

BLOCK TIME

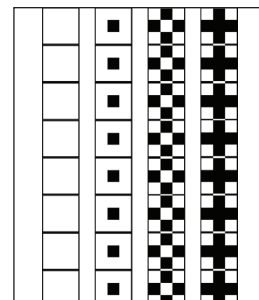
Game for Creating 4-Part Symmetric Patterns

by Rosalie Neilson

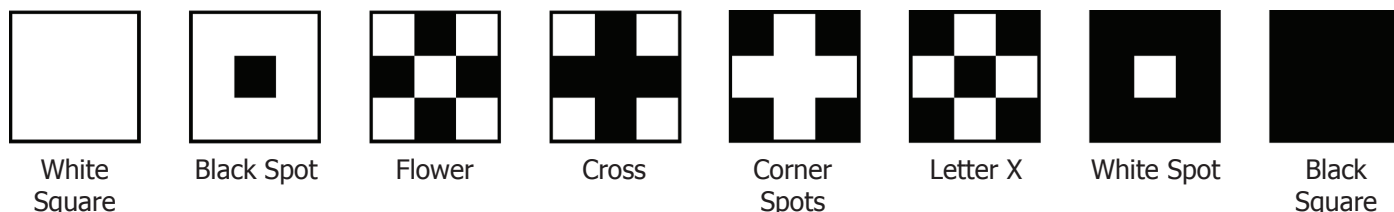
BLOCK TIME BOARD & MOTIF STRIPS

The Game consists of a Board and a series of Motif Strips. Cut the Motif Strips into individual tiles. Cut inside the border outlines for best fit on the Board. The Board has 25 squares, nine shaded squares labeled 1, 2, 3 and sixteen non-shaded squares labeled a, b, c. When a Board square has the same number or letter, place the same Motif tile into each square with that label.

3	c	b	c	3
∩	2	a	2	∩
∩	∩	1	∩	∩
∩	2	e	2	∩
3	∩	q	∩	3



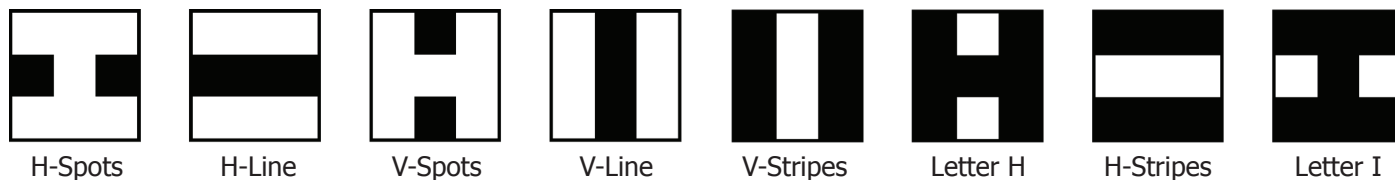
For shaded squares 1, 2, 3, use 4-part symmetric tiles. The eight choices for these shaded squares are shown below. The Board has four squares labeled 2, four squares labeled 3, and a single square labeled 1 at the center of the Board.



Eight 4-part Symmetric Motifs

Rotational symmetric motifs are mirror image on vertical, horizontal, and diagonal axes

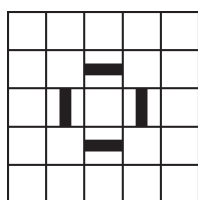
For the non-shaded squares labeled a, b, c, there are sixteen choices. Use any of the 4-part symmetric motifs shown above or any of the 2-part symmetric motifs shown below. There are four squares labeled a, four squares labeled b, and eight squares labeled c.



Eight 2-part symmetric motifs

Bilateral symmetric motifs are mirror image on vertical and horizontal axes

To maintain 4-part symmetry, rotate the 2-part symmetric tiles 90 degrees as shown by the orientation of a, b, c squares in the Game Board grid. If tiles are not rotated, the pattern will show 2-part symmetry.



4-part symmetry

Left example shows H-line in square "a" rotating 90 degrees to V-Line in the next square "a". Pattern has 4-part symmetry.



