

## 第七章 快速精準製圖-結構複製法

在 147 種豐富的對稱結構圖樣中，我們利用設計基本單元之概念，利用設計基本單元的概念，進行拼貼來建構 147 種雙瓦片的等面鋪磚圖樣；在本章節中我們將介紹三種結構複製法(Structural Cloning Method, SCM)的製圖方法，來快速準確的掌握大量物件。

### 7-1 拼貼法

MathPS 軟體中自訂磁力點(Add Magneticism)功能，來增加物件周邊之吸引力，利用基本單元拼貼一部份後，再將所有基本單元群組後縮小並再行拼貼，既快速而又方便。如圖 7-1 所示：

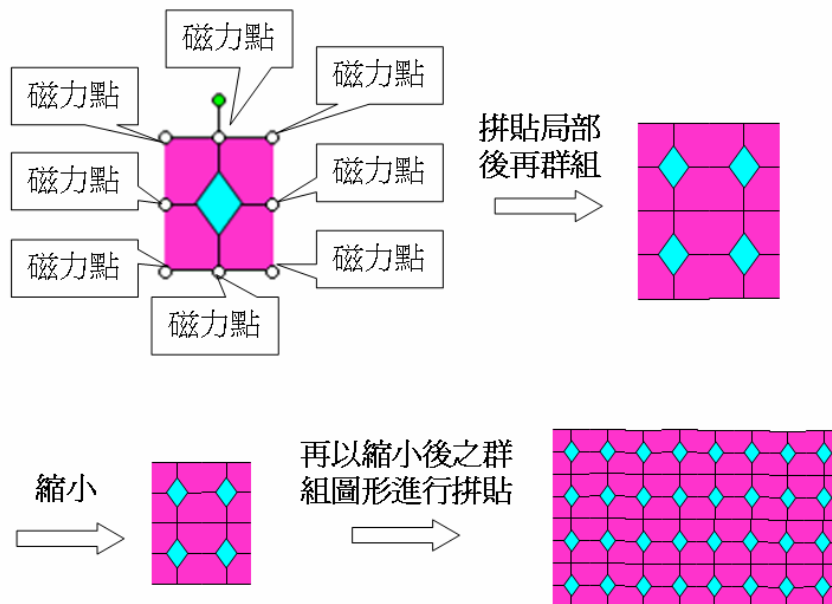
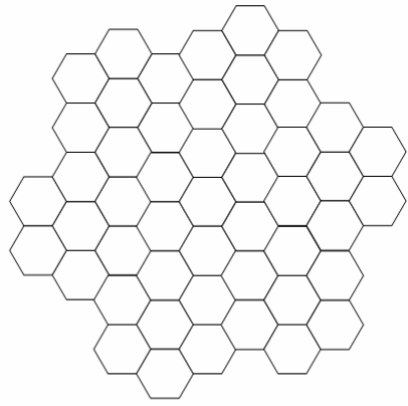


圖 7-1 拼貼法介紹

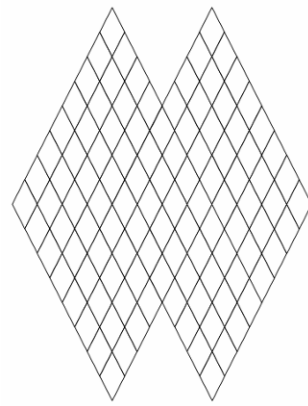
### 7-2 定框複製法(Frame-Based)

連續圖案往往具有大量物件需處理，因此我們必須套用巨型網狀結構來作處理，而 MathPS 中的定框複製法(Frame-Based)更提供了我們簡單操作，準確定位卻又能處理大量物件的特性。圖 7-2(a)、(b)、(c)、(d)為各種對稱結構所對應的巨型網狀結構。



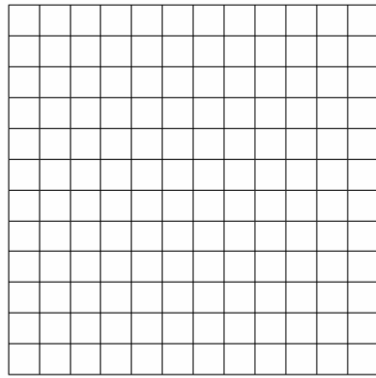
(a) 正六邊形網狀結構

(套用於 p3,p3m1,p31m,p6,p6m 此五種結構)



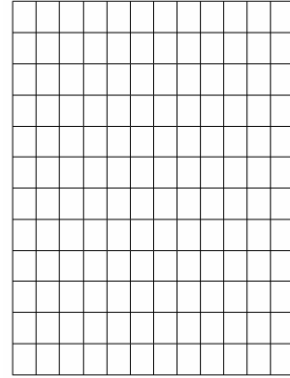
(b) 菱形網狀結構

(套用於 cmm 此對稱結構)



(c) 正方形網狀結構

(套用於 p4,p4g,p4m 此五種結構)



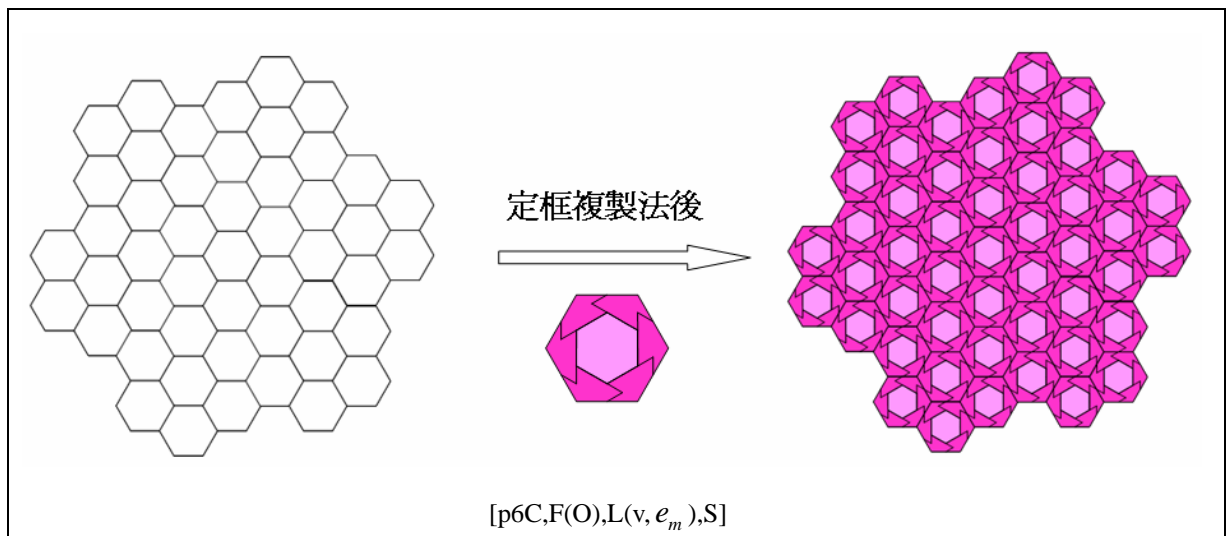
(d) 矩形網狀結構

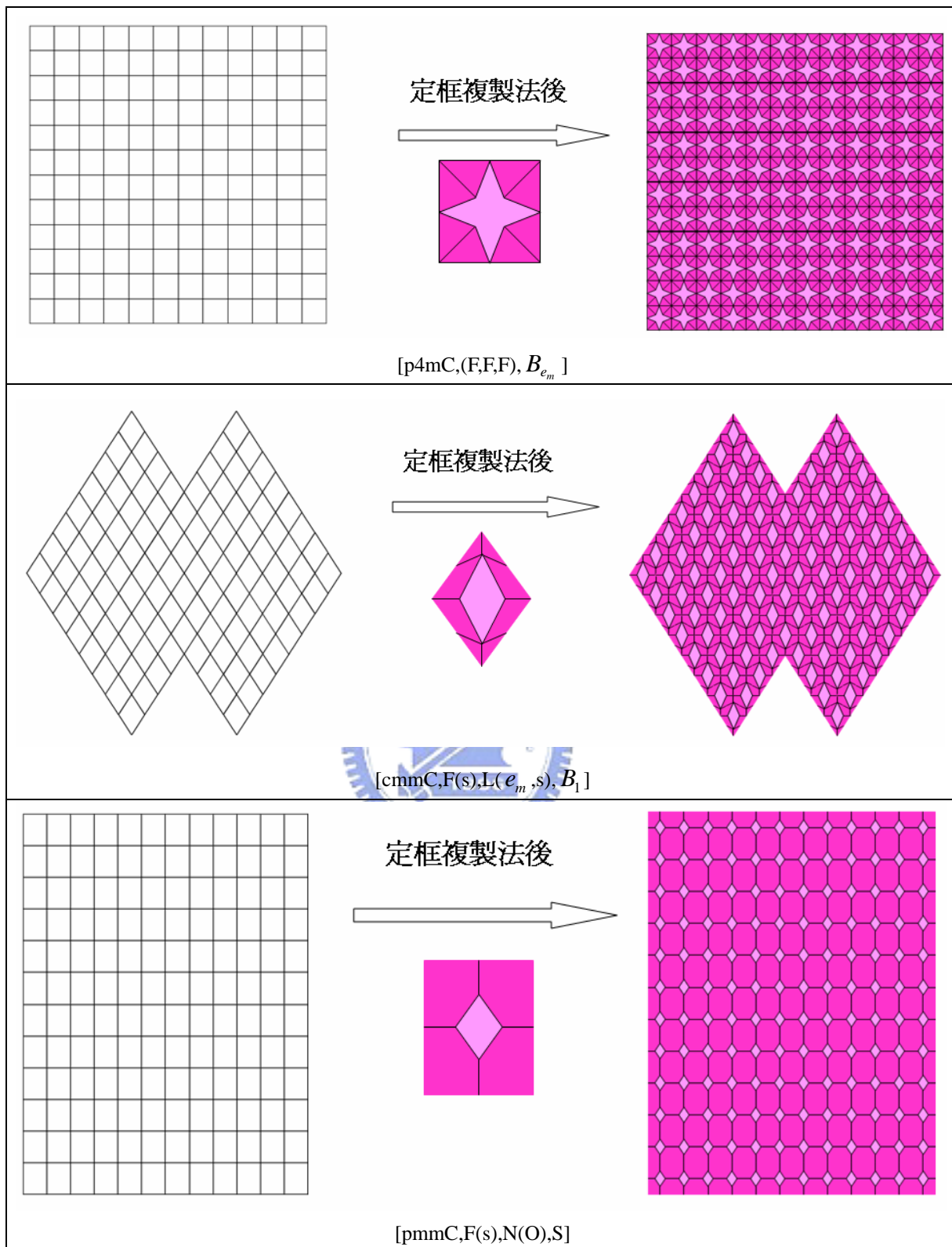
(套用於 pmm 此對稱結構)

圖 7-2 各種巨型網狀結構

以下範例為各設計的基本單元套用巨型網狀結構後之結果對照表，如表 7-1 所示：

表 7-1 各巨型網狀結構套用基本型作定框複製法後之結果對照





由於定框複製法必需考量到基本單元外框之形狀，若基本單元中有物件超出基本單元外框，則可能會造成定框複製後圖形變形扭曲。因此，我們在下節中介紹另一種方法來彌補這缺點。

### 7-3 定線複製法(Line-Based)

有些連續圖案形狀較為複雜，其基本單元中有物件超出其基本單元外框，爲了彌補定框複製法之不足，並能夠精準掌握處理大量物件定位，我們可以利用定線複製法的特性來處理[16]。其製作圖形步驟如下：

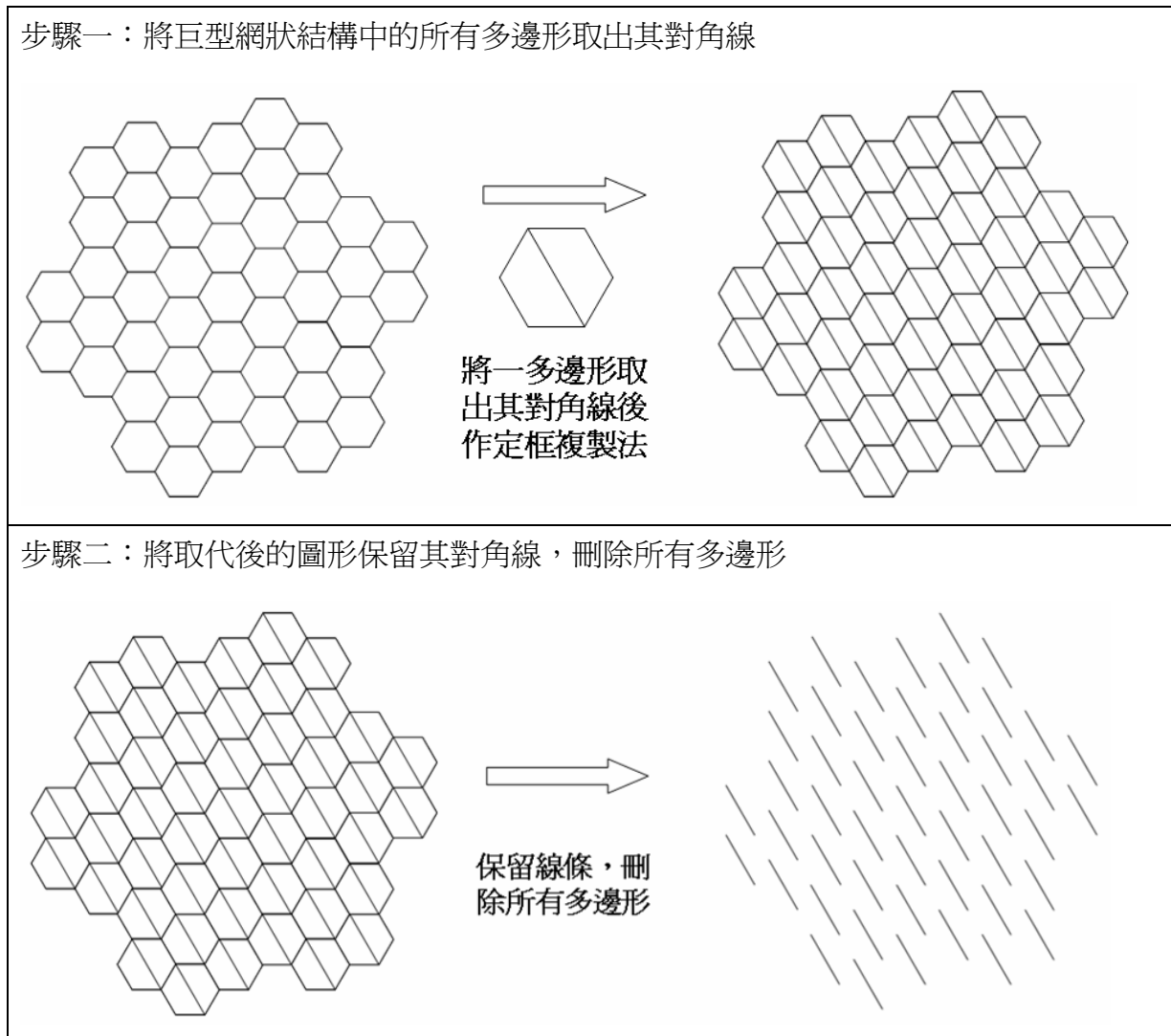
步驟一：將巨型網狀結構中的所有多邊形取出其對角線

步驟二：將取代後的圖形保留其對角線，刪除所有多邊形

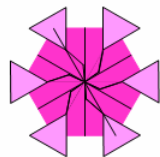
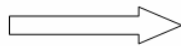
步驟三：以對角線爲基準線，將基本單元複製到網狀結構

詳細的流程圖表如表 7-2 所示：

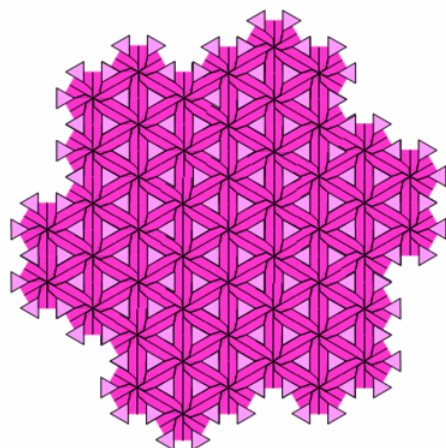
表 7-2 定線複製法做結構式自我複製的流程步驟



步驟三：以對角線為基準線，將基本單元複製到網狀結構後，即得到我們要的圖形



以對角線為基準線，將  
圖形複製到網狀結構





## 第八章 結論與未來展望

在本章節中，將對我們的研究結果做一個客觀的評估及比較，最後則是給日後的研究提出建議。

### 8-1 結論與討論

首先，我們先對雙瓦片的等面鋪磚圖樣建構方法做一比較，再針對研究結果做分析與評估，其分別陳述如後：

#### 一、圖樣建構方法比較

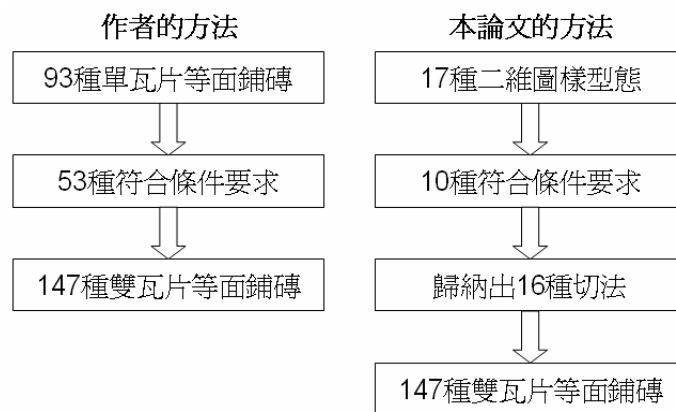


圖 8-1 圖樣建構方法比較

如圖 8-1 所示，在雙瓦片的等面鋪磚圖樣中，作者建構圖樣的過程乃是直接利用前人所研究的 93 種單瓦片的等面鋪磚結構，透過對正規瓦片的限制，因而從 93 種規格中選出其中 53 種符合條件者，在特定的位置覆蓋上正規瓦片而得到這 147 種規格圖樣，也由於建構方法取材圖樣種類數量繁多，加深了其複雜度。

本研究的建構方法則是基於所有二維平面圖形結構皆來自十七種二維圖樣型態，透過正規瓦片的限制，從十七種二維圖樣型態歸納出十種，由結構解析分析正規瓦片可能出現的位置及結構，用此一概念，歸納出共十六種切法，方法大同小異，再從這十六種切法考量對稱軸(或外圍結構)的虛實、線條如何連接，再對正規瓦片作擴展，以設計基本單元的想法來建構兩種瓦片的新概念，創造出這 147 種雙瓦片的等面鋪磚圖樣，比作者建構圖樣的方法創新簡化了許多。

## 二、繪圖程序方法所能克服的問題

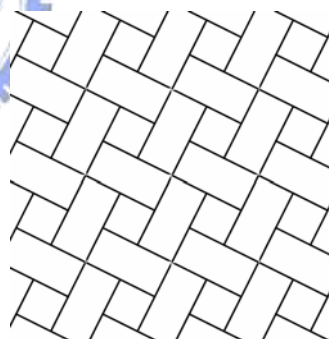
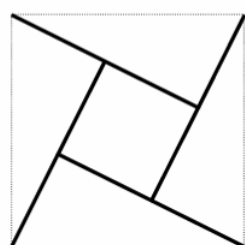
在繪圖程序方法中的每個位置的先後順序即代表我們的分析步驟與思考邏輯，每一組繪圖程序方法都代表著一個基本單元，可完全的表達出其結構為何，線條如何連接，正規瓦片是否擴展，充分的解決了符號與圖樣之間的關係，構圖步驟即分析方法，化思考邏輯為操作程序。

