

Tables from *Crafting Novel Knotted Textiles with Mathematics* by Nithikul Nimkulrat

TABLE 1

The 560 probable combinations of three prototiles from the set of sixteen. Combinations marked with * create valid Wang tilings.

Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles
{0, 1, 2}	{0, 5, C}	{1, 2, A}	{1, 8, G}	{2, 5, B}	{3, 4, B}	{3, C, F}*}	{4, D, E}	{6, 8, G}	{8, 9, A}
{0, 1, 3}	{0, 5, D}	{1, 2, B}	{1, 8, A}	{2, 5, C}	{3, 4, C}	{3, D, E}	{4, D, F}	{6, 8, A}	{8, 9, B}
{0, 1, 4}*	{0, 5, E}	{1, 2, C}	{1, 8, B}	{2, 5, D}	{3, 4, D}*}	{3, D, F}	{4, E, F}	{6, 8, B}	{8, 9, C}
{0, 1, 5}	{0, 5, F}	{1, 2, D}	{1, 8, C}	{2, 5, E}	{3, 4, E}	{3, E, F}	{5, 6, 7}	{6, 8, C}	{8, 9, D}
{0, 1, 6}	{0, 6, 7}	{1, 2, E}	{1, 8, D}	{2, 5, F}	{3, 4, F}	{4, 5, 6}	{5, 6, 8}	{6, 8, D}	{8, 9, E}
{0, 1, 7}	{0, 6, 8}	{1, 2, F}	{1, 8, E}	{2, 6, 7}	{3, 5, 6}	{4, 5, 7}	{5, 6, 9}*}	{6, 8, E}	{8, 9, F}
{0, 1, 8}	{0, 6, 9}	{1, 3, 4}	{1, 8, F}	{2, 6, 8}	{3, 5, 7}	{4, 5, 8}	{5, 6, A}	{6, 8, F}	{8, A, B}
{0, 1, 9}	{0, 6, A}	{1, 3, 5}	{1, 9, A}	{2, 6, 9}	{3, 5, 8}	{4, 5, 9}	{5, 6, B}	{6, 9, A}*}	{8, A, C}
{0, 1, A}	{0, 6, B}	{1, 3, 6}	{1, 9, B}	{2, 6, A}	{3, 5, 9}	{4, 5, A}	{5, 6, C}	{6, 9, B}	{8, A, D}
{0, 1, B}	{0, 6, C}	{1, 3, 7}	{1, 9, C}	{2, 6, B}	{3, 5, A}	{4, 5, B}	{5, 6, D}	{6, 9, C}	{8, A, E}
{0, 1, C}	{0, 6, D}	{1, 3, 8}	{1, 9, D}	{2, 6, C}	{3, 5, B}	{4, 5, C}	{5, 6, E}	{6, 9, D}	{8, A, F}
{0, 1, D}	{0, 6, E}	{1, 3, 9}	{1, 9, E}	{2, 6, D}	{3, 5, C}	{4, 5, D}	{5, 6, F}	{6, 9, E}	{8, B, C}
{0, 1, E}	{0, 6, F}	{1, 3, A}	{1, 9, E}	{2, 6, E}	{3, 5, D}	{4, 5, E}	{5, 7, 8}	{6, 9, F}	{8, B, D}