H-Spots rotate to V-Spots and vice versa



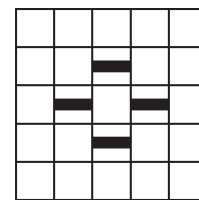
H-Line rotates to V-Line and vice versa



V-Stripes rotate to H-Stripes and vice versa



Letter H rotates to Letter I and vice versa



2-part symmetry

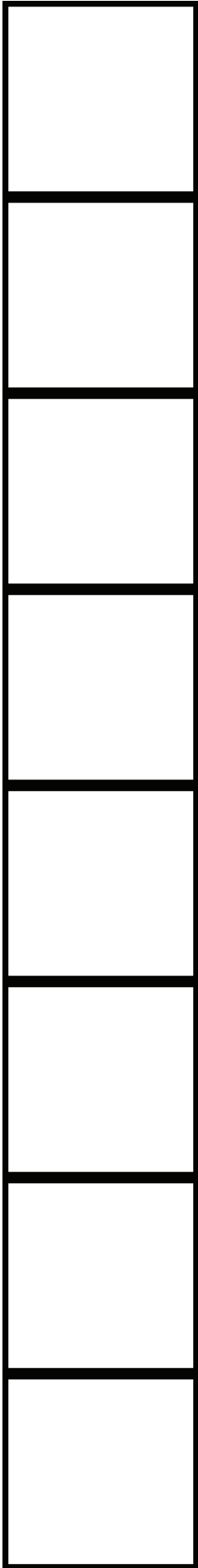
Right example shows H-line in both squares "a" with no rotation. Pattern has 2-part symmetry.

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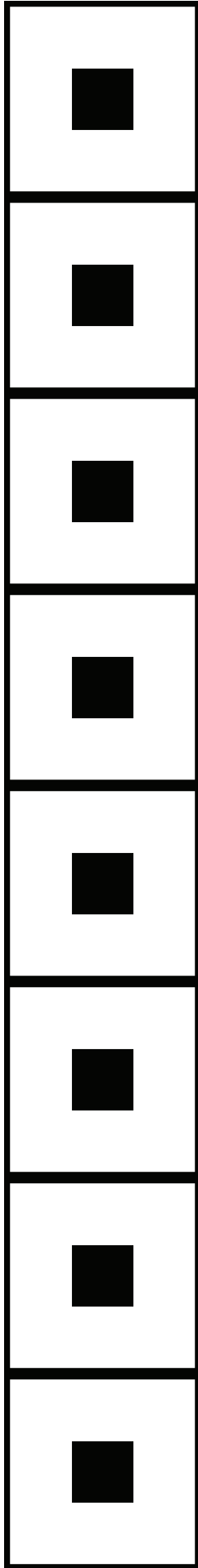
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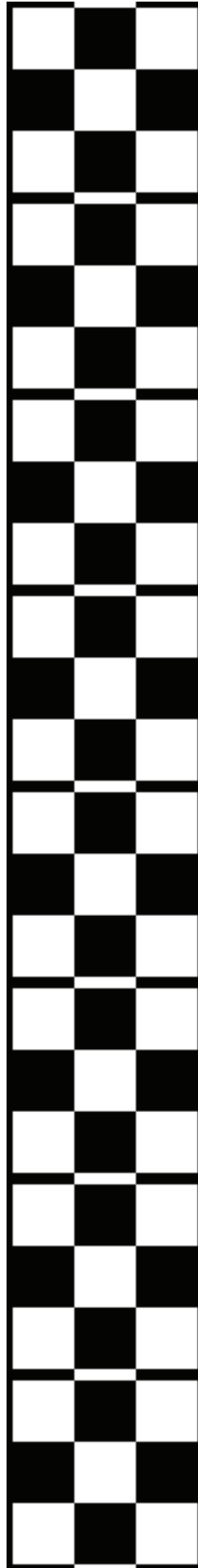
3	c	b	c	3
c	2	a	2	c
b	a	1	a	b
c	2	a	2	c
3	c	q	c	3