## 三、簡單的技術操作，精確而快速的製圖

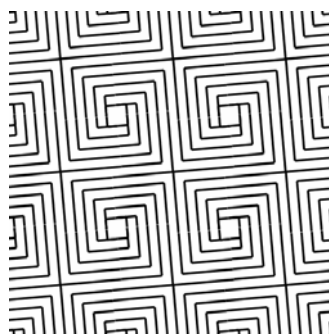
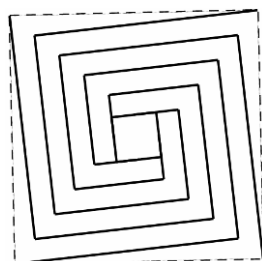
由於我們建構圖樣的方法是以設計基本單元的新概念，利用數學簡報系統(MathPS)所提供的構圖環境，配合構圖方法-結構複製法，即可精確而又快速的製圖，方法簡單，操作容易。

## 四、結構簡化，創意無限

在每一組繪圖程序方法中，其所代表的正是構成每一類圖樣其最小的基本單元的原始結構，在結構中的部分線條(除對稱軸外)，皆可以對線條作變化；也因此結構明顯的簡化了，學習者更可進一步發揮創意，依照我們的理論方法創作出更多富有創意的圖樣。(圖 8-2 為繪圖程序方法[p4C,N(O),L(v,v),S]此基本單元變形前後之圖樣比較)



(a) 變形前的基本單元及其密鋪圖樣



(b) 變形後基本單元及其密鋪圖樣

圖 8-2 [p4C,N(O),L(v,v),S]此基本單元變化前後之圖樣



然而，在這 147 種雙瓦片的等面鋪磚建構過程中，我們由所歸納出的 16 種切法，從線條所有的可能連接方式作窮舉，建構出這些圖樣；原創者則是由所歸納出的 53 種圖樣，對正規瓦片所能覆蓋的位置作窮舉考量，建構出這 147 種規格圖樣；由於皆少了代數式的驗證，故對於證明部分不甚足夠。另一方面，前人在等面鋪磚這部分的研究也是採用窮舉的方式，而國內在這領域的研究更是寥寥可數，也因此困難重重。未來，更希望能帶動國內這部分的研究，更上層樓。

## 8-2 未來展望

本研究中我們主要是針對雙瓦片的等面鋪磚這部分做研究，在研究過程中也產生了一些新方向，給日後的研究者一些建議分別如下：

### 1. 三種瓦片的等面鋪磚之研究

雙瓦片的等面鋪磚研究結構較為單純，然而卻可創造出 147 種不同規格且富有創意的圖樣；三種不同瓦片(二正規瓦片，另一不規則的瓦片)的等面鋪磚圖樣必定更豐富、更多元。

### 2. 人際介面程式之撰寫

在這 147 種雙瓦片的等面鋪磚圖樣中，我們運用設計基本單元的想法，由一個基本型(正方形、長方形、正六邊形、菱形)來建構這 147 種規格圖樣。若能配合我們所研發的繪圖程序方法來撰寫人際介面程式，讓線條的連接與變化更隨心所欲，學習者將可發揮更大創意，設計出非常多元而有創意的圖樣。

### 3. Ecsherization

在 <http://www.mcescher.com> 網頁中蒐集許多 Ecsher 手繪的動物密鋪磁磚，非常具有創意。在這 147 種雙瓦片的等面鋪磚圖樣中，我們可以將每一種動物視為一種瓦片，若能配合藝術與人文的協助，在瓦片內部做適當的構圖，並配合人際介面的程式將線條作變化，必然可以建構出非常多富有創意的兩種動物瓦片的密鋪圖樣。

### 4. 雙瓦片的一般化研究

147 種雙瓦片的等面鋪磚圖樣中，我們對正規瓦片的條件以及其鋪磚方式做了些限制，若我們將條件放寬，不作此限制，那麼所產生創造出來的圖樣類別必然更為豐富、更多元。

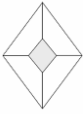




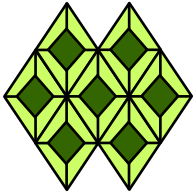
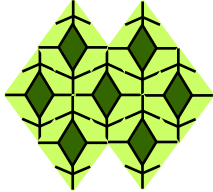
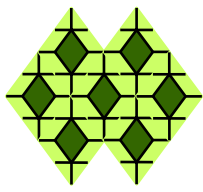


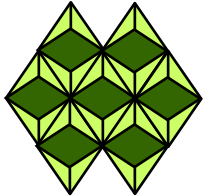
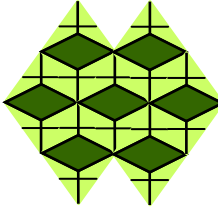
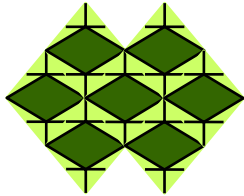
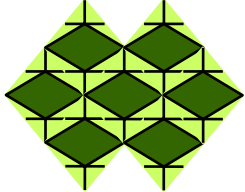


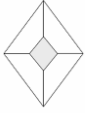






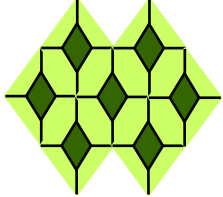

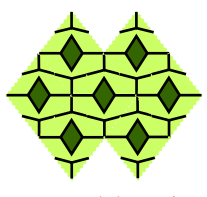
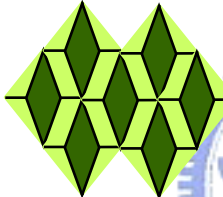
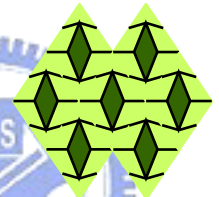
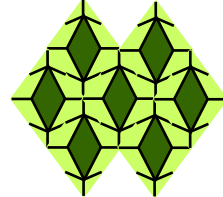
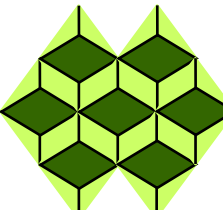
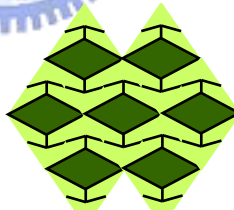

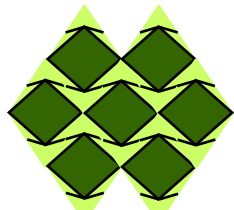
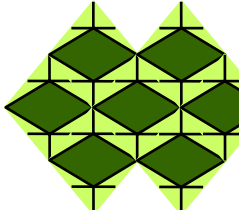
## 參考文獻






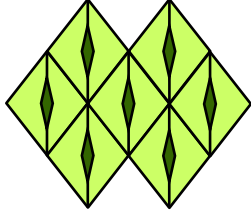
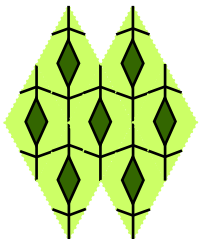
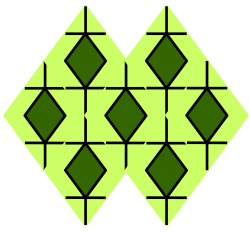


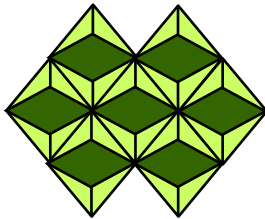
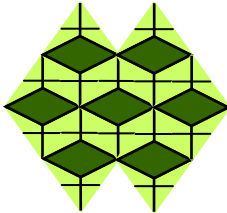
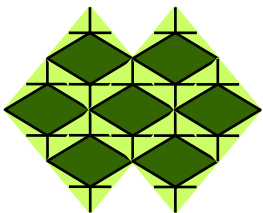
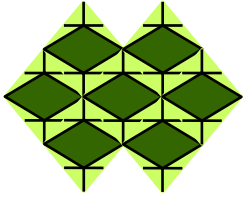
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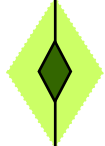
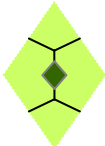


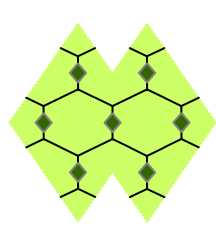
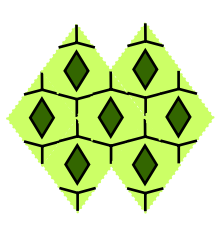


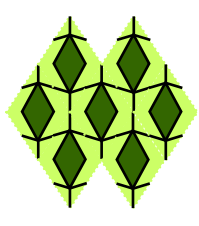

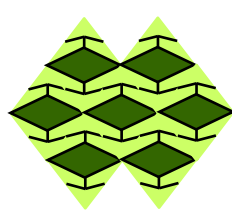
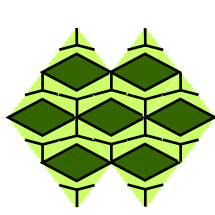
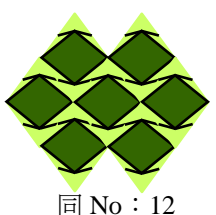
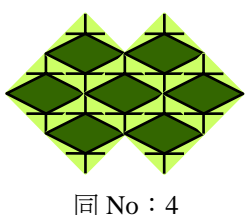


## 附錄一：20 種雙瓦片的等面鋪磚(cmm)








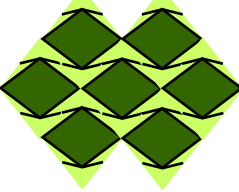
結構(cmmC) 正規瓦片(二次鏡射, 菱形)	 cmmC	 兩條對稱軸皆為實線	
對稱軸虛實	兩條皆實線 F(s)		
外圍結構虛實 及有無線條從 外邊中點連出	 F(O)	 $L(e_m, s)$	 $L(e_m, v)$
正規瓦片 小時圖形 (S : small)	 $[cmmC, F(s), F(O), S]$ No : 5	 $[cmmC, F(s), L(e_m, s), S]$ No : 1	 同 No : 2
	正規瓦片 擴展後圖形 $B_1$ : 菱形上下 方向擴展	 $[cmmC, F(s), F(O), B_1]$ No : 6	 $[cmmC, F(s), L(e_m, s), B_1]$ No : 2
$B_1'$ : 菱形左右 方向擴展	 同 No : 6	 $[cmmC, F(s), L(e_m, s), B_1']$ No : 3	 同 No : 4
	$B_2$ : 菱形往二 邊擴展	正規瓦片覆蓋全圖	 $[cmmC, F(s), L(e_m, s), B_2]$ No : 4

結構(cmmC) 正規瓦片(二次鏡射, 菱形)	 cmmC	 對稱軸皆實線	 一實一部份虛 $P_1(s)$	 一實一部份虛 $P_1'(s)$
對稱軸虛實	兩條皆實線 F(s)	一實一部份虛 $P_1(s)$	一實一部份虛 $P_1'(s)$	
外圍結構虛實 及有無線條從外邊中點連出	 N	 $L(e_m, s)$	 $L(e_m, s)$	
正規瓦片 小時圖形 (S : small)	 [cmmC, F(s), N, S] No : 7	 [cmmC, $P_1(s)$ , $L(e_m, s)$ , S] No : 9	 [cmmC, $P_1'(s)$ , $L(e_m, s)$ , S] No : 13	
正規瓦片 擴展後圖形 $B_1$ : 菱形上下 方向擴展	 [cmmC, F(s), N, $B_1$ ] No : 8	 [cmmC, $P_1(s)$ , $L(e_m, s)$ , $B_1$ ] No : 10	 同 No : 2	
$B_1'$ : 菱形左右 方向擴展	 同 No : 8	 [cmmC, $P_1(s)$ , $L(e_m, s)$ , $B_1'$ ] No : 11	 [cmmC, $P_1'(s)$ , $L(e_m, s)$ , $B_1'$ ] No : 14	
正規瓦片 擴展後圖形 $B_2$ : 菱形往二 邊擴展	正規瓦片覆蓋全圖	 [cmmC, $P_1(s)$ , $L(e_m, s)$ , $B_2$ ] No : 12	 同 No : 4	

結構(cmmC) 正規瓦片(二次鏡射, 菱形)	 cmmC	 一實一虛 $P_2(s)$	
對稱軸虛實	一實一虛 $P_2(s)$		
外圍結構虛實 及有無線條從外邊中點連出	 F(O)	 $L(e_m, s)$	 $L(e_m, v)$
正規瓦片 小時圖形 (S : small)	 $[cmmC, P_2(s), F(O), S]$ No : 17	 $[cmmC, P_2(s), L(e_m, s), S]$ No : 15	 同 No : 15
正規瓦片 擴展後圖形 $B_1$ : 菱形上下 方向擴展	 $[cmmC, P_2(s), F(O), B_1]$ No : 18	 $[cmmC, P_2(s), L(e_m, s), B_1]$ No : 16	無
$B_1'$ : 菱形左右 方向擴展	 同 No : 6	 同 No : 3	 同 No : 4
$B_2$ : 菱形往二 邊擴展	正規瓦片覆蓋全圖	 同 No : 4	無

結構(cmmC) 正規瓦片(二次 鏡射, 菱形)	 cmmC	 一實一虛 $P_2(s)$	 一虛一部份實 $P_3(s)$	 一虛一部份實 $P_3'(s)$
對稱軸虛實	一實一虛 $P_2(s)$	一虛一部份實 $P_3(s)$	一虛一部份實 $P_3'(s)$	
外圍結構虛實 及有無線條從 外邊中點連出	 N	 $L(e_m, s)$	 $L(e_m, s)$	
正規瓦片 小時圖形 (S : small)	 不規則瓦片無法收斂	 [cmmC, $P_3(s)$ , $L(e_m, s)$ , S] No : 19	 不規則瓦片包住正規瓦片	
正規瓦片 擴展後圖形 $B_1$ : 菱形上下 方向擴展	 不規則瓦片無法收斂	 [cmmC, $P_3(s)$ , $L(e_m, s)$ , $B_1$ ] No : 20	 同 No : 16	
$B_1'$ : 菱形左右 方向擴展	 同 No : 8	 同 No : 11	 同 No : 14	
$B_2$ : 菱形往二 邊擴展	正規瓦片覆蓋全圖	 同 No : 12	 同 No : 4	

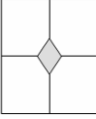
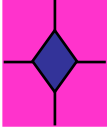
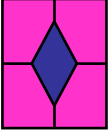
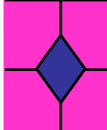
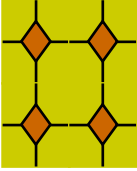
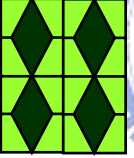
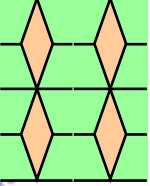
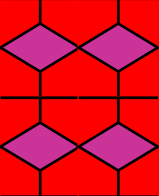
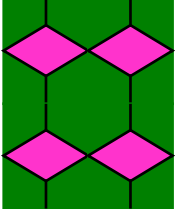
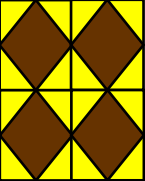
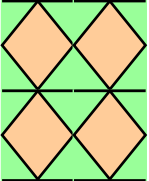
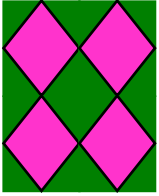


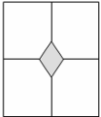
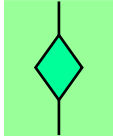
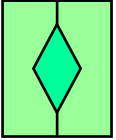
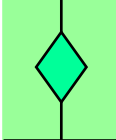
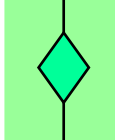
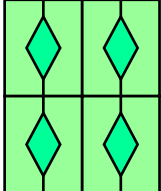
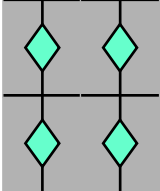
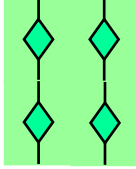
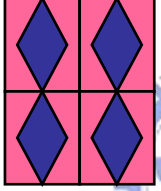
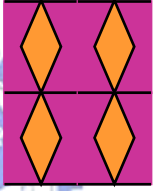
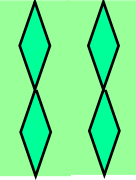
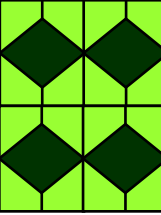
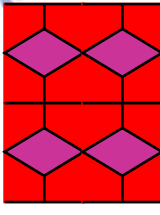
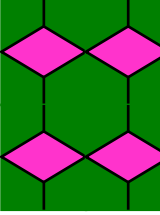
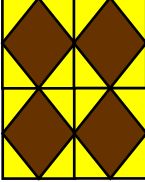
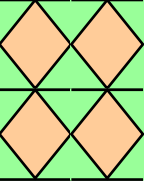
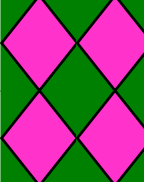
結構(cmmC) 正規瓦片(二次鏡射, 菱形)	 cmmC	 對稱軸皆為虛線 N(s)	
對稱軸虛實	對稱軸皆為虛線 N(s)		
外圍結構虛實 及有無線條從外邊中點連出	 F(O)	 $L(e_m, s)$	 N
正規瓦片 小時圖形 (S : small)	 不規則瓦片包住正規瓦片	 不規則瓦片無法收斂	 不規則瓦片無法收斂
正規瓦片 擴展後圖形 $B_1$ : 菱形上下方向擴展	 同 No : 18	 同 No : 10	 不規則瓦片無法收斂
$B_1'$ : 菱形左右方向擴展	 同 No : 18	 不規則瓦片無法收斂	 不規則瓦片無法收斂
$B_2$ : 菱形往二邊擴展	正規瓦片覆蓋全圖	 同 No : 12	正規瓦片覆蓋全圖

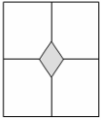
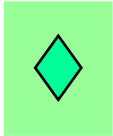
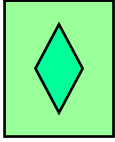
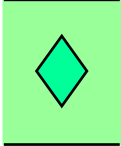
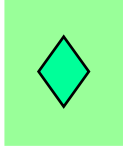
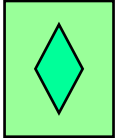
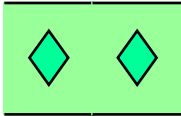
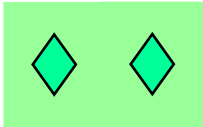
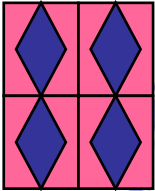
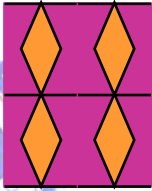
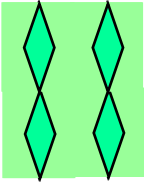
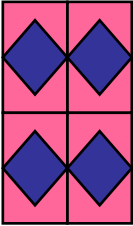
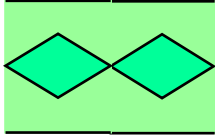
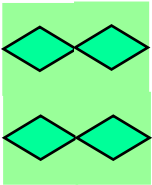
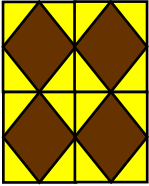
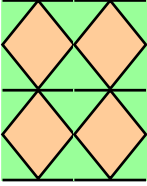
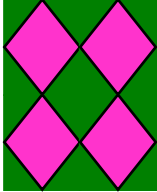
各類圖樣相關符號比較

