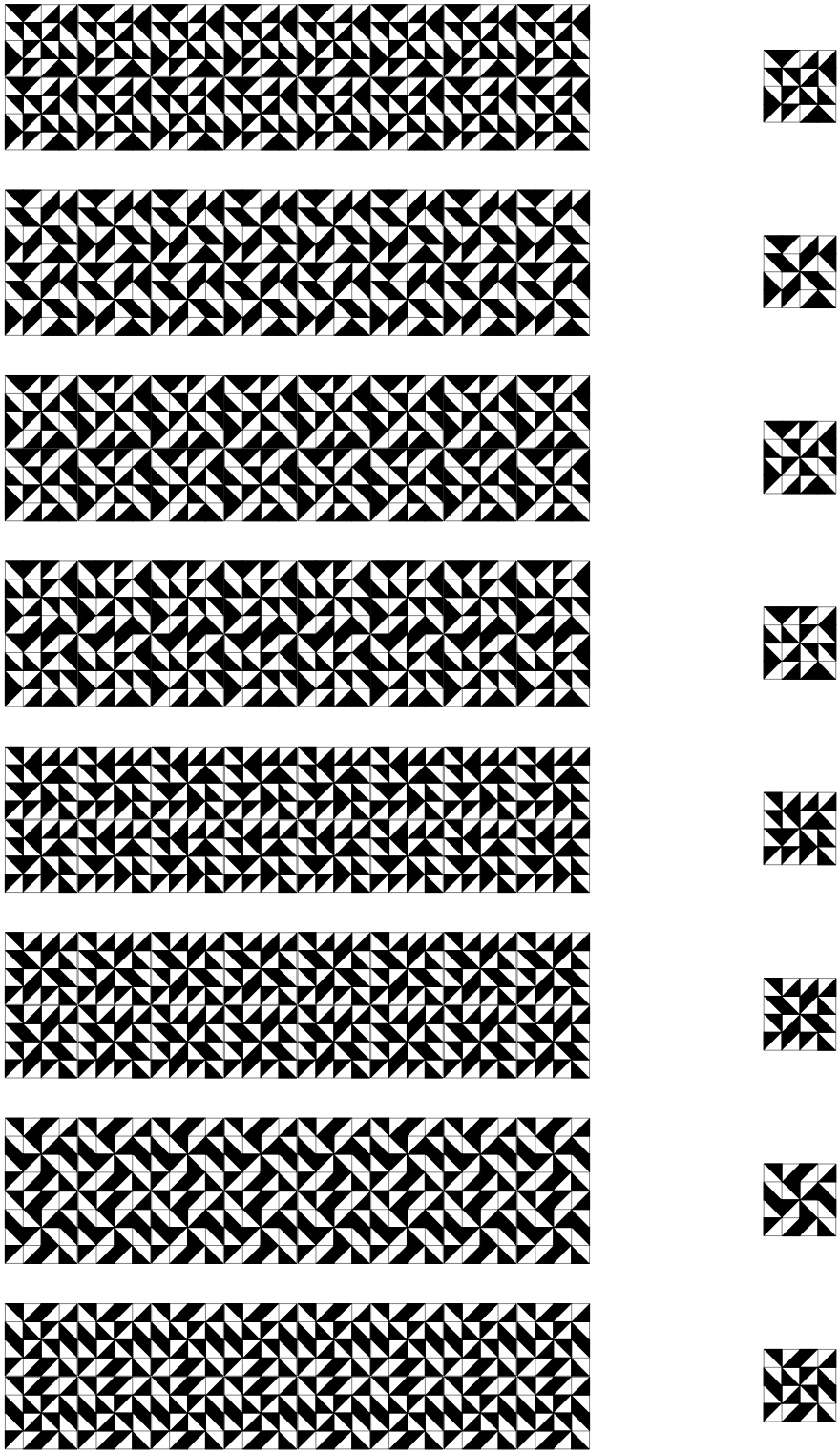


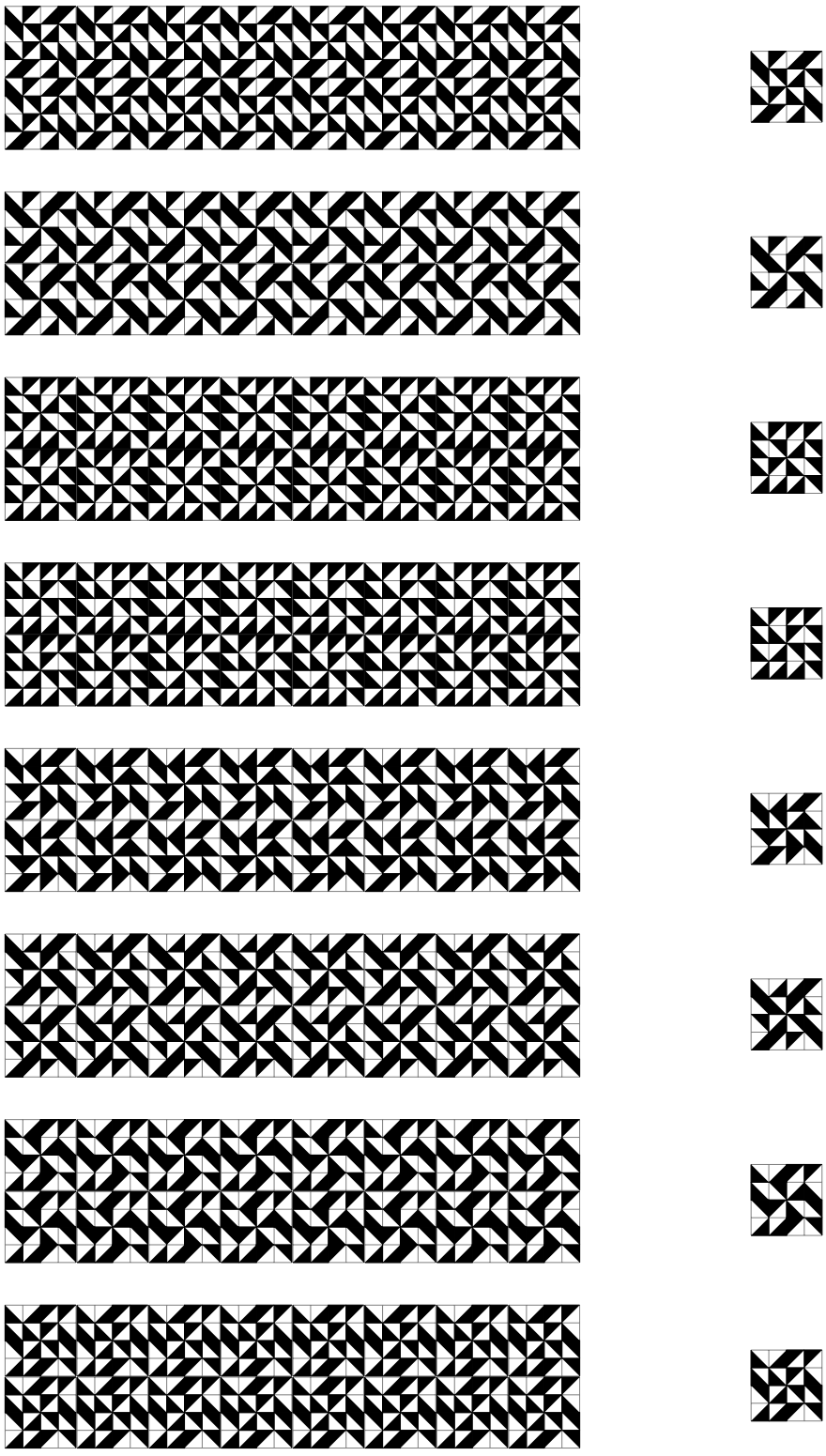