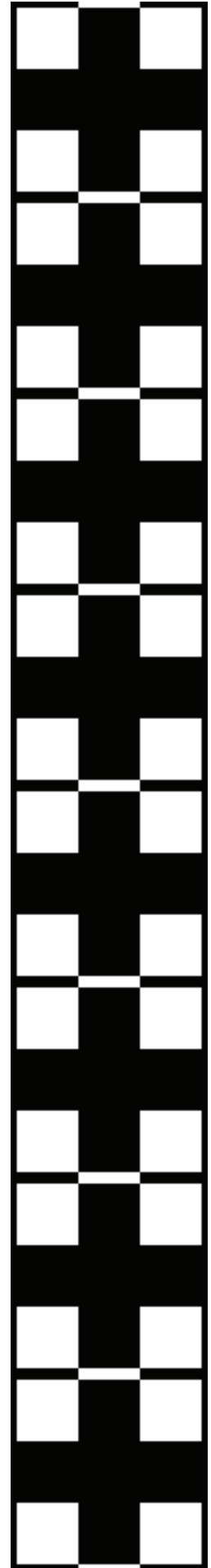
White Square



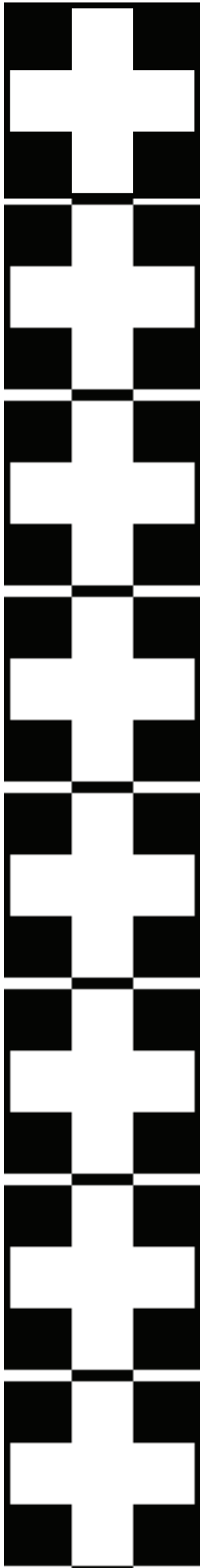
Black Spot



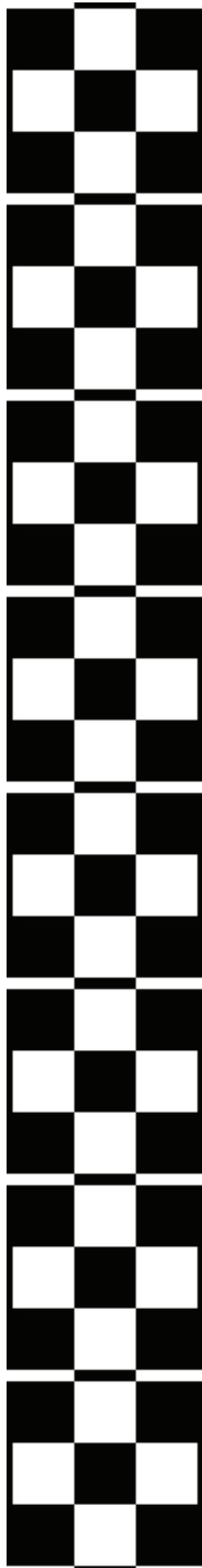
Flower



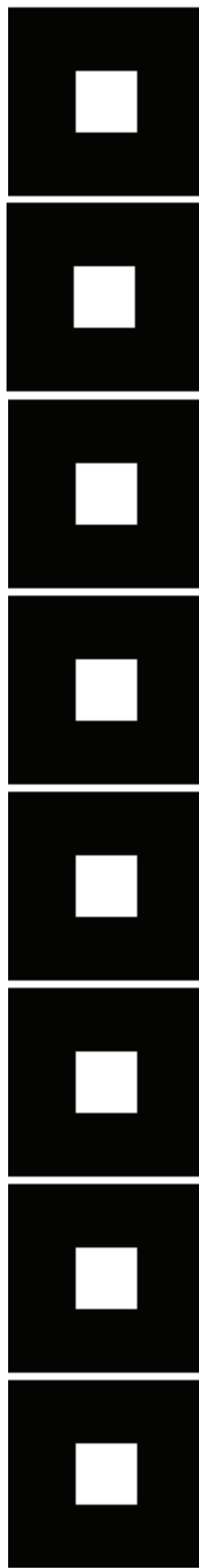
Cross



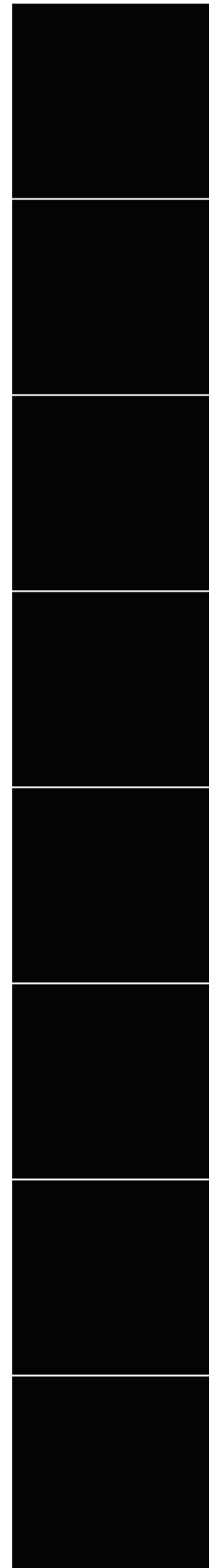