No	Symmetries	Incidence	T class	Our symbol
1	[cmm,d2,c1]	$[a^+b^+c^+d^+e^+;A^+b^-c^+d^-e^-]$	$[3^2.4^3]$	$[cmmC, F(s), L(e_m, s), S]$
2	[cmm,d2,c1]	$[a^+b^+c^+d^+;A^+b^+c^-d^-]$	$[3.5^2.4]$	$[cmmC, F(s), L(e_m, s), B_1]$
3	[cmm,d2,c1]	$[a^+b^+c^+d^+;A^+b^-c^+d^-]$	$[3.6.4^2]$	$[cmmC, F(s), L(e_m, s), B_1']$
4	[cmm,d2,c1]	$[a^+b^+c^+;A^+b^+c^-]$	$[6.5^2]$	$[cmmC, F(s), L(e_m, s), B_2]$
5	[cmm,d2,c1]	$[a^+b^+c^+d^+;A^+b^-c^+d^-]$	$[3^2.8^2]$	$[cmmC, F(s), F(O), S]$
6	[cmm,d2,c1]	$[a^+b^+c^+;A^+b^+c^-]$	$[3.10^2]$	$[cmmC, F(s), F(O), B_1]$
7	[cmm,d2,c2]	$[(a^+b^+c^+)^2;A^+b^+c^-]$	$[(3^2.4)^2]$	$[cmmC, F(s), N, S]$
8	[cmm,d2,c2]	$[(a^+b^+)^2;A^+b^-]$	$[(3.6)^2]$	$[cmmC, F(s), N, B_1]$
9	[cmm,d2,d1]	$[a^+ba^-c^+d^+d^-c^-;A^+bc^-d^+]$	$[3^7]$	$[cmmC, P_1(s), L(e_m, s), S]$
10	[cmm,d2,d1]	$[a^+ba^-c^+c^-;A^+bc^+]$	$[4.3^2.4^2]$	$[cmmC, P_1(s), L(e_m, s), B_1]$
11	[cmm,d2,d1]	$[a^+a^-b^+c^+c^-b^-;A^+b^+c^+]$	$[3.4.3^4]$	$[cmmC, P_1(s), L(e_m, s), B_1']$
12	[cmm,d2,d1]	$[a^+a^-b^+b^-;A^+b^+]$	$[4^4]$	$[cmmC, P_1(s), L(e_m, s), B_2]$
13	[cmm,d2,d1]	$[ab^+c^+d^+d^-c^-b^-;Ab^-c^+d^+]$	$[3^2.4.3^3.4]$	$[cmmC, P_1'(s), L(e_m, s), S]$
14	[cmm,d2,d1]	$[ab^+c^+c^-b^-;Ab^-c^+]$	$[6^2.3^3]$	$[cmmC, P_1'(s), L(e_m, s), B_1']$
15	[cmm,d2,d1]	$[ab^+c^+dc^-b^-;Ab^-c^+d^+]$	$[3^2.4^4]$	$[cmmC, P_2(s), L(e_m, s), S]$
16	[cmm,d2,d1]	$[ab^+cb^-;Ab^+c^+]$	$[5^4]$	$[cmmC, P_2(s), L(e_m, s), B_1]$
17	[cmm,d2,d1]	$[ab^+c^+c^-b^-;Ab^-c^+]$	$[3^2.6^3]$	$[cmmC, P_2(s), F(O), S]$
18	[cmm,d2,d1]	$[ab^+b^-;Ab^+]$	$[8^3]$	$[cmmC, P_2(s), F(O), B_1]$
19	[cmm,d2,d2]	$[(ab^+c^+c^-b^-)^2;Ab^-c^+]$	$[3^{10}]$	$[cmmC, P_3(s), L(e_m, s), S]$
20	[cmm,d2,d2]	$[(ab^+b^-)^2;Ab^+]$	$[4^6]$	$[cmmC, P_3(s), L(e_m, s), B_1]$

## 附錄二：13 種雙瓦片的等面鋪磚(pmm)

結構(pmmC) 正規瓦片(二次鏡射，菱形)	 pmmC	 兩條對稱軸皆實線	
對稱軸虛實	兩條皆實線 F(s)		
外圍結構虛實及有無線條從外邊中點連出	 F(O)	 P(O)	 N(O)
正規瓦片 小時圖形 (S : small)	 [pmmC,F(s),F(O),S] No : 21	 [pmmC,F(s),P(O),S] No : 24	 [pmmC,F(s),N(O),S] No : 32
正規瓦片 擴展後圖形 $B_1$ : 菱形上下方向擴展	 同 No : 22	 [pmmC,F(s),P(O), $B_1$ ] No : 25	 同 No : 33
$B_1'$ : 菱形左右方向擴展	 [pmmC,F(s),F(O), $B_1'$ ] No : 22	 [pmmC,F(s),P(O), $B_1'$ ] No : 26	 [pmmC,F(s),N(O), $B_1'$ ] No : 33
$B_2$ : 菱形往二邊擴展	 [pmmC,F(s),F(O), $B_2$ ] No : 23	 [pmmC,F(s),P(O), $B_2$ ] No : 27	 Diamond tiling

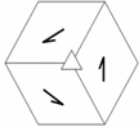
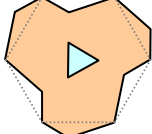
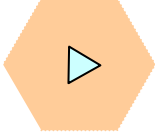
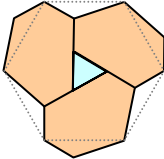
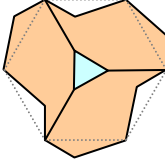
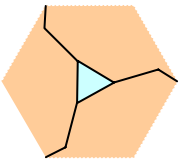
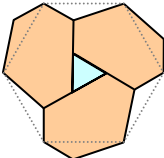
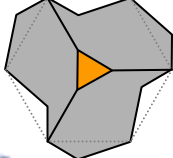
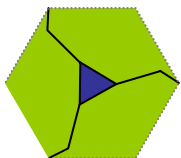
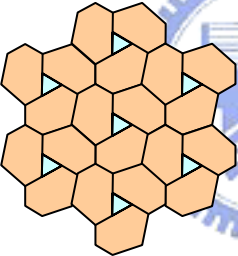
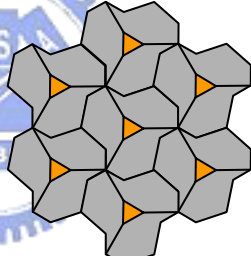
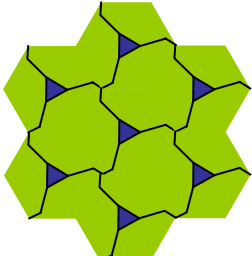
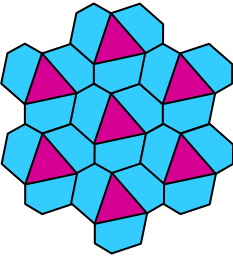
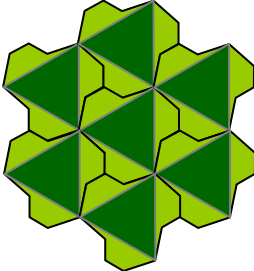
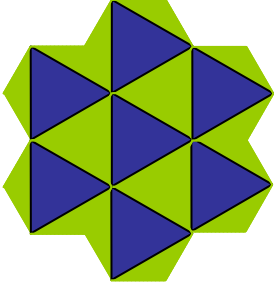
結構(pmmC) 正規瓦片(二次鏡射, 菱形)	 pmmC	 對稱軸一實一虛	
對稱軸虛實	兩條一實一虛 P(s)		
外圍結構虛實及有無線條從外邊中點連出	 F(O)	 P(O)	 N(O)
正規瓦片 小時圖形 (S : small)	 [pmmC,P(s),F(O),S <sub>1</sub> ] No : 28	 [pmmC,P(s),P(O),S <sub>1</sub> ] No : 30	 不規則瓦片無法收斂
正規瓦片 擴展後圖形 $B_1$ : 菱形上下方向擴展	 [pmmC,P(s),F(O),B <sub>1</sub> ] No : 29	 [pmmC,P(s),P(O),B <sub>1</sub> ] No : 31	 不規則瓦片無法收斂
$B_1'$ : 菱形左右方向擴展	 同 No : 22	 同 No : ; 26	 同 No : 33
$B_2$ : 菱形往二邊擴展	 同 No : 23	 同 No : 27	 Diamond tiling

結構(pmmC) 正規瓦片(二次鏡射, 菱形)	 pmmC	 兩條對稱軸皆為虛線	
對稱軸虛實	兩條皆虛線 N(s)		
外圍結構虛實及有無線條從外邊中點連出	 F(O)	 P(O)	 N(O)
正規瓦片 小時圖形 (S : small)	 不規則瓦片包住正規瓦片	 不規則瓦片無法收斂	 不規則瓦片無法收斂
正規瓦片 擴展後圖形 $B_1$ : 菱形上下方向擴展	 同 No : 29	 同 No : 31	 不規則瓦片無法收斂
$B_1'$ : 菱形左右方向擴展	 同 No : 29	 不規則瓦片無法收斂	 不規則瓦片無法收斂
$B_2$ : 菱形往二邊擴展	 同 No : 23	 同 No : 27	 Diamond tiling

各類圖樣相關符號比較

No	Symmetries	Incidence	T class	Our symbol
21	[pmm,d2,c1]	$[a^+b^+c^+d^+e^+;A^+b^-c^-d^-e^-]$	$[3^2.4^3]$	[pmmC,F(s),F(O),S]
22	[pmm,d2,c1]	$[a^+b^+c^+d^+;A^+b^-c^-d^-]$	$[3.6.4^2]$	[pmmC,F(s),F(O), $B_1'$ ]
23	[pmm,d2,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[6^2.4]$	[pmmC,F(s),F(O), $B_2$ ]
24	[pmm,d2,d1]	$[a^+ba^-c^+dc^-;A^+bc^-d]$	$[3^4.4^2]$	[pmmC,F(s),P(O), S]
25	[pmm,d2,d1]	$[a^+ba^-c^-;A^+bc]$	$[6.3^2.6]$	[pmmC,F(s),P(O), $B_1$ ]
26	[pmm,d2,d1]	$[a^+a^-b^+cb^-;A^+b^-c]$	$[3.4.3.4^2]$	[pmmC,F(s),P(O), $B_1'$ ]
27	[pmm,d2,d1]	$[a^+a^-b^-;A^+b]$	$[6.4.6]$	[pmmC,F(s),P(O), $B_2$ ]
28	[pmm,d2,d1]	$[ab^+c^+dc^-b^-;Ab^-c^-d]$	$[3^2.4^4]$	[pmmC,P(s),F(O),S]
29	[pmm,d2,d1]	$[ab^+cb^-;Ab^-c]$	$[6^2.4^2]$	[pmmC,P(s),F(O), $B_1$ ]
30	[pmm,d2,d2]	$[(ab^+cb^-)^2;Ab^-c]$	$[(3^2.4^2)^2]$	[pmmC,P(s),P(O), S]
31	[pmm,d2,d2]	$[(ab)^2;Ab]$	$[6^4]$	[pmmC,P(s),P(O), $B_1$ ]
32	[pmm,d2,d2]	$[(a^+ba^-c)^2;A^+bc]$	$[3^8]$	[pmmC,F(s),N(O), S]
33	[pmm,d2,d2]	$[(a^+a^-b)^2;A^+b]$	$[(3.4.3)^2]$	[pmmC,F(s),N(O), $B_1'$ ]

### 附錄三：5 種雙瓦片的等面鋪磚(p3)

結構(p3C) 正規瓦片(三重旋轉對稱, 正三角形)	 P3C	 外圍六邊為實線	 外圍六邊為虛線
外圍六邊虛實	外圍六邊為實線(F(O))		外圍六邊為虛線(N(O))
線條如何從中心正規瓦片頂點連出	 L(v,e)	 L(v,v)	 L(v,v)
著色後圖形			
正規瓦片小時圖形 (S : small)	 [p3C,F(O),L(v,e),S]	 [p3C,F(O),L(v,v),S]	 [p3C,N(O),L(v,v),S]
	No : 34	No : 36	No : 38
正規瓦片 擴展後圖形 (B : big)	 [p3C,F(O),L(v,e),B <sub>e</sub> ]	 [p3C,F(O),L(v,v),B <sub>v</sub> ]	
	No : 35	No : 37	Triangle tiling

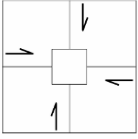
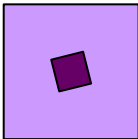
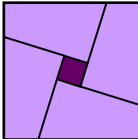
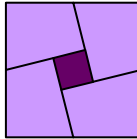
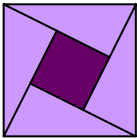
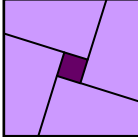

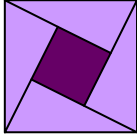
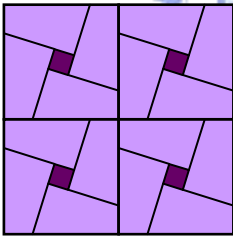
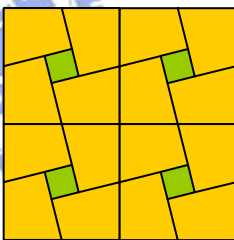
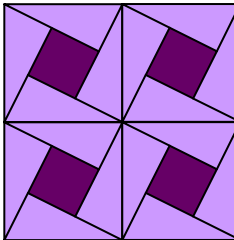
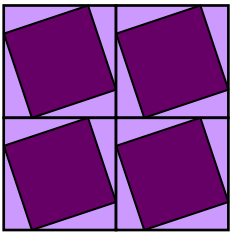
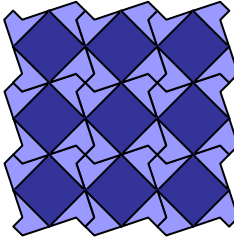
## 各類圖樣相關符號比較

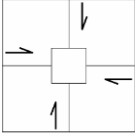
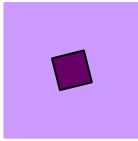
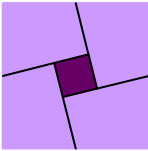
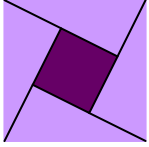
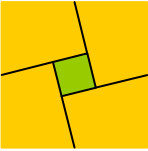
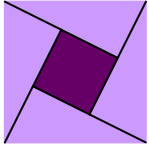
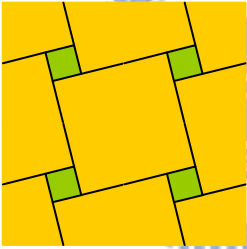
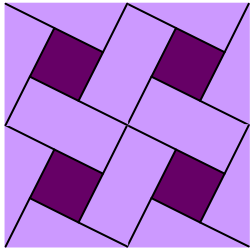
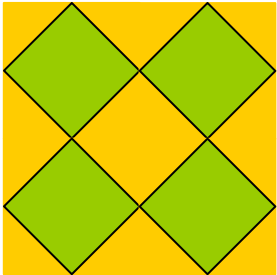
<i>No</i>	<i>Symmetries</i>	<i>Incidence</i>	<i>T class</i>	Our symbol
34	[p3,c3,c1]	$[a^+b^+c^+d^+e^+f^+g^+;A^+g^+d^+c^+f^+e^+b^+]$	$[3^7]$	[p3C,F(O),L(v,e),S]
35	[p3,c3,c1]	$[a^+b^+c^+d^+e^+;A^+c^+b^+e^+d^+]$	$[4^2.3.4.3]$	[p3C,F(O),L(v,e), $B_e$ ]
36	[p3,c3,c1]	$[a^+b^+c^+d^+e^+;A^+e^+d^+c^+b^+]$	$[3^2.6.3.6]$	[p3C,F(O),L(v,v),S]
37	[p3,c3,c1]	$[a^+b^+c^+;A^+c^+b^+]$	$[9^2.3]$	[p3C,F(O),L(v,v), $B_v$ ]
38	[p3,c3,c3]	$[(a^+b^+c^+)^3;A^+c^+b^+]$	$[3^9]$	[p3C,N(O),L(v,v),S]





### 附錄四：7 種雙瓦片的等面鋪磚(p4)

<p>結構(p4C) 正規瓦片(四重旋轉對稱，正方形)</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  p4C         </div> <div style="text-align: center;">  外圍正方形為實線         </div> </div>		
<p>外圍正方形虛實</p>	<p style="text-align: center;">外圍正方形為實線(F(O))</p>		
<p>線條如何從中心正規瓦片頂點連出</p>	<div style="text-align: center;">  L(v,e)         </div>	<div style="text-align: center;">  L(v, <math>e_m</math>)         </div>	<div style="text-align: center;">  L(v,v)         </div>
<p>著色後圖形</p>			
<p>正規瓦片小時圖形 (S : small)</p>	<div style="text-align: center;">  [p4C,F(O),L(v,e),S] No : 59         </div>	<div style="text-align: center;">  [p4C,F(O),L(v, <math>e_m</math>),S] No : 61         </div>	<div style="text-align: center;">  [p4C,F(O),L(v,v),S] No : 63         </div>
	<div style="text-align: center;">  [p4C,F(O),L(v,e),B] No : 60         </div>	<div style="text-align: center;">  [p4C,F(O),L(v, <math>e_m</math>),B] No : 62         </div>	<p style="text-align: center;">正規瓦片覆蓋全圖</p>

結構(p4C) 正規瓦片(四重旋轉對稱, 正方形)	 <p>p4C</p>	 <p>外圍正方形為虛線</p>
外圍正方形虛實	外圍正方形為虛線(N(O))	
線條如何從中心正規瓦片頂點連出	 <p><math>L(v, e_m)</math></p>	 <p><math>L(v, v)</math></p>
著色後圖形		
正規瓦片小時圖形 (S : small)	 <p><math>[p4C, N(O), L(v, e_m), S]</math></p> <p>No : 65</p>	 <p><math>[p4C, N(O), L(v, v), S]</math></p> <p>No : 64</p>
正規瓦片 擴展後圖形 (B : big)	 <p>Square tiling</p>	正規瓦片覆蓋全圖

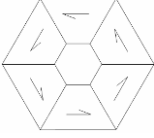
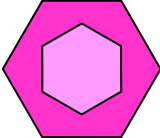
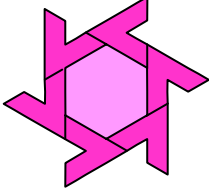
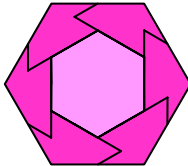
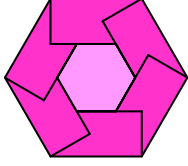
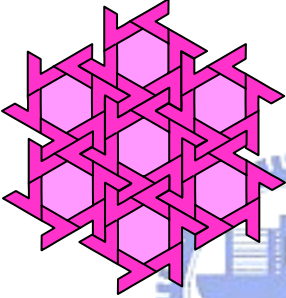
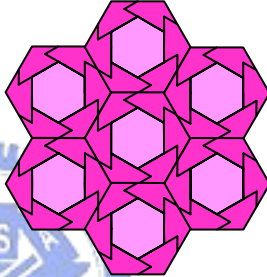
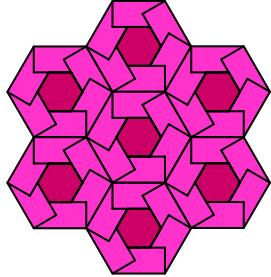
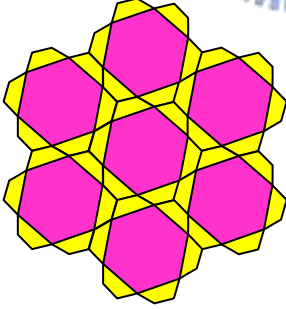
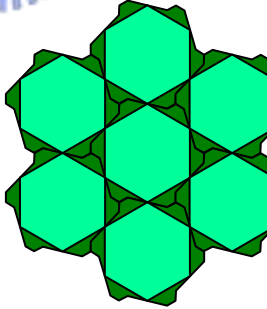
## 各類圖樣相關符號比較