{0, 1, F}	{0, 7, 8}	{1, 3, B}	{1, A, B}	{2, 6, F}	{3, 5, E}	{4, 5, F}	{5, 7, 9}	{6, A, B}	{8, B, E}
{0, 2, 3}	{0, 7, 9}	{1, 3, C}	{1, A, C}	{2, 7, 8}	{3, 5, F}	{4, 6, 7}	{5, 7, A}	{6, A, C}	{8, B, F}
{0, 2, 4}	{0, 7, A}	{1, 3, D}	{1, A, D}	{2, 7, 9}	{3, 6, 7}	{4, 6, 8}	{5, 7, B}	{6, A, D}	{8, C, D}
{0, 2, 5}	{0, 7, B}	{1, 3, E}	{1, A, E}	{2, 7, A}	{3, 6, 8}	{4, 6, 9}	{5, 7, C}	{6, A, E}	{8, C, E}
{0, 2, 6}	{0, 7, C}	{1, 3, F}	{1, A, F}	{2, 7, B}	{3, 6, 9}	{4, 6, A}	{5, 7, D}*}	{6, A, F}	{8, C, F}
{0, 2, 7}	{0, 7, D}	{1, 4, 5}*}	{1, B, C}	{2, 7, C}	{3, 6, A}	{4, 6, B}	{5, 7, E}	{6, B, C}	{8, D, E}
{0, 2, 8}*}	{0, 7, E}	{1, 4, 6}	{1, B, D}	{2, 7, D}	{3, 6, B}	{4, 6, C}	{5, 7, F}	{6, B, D}*}	{8, D, F}
{0, 2, 9}	{0, 7, F}	{1, 4, 7}	{1, B, E}	{2, 7, E}	{3, 6, C}	{4, 6, D}	{5, 8, 9}	{6, B, E}	{8, E, F}
{0, 2, A}	{0, 8, 9}	{1, 4, 8}	{1, B, F}	{2, 7, F}	{3, 6, D}	{4, 6, E}	{5, 8, A}	{6, B, F}	{9, A, B}
{0, 2, B}	{0, 8, A}	{1, 4, 9}	{1, C, D}	{2, 8, G}	{3, 6, E}	{4, 6, F}	{5, 8, B}	{6, C, D}	{9, A, C}
{0, 2, C}	{0, 8, B}	{1, 4, A}	{1, C, E}	{2, 8, A}*}	{3, 6, F}	{4, 7, 8}	{5, 8, C}	{6, C, E}	{9, A, D}
{0, 2, D}	{0, 8, C}	{1, 4, B}	{1, C, F}	{2, 8, B}	{3, 7, 8}	{4, 7, 9}	{5, 8, D}	{6, C, F}	{9, A, E}
{0, 2, E}	{0, 8, D}	{1, 4, C}	{1, D, E}	{2, 8, C}	{3, 7, 9}	{4, 7, A}	{5, 8, E}	{6, D, E}	{9, A, F}
{0, 2, F}	{0, 8, E}	{1, 4, D}	{1, D, F}	{2, 8, D}	{3, 7, A}	{4, 7, B}	{5, 8, F}	{6, D, F}	{9, B, C}
{0, 3, 4}	{0, 8, F}	{1, 4, E}	{1, E, F}	{2, 8, E}	{3, 7, B}	{4, 7, C}	{5, 9, A}	{6, E, F}	{9, B, D}