Corner Spots
BLOCK TIME



Letter X
www.rosalieneilson.com



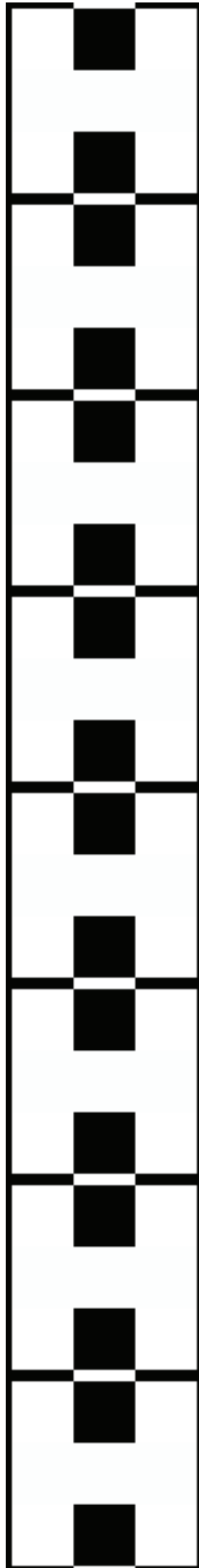
White Spot



Black Square
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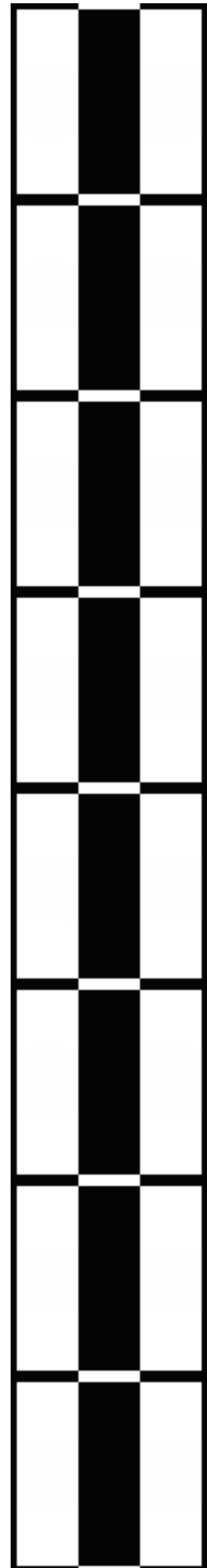
H-Spots