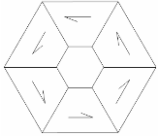
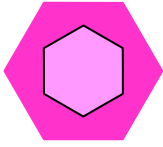
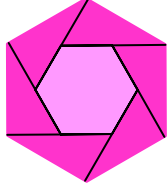
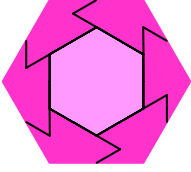
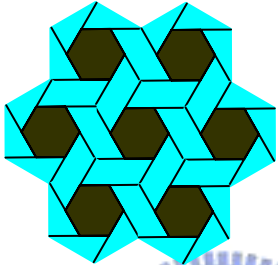
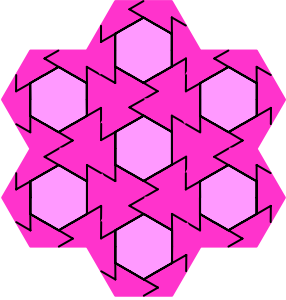

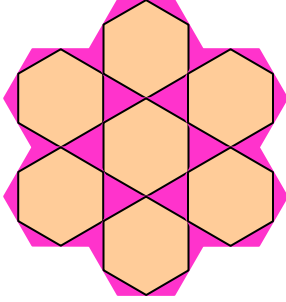
No	Symmetries	Incidence	T class	Our symbol
59	[p4,c4,c1]	$[a^+b^+c^+d^+e^+f^+;A^+f^+c^+e^+d^+b^+]$	$[3^4.4.3]$	[p4C,F(O),L(v,e),S]
60	[p4,c4,c1]	$[a^+b^+c^+d^+;A^+b^+d^+c^+]$	$[4^4]$	[p4C,F(O),L(v,e),B]
61	[p4,c4,c1]	$[a^+b^+c^+d^+e^+;A^+e^+d^+c^+b^+]$	$[3^2.4^3]$	[p4C,F(O),L(v, $e_m$ ),S]
62	[p4,c4,c1]	$[a^+b^+c^+;A^+c^+b^+]$	$[6^2.4]$	[p4C,F(O),L(v, $e_m$ ),B]
63	[p4,c4,c1]	$[a^+b^+c^+d^+;A^+d^+c^+b^+]$	$[3^2.8^2]$	[p4C,F(O),L(v,v),S]
64	[p4,c4,c2]	$[(a^+b^+c^+)^2;A^+c^+b^+]$	$[(3^2.4)^2]$	[p4C,N(O),L(v,v),S]
65	[p4,c4,c4]	$[(a^+b^+)^4;A^+b^+]$	$[3^8]$	[p4C,N(O),L(v, $e_m$ ),S]

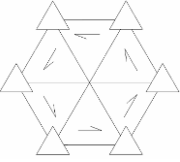
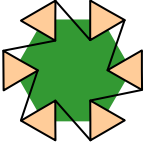
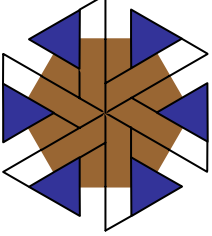
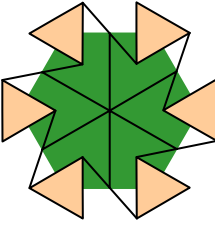
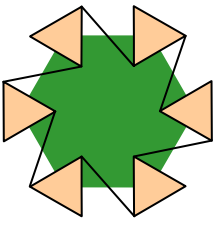
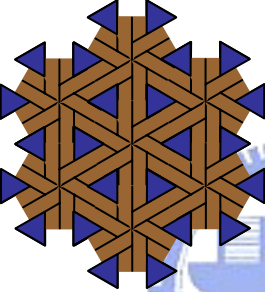
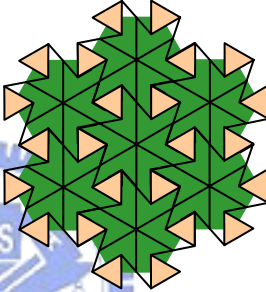
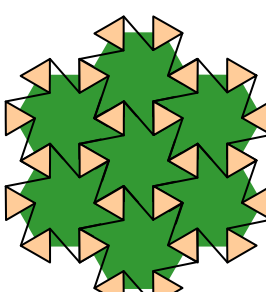
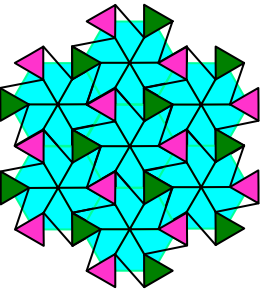
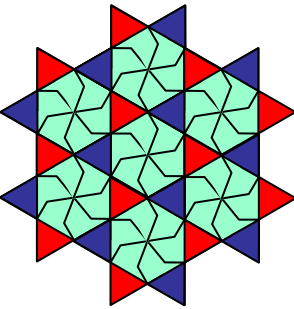
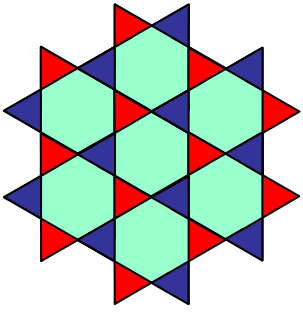


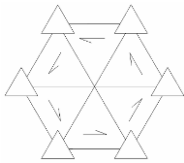
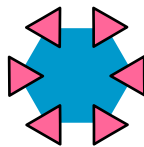
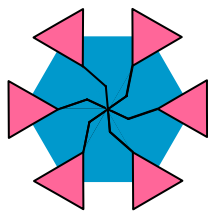
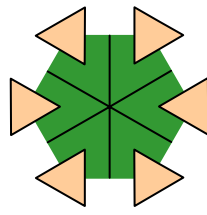
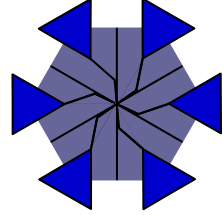
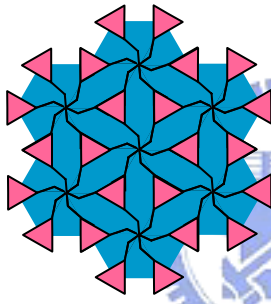
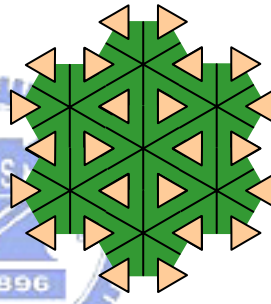
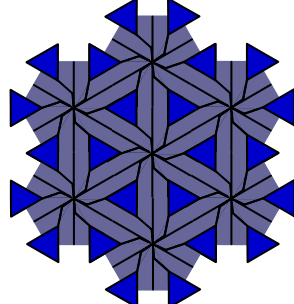


### 附錄五：14種雙瓦片的等面鋪磚(p6)

結構(p6C) 正規瓦片(六重旋轉對稱, 正六邊形)	 p6C	 外圍六邊為實線	
外圍六邊虛實	外圍六邊為實線(F(O))		
線條如何從中心正規瓦片頂點連出	 L(v,e)	 L(v, e <sub>m</sub> )	 L(v,v)
正規瓦片小時圖形 (S : small)	 [p6C,F(O),L(v,e),S] No : 105	 [p6C,F(O),L(v, e <sub>m</sub> ),S] No : 107	 [p6C,F(O),L(v,v),S] No : 109
正規瓦片 擴展後圖形 (B : big)	 [p6C,F(O),L(v,e),B] No : 106	 [p6C,F(O),L(v, e <sub>m</sub> ),B] No : 108	正規瓦片覆蓋全圖

結構(p6C) 正規瓦片(六重旋轉對稱, 正六邊形)	 <p>p6C</p>	 <p>外圍六邊為虛線</p>
外圍六邊虛實	外圍六邊為虛線(N(O))	
線條如何從中心正規瓦片頂點連出	 <p>L(v,v)</p>	 <p>L(v, e<sub>m</sub>)</p>
正規瓦片小時圖形 (S : small)	 <p>[p6C,N(O),L(v,v),S] No : 110</p>	 <p>[p6C,N(O),L(v, e<sub>m</sub>),S] No : 111</p>
正規瓦片 擴展後圖形 (B : big)	 <p>正規瓦片覆蓋全圖</p>	 <p>兩正規瓦片 Triangle+Hexagon</p>

結構(p6V) 正規瓦片(三重旋轉對稱, 正三角形)	 <p style="text-align: center;">p6V</p>  <p style="text-align: center;">外圍六邊為實線</p>		
外圍六邊虛實	外圍六邊為實線(F(O))		
線條如何從結構中心點連出	 <p style="text-align: center;">L(v,e)</p>	 <p style="text-align: center;">L(v, e<sub>m</sub>)</p>	 <p style="text-align: center;">N</p>
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[p6V,F(O),L(v,e),S]</p> <p style="text-align: center;">No : 98</p>	 <p style="text-align: center;">[p6V,F(O),L(v, e<sub>m</sub>),S]</p> <p style="text-align: center;">No : 100</p>	 <p style="text-align: center;">[p6V,F(O),N,S]</p> <p style="text-align: center;">No : 104</p>
正規瓦片 擴展後圖形 (B : big)	 <p style="text-align: center;">[p6V,F(O),L(v,e),B]</p> <p style="text-align: center;">No : 99</p>	 <p style="text-align: center;">[p6V,F(O),L(v, e<sub>m</sub>),B]</p> <p style="text-align: center;">No : 101</p>	 <p style="text-align: center;">兩正規瓦片</p> <p style="text-align: center;">Triangle+ Hexagon</p>

結構(p6V) 正規瓦片(三重旋 轉對稱, 正三角形)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>p6V</p> </div> <div style="text-align: center;">  <p>外圍六邊為虛線</p> </div> </div>		
外圍六邊虛實	外圍六邊為虛線(N(O))		
線條如何從結構中 心點連出	 <p>L(v,v)</p>	 <p>L(v, e<sub>m</sub>)</p>	 <p>L(v, v+ e<sub>m</sub>)</p>
正規瓦片小時圖形 (S : small)	 <p>[p6V,N(O),L(v,v),S]</p> <p>No : 103</p>	 <p>不規則瓦片包住正規瓦片</p>	 <p>[p6V,N(O), L(v, v+ e<sub>m</sub>),S]</p> <p>No : 102</p>
正規瓦片 擴展後圖形 (B : big)	正規瓦片覆蓋全圖	正規瓦片覆蓋全圖	正規瓦片覆蓋全圖

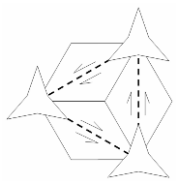
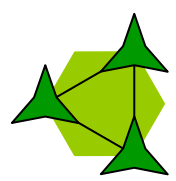

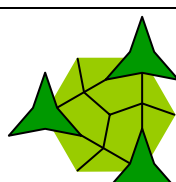
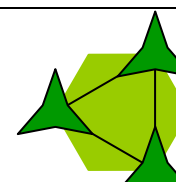
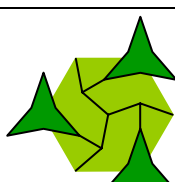
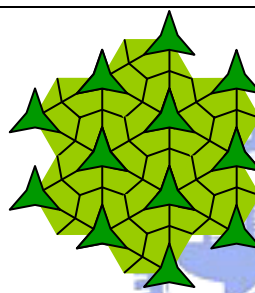
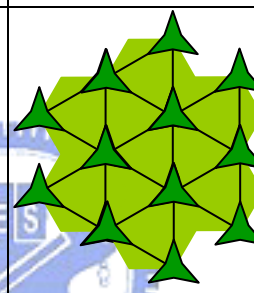
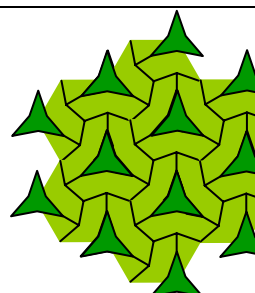
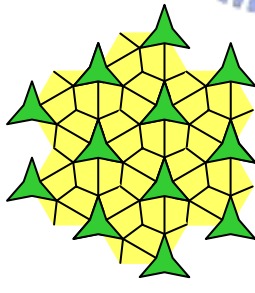
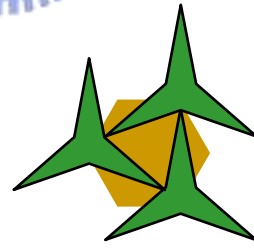
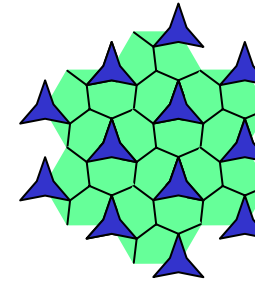
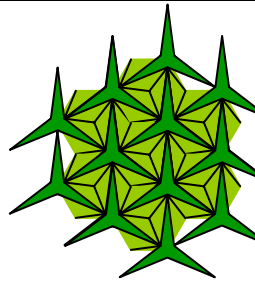
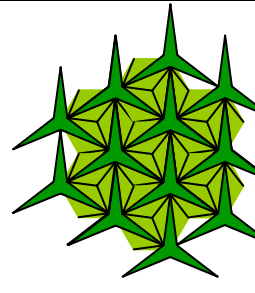


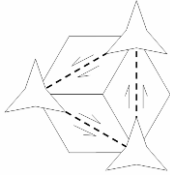
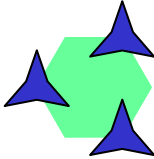
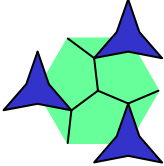
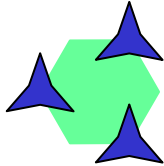
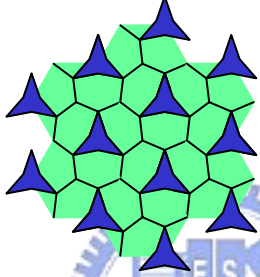
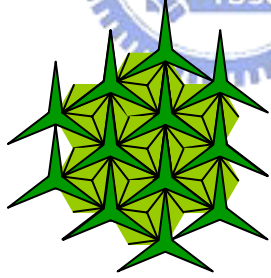
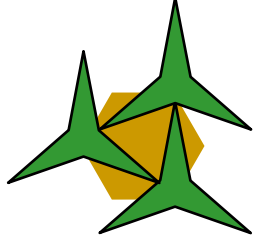
各類圖樣相關符號比較

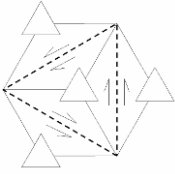
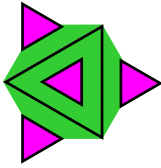
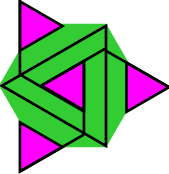
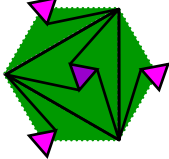
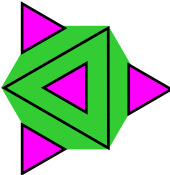
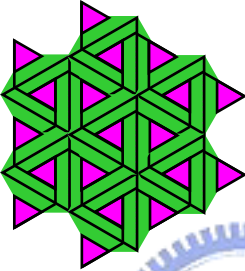
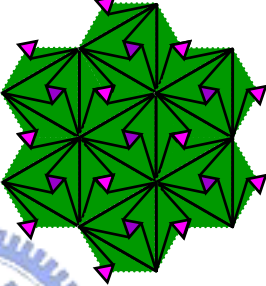
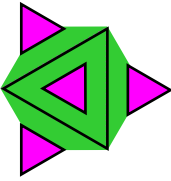
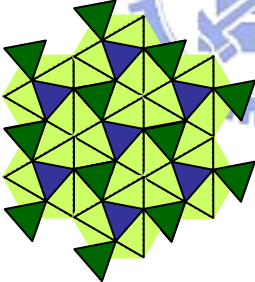
<i>No</i>	<i>Symmetries</i>	<i>Incidence</i>	<i>T class</i>	<i>Our symbol</i>
98	[p6,c3,c1]	$[a^+b^+c^+d^+e^+f^+;A^+f^+c^+e^+d^+b^+]$	$[3^4.6.3]$	[p6V,F(O),L(v,e),S]
99	[p6,c3,c1]	$[a^+b^+c^+d^+;A^+b^+d^+c^+]$	$[4^3.6]$	[p6V,F(O),L(v,e),B]
100	[p6,c3,c1]	$[a^+b^+c^+d^+e^+;A^+e^+d^+c^+b^+]$	$[3^2.4.6.4]$	[p6V,F(O),L(v, $e_m$ ),S]
101	[p6,c3,c1]	$[a^+b^+c^+;A^+c^+b^+]$	$[6^3]$	[p6V,F(O),L(v, $e_m$ ),B]
102	[p6,c3,c1]	$[a^+b^+c^+d^+;A^+d^+c^+b^+]$	$[3^2.12^2]$	[p6V,N(O),L(v, $v+e_m$ ),S]
103	[p6,c3,c2]	$[(a^+b^+c^+)^2;A^+c^+b^+]$	$[(3^2.6)^2]$	[p6V,N(O),L(v,v),S]
104	[p6,c3,c6]	$[(a^+b^+)^6;A^+b^+]$	$[3^{12}]$	[p6V,F(O),N,S]
105	[p6,c6,c1]	$[a^+b^+c^+d^+e^+f^+;A^+f^+c^+e^+d^+b^+]$	$[3^6]$	[p6C,F(O),L(v,e),S]
106	[p6,c6,c1]	$[a^+b^+c^+d^+;A^+b^+d^+c^+]$	$[4^3.3]$	[p6C,F(O),L(v,e),B]
107	[p6,c6,c1]	$[a^+b^+c^+d^+e^+;A^+e^+d^+c^+b^+]$	$[3^2.4.3.4]$	[p6C,F(O),L(v, $e_m$ ),S]
108	[p6,c6,c1]	$[a^+b^+c^+;A^+c^+b^+]$	$[6^2.3]$	[p6C,F(O),L(v, $e_m$ ),B]
109	[p6,c6,c1]	$[a^+b^+c^+d^+;A^+d^+c^+b^+]$	$[3^2.6^2]$	[p6C,F(O),L(v,v),S]
110	[p6,c6,c2]	$[(a^+b^+c^+)^2;A^+c^+b^+]$	$[3^6]$	[p6C,N(O),L(v,v),S]
111	[p6,c6,c3]	$[(a^+b^+)^3;A^+b^+]$	$[3^6]$	[p6C,N(O),L(v, $e_m$ ),S]

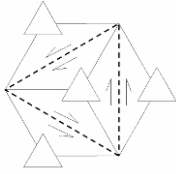
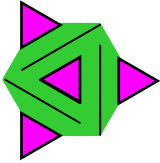
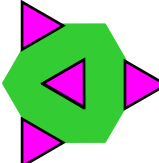
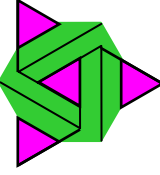
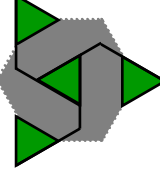
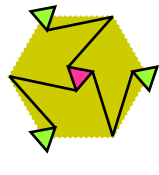


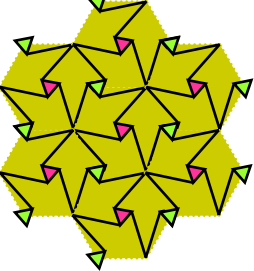
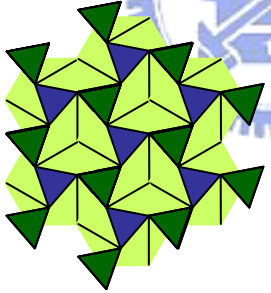
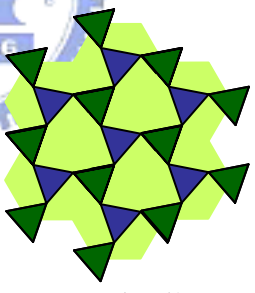