TABLE 1 (CONTINUED)

The 560 probable combinations of three prototiles from the set of sixteen. Combinations marked with * create valid Wang tilings.

Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles	Prototiles
{0, 3, 5}	{0, 9, A}	{1, 4, F}	{2, 3, 4}	{2, 8, F}	{3, 7, C}	{4, 7, D}	{5, 9, B}	{7, 8, 9}	{9, B, E}
{0, 3, 6}	{0, 9, B}	{1, 5, 6}*}	{2, 3, 5}	{2, 9, A}	{3, 7, D}	{4, 7, E}	{5, 9, C}	{7, 8, A}	{9, B, F}
{0, 3, 7}	{0, 9, C}	{1, 5, 7}	{2, 3, 6}	{2, 9, B}	{3, 7, E}	{4, 7, F}	{5, 9, D}	{7, 8, B}	{9, C, D}
{0, 3, 8}	{0, 9, D}	{1, 5, 8}	{2, 3, 7}	{2, 9, C}	{3, 7, F}	{4, 8, G}	{5, 9, E}	{7, 8, C}	{9, C, E}
{0, 3, 9}	{0, 9, E}	{1, 5, 9}	{2, 3, 8}	{2, 9, D}	{3, 8, G}	{4, 8, A}	{5, 9, F}	{7, 8, D}	{9, C, F}
{0, 3, A}	{0, 9, F}	{1, 5, A}	{2, 3, 9}	{2, 9, E}	{3, 8, A}	{4, 8, B}	{5, A, B}	{7, 8, E}	{9, D, E}
{0, 3, B}	{0, A, B}	{1, 5, B}	{2, 3, A}	{2, 9, F}	{3, 8, B}	{4, 8, C}	{5, A, C}	{7, 8, F}	{9, D, F}
{0, 3, c}*}	{0, A, C}	{1, 5, C}	{2, 3, B}	{2, A, B}	{3, 8, C}	{4, 8, D}	{5, A, D}	{7, 9, A}	{9, E, F}
{0, 3, D}	{0, A, D}	{1, 5, D}	{2, 3, C}	{2, A, C}	{3, 8, D}	{4, 8, E}	{5, A, E}	{7, 9, B}	{A, B, C}
{0, 3, E}	{0, A, E}	{1, 5, E}	{2, 3, D}	{2, A, D}	{3, 8, E}*}	{4, 8, F}	{5, A, F}	{7, 9, C}	{A, B, D}
{0, 3, F}	{0, A, F}	{1, 5, F}	{2, 3, E}	{2, A, E}	{3, 8, F}	{4, 9, A}	{5, B, C}	{7, 9, D}	{A, B, E}*}
{0, 4, 5}	{0, B, C}	{1, 6, 7}	{2, 3, F}	{2, A, F}	{3, 9, A}	{4, 9, B}	{5, B, D}	{7, 9, E}*}	{A, B, F}
{0, 4, 6}	{0, B, D}	{1, 6, 8}*}	{2, 4, 5}	{2, B, C}*}	{3, 9, B}	{4, 9, C}	{5, B, E}	{7, 9, F}	{A, C, D}
{0, 4, 7}	{0, B, E}	{1, 6, 9}	{2, 4, 6}	{2, B, D}	{3, 9, C}	{4, 9, D}	{5, B, F}	{7, A, B}	{A, C, E}
{0, 4, 8}	{0, B, F}	{1, 6, A}	{2, 4, 7}	{2, B, E}	{3, 9, D}	{4, 9, E}	{5, C, D}	{7, A, C}	{A, C, F}
{0, 4, 9}	{0, C, D}	{1, 6, B}	{2, 4, 8}	{2, B, F}	{3, 9, E}	{4, 9, F}	{5, C, E}	{7, A, D}	{A, D, E}
{0, 4, A}	{0, C, E}	{1, 6, C}	{2, 4, 9}*}	{2, C, D}	{3, 9, F}	{4, A, B}	{5, C, F}	{7, A, E}	{A, D, F}
{0, 4, B}	{0, C, F}	{1, 6, D}	{2, 4, A}	{2, C, E}	{3, A, B}	{4, A, C}	{5, D, E}	{7, A, F}	{A, E, F}
{0, 4, C}	{0, D, E}	{1, 6, E}	{2, 4, B}	{2, C, F}	{3, A, C}	{4, A, D}	{5, D, F}	{7, B, C}	{B, C, D}
{0, 4, D}	{0, D, F}	{1, 6, F}	{2, 4, C}	{2, D, E}	{3, A, D}	{4, A, E}	{5, E, F}	{7, B, D}	{B, C, E}
{0, 4, E}	{0, E, F}	{1, 7, 8}	{2, 4, D}	{2, D, F}	{3, A, E}	{4, A, F}	{6, 7, 8}	{7, B, E}	{B, C, F}
{0, 4, F}	{1, 2, 3}	{1, 7, 9}	{2, 4, E}	{2, E, F}	{3, A, F}	{4, B, C}	{6, 7, 9}	{7, B, F}	{B, D, E}
{0, 5, 6}	{1, 2, 4}	{1, 7, A}	{2, 4, F}	{3, 4, 5}	{3, B, C}	{4, B, D}	{6, 7, A}	{7, C, D}	{B, D, F}
{0, 5, 7}	{1, 2, 5}	{1, 7, B}	{2, 5, 6}	{3, 4, 6}	{3, B, D}	{4, B, E}	{6, 7, B}	{7, C, E}	{B, E, F}*}
{0, 5, 8}	{1, 2, 6}	{1, 7, c}*}	{2, 5, 7}	{3, 4, 7}	{3, B, E}	{4, B, F}	{6, 7, C}	{7, C, F}	{C, D, E}
{0, 5, 9}	{1, 2, 7}	{1, 7, D}	{2, 5, 8}	{3, 4, 8}	{3, B, F}	{4, C, D}	{6, 7, D}	{7, D, E}	{C, D, F}
{0, 5, A}	{1, 2, 8}	{1, 7, E}	{2, 5, 9}	{3, 4, 9}	{3, C, D}	{4, C, E}	{6, 7, E}	{7, D, F}*}	{C, E, F}
{0, 5, B}	{1, 2, 9}	{1, 7, F}	{2, 5, A}	{3, 4, A}	{3, C, E}	{4, C, F}	{6, 7, F}	{7, E, F}	{D, E, F}