V-Spots



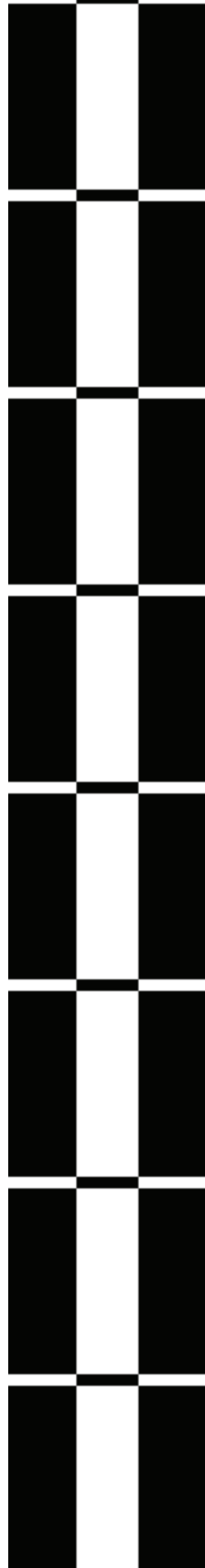
H-Line



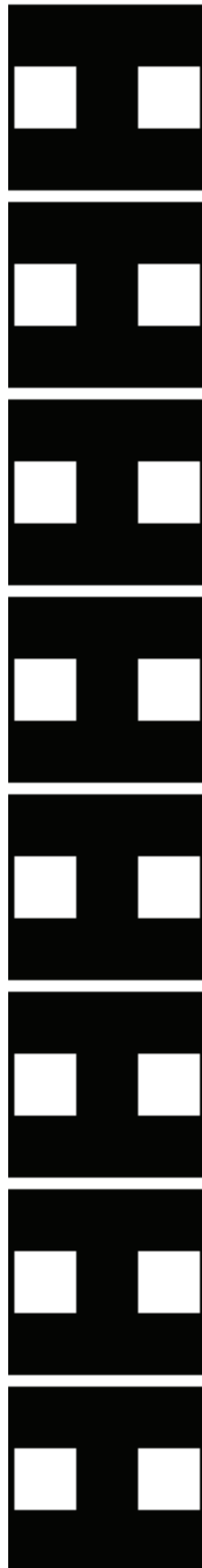
V-Line



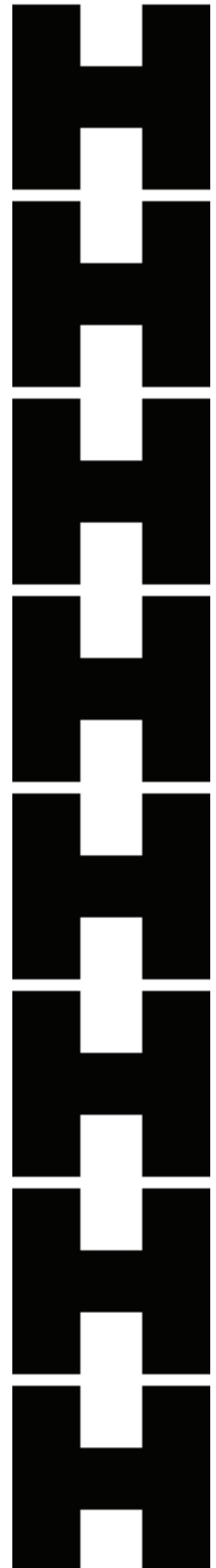
H-Stripes



V-Stripes



Letter I



Letter H

Step-by-Step Construction of 4-Part Symmetric Pattern

3	c	b	c	3
c	2	a	2	c
b	a	■	b	d
c	2	a	2	c
3	c	q	c	3

Step 1: Black Spot Motif placed in Square 1

3	c	b	c	3
c	+	a	+	c
b	a	■	b	d
c	+	a	+	c
3	c	q	c	3

Step 2: Cross Motif placed in Square 2

■	c	b	c	■
c	+	a	+	c
b	a	■	b	d
c	+	a	+	c
■	c	q	c	■

Step 3: Black Square placed in Square 3

■	c	b	c	■
c	+	□	+	c
b	□	■	□	d
c	+	□	+	c
■	c	q	c	■

Step 4: White Square placed in Square a

■	c	+	c	■
c	+	□	+	c
+	□	■	□	+
c	+	□	+	c
■	c	+	c	■

Step 5: Flower Motif placed in Square b

+	□	+	□	+
c	+	□	+	c
+	□	■	□	+
c	+	□	+	c
+	□	+	□	+

Step 6: H-Lines in Squares c of top & bottom rows rotate to V-Lines in Squares c of outside columns to maintain 4-part symmetry