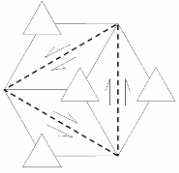
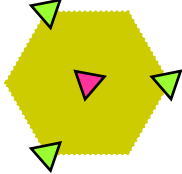
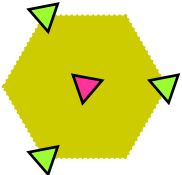
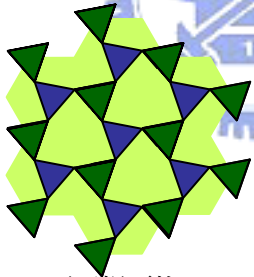
## 附錄六：13 種雙瓦片的等面鋪磚(p31m)

<p>結構(p31mV) 正規瓦片(三次鏡射, 三角星形)</p>	 <p>P31mV</p>	 <p>對稱軸皆實線</p>	 <p>對稱軸部分虛線</p>
<p>對稱軸虛實</p>	對稱軸為實線：F(s)		對稱軸部分虛線：P(s)
<p>線條如何從結構中心點連出</p>	 <p>L(v,s)</p>	 <p>N</p>	 <p>L(v,s)</p>
<p>正規瓦片小時圖形 (S : small)</p>	 <p>[p31mV,F(s),L(v,s),S]</p> <p>No : 46</p>	 <p>[p31mV,F(s),N,S]</p> <p>No : 49</p>	 <p>[p31mV,P(s),L(v,s),S]</p> <p>No : 50</p>
<p>正規瓦片 擴展後圖形 (B : big)</p>	 <p>[p31mV,F(s),L(v,s),B]</p> <p>No : 47</p>	 <p>兩正規瓦片</p> <p>Triangle+3-star</p>	 <p>[p31mV,P(s),L(v,s),B]</p> <p>No : 51</p>
<p>正規瓦片 擴展後圖形 (B' : 正規瓦片 更大時圖形)</p>	 <p>[p31mV,F(s),L(v,s),B']</p> <p>No : 48</p>	<p>無</p>	 <p>同 No : 48</p>

<p>結構(p31mV) 正規瓦片(三次鏡射, 三角星形)</p>	 <p>p31mV</p>  <p>對稱軸皆為虛線</p>	
<p>對稱軸虛實</p>	<p>對稱軸皆為虛線：N(s)</p>	
<p>線條如何從結構中心點連出</p>	 <p>線段連至對稱軸端點：L(v,v)</p>	 <p>無線段連出：N</p>
<p>正規瓦片小時圖形 (S : small)</p>	 <p>同 No : : 51</p>	<p>不規則瓦片無法收斂</p>
<p>正規瓦片 擴展後圖形 (B : big)</p>	 <p>同 No : 48</p>	 <p>兩正規瓦片</p>
		<p>Triangle+3-star</p>

結構(p31mC) 正規瓦片(三重旋轉 對稱, 正三角形)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>p31mC</p> </div> <div style="text-align: center;">  <p>對稱軸皆為實線</p> </div> </div>		
對稱軸虛實	對稱軸皆為實線 : F(s)		
線段如何從中心正 規瓦片頂點連出	 L(v,s)	 L(v,v)	 N
正規瓦片小時圖形 (S : small)	 [p31mC,F(s),L(v,s),S] No : 39	 [p31mC,F(s),L(v,v),S] No : 41	 不規則瓦片包住正規瓦片
正規瓦片 擴展後圖形 (B : big)	 [p31mC,F(s),L(v,s),B] No : 40	正規瓦片覆蓋全圖	正規瓦片覆蓋全圖

結構(p31mC) 正規瓦片(三重旋轉 對稱, 正三角形)	 p31mC	 對稱軸部分虛線	 對稱軸皆為虛線
對稱軸虛實	對稱軸部分虛線 P(s)	對稱軸皆為虛線 : N(s)	
線段如何從中心正 規瓦片頂點連出	 L(v,s)	 L(v,s)	 L(v,v)
正規瓦片小時圖形 (S : small)	 [p31mC,P(s),L(v,s),S] No : 42	 [p31mC,N(s),L(v,s),S] No : 45	 [p31mC,N(s),L(v,v),S] No : 44
正規瓦片 擴展後圖形 (B : big)	 [p31mC,P(s),L(v,s),B] No : 43	 兩正規瓦片 Triangle+3-star	正規瓦片覆蓋全圖

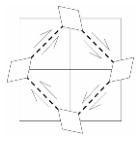
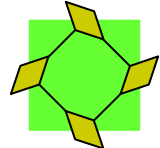

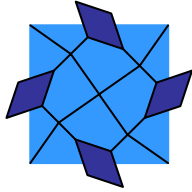
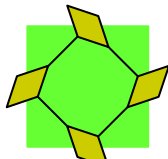
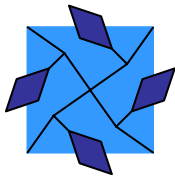
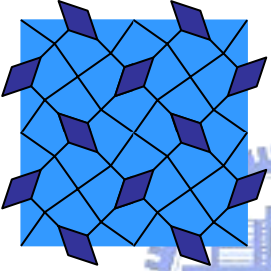
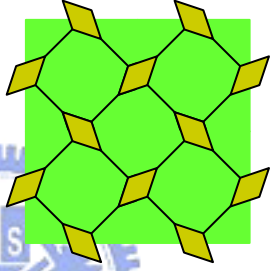
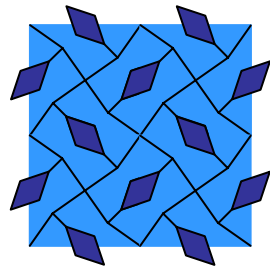
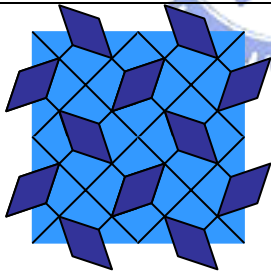
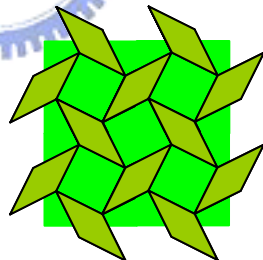
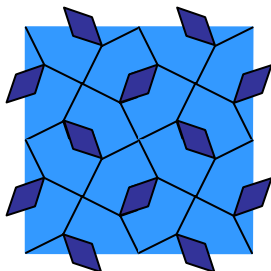
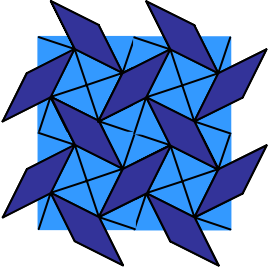
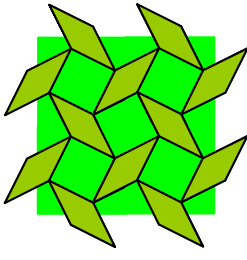
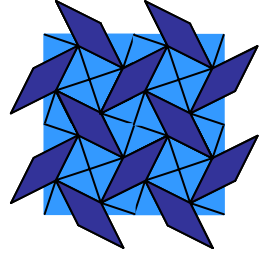
<p>結構(p31mC)</p> <p>正規瓦片(三重旋轉對稱, 正三角形)</p>	 <p>p31mC</p>
<p>對稱軸虛實</p>	<p>對稱軸皆為虛線：N(s)</p>
<p>線段如何從中心正規瓦片頂點連出</p>	 <p>無線段連至對稱軸：N</p>
<p>正規瓦片小時圖形 (S : small)</p>	 <p>不規則瓦片無法收斂</p>
<p>正規瓦片擴展後圖形 (B : big)</p>	 <p>兩正規瓦片</p> <p>Triangle+3-star</p>

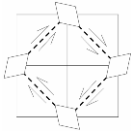
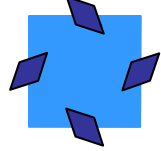
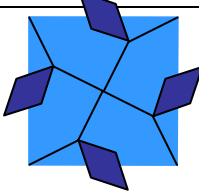
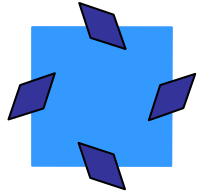
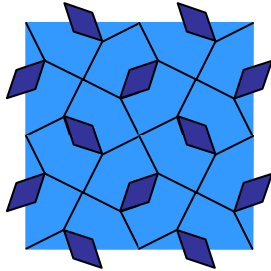
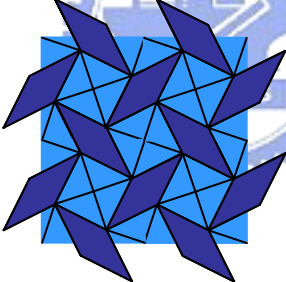
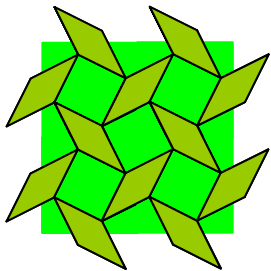
各類圖樣相關符號比較

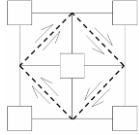
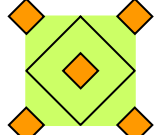
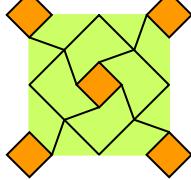
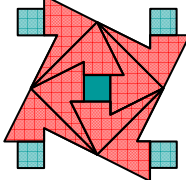
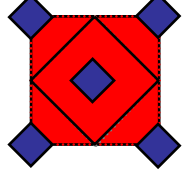
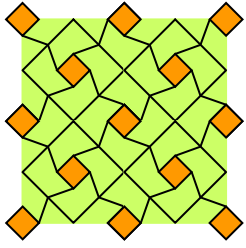
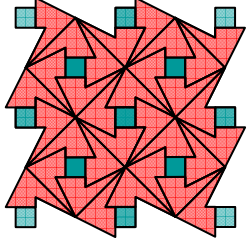
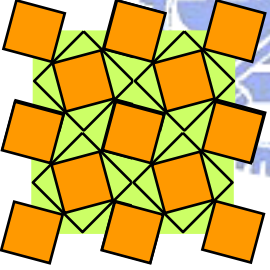
<i>No</i>	<i>Symmetries</i>	<i>Incidence</i>	<i>T class</i>	<i>Our symbol</i>
39	[p31m,c3,c1]	$[a^+b^+c^+d^+e^+;A^+e^+c^-d^+b^+]$	$[3^2.4.6.4]$	[p31mC,F(s),L(v,s),S]
40	[p31m,c3,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[6^3]$	[p31mC,F(s),L(v,s),B]
41	[p31m,c3,c1]	$[a^+b^+c^+d^+;A^+d^+c^-b^+]$	$[3^2.12^2]$	[p31mC,F(s),L(v,v),S]
42	[p31m,c3,d1]	$[a^+b^+b^-a^-c^+d^+d^-c^-;A^+c^-b^-d^-]$	$[3^8]$	[p31mC,P(s),L(v,s),S]
43	[p31m,c3,d1]	$[a^+a^-b^+b^-;A^+b^-]$	$[5^2.3.5]$	[p31mC,P(s),L(v,s),B]
44	[p31m,c3,d1]	$[a^+b^+b^-a^-c^+c^-;A^+c^-b^-]$	$[(3^2.6)^2]$	[p31mC,N(s),L(v,v),S]
45	[p31m,c3,d3]	$[(a^+ba^-c)^3;A^+cb]$	$[3^{12}]$	[p31mC,N(s),L(v,s),S]
46	[p31m,d3,c1]	$[a^+b^+c^+d^+e^+;A^+b^-d^+c^+e^-]$	$[3^2.4.3.4]$	[p31mV,F(s),L(v,s),S]
47	[p31m,d3,c1]	$[a^+b^+c^+d^+;A^+c^+b^+d^-]$	$[(3.5)^2]$	[p31mV,F(s),L(v,s),B]
48	[p31m,d3,c1]	$[a^+b^+c^+;A^+c^+b^+]$	$[6^2.3]$	[p31mV,F(s),L(v,s),B']
49	[p31m,d3,c3]	$[(a^+b^+)^3;A^+b^-]$	$[3^6]$	[p31mV,F(s),N,S]
50	[p31m,d3,d1]	$[ab^+c^+d^+d^-c^-b^-;Ab^-d^+c^+]$	$[3^7]$	[p31mV,P(s),L(v,s),S]
51	[p31m,d3,d1]	$[ab^+c^+c^-b^-;Ac^+b^+]$	$[4^2.3.4.3]$	[p31mV,P(s),L(v,s),B]

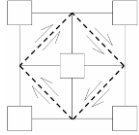

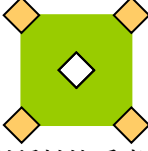
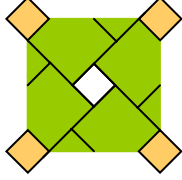
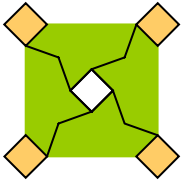
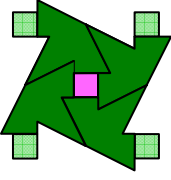
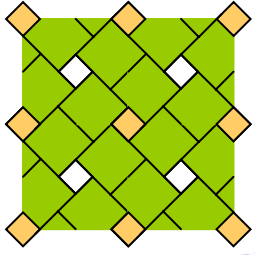
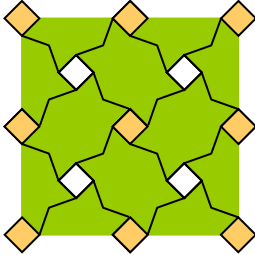
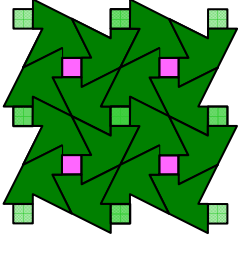
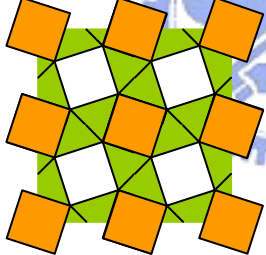
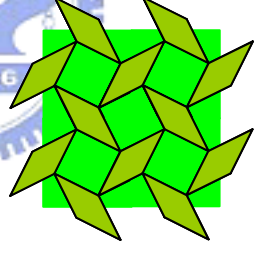
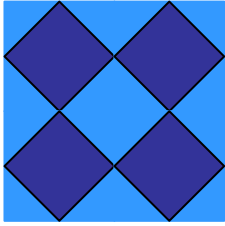


### 附錄七：13 種雙瓦片的等面鋪磚(p4g)

結構(p4g $E_m$ ) 正規瓦片(二次鏡射, 菱形)	 $p4g E_m$	 對稱軸為實線	 對稱軸部分虛線
對稱軸虛實	對稱軸為實線：F(s)		對稱軸部分虛線：P(s)
線段如何從結構中心點連出	 L(v,s)	 N	 L(v,s)
正規瓦片小時圖形 (S : small)	 $[p4g E_m, F(s), L(v,s), S]$ No : 73	 $[p4g E_m, F(s), N, S]$ No : 76	 $[p4g E_m, P(s), L(v,s), S]$ No : 77
正規瓦片擴展後圖形 ( $B_1$ : 菱形往一邊擴展)	 $[p4g E_m, F(s), L(v,s), B_1]$ No : 74	 兩正規瓦片 Square+Diamond	 $[p4g E_m, P(s), L(v,s), B_1]$ No : 78
$B_2$ : 菱形往二邊擴展	 $[p4g E_m, F(s), L(v,s), B_2]$ No : 75	 兩正規瓦片 Square+Diamond	 同 No : 75

結構( $p4g E_m$ ) 正規瓦片(二次鏡射, 菱形)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><math>p4g E_m</math></p> </div> <div style="text-align: center;">  <p>對稱軸皆為虛線</p> </div> </div>	
對稱軸虛實	對稱軸皆為虛線 : $N(s)$	
線段如何從結構中心點連出	 <p><math>L(v,v)</math></p>	 <p>N</p>
正規瓦片小時圖形 (S : small)	 <p>同 No : 78</p>	<p>不規則瓦片無法收斂</p>
正規瓦片 擴展後圖形 (B : big)	 <p>同 No : 75</p>	 <p>兩正規瓦片 Square+Diamond</p>

結構(p4gC) 正規瓦片(四重旋轉 對稱, 正方形)	 p4gC	 對稱軸為實線	
對稱軸虛實	對稱軸為實線 : F(s)		
線段如何從中心正 規瓦片頂點連出	 L(v,s)	 L(v,v)	 N
正規瓦片小時圖形 (S : small)	 [p4gC,F(s),L(v,s),S] No : 66	 [p4gC,F(s),L(v,v),S] No : 68	不規則瓦片包住正規瓦片
正規瓦片 擴展後圖形 (B : big)	 [p4gC,F(s),L(v,s),B] No : 67	正規瓦片覆蓋全圖	正規瓦片覆蓋全圖

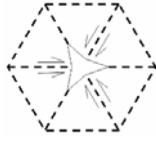






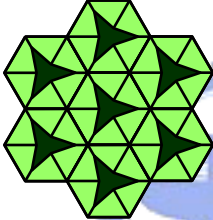
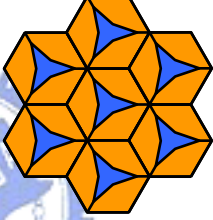
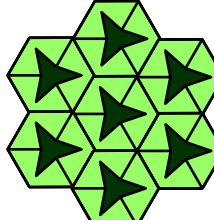
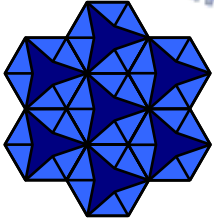
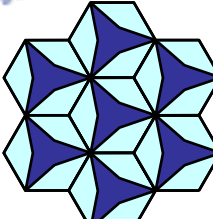
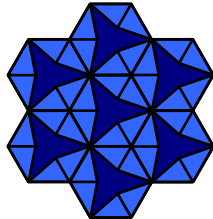
結構(p4gC) 正規瓦片(四重旋轉 對稱, 正方形)	 p4gC	 對稱軸部分虛線	 對稱軸皆為虛線
對稱軸虛實	對稱軸部分虛線 P(s)	對稱軸皆為虛線 : N(s)	
線段如何從中心正 規瓦片頂點連出	 L(v,s)	 L(v,s)	 L(v,v)
正規瓦片小時圖形 (S : small)	 [p4C,P(s),L(v,s),S] No : 69	 [p4gC,N(s),L(v,s),S] No : 72	 [p4gC,N(s),L(v,v),S] No : 71
正規瓦片 擴展後圖形 (B : big)	 [p4C,P(s),L(v,s),B] No : 70	 兩正規瓦片	 Square tiling

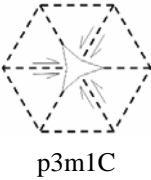






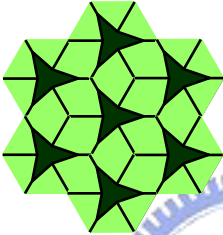
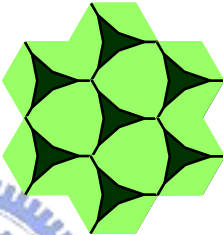
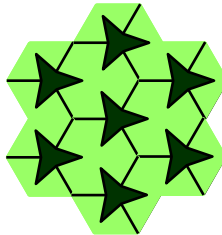
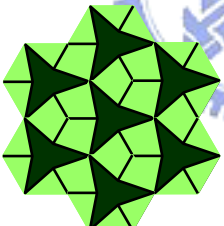
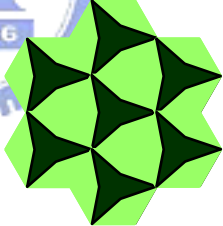
各類圖樣相關符號比較