Frieze patterns for family 1010



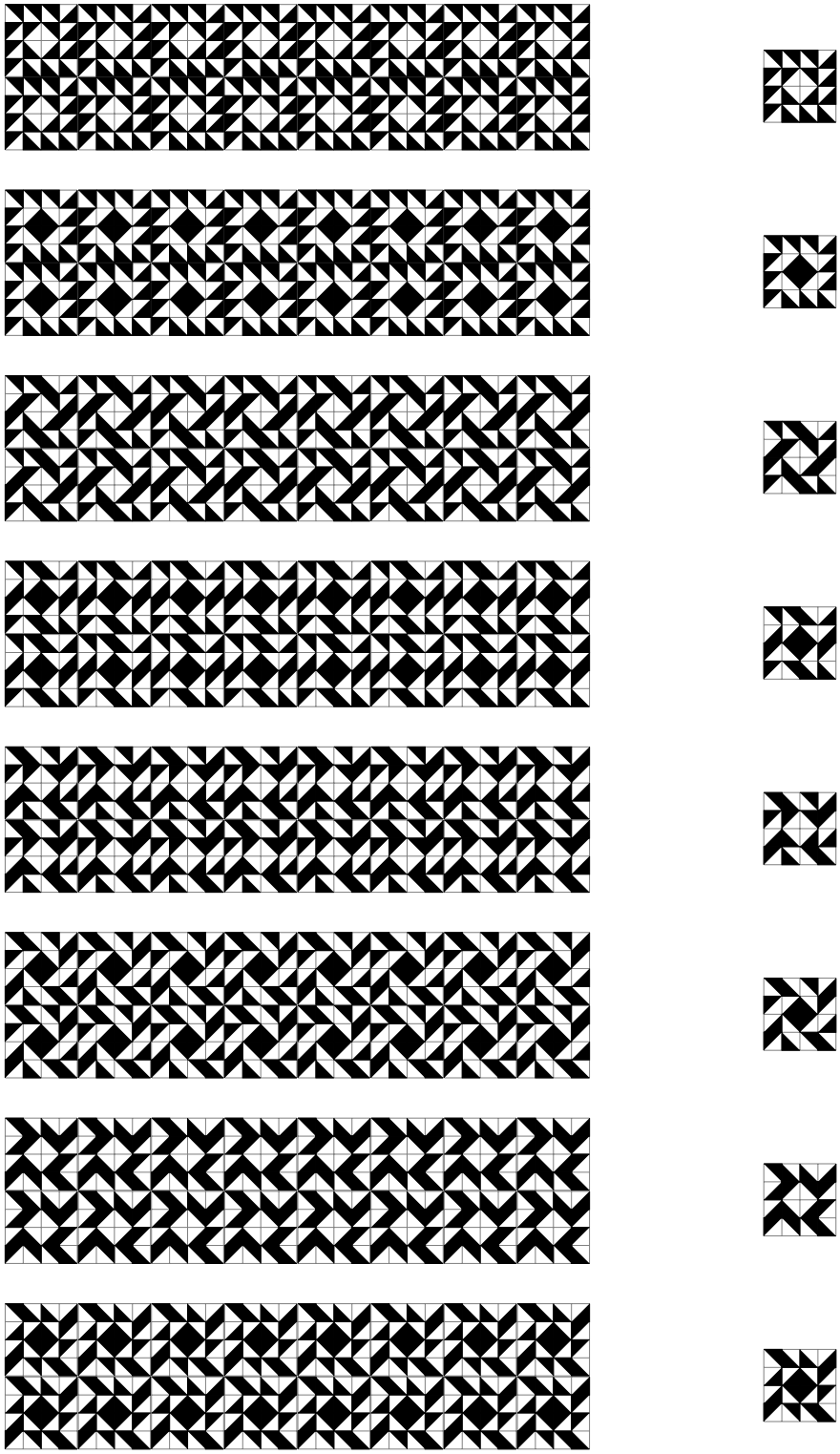