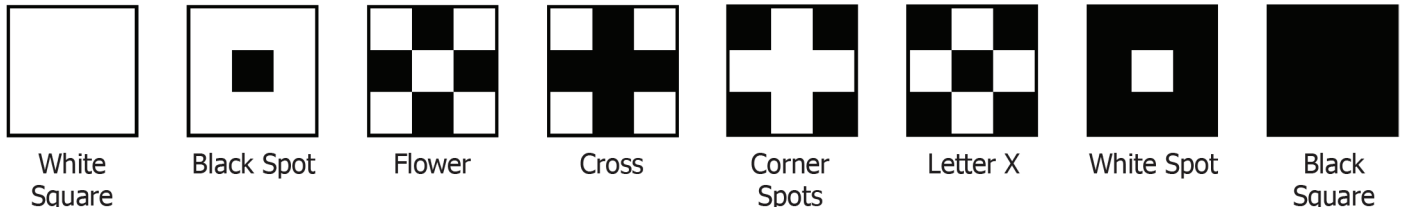
BLOCK TIME

A Study in 4-Part Symmetric Patterns

by Rosalie Neilson

EXERCISE ONE

Select 9 tiles of the same design. Use the motifs that have 4-part symmetry as shown below.



Place the tiles in the shaded squares labeled 1, 2, & 3. How many squares are labeled 1? How many squares are labeled 2? How many squares are labeled 3? Try this with a different set of 9 motifs. Does the pattern look like a letter from the alphabet? Compare your patterns with those on the next page. Which is your favorite?

EXERCISE TWO

For the next exercise, select 16 tiles of the same motif. Use the motifs that have 4-part symmetry as shown above. Place the tiles in all the squares that have an alphabetical label - a, b, and c. How many squares are labeled a? How many squares are labeled b? How many squares are labeled c? Which alphabetical letter has the most number of squares? What shapes are formed when you place tiles in squares a, b, c? Can you see squares, diamonds, and circles? Try this exercise with a different set of 16 motifs. Compare your patterns with those on the next page.

EXERCISE THREE

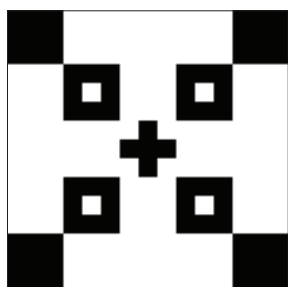
Use three motifs for the next exercise: the Cross, the Flower, and Black Square. Place them in a pattern on the shaded squares labeled 1, 2, and 3. You will need one motif for Square 1, four motifs for Squares 2, and four motifs for Squares 3. Can you change the pattern to a different one using the same three motifs?



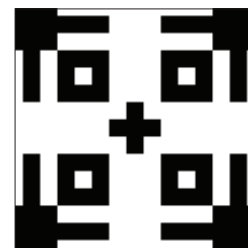
Guess how many different patterns you can make? Each time, put a different motif in Squares 1, 2, and 3. You should be able to make six different combinations with these three motifs. Compare your patterns with those on the next page. Try this exercise again with a different set of three motifs. You can photograph your patterns with a cell phone to compare results.

EXERCISE FOUR

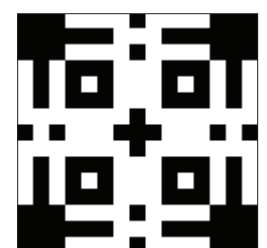
For this exercise, I used a pattern from Exercise Three.