No	Symmetries	Incidence	T class	Our symbol
66	[p4g,c4,c1]	$[a^+b^+c^+d^+e^+; A^+e^+c^-d^-b^+]$	$[3^2.4^3]$	[p4gC,F(s),L(v,s),S]
67	[p4g,c4,c1]	$[a^+b^+c^+; A^+b^-c^-]$	$[6^2.4]$	[p4gC,F(s),L(v,s),B]
68	[p4g,c4,c1]	$[a^+b^+c^+d^+; A^+d^+c^-b^+]$	$[3^2.8^2]$	[p4gC,F(s),L(v,v),S]
69	[p4g,c4,d1]	$[a^+b^+b^-a^-c^+dc^-; A^+c^-b^-d]$	$[3^7]$	[p4C,P(s),L(v,s),S]
70	[p4g,c4,d1]	$[a^+a^-b; A^+b]$	$[5^3]$	[p4C,P(s),L(v,s),B]
71	[p4g,c4,d1]	$[a^+b^+b^-a^-c^+c^-; A^+c^-b^-]$	$[(3^2.4)^2]$	[p4gC,N(s),L(v,v),S]
72	[p4g,c4,d2]	$[(a^+ba^-c)^2; A^+cb]$	$[3^8]$	[p4gC,N(s),L(v,s),S]
73	[p4g,d2,c1]	$[a^+b^+c^+d^+e^+; A^+b^-d^+c^+e^-]$	$[3^2.4^3]$	[p4g $E_m$ ,F(s),L(v,s),S]
74	[p4g,d2,c1]	$[a^+b^+c^+d^+; A^+b^-d^+c^+]$	[3.5.4.5]	[p4g $E_m$ ,F(s),L(v,s), $B_1$ ]
75	[p4g,d2,c1]	$[a^+b^+c^+; A^+c^+b^+]$	$[6^2.4]$	[p4g $E_m$ ,F(s),L(v,s), $B_2$ ]
76	[p4g,d2,c4]	$[(a^+b^+)^4; A^+b^-]$	$[3^8]$	[p4g $E_m$ ,F(s),N,S]
77	[p4g,d2,d1]	$[ab^+c^+d^+d^-c^-b^-; Ab^-d^+c^+]$	$[3^3.4.3.4.3]$	[p4g $E_m$ ,P(s),L(v,s),S]
78	[p4g,d2,d1]	$[ab^+c^+c^-b^-; Ac^+b^+]$	$[4^5]$	[p4g $E_m$ ,P(s),L(v,s), $B_1$ ]





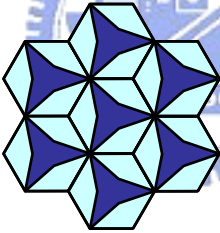


## 附錄八：7 種雙瓦片的等面鋪磚(p3m1)

結構(p3m1C) 正規瓦片(三次鏡射，三角星形)	 p3m1C		
對稱軸虛實	三邊皆實線	任兩邊為實線	
基本單元對稱軸虛實情況 (外邊,內邊 1,內邊 2)	 (F,F,F)	 (F,F,N)	 (F,N,F)
著色後圖形			
正規瓦片小時圖形 (S : small)	 [p3m1C,(F,F,F),S] No : 52	 [p3m1C,(F,F,N),S] No : 54	 同 No : : 54
正規瓦片 擴展後圖形 (B : big)	 [p3m1C,(F,F,F),B] No : 53	 [p3m1C,(F,F,N),B] No : 55	 同 No : 53

結構 (regular tile : d3)	 <p>p3m1C</p>		
對稱軸虛實	任二邊為實線	任一邊為實線	
基本單元對稱軸虛 實情況 (外邊,內邊 1,內邊 2)	 <p>(N,F,F)</p>	 <p>(N,F,N)</p>	 <p>(N,N,F)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p>[p3m1C,(N,F,F),S] No : 56</p>	 <p>[p3m1C,(N,F,N),S] No : 58</p>	 <p>同 No : 58</p>
正規瓦片 擴展後圖形 (B : big)	 <p>[p3m1C,(N,F,F),B] No : 57</p>	 <p>兩正規瓦片 Two 3-star</p>	<p>同 No : 57</p>



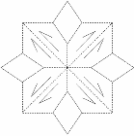
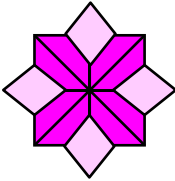
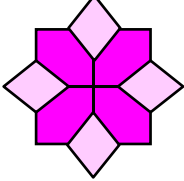
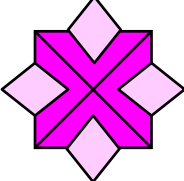
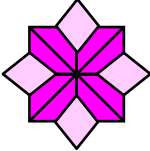
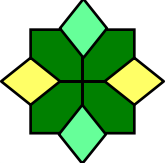

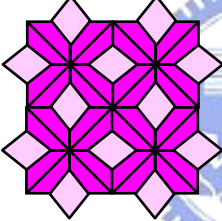
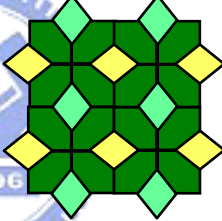
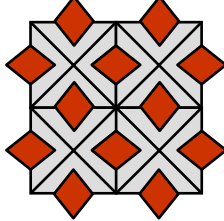
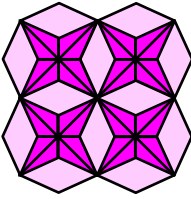
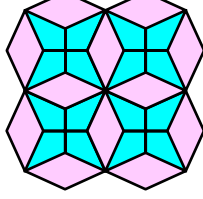
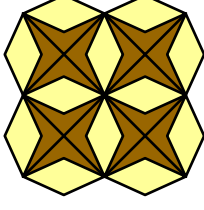
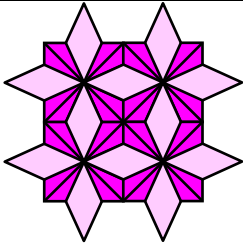
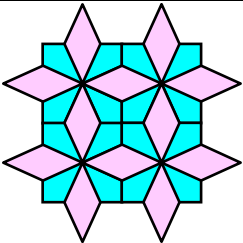
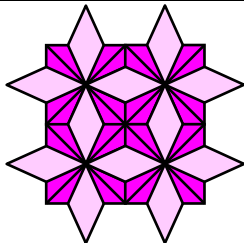
結構 (regular tile : d3)	 p3m1C	
對稱軸虛實	任一邊為實線	三邊皆為虛線
基本單元對稱軸虛 實情況 (外邊,內邊 1,內邊 2)	 (F,N,N)	 (N,N,N)
著色後圖形		
正規瓦片小時圖形 (S : small)	 不規則瓦片包住正規瓦片	 不規則瓦片無法收斂
正規瓦片 擴展後圖形 (B : big)	 同 No : 55	 兩正規瓦片 Two 3-star

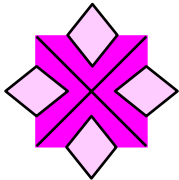
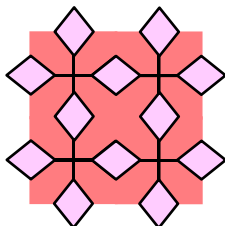
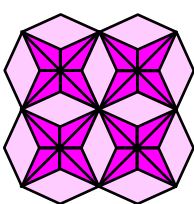
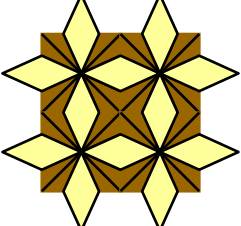
## 各類圖樣相關符號比較

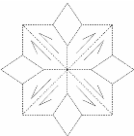
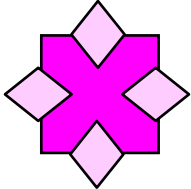
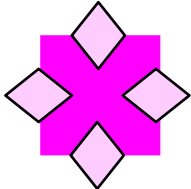
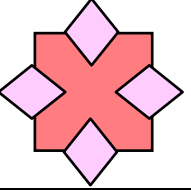
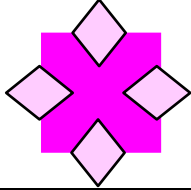
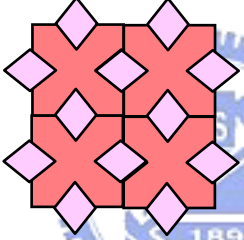
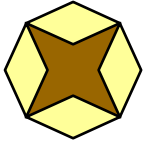
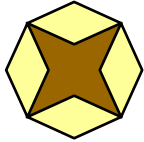
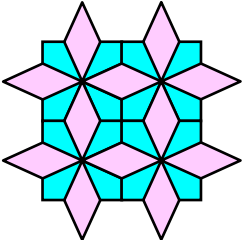
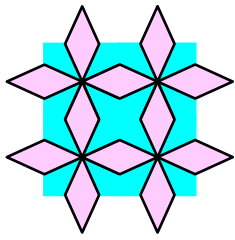
<i>No</i>	<i>Symmetries</i>	<i>Incidence</i>	<i>T class</i>	<i>Our symbol</i>
52	[p3m1,d3,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> d <sup>-</sup> ]	[3 <sup>2</sup> .6 <sup>2</sup> ]	[p3m1C,(F,F,F),S]
53	[p3m1,d3,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[3.6.9]	[p3m1C,(F,F,F),B]
54	[p3m1,d3,d1]	[ab <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ;Ab <sup>-</sup> c <sup>-</sup> ]	[3 <sup>2</sup> .6.3.6]	[p3m1C,(F,F,N),S]
55	[p3m1,d3,d1]	[ab <sup>+</sup> b <sup>-</sup> ;Ab <sup>-</sup> ]	[9 <sup>2</sup> .3]	[p3m1C,(F,F,N),B]
56	[p3m1,d3,d1]	[a <sup>+</sup> b <sup>+</sup> b <sup>-</sup> a <sup>-</sup> c <sup>+</sup> c <sup>-</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[3 <sup>6</sup> ]	[p3m1C,(N,F,F),S]
57	[p3m1,d3,d1]	[a <sup>+</sup> a <sup>-</sup> b <sup>+</sup> b <sup>-</sup> ;A <sup>+</sup> b <sup>-</sup> ]	[3.6.3 <sup>2</sup> ]	[p3m1C,(N,F,F),B]
58	[p3m1,d3,d3]	[(ab <sup>+</sup> b <sup>-</sup> ) <sup>3</sup> ;Ab <sup>-</sup> ]	[3 <sup>9</sup> ]	[p3m1C,(N,F,N),S]

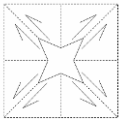

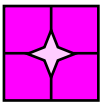
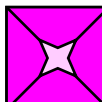
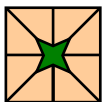
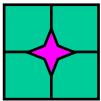
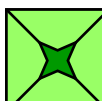
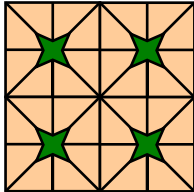
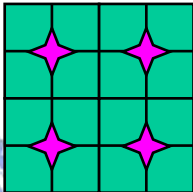
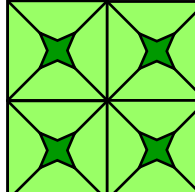
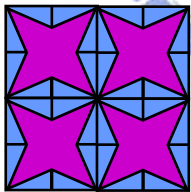
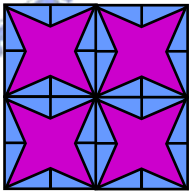
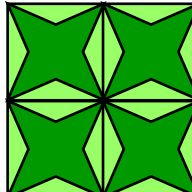
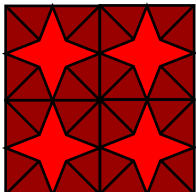
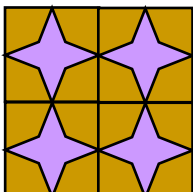
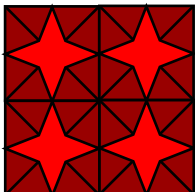


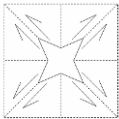

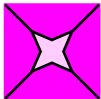
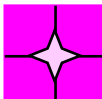


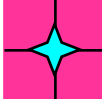
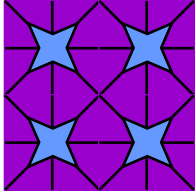
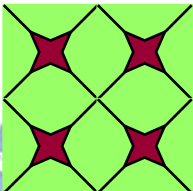
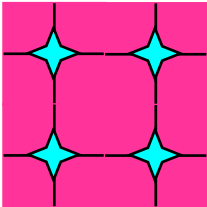
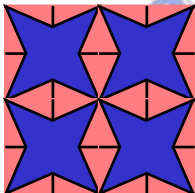
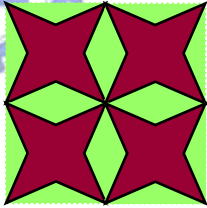
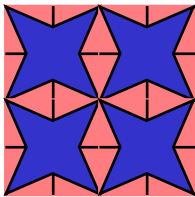
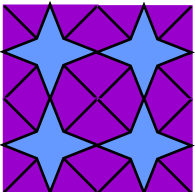
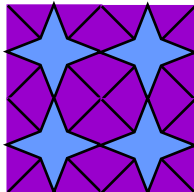
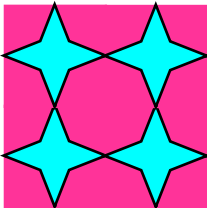
## 附錄九：19 種雙瓦片的等面鋪磚(p4m)

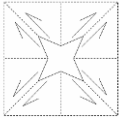

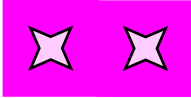
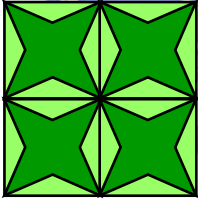
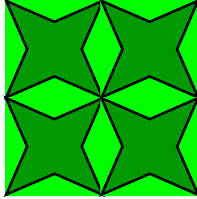
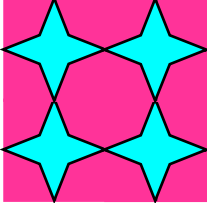
結構(p4m $E_m$ ) 正規瓦片(二次鏡射, 菱形)	 $p4m E_m$		
對稱軸虛實	三邊皆實線	任兩邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 (F,F,F)	 (F,F,N)	 (F,N,F)
著色後圖形			
正規瓦片小時圖形 (S : small)	 $[p4m E_m, (F,F,F), S]$ No : 79	 $[p4m E_m, (F,F,N), S]$ No : 81	 $[p4m E_m, (F,N,F), S]$ No : 83
正規瓦片 擴展後圖形 ( $B_v$ : 往頂點方向 擴展)	 同 No : 80	 同 No : 82	 $[p4m E_m, (F,N,F), B_v]$ No : 84
$B_c$ : 往中心方向擴 展	 $[p4m E_m, (F,F,F), B_c]$ No : 80	 $[p4m E_m, (F,F,N), B_c]$ No : 82	 同 No : 80

結構( $p4m E_m$ ) 正規瓦片(二次鏡射, 菱形)	 $p4m E_m$		
對稱軸虛實	任二邊為實線	任一邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 (N,F,F)	 (N,N,F)	 (N,F,N)
著色後圖形			
正規瓦片小時圖形 (S : small)	 同 No : 83	 不規則瓦片包住正規瓦片	 $[p4m E_m, (N,F,N), S]$ No : 85
正規瓦片 擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 同 No : 80	 同 No : 84	 同 No : 82
$B_c$ : 往中心方向擴展	 同 No : 84	 同 No : 84	 兩正規瓦片 Diamond+4-star

結構( $p4m E_m$ ) 正規瓦片(二次鏡射, 菱形)	 $p4m E_m$	
對稱軸虛實	任一邊為實線	三邊皆為虛線
基本單元 (外股,內股,斜邊) 虛實情況	 (F,N,N)	 (N,N,N)
著色後圖形		
正規瓦片小時圖形 (S : small)	 同 No : 85	不規則瓦片無法收斂
正規瓦片 擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 兩正規瓦片 Diamond +4-star	 兩正規瓦片 Diamond +4-star
$B_c$ : 往中心方向擴展	 同 No : 82	 兩正規瓦片 Diamond +4-star

結構(p4mC) 正規瓦片(四次鏡射, 四角星形)	 p4mC		
對稱軸虛實	三邊皆實線	任兩邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 (F,F,F)	 (F,F,N)	 (F,N,F)
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p>[p4mC,(F,F,F),S] No : 86</p>	 <p>[p4mC,(F,F,N),S] No : 89</p>	 <p>[p4mC,(F,N,F),S] No : 94</p>
	 <p>[p4mC,(F,F,F), <math>B_v</math> ] No : 87</p>	 <p>同 No : 87</p>	 <p>[p4mC,(F,N,F), <math>B_v</math> ] No : 95</p>
$B_{e_m}$ : 往邊中點方向擴展	 <p>[p4mC,(F,F,F), <math>B_{e_m}</math> ] No : 88</p>	 <p>[p4mC,(F,F,N), <math>B_{e_m}</math> ] No : 90</p>	 <p>同 No : 88</p>

結構(p4mC) 正規瓦片(四次鏡射, 四角星形)	 <p>p4mC</p>		
對稱軸虛實	任兩邊皆實線	任一邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p>(N,F,F)</p>	 <p>(N,N,F)</p>	 <p>(N,F,N)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p>[P4mC,(N,F,F),S] No : 91</p>	 <p>[P4mC,(N,N,F),S] No : 96</p>	 <p>[P4mC,(F,N,F),S] No : 97</p>
	 <p>[P4mC,(N,F,F), <math>B_v</math> ] No : 93</p>	 <p>兩正規瓦片 Diamond+4-star</p>	 <p>同 No : 93</p>
$B_{e_m}$ : 往邊中點方向擴展	 <p>[P4mC,(N,F,F), <math>B_{e_m}</math> ] No : 92</p>	 <p>同 No : 92</p>	 <p>兩正規瓦片 Two 4-star</p>

結構(p4mC) 正規瓦片(四次鏡射, 四角星形)	 p4mC	
對稱軸虛實	任一邊皆實線	三邊皆為虛線
基本單元 (外股,內股,斜邊) 虛實情況	 (F,N,N)	 (N,N,N)
著色後圖形		
正規瓦片小時圖形 (S : small)	 不規則瓦片包住正規瓦片	 不規則瓦片無法收斂
正規瓦片 擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 同 No : 95	 兩正規瓦片 Diamond+4-star
$B_{em}$ : 往邊中點方向擴展	 同 No : 90	 兩正規瓦片 Diamond+4-star