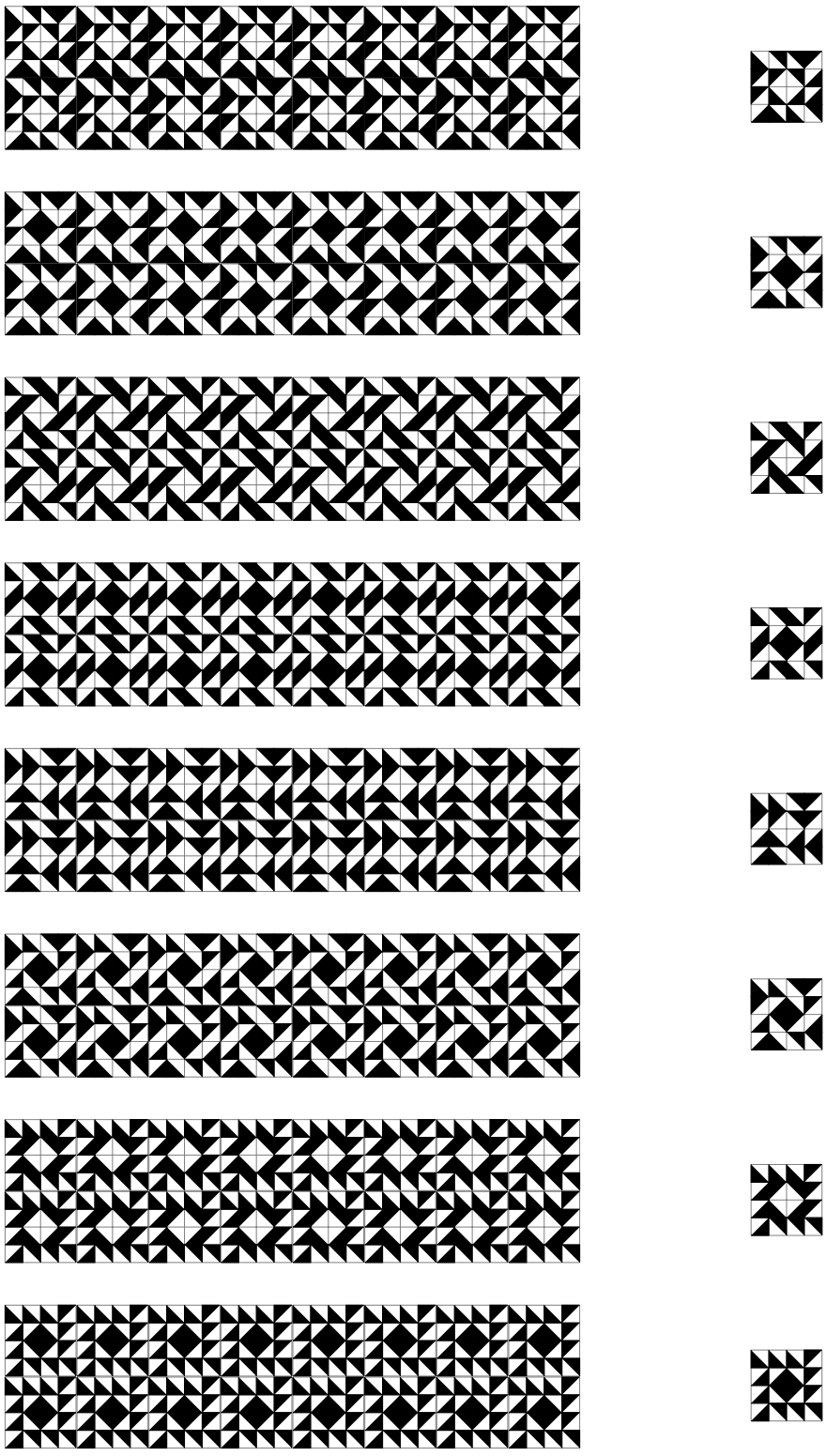
Frieze patterns for family 1011





Frieze patterns for family 1100