TABLE 2

Diagrams and photographs showing twenty knotted patterns created by tiling three different prototypes. Drawings and photography by the author.

Tiling Notation	Knotted Paper String								
Pattern 3.1: {0, 1, 4}	Pattern 3.1: {0, 1, 4}	Pattern 3.3: {0, 2, 8}	Pattern 3.3: {0, 2, 8}	Pattern 3.5: {0, 3, c}	Pattern 3.5: {0, 3, c}	Pattern 3.7: {1, 4, 5}	Pattern 3.7: {1, 4, 5}	Pattern 3.9: {1, 6, 8}	Pattern 3.9: {1, 6, 8}
Pattern 3.2: {f, e, b}	Pattern 3.2: {f, e, b}	Pattern 3.4: {f, d, 7}	Pattern 3.4: {f, d, 7}	Pattern 3.6: {f, c, 3}	Pattern 3.6: {f, c, 3}	Pattern 3.8: {e, b, a}	Pattern 3.8: {e, b, a}	Pattern 3.10: {e, 9, 7}	Pattern 3.10: {e, 9, 7}
Pattern 3.11: {1, 7, c}	Pattern 3.11: {1, 7, c}	Pattern 3.13: {2, 4, 9}	Pattern 3.13: {2, 4, 9}	Pattern 3.15: {2, 8, a}	Pattern 3.15: {2, 8, a}	Pattern 3.17: {2, b, c}	Pattern 3.17: {2, b, c}	Pattern 3.19: {5, 6, 9}	Pattern 3.19: {5, 6, 9}
Pattern 3.12: {e, 8, 3}	Pattern 3.12: {e, 8, 3}	Pattern 3.14: {d, b, 6}	Pattern 3.14: {d, b, 6}	Pattern 3.16: {d, 7, 5}	Pattern 3.16: {d, 7, 5}	Pattern 3.18: {d, 4, 3}	Pattern 3.18: {d, 4, 3}	Pattern 3.20: {a, 9, 6}	Pattern 3.20: {a, 9, 6}

TABLE 3

Diagrams and photographs showing forty-eight knotted patterns created by tiling four different prototiles. Drawings and photography by the author.