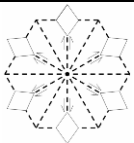
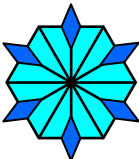
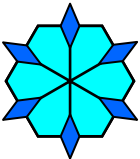
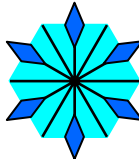
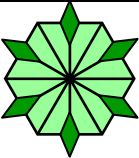
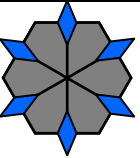
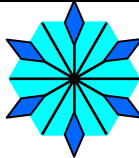
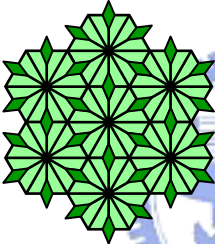
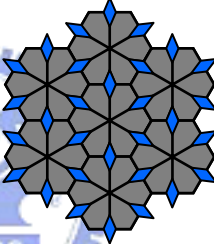
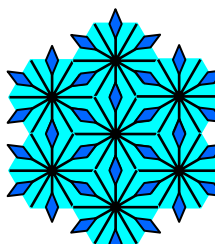
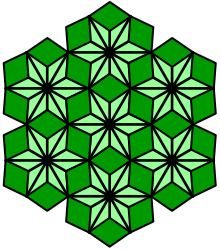
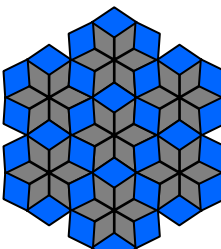
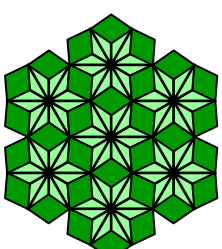
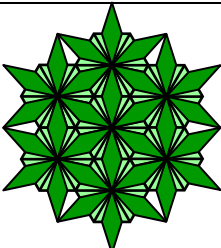
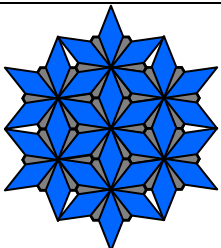
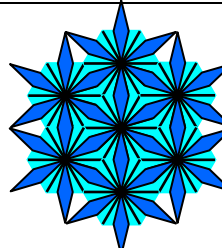


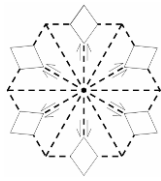


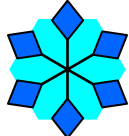
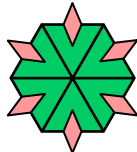

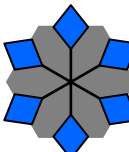
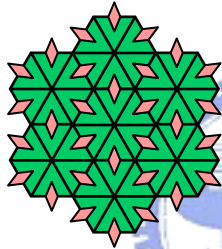

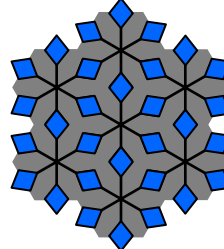
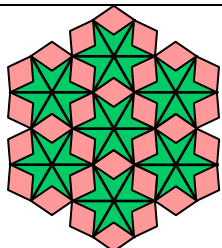
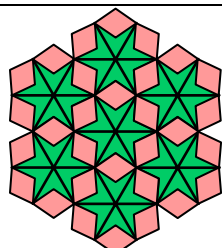
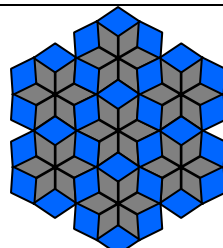
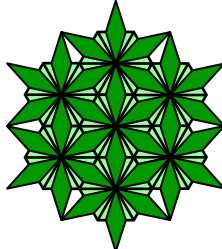
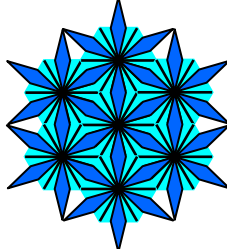
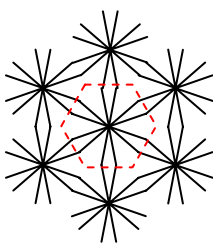
各類圖樣相關符號比較

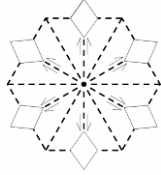


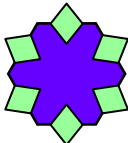
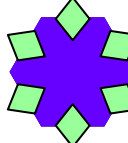
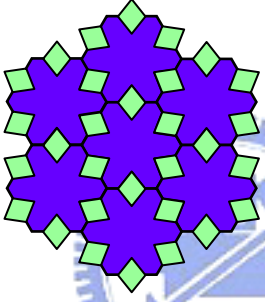
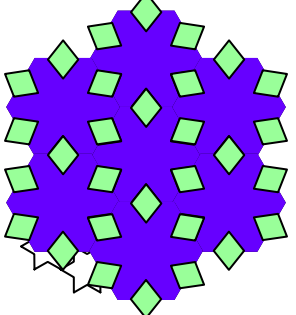
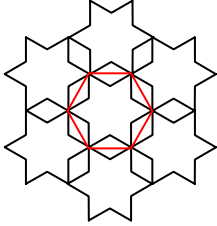
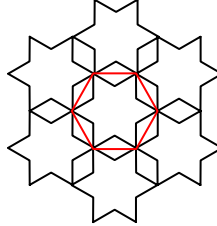
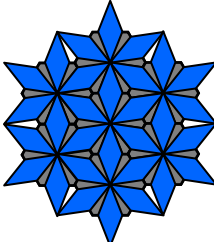
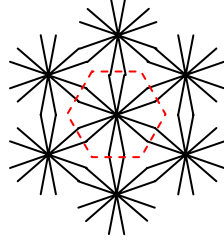
No	Symmetries	Incidence	T class	Our symbol
79	[p4m,d2,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> d <sup>-</sup> ]	[3 <sup>2</sup> .8 <sup>2</sup> ]	[p4m E <sub>m</sub> ,(F,F,F),S]
80	[p4m,d2,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[3.12.8]	[p4m E <sub>m</sub> ,(F,F,F), B <sub>c</sub> ]
81	[p4m,d2,d1]	[a <sup>+</sup> b <sup>+</sup> b <sup>-</sup> a <sup>-</sup> c <sup>+</sup> c <sup>-</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[(3 <sup>2</sup> .4) <sup>2</sup> ]	[p4m E <sub>m</sub> ,(F,F,N),S]
82	[p4m,d2,d1]	[a <sup>+</sup> a <sup>-</sup> b <sup>+</sup> b <sup>-</sup> ;A <sup>+</sup> b <sup>-</sup> ]	[3.8.3.4]	[p4m E <sub>m</sub> ,(F,F,N), B <sub>c</sub> ]
83	[p4m,d2,d1]	[ab <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ;Ab <sup>-</sup> c <sup>-</sup> ]	[3 <sup>2</sup> .8.4.8]	[p4m E <sub>m</sub> ,(F,N,F),S]
84	[p4m,d2,d1]	[ab <sup>+</sup> b <sup>-</sup> ;Ab <sup>-</sup> ]	[12 <sup>2</sup> .4]	[p4m E <sub>m</sub> ,(F,N,F), B <sub>v</sub> ]
85	[p4m,d2,d4]	[(ab <sup>+</sup> b <sup>-</sup> ) <sup>4</sup> ;Ab <sup>-</sup> ]	[(3 <sup>2</sup> .4) <sup>4</sup> ]	[p4m E <sub>m</sub> ,(N,F,N),S]
86	[p4m,d4,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> d <sup>-</sup> ]	[3 <sup>2</sup> .4.8]	[p4mC,(F,F,F),S]
87	[p4m,d4,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[3.4.12]	[p4mC,(F,F,F), B <sub>v</sub> ]
88	[p4m,d4,c1]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;A <sup>+</sup> b <sup>-</sup> c <sup>-</sup> ]	[3.6.8]	[p4mC,(F,F,F), B <sub>e<sub>m</sub></sub> ]
89	[p4m,d4,d1]	[ab <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ;Ab <sup>-</sup> c <sup>-</sup> ]	[3 <sup>2</sup> .4 <sup>3</sup> ]	[p4mC,(F,F,N),S]
90	[p4m,d4,d1]	[ab <sup>+</sup> b <sup>-</sup> ;Ab <sup>-</sup> ]	[6 <sup>2</sup> .4]	[p4mC,(F,F,N), B <sub>e<sub>m</sub></sub> ]
91	[p4m,d4,d1]	[a <sup>+</sup> ba <sup>-</sup> c <sup>+</sup> c <sup>-</sup> ;A <sup>+</sup> bc <sup>-</sup> ]	[3 <sup>4</sup> .4]	[p4mC,(N,F,F),S]
92	[p4m,d4,d1]	[a <sup>+</sup> a <sup>-</sup> b <sup>+</sup> b <sup>-</sup> ;A <sup>+</sup> b <sup>-</sup> ]	[(3.4) <sup>2</sup> ]	[p4mC,(N,F,F), B <sub>e<sub>m</sub></sub> ]
93	[p4m,d4,d1]	[a <sup>+</sup> a <sup>-</sup> b;A <sup>+</sup> b]	[3.8.3]	[p4mC,(N,F,F), B <sub>v</sub> ]
94	[p4m,d4,d1]	[ab <sup>+</sup> cb <sup>-</sup> ;Ab <sup>-</sup> c]	[3 <sup>2</sup> .8 <sup>2</sup> ]	[p4mC,(F,N,F),S]
95	[p4m,d4,d1]	[ab;Ab]	[12 <sup>2</sup> ]	[p4mC,(F,N,F), B <sub>v</sub> ]
96	[p4m,d4,d2]	[(ab <sup>+</sup> b <sup>-</sup> ) <sup>2</sup> ;Ab <sup>-</sup> ]	[(3 <sup>2</sup> .4) <sup>2</sup> ]	[p4mC,(N,N,F),S]
97	[p4m,d4,d4]	[(ab) <sup>4</sup> ;Ab]	[3 <sup>8</sup> ]	[p4mC,(F,N,F),S]

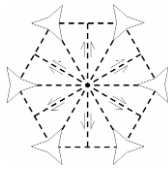
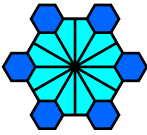
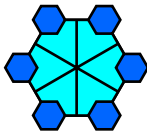
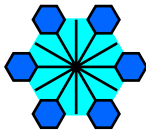
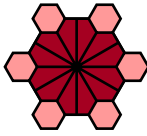
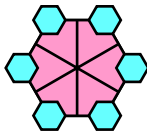
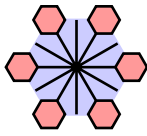
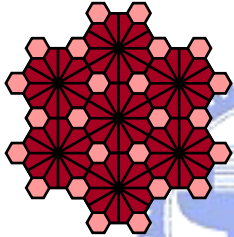
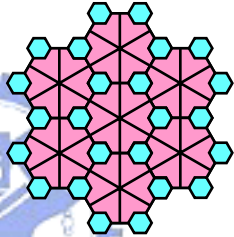
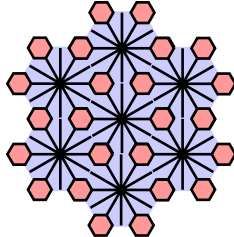
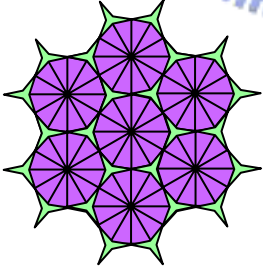
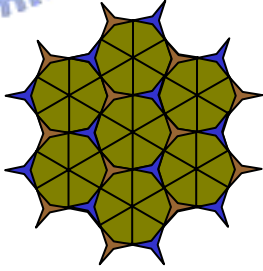
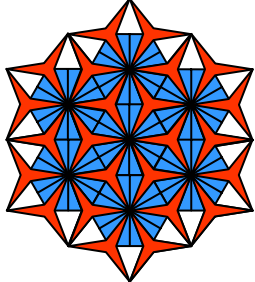
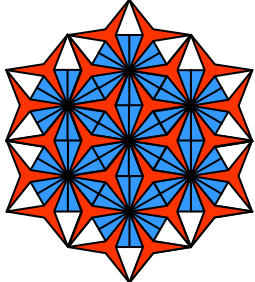


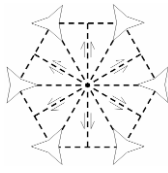
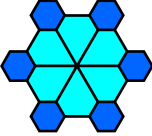
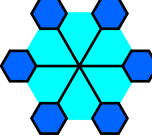
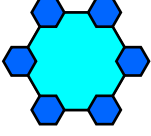
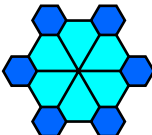
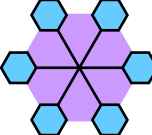
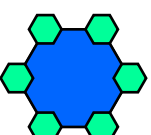
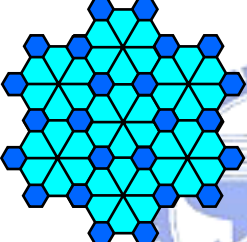
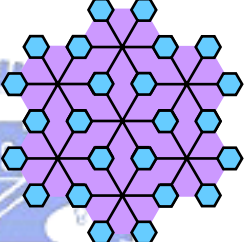
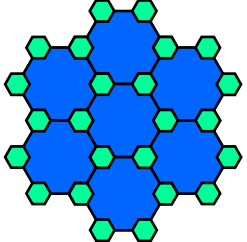
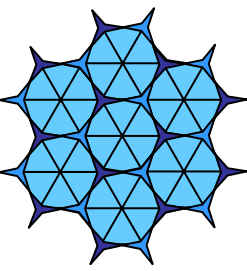
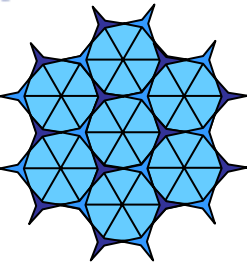
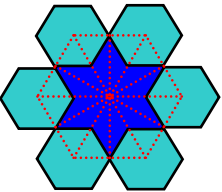
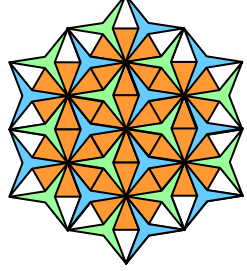
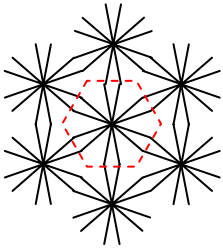
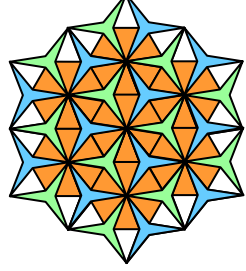
### 附錄十：36種雙瓦片的等面鋪磚(p6m)

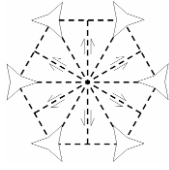
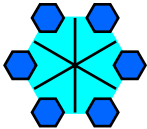
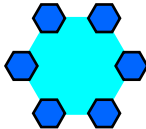
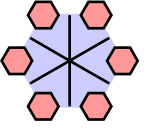
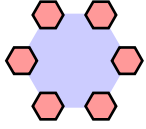
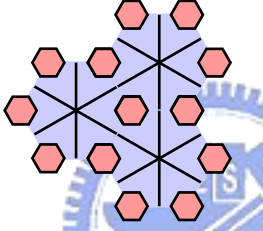
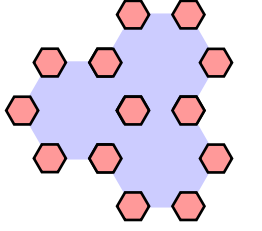
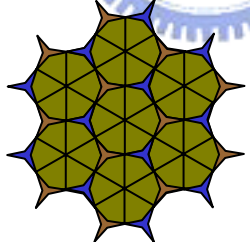
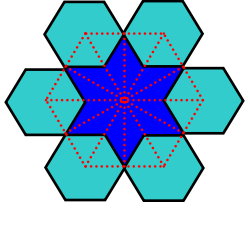
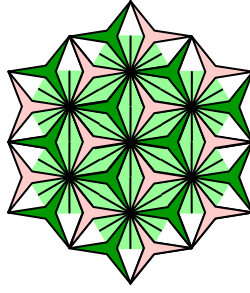
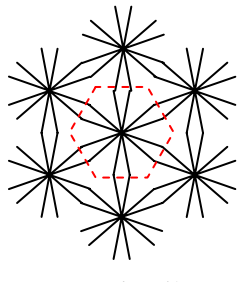
結構(p6m $E_m$ ) 正規瓦片(二次鏡射, 菱形)	 <p style="text-align: center;">p6m <math>E_m</math></p>		
對稱軸虛實	三邊皆實線	任兩邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況			
著色後圖形	 (F,F,F)	 (F,F,N)	 (N,F,F)
正規瓦片小時圖形 (S : small)	 [p6m $E_m$ , (F,F,F), S] No : 112	 [p6m $E_m$ , (F,F,N), S] No : 115	 [p6m $E_m$ , (N,F,F), S] No : 118
正規瓦片 擴展後圖形 ( $B_v$ : 往頂點方向 擴展)	 [p6m $E_m$ , (F,F,F), $B_v$ ] No : 113	 [p6m $E_m$ , (F,F,N), $B_v$ ] No : 116	 同 No : 113
$B_c$ : 往中心方向擴 展	 [p6m $E_m$ , (F,F,F), $B_c$ ] No : 114	 [p6m $E_m$ , (F,F,N), $B_c$ ] No : 117	 [p6m $E_m$ , (N,F,F), $B_c$ ] No : 119

結構( $p6m E_m$ ) 正規瓦片(二次鏡射, 菱形)	 <p style="text-align: center;"><math>p6m E_m</math></p>		
對稱軸虛實	任兩邊為實線	任一邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(F,N,F)</p>	 <p style="text-align: center;">(N,N,F)</p>	 <p style="text-align: center;">(N,F,N)</p>
著色後圖形			
正規瓦片 小時圖形 (S : small)	 <p style="text-align: center;">[<math>p6m E_m, (F,N,F), S</math>]</p> <p style="text-align: center;">No : 120</p>	 <p style="text-align: center;">不規則瓦片包住正規瓦片</p>	 <p style="text-align: center;">[<math>p6m E_m, (N,F,N), S</math>]</p> <p style="text-align: center;">No : 122</p>
正規瓦片擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 <p style="text-align: center;">[<math>p6m E_m, (F,N,F), B_v</math>]</p> <p style="text-align: center;">No : 121</p>	 <p style="text-align: center;">同 No : 121</p>	 <p style="text-align: center;">同 No : 116</p>
$B_c$ : 往中心方向擴展	 <p style="text-align: center;">同 No : 114</p>	 <p style="text-align: center;">同 No : 119</p>	 <p style="text-align: center;">兩正規瓦片</p> <p style="text-align: center;">Diamond+3-star</p>

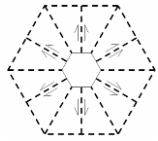
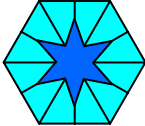
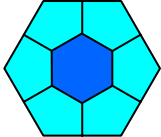
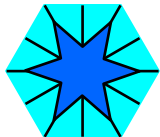
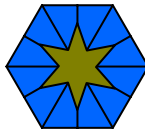
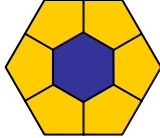
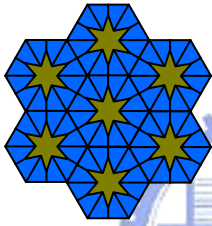
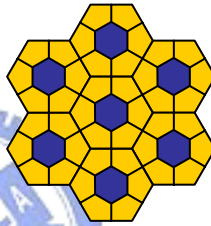
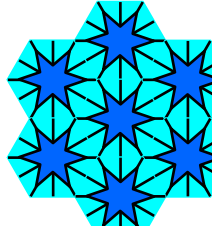
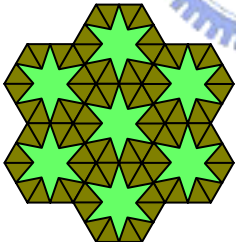
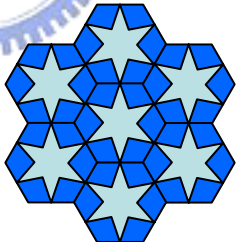
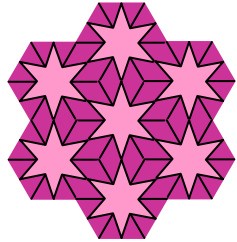
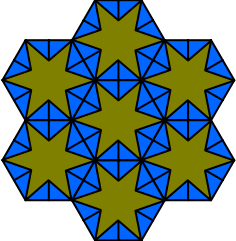
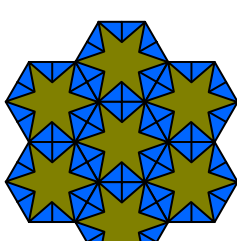
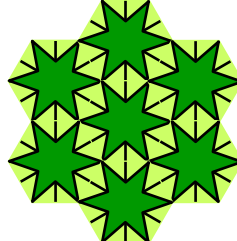
結構( $p6m E_m$ ) 正規瓦片(二次鏡射, 菱形)	 <p style="text-align: center;"><math>p6m E_m</math></p>	
對稱軸虛實	任一邊為實線	全為虛線
基本單元 (外股,內股,斜邊) 虛實情況		
著色後圖形	 <p style="text-align: center;">(F,N,N)</p>	 <p style="text-align: center;">(N,N,N)</p>
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[<math>p6m E_m, (F,N,N), S</math>] No : 123</p>	 <p style="text-align: center;">不規則瓦片無法收斂</p>
正規瓦片擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 <p style="text-align: center;">兩正規瓦片 Diamond+6-star</p>	 <p style="text-align: center;">兩正規瓦片 Diamond+6-star</p>
$B_c$ : 往中心方向擴展 展	 <p style="text-align: center;">同 No : 117</p>	 <p style="text-align: center;">兩正規瓦片 Diamond+3-star</p>