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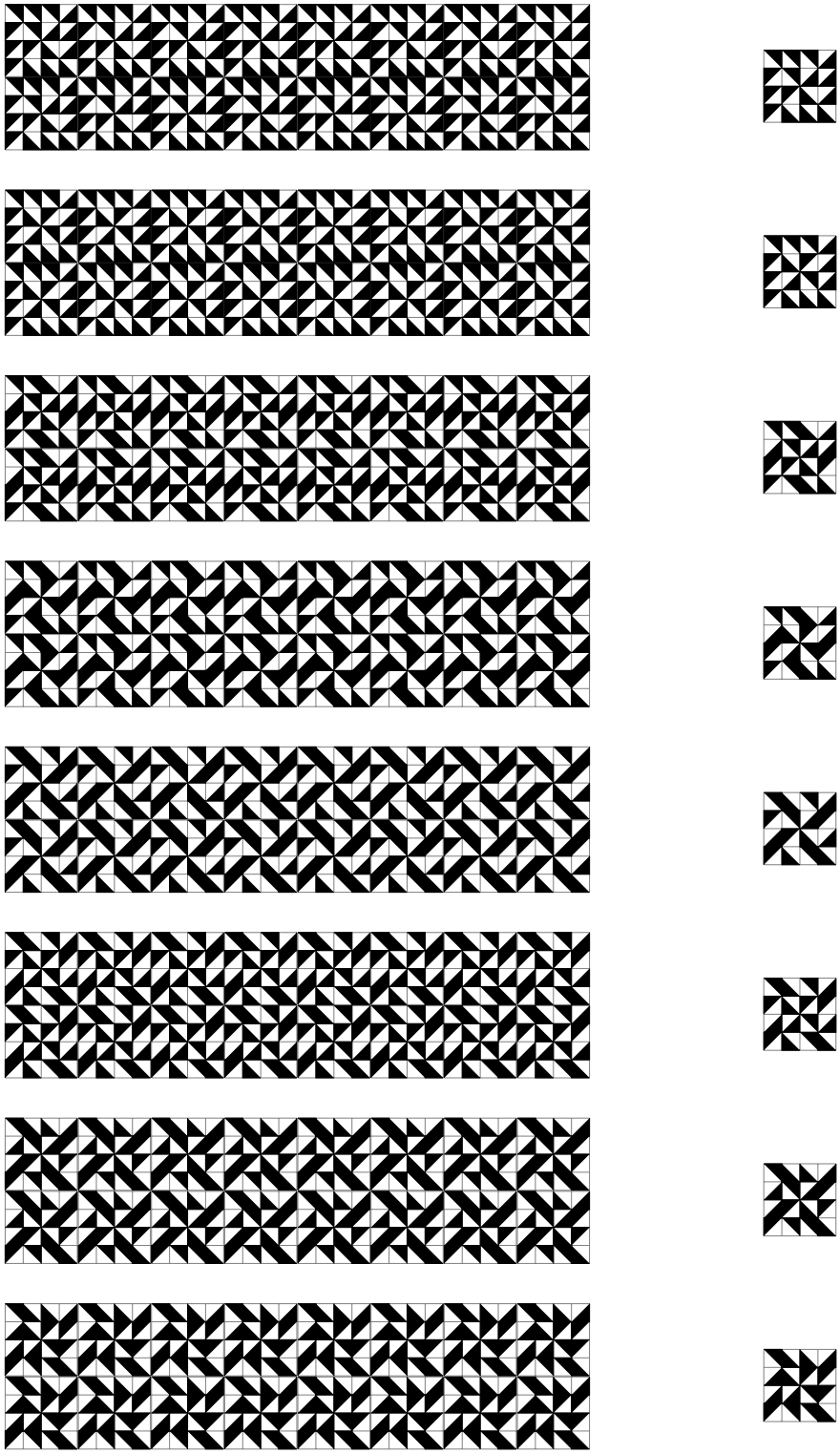