Put horizontal line (H-Line) in the top and bottom rows of squares labeled c. When H-line is placed in the outside column squares labeled c, it rotates 90 degrees to a vertical line (V-Line) to maintain 4-part symmetry.



Pattern with added H- and V-Lines. Next, put V-spots in squares b. Rotate to H-spots.



Pattern with added Spots. Put a Black Spot in all squares labeled a. What will pattern look like?

EXERCISE FIVE

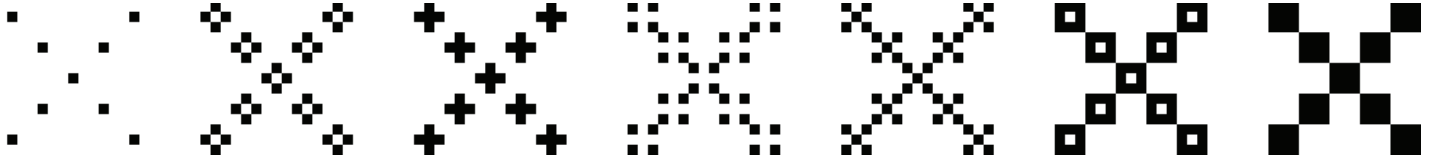
For this exercise, use the same pattern as the one above. Put horizontal lines (H-Line) in squares labeled c. DO NOT rotate to V-Line. Put V-Spots in all squares labeled b. DO NOT rotate to H-Spots. Put Black Spot in squares labeled a. What does pattern look like? This pattern has 2-part or mirror symmetry.

BLOCK TIME

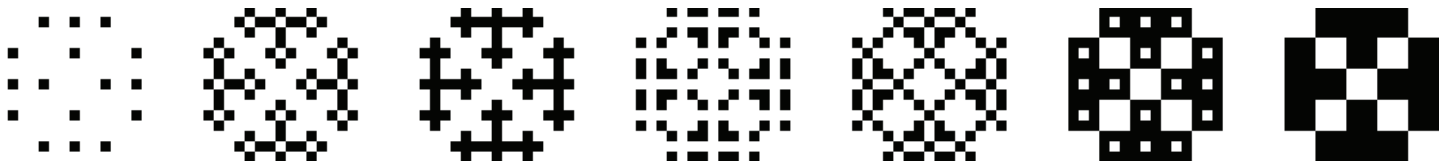
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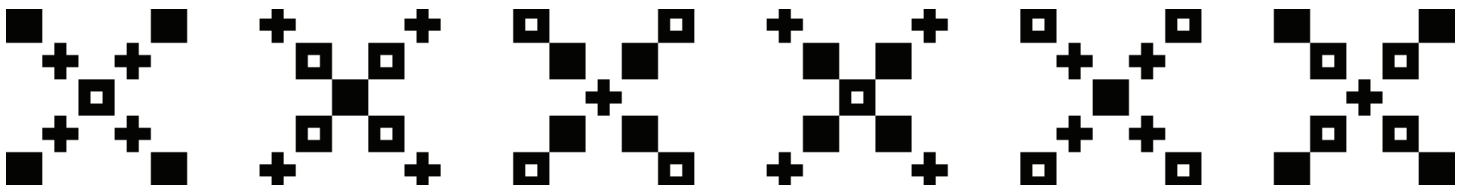
EXERCISE ONE PATTERNS



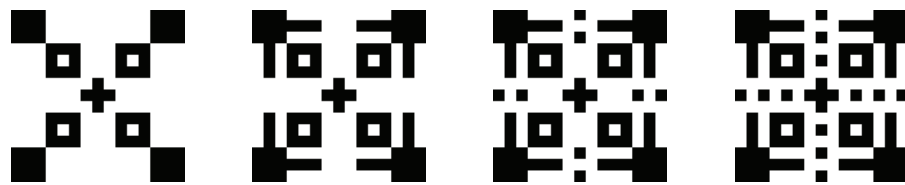
EXERCISE TWO PATTERNS



EXERCISE THREE PATTERNS



EXERCISE FOUR PATTERNS



EXERCISE FIVE PATTERN