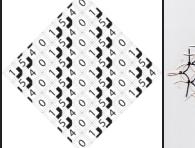
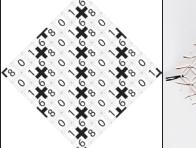
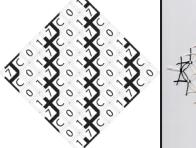
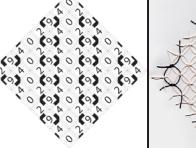
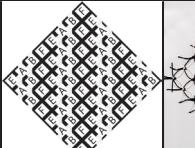
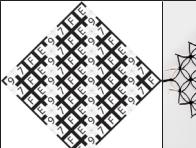
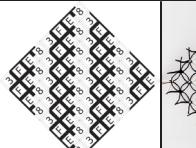
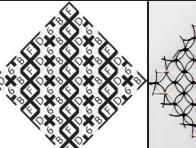
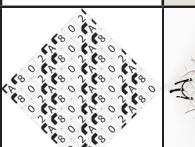
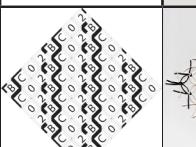
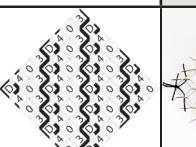
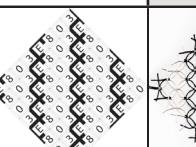
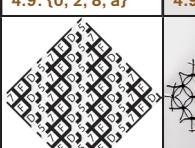
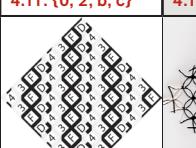
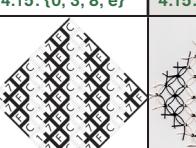
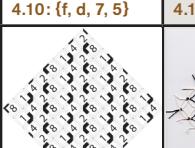
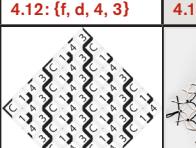
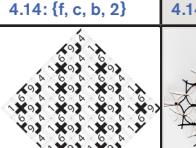
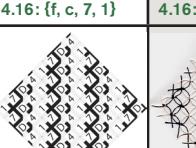
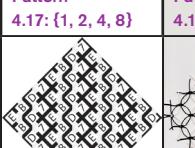
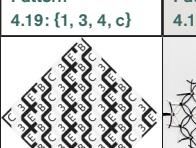
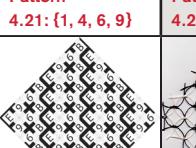
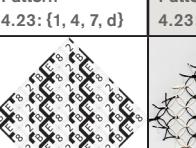
Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String
							
Pattern 4.1: {0, 1, 4, 5}	Pattern 4.1: {0, 1, 4, 5}	Pattern 4.3: {0, 1, 6, 8}	Pattern 4.3: {0, 1, 6, 8}	Pattern 4.5: {0, 1, 7, c}	Pattern 4.5: {0, 1, 7, c}	Pattern 4.7: {0, 2, 4, 9}	Pattern 4.7: {0, 2, 4, 9}
							
Pattern 4.2: {f, e, b, a}	Pattern 4.2: {f, e, b, a}	Pattern 4.4: {f, e, 9, 7}	Pattern 4.4: {f, e, 9, 7}	Pattern 4.6: {f, e, 8, 3}	Pattern 4.6: {f, e, 8, 3}	Pattern 4.8: {f, d, b, 6}	Pattern 4.8: {f, d, b, 6}
							
Pattern 4.9: {0, 2, 8, a}	Pattern 4.9: {0, 2, 8, a}	Pattern 4.11: {0, 2, b, c}	Pattern 4.11: {0, 2, b, c}	Pattern 4.13: {0, 3, 4, d}	Pattern 4.13: {0, 3, 4, d}	Pattern 4.15: {0, 3, 8, e}	Pattern 4.15: {0, 3, 8, e}
							
Pattern 4.10: {f, d, 7, 5}	Pattern 4.10: {f, d, 7, 5}	Pattern 4.12: {f, d, 4, 3}	Pattern 4.12: {f, d, 4, 3}	Pattern 4.14: {f, c, b, 2}	Pattern 4.14: {f, c, b, 2}	Pattern 4.16: {f, c, 7, 1}	Pattern 4.16: {f, c, 7, 1}
							