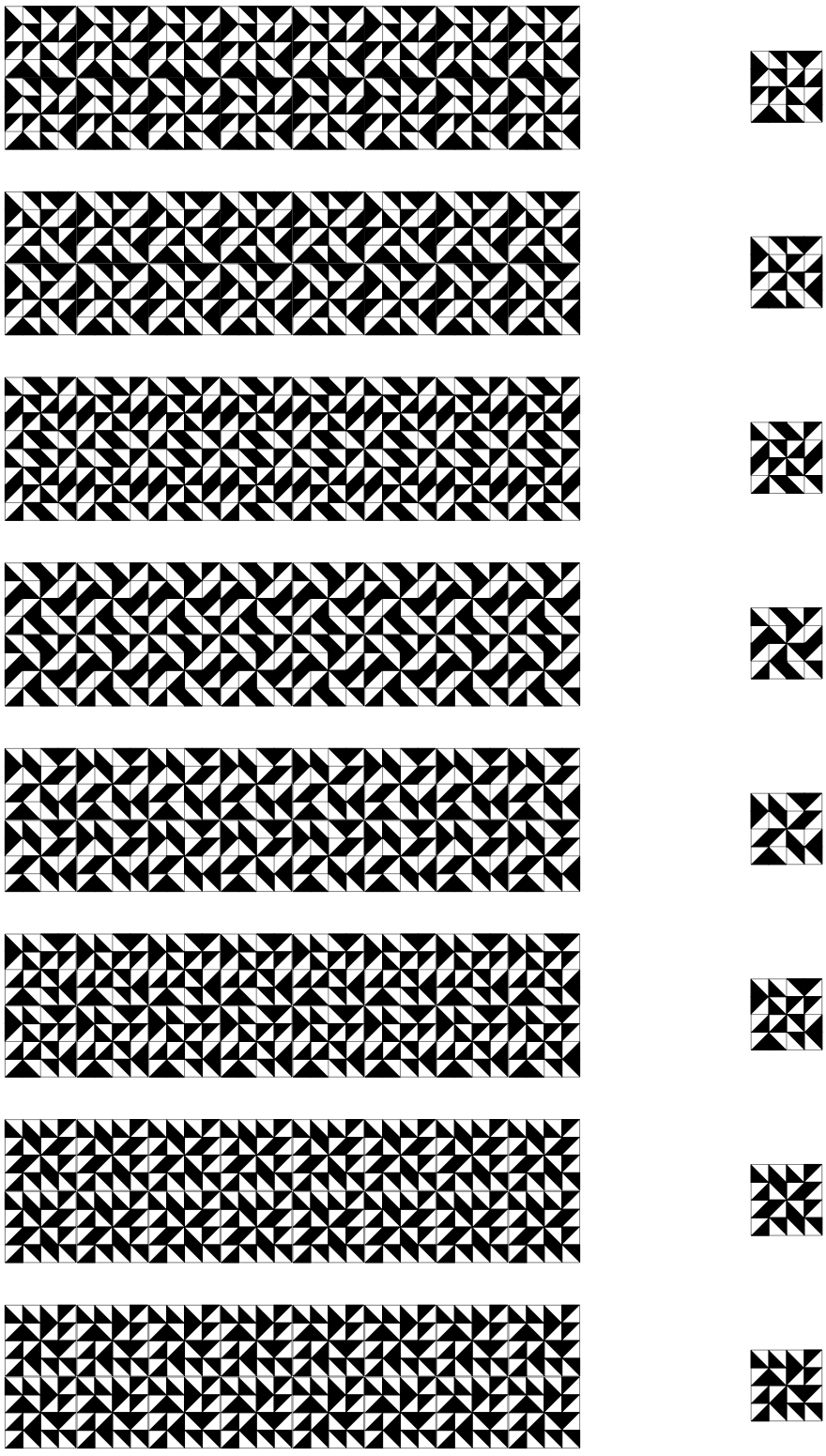
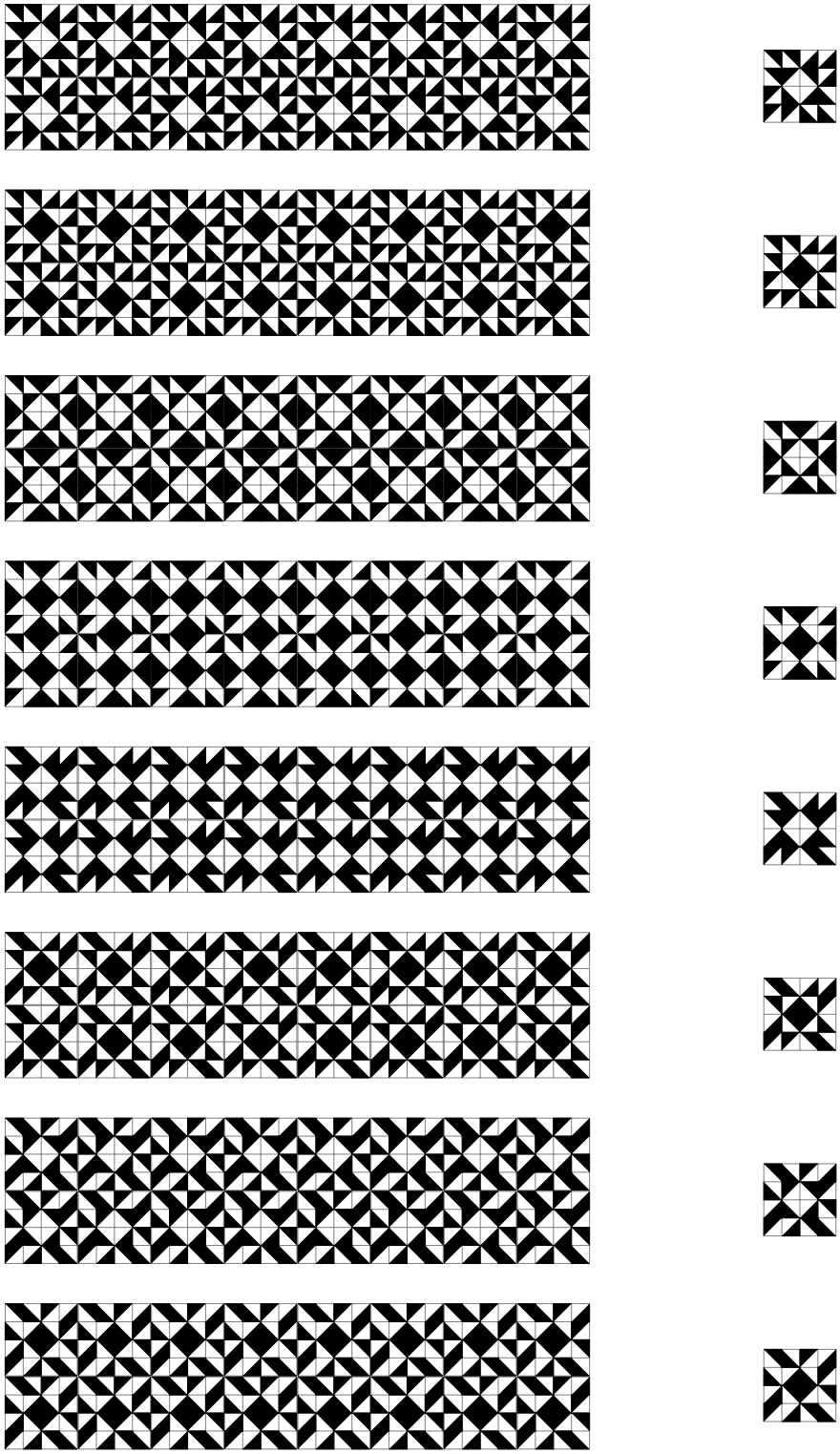