Pattern 4.17: {1, 2, 4, 8}	Pattern 4.17: {1, 2, 4, 8}	Pattern 4.19: {1, 3, 4, c}	Pattern 4.19: {1, 3, 4, c}	Pattern 4.21: {1, 4, 6, 9}	Pattern 4.21: {1, 4, 6, 9}	Pattern 4.23: {1, 4, 7, d}	Pattern 4.23: {1, 4, 7, d}
							
Pattern 4.18: {e, d, b, 7}	Pattern 4.18: {e, d, b, 7}	Pattern 4.20: {e, c, b, 3}	Pattern 4.20: {e, c, b, 3}	Pattern 4.22: {e, b, 9, 6}	Pattern 4.22: {e, b, 9, 6}	Pattern 4.24: {e, b, 8, 2}	Pattern 4.24: {e, b, 8, 2}

TABLE 3 (CONTINUED)

Diagrams and photographs showing forty-eight knotted patterns created by tiling four different prototiles. Drawings and photography by the author.

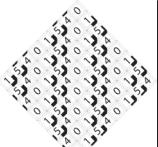
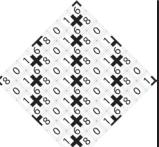
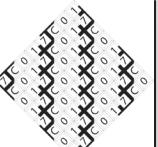
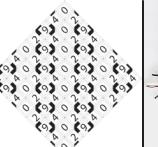
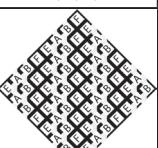
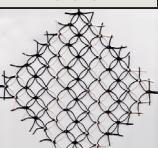
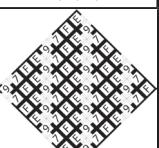
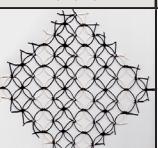
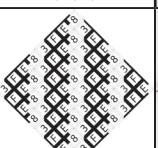
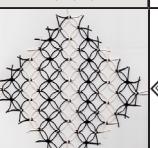
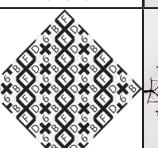
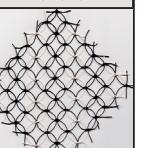
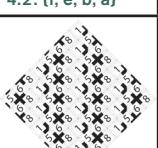
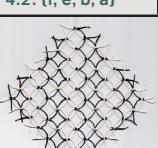
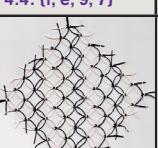
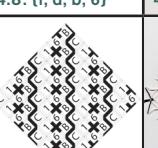
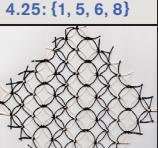
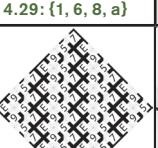
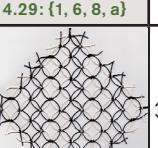
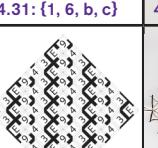
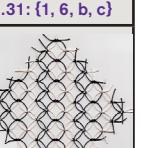
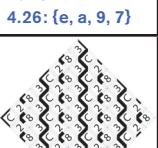
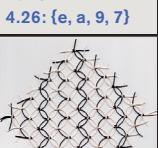
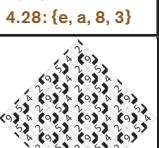
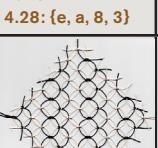
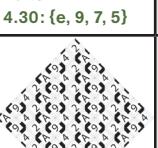
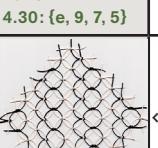
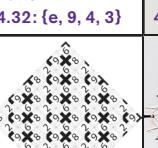
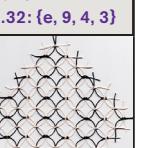
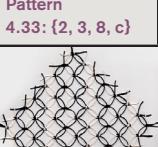
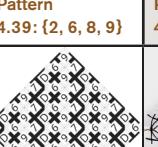
Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String
							