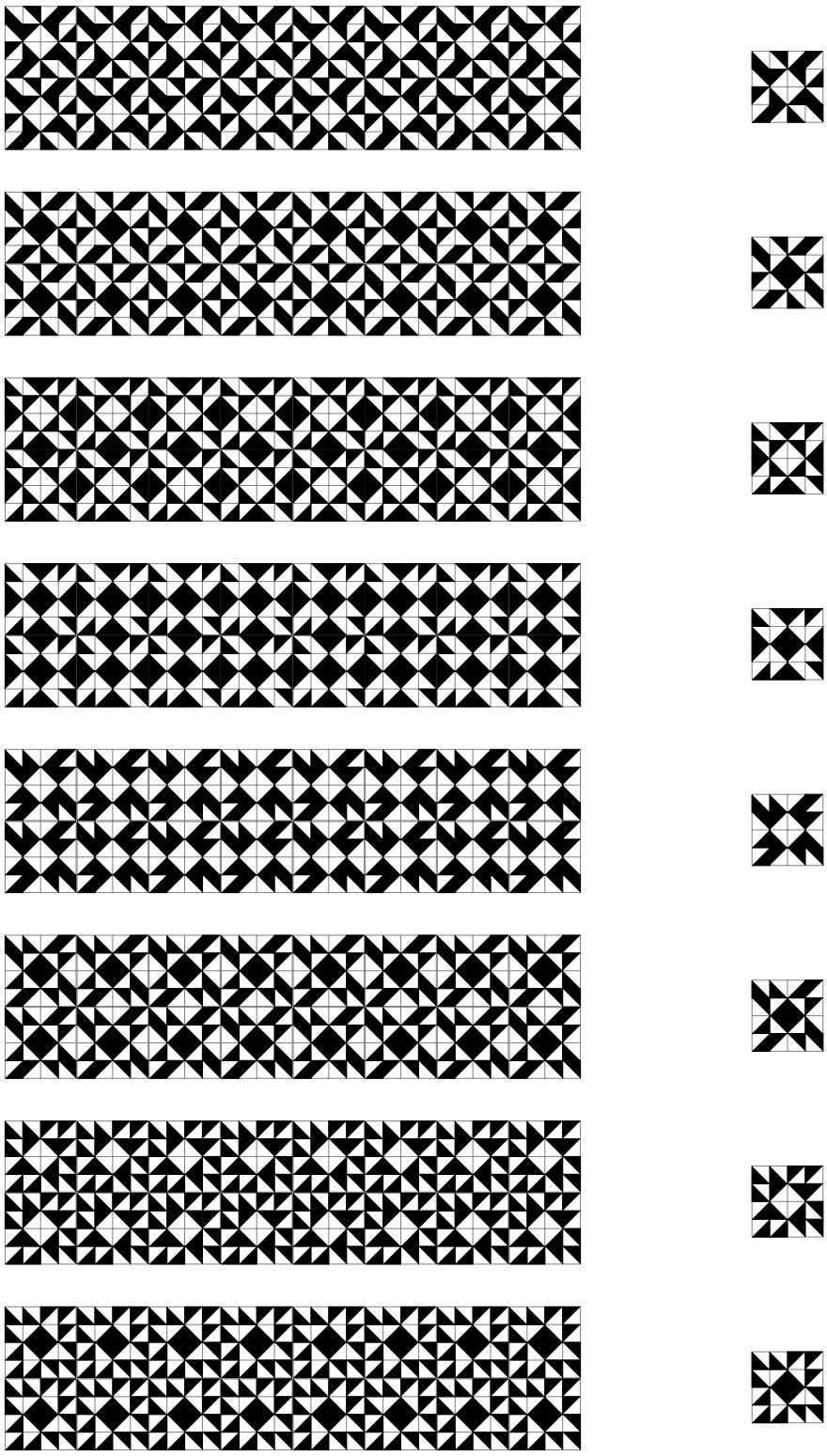


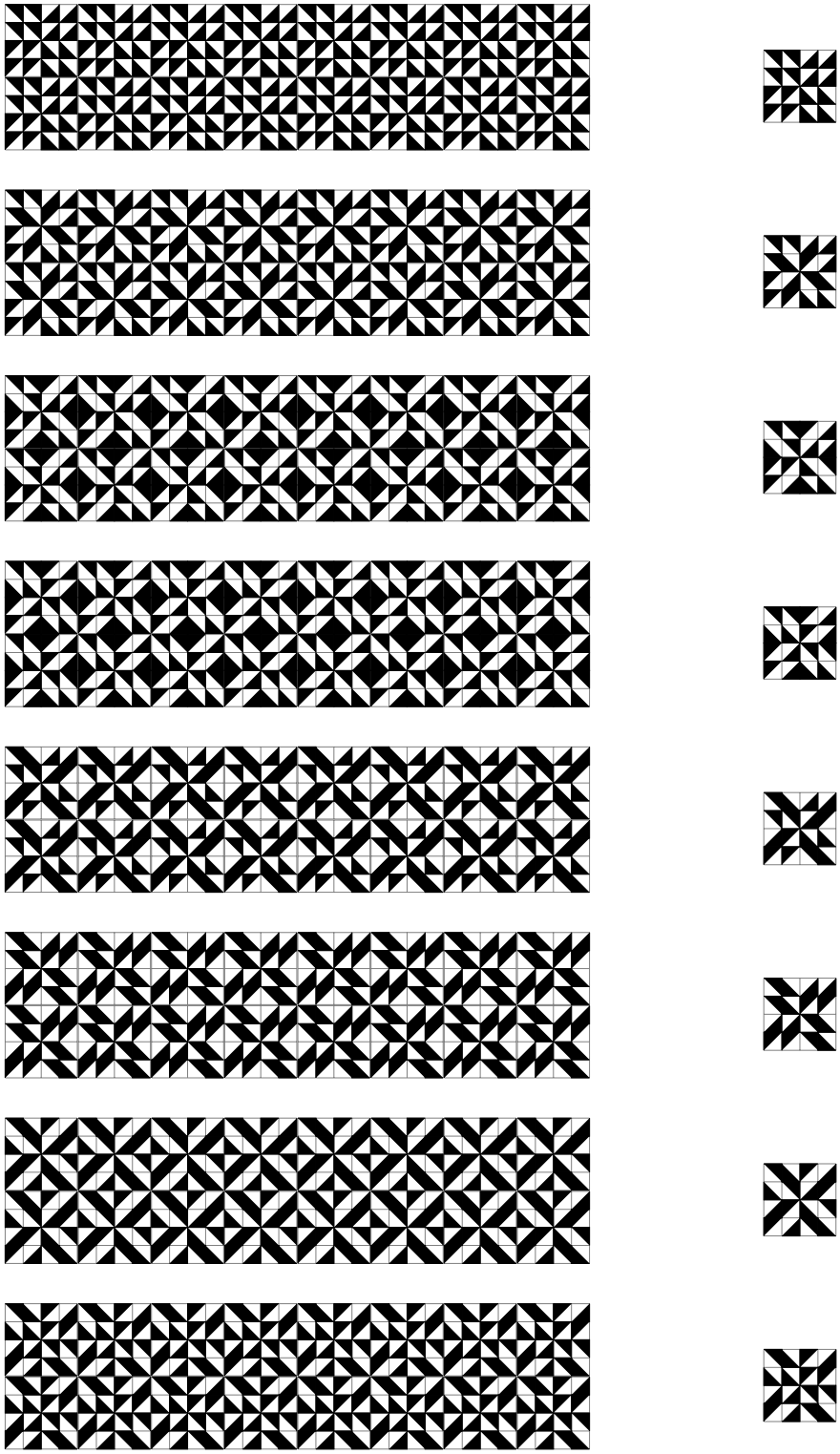


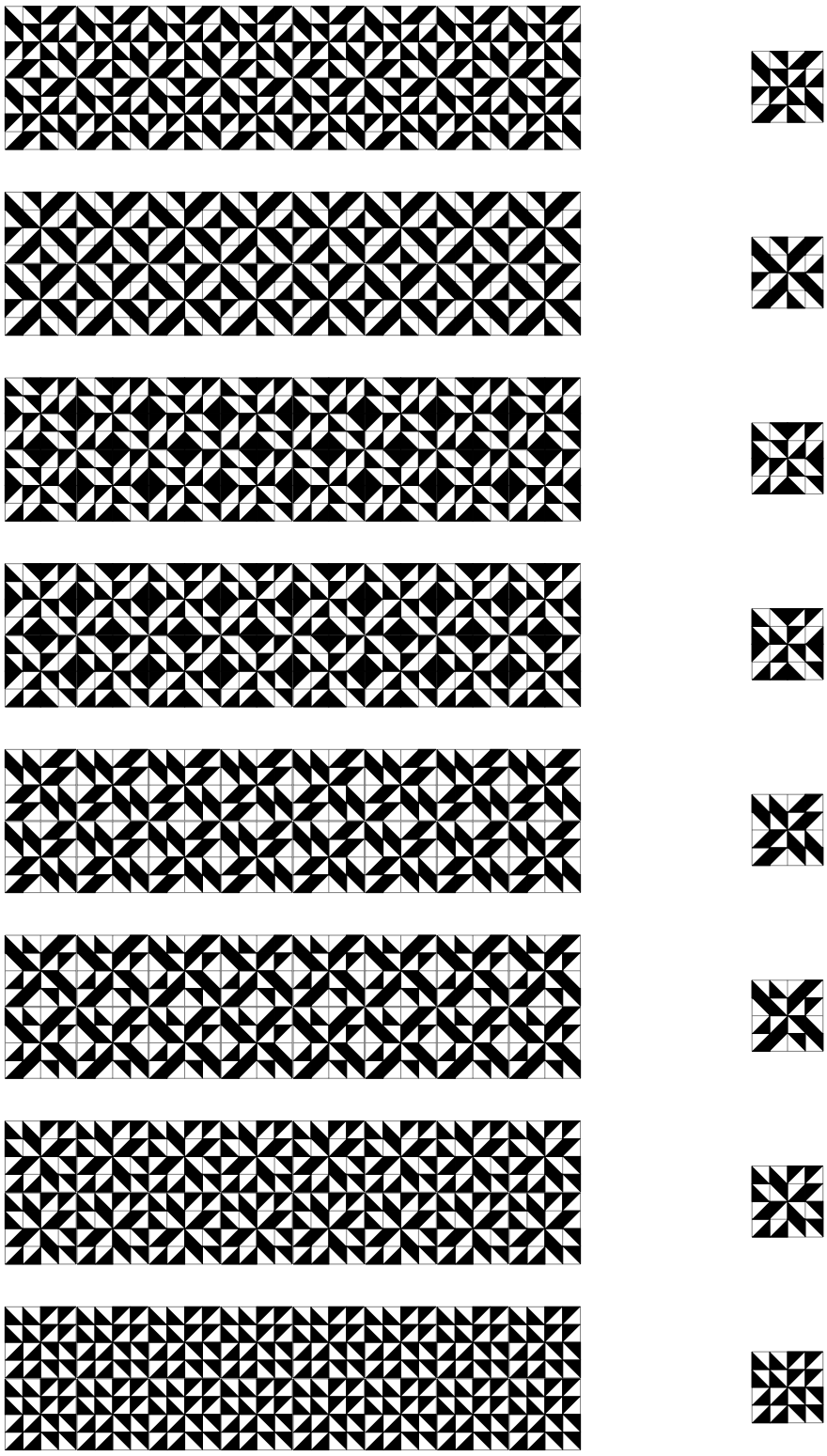
Frieze patterns for family 1110





Frieze patterns for family 1111





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