Pattern 4.1: {0, 1, 4, 5}	Pattern 4.1: {0, 1, 4, 5}	Pattern 4.3: {0, 1, 6, 8}	Pattern 4.3: {0, 1, 6, 8}	Pattern 4.5: {0, 1, 7, c}	Pattern 4.5: {0, 1, 7, c}	Pattern 4.7: {0, 2, 4, 9}	Pattern 4.7: {0, 2, 4, 9}
							
Pattern 4.2: {f, e, b, a}	Pattern 4.2: {f, e, b, a}	Pattern 4.4: {f, e, 9, 7}	Pattern 4.4: {f, e, 9, 7}	Pattern 4.6: {f, e, 8, 3}	Pattern 4.6: {f, e, 8, 3}	Pattern 4.8: {f, d, b, 6}	Pattern 4.8: {f, d, b, 6}
							
Pattern 4.25: {1, 5, 6, 8}	Pattern 4.25: {1, 5, 6, 8}	Pattern 4.27: {1, 5, 7, c}	Pattern 4.27: {1, 5, 7, c}	Pattern 4.29: {1, 6, 8, a}	Pattern 4.29: {1, 6, 8, a}	Pattern 4.31: {1, 6, b, c}	Pattern 4.31: {1, 6, b, c}
							
Pattern 4.26: {e, a, 9, 7}	Pattern 4.26: {e, a, 9, 7}	Pattern 4.28: {e, a, 8, 3}	Pattern 4.28: {e, a, 8, 3}	Pattern 4.30: {e, 9, 7, 5}	Pattern 4.30: {e, 9, 7, 5}	Pattern 4.32: {e, 9, 4, 3}	Pattern 4.32: {e, 9, 4, 3}
							
Pattern 4.33: {2, 3, 8, c}	Pattern 4.33: {2, 3, 8, c}	Pattern 4.35: {2, 4, 5, 9}	Pattern 4.35: {2, 4, 5, 9}	Pattern 4.37: {2, 4, 9, a}	Pattern 4.37: {2, 4, 9, a}	Pattern 4.39: {2, 6, 8, 9}	Pattern 4.39: {2, 6, 8, 9}
							
Pattern 4.34: {d, c, 7, 3}	Pattern 4.34: {d, c, 7, 3}	Pattern 4.36: {d, b, a, 6}	Pattern 4.36: {d, b, a, 6}	Pattern 4.38: {d, b, 6, 5}	Pattern 4.38: {d, b, 6, 5}	Pattern 4.40: {d, 9, 7, 6}	Pattern 4.40: {d, 9, 7, 6}

TABLE 4

Diagrams and photographs showing four knotted patterns created by combining three different prototiles into non-Wang tilings. Drawings and photography by the author.

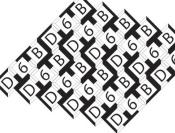
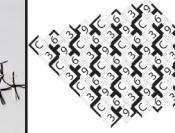
Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String
			
Pattern 3.21: {2, 4, 9}	Pattern 3.21: {2, 4, 9}	Pattern 3.23: {2, 4, 9}	Pattern 3.23: {2, 4, 9}
			
Pattern 3.22: {D, B, 6}	Pattern 3.22: {D, B, 6}	Pattern 3.24: {D, B, 6}	Pattern 3.24: {D, B, 6}

TABLE 5

Diagrams and photographs showing three knotted patterns created by combining four different prototiles into non-Wang tilings. Drawings and photography by the author.

Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String	Tiling Notation	Knotted Paper String
					
Pattern 4.49: {1, 2, 4, 8}	Pattern 4.49: {1, 2, 4, 8}	Pattern 4.50: {E, D, B, 7}	Pattern 4.50: {E, D, B, 7}	Pattern 4.51: {3, 6, 9, C}	Pattern 4.51: {3, 6, 9, C}