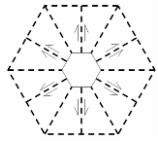
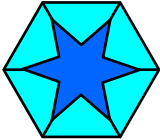
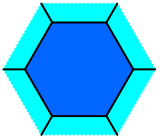
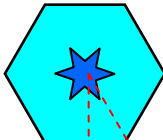





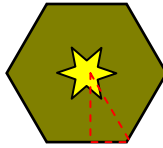
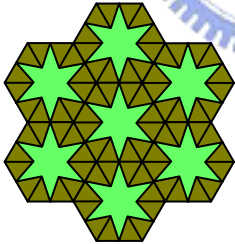
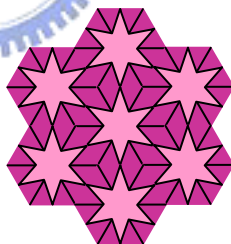
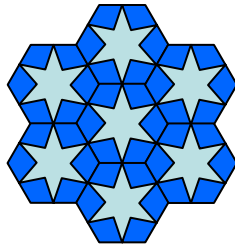
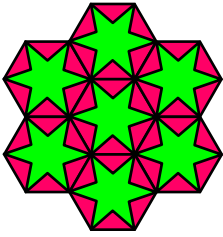
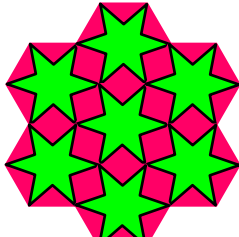
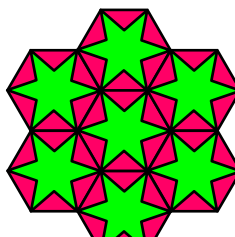
結構(p6mV) 正規瓦片(三次鏡射, 三角星形)	 <p style="text-align: center;">p6mV</p>		
對稱軸虛實	三邊為實線	任兩邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(F,F,F)</p>	 <p style="text-align: center;">(F,F,N)</p>	 <p style="text-align: center;">(N,F,F)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[p6mV,(F,F,F),S] No : 124</p>	 <p style="text-align: center;">[p6mV,(F,F,N),S] No : 127</p>	 <p style="text-align: center;">[p6mV,(N,F,F),S] No : 129</p>
	正規瓦片擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 <p style="text-align: center;">[p6mV,(F,F,F), <math>B_v</math>] No : 125</p>	 <p style="text-align: center;">[p6mV,(F,F,N), <math>B_v</math>] No : 128</p>
$B_c$ : 往中心方向擴展)		 <p style="text-align: center;">[p6mV,(F,F,F), <math>B_c</math>] No : 126</p>	 <p style="text-align: center;">同 No : 126</p>

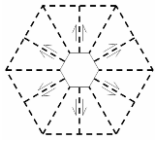
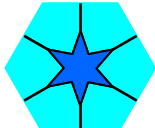
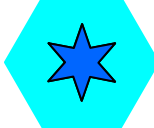
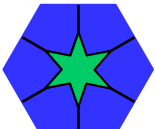

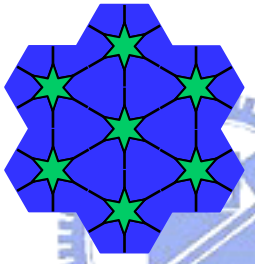
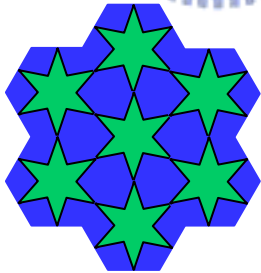
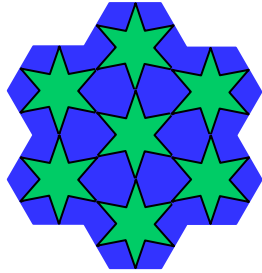
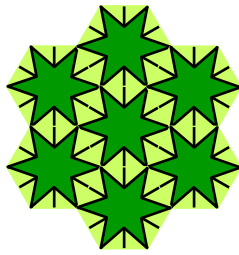
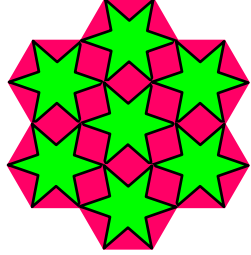
結構(p6mV) 正規瓦片(三次鏡射, 三角星形)	 <p style="text-align: center;">p6mV</p>		
對稱軸虛實	任兩邊為實線	任一邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(F,N,F)</p>	 <p style="text-align: center;">(N,N,F)</p>	 <p style="text-align: center;">(F,N,N)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[p6mV,(F,N,F),S] No : 131</p>	 <p style="text-align: center;">[p6mV,(N,N,F),S] No : 134</p>	 <p style="text-align: center;">[p6mV,(F,N,N),S] No : 135</p>
正規瓦片擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 <p style="text-align: center;">[p6mV,(F,N,F), <math>B_v</math>] No : 132</p>	 <p style="text-align: center;">同 No : 132</p>	 <p style="text-align: center;">兩正規瓦片 Hexagon+6-star</p>
$B_c$ : 往中心方向擴展	 <p style="text-align: center;">[p6mV,(F,N,F), <math>B_c</math>] No : 133</p>	 <p style="text-align: center;">兩正規瓦片 Diamond+3-star</p>	 <p style="text-align: center;">同 No : 133</p>

結構(p6mV) 正規瓦片(三次鏡射, 三角星形)	 <p style="text-align: center;">p6mV</p>	
對稱軸虛實	任一邊為實線	三邊皆為虛線
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(N,F,N)</p>	 <p style="text-align: center;">(N,N,N)</p>
著色後圖形		
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">不規則瓦片包住正規瓦片</p>	 <p style="text-align: center;">不規則瓦片無法收斂</p> <p style="text-align: center;">No : 134</p>
正規瓦片擴展後圖形 ( $B_v$ : 往頂點方向擴展)	 <p style="text-align: center;">同 No : 128</p>	 <p style="text-align: center;">兩正規瓦片</p> <p style="text-align: center;">Hexagon+6-star</p>
$B_c$ : 往中心方向擴展	 <p style="text-align: center;">同 No : 130</p>	 <p style="text-align: center;">兩正規瓦片</p> <p style="text-align: center;">Diamond+3-star</p>



結構(p6mC) 正規瓦片(六重鏡射)	 <p style="text-align: center;">p6mC</p>		
對稱軸虛實	三邊為實線	任兩邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(F,F,F)</p>	 <p style="text-align: center;">(F,F,N)</p>	 <p style="text-align: center;">(N,F,F)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[p6mC,(F,F,F),S] No : 136</p>	 <p style="text-align: center;">[p6mC,(F,F,N),S] No : 139</p>	 <p style="text-align: center;">[p6mC,(N,F,F),S] No : 141</p>
	 <p style="text-align: center;">[p6mC,(F,F,F),<math>B_{e_m}</math>] No : 137</p>	 <p style="text-align: center;">[p6mC,(F,F,N),<math>B_{e_m}</math>] No : 140</p>	 <p style="text-align: center;">[p6mC,(N,F,F),<math>B_{e_m}</math>] No : 143</p>
$B_v$ : 往頂點方向擴展	 <p style="text-align: center;">[p6mC,(F,F,F),<math>B_v</math>] No : 138</p>	 <p style="text-align: center;">同 No : 138</p>	 <p style="text-align: center;">[p6mC,(N,F,F),<math>B_v</math>] No : 142</p>

結構(p6mC) 正規瓦片(六重鏡射)	 <p>p6mC</p>		
對稱軸虛實	任兩邊為實線	任一邊為實線	
基本單元 (外股,內股,斜邊) 虛實情況	 <p>(F,N,F)</p>	 <p>(N,N,F)</p>	 <p>(F,N,N)</p>
著色後圖形			
正規瓦片小時圖形 (S : small)	 <p>[p6mC,(F,N,F),S]</p> <p>No : 144</p>	 <p>[p6mC,(N,N,F),S]</p> <p>No : 146</p>	 <p>不規則瓦片包住正規瓦片</p> <p>No : 141</p>
正規瓦片擴展後圖形 ( $B_{e_m}$ : 往邊中點方向擴展)	 <p>同 No : 137</p> <p>No : 137</p>	 <p>同 No : 143</p>	 <p>同 No : 140</p>
$B_v$ : 往頂點方向擴展	 <p>[p6mC,(F,N,F), <math>B_v</math>]</p> <p>No : 145</p>	 <p>兩正規瓦片</p> <p>Diamond+6-star</p>	 <p>同 No : 145</p>

結構(p6mC) 正規瓦片(六重鏡射)	 <p style="text-align: center;">p6mC</p>	
對稱軸虛實	任一邊為實線	全為虛線
基本單元 (外股,內股,斜邊) 虛實情況	 <p style="text-align: center;">(N,F,N)</p>	 <p style="text-align: center;">(N,N,N)</p>
著色後圖形		
正規瓦片小時圖形 (S : small)	 <p style="text-align: center;">[p6mC,(N,F,N),S] No : 147</p>	<p style="text-align: center;">不規則瓦片無法收斂</p>
正規瓦片擴展後圖形 ( $B_{e_m}$ : 往邊中點方向擴展)	 <p style="text-align: center;">兩正規瓦片 3-star+6-star</p>	 <p style="text-align: center;">兩正規瓦片 3-star+6-star</p>
$B_v$ : 往頂點方向擴展	 <p style="text-align: center;">同 No : 142</p>	 <p style="text-align: center;">兩正規瓦片 Diamond+6-star</p>

各類圖樣相關符號比較

No	Symmetries	Incidence	T class	Our symbol
112	[p6m,d2,c1]	$[a^+b^+c^+d^+;A^+b^-c^-d^-]$	$[3^2.6.12]$	$[p6m E_m, (F,F,F), S]$
113	[p6m,d2,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.9.12]$	$[p6m E_m, (F,F,F), B_v]$
114	[p6m,d2,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.18.6]$	$[p6m E_m, (F,F,F), B_c]$
115	[p6m,d2,d1]	$[a^+b^+b^-a^-c^+c^-;A^+b^-c^-]$	$[3^5.6]$	$[p6m E_m, (F,F,N), S]$
116	[p6m,d2,d1]	$[a^+a^-b^+b^-;A^+b^-]$	$[(3.6)^2]$	$[p6m E_m, (F,F,N), B_v]$
117	[p6m,d2,d1]	$[a^+a^-b^+b^-;A^+b^-]$	$[3.12.3^2]$	$[p6m E_m, (F,F,N), B_c]$
118	[p6m,d2,d1]	$[a^+b^+c^+c^-b^-;A^+b^-c^-]$	$[3^2.12.3.12]$	$[p6m E_m, (N,F,F), S]$
119	[p6m,d2,d1]	$[ab^+b^-;Ab^-]$	$[18^2.3]$	$[p6m E_m, (N,F,F), B_c]$
120	[p6m,d2,d1]	$[ab^+c^+c^-b^-;Ab^-c^-]$	$[3^2.6^3]$	$[p6m E_m, (F,N,F), S]$
121	[p6m,d2,d1]	$[ab^+b^-;Ab^-]$	$[9^2.6]$	$[p6m E_m, (F,N,F), B_v]$
122	[p6m,d2,d3]	$[(ab^+b^-)^3;Ab^-]$	$[(3^2.6)^3]$	$[p6m E_m, (N,F,N), S]$
123	[p6m,d2,d6]	$[(ab^+b^-)^6;Ab^-]$	$[3^{18}]$	$[p6m E_m, (F,N,N), S]$
124	[p6m,d3,c1]	$[a^+b^+c^+d^+;A^+b^-c^-d^-]$	$[3^2.4.12]$	$[p6m V, (F,F,F), S]$
125	[p6m,d3,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.6.12]$	$[p6m V, (F,F,F), B_v]$
126	[p6m,d3,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.18.4]$	$[p6m V, (F,F,F), B_c]$
127	[p6m,d3,d1]	$[ab^+c^+c^-b^-;Ab^-c^-]$	$[3^2.4.6.4]$	$[p6m V, (F,F,N), S]$
128	[p6m,d3,d1]	$[ab^+b^-;Ab^-]$	$[6^3]$	$[p6m V, (F,F,N), B_v]$
129	[p6m,d3,d1]	$[ab^+cb^-;Ab^-c^-]$	$[3^2.12^2]$	$[p6m V, (N,F,F), S]$
130	[p6m,d3,d1]	$[ab;Ab]$	$[18^2]$	$[p6m V, (N,F,F), B_c]$
131	[p6m,d3,d1]	$[a^+ba^-c^+c^-;A^+bc^-]$	$[3^4.6]$	$[p6m V, (F,N,F), S]$
132	[p6m,d3,d1]	$[a^+a^-b^+b^-;A^+b^-]$	$[3.4.3.6]$	$[p6m V, (F,N,F), B_v]$
133	[p6m,d3,d1]	$[a^+a^-b;A^+b]$	$[3.12.3]$	$[p6m V, (F,N,F), B_c]$
134	[p6m,d3,d2]	$[(ab^+b^-)^2;Ab^-]$	$[(3^2.6)^2]$	$[p6m V, (N,N,F), S]$
135	[p6m,d3,d6]	$[(ab)^6;Ab]$	$[3^{12}]$	$[p6m V, (F,N,N), S]$
136	[p6m,d6,c1]	$[a^+b^+c^+d^+;A^+b^-c^-d^-]$	$[3^2.4.6]$	$[p6m C, (F,F,F), S]$
137	[p6m,d6,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.6^2]$	$[p6m C, (F,F,F), B_{e_m}]$
138	[p6m,d6,c1]	$[a^+b^+c^+;A^+b^-c^-]$	$[3.9.4]$	$[p6m C, (F,F,F), B_v]$

<i>No</i>	<i>Symmetries</i>	<i>Incidence</i>	<i>T class</i>	<i>Our symbol</i>
139	[p6m,d6,d1]	$[ab^+c^+c^-b^-;Ab^-c^-]$	$[3^2.4.3.4]$	[p6mC,(F,F,N),S]
140	[p6m,d6,d1]	$[ab^+b^-;Ab^-]$	$[6^2.3]$	[p6mC,(F,F,N), $B_{e_m}$ ]
141	[p6m,d6,d1]	$[a^+ba^-c^+c^-;A^+bc^-]$	$[3^5]$	[p6mC,(N,F,F),S]
142	[p6m,d6,d1]	$[a^+a^-b^-;A^+b^-]$	[3.6.3]	[p6mC,(N,F,F), $B_v$ ]
143	[p6m,d6,d1]	$[a^+a^-b^+b^-;A^+b^-]$	$[3.4.3^2]$	[p6mC,(N,F,F), $B_{e_m}$ ]
144	[p6m,d6,d1]	$[ab^+cb^-;Ab^-c^-]$	$[3^2.6^2]$	[p6mC,(F,N,F),S]
145	[p6m,d6,d1]	[ab;Ab]	$[9^2]$	[p6mC,(F,N,F), $B_v$ ]
146	[p6m,d6,d2]	$[(ab^+b^-)^2;Ab^-]$	$[3^6]$	[p6mC,(N,N,F),S]
147	[p6m,d6,d3]	$[(ab)^3;Ab]$	$[3^6]$	[p6mC,(N,F,N),S]





## 附錄十一：93 種單瓦片等面鋪磚型態

Isohedral type	Topological type	Incidence symbol	Symmetry group	Induced tile group
IH1	[3 <sup>6</sup> ]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ]	p1	c1
IH2		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;b <sup>-</sup> a <sup>-</sup> f <sup>+</sup> e <sup>-</sup> d <sup>-</sup> c <sup>+</sup> ]	pg	c1
IH3		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;c <sup>-</sup> e <sup>+</sup> a <sup>-</sup> f <sup>-</sup> b <sup>+</sup> d <sup>-</sup> ]	pg	c1
IH4		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;a <sup>+</sup> e <sup>+</sup> c <sup>+</sup> d <sup>+</sup> b <sup>+</sup> f <sup>+</sup> ]	p2	c1
IH5		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;a <sup>+</sup> e <sup>+</sup> d <sup>-</sup> c <sup>-</sup> b <sup>-</sup> f <sup>+</sup> ]	pgg	c1
IH6		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;a <sup>+</sup> e <sup>-</sup> c <sup>+</sup> f <sup>-</sup> b <sup>-</sup> d <sup>-</sup> ]	pgg	c1
IH7		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> f <sup>+</sup> ;b <sup>+</sup> a <sup>+</sup> d <sup>+</sup> c <sup>+</sup> f <sup>+</sup> e <sup>+</sup> ]	p3	c1
IH8		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ]	p2	c2
IH9		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ;a <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ]	pgg	c2
IH10		[a <sup>+</sup> b <sup>+</sup> a <sup>+</sup> b <sup>+</sup> a <sup>+</sup> b <sup>+</sup> ;b <sup>+</sup> a <sup>+</sup> ]	p3	c3
IH11		[a <sup>+</sup> a <sup>+</sup> a <sup>+</sup> a <sup>+</sup> a <sup>+</sup> a <sup>+</sup> ;a <sup>+</sup> ]	p6	c6
IH12		[ab <sup>+</sup> c <sup>+</sup> dc <sup>-</sup> b <sup>-</sup> ;dc <sup>-</sup> b <sup>-</sup> a]	cm	d1(s)
IH13		[ab <sup>+</sup> c <sup>+</sup> dc <sup>-</sup> b <sup>-</sup> ;db <sup>+</sup> c <sup>+</sup> a]	pmg	d1(s)
IH14		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> a <sup>-</sup> ;c <sup>-</sup> b <sup>-</sup> a <sup>-</sup> ]	cm	d1(l)
IH15		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> a <sup>-</sup> ;a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> ]	pmg	d1(l)
IH16		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> a <sup>-</sup> ;a <sup>-</sup> c <sup>+</sup> b <sup>+</sup> ]	p31m	d1(l)
IH17		[ab <sup>+</sup> b <sup>+</sup> ab <sup>+</sup> b <sup>+</sup> ;ab <sup>+</sup> ]	cmm	d2
IH18		[ababab;ba]	p31m	d3(s)
IH19		[a <sup>+</sup> a <sup>-</sup> a <sup>+</sup> a <sup>-</sup> a <sup>+</sup> a <sup>-</sup> ;a <sup>-</sup> ]	p3m1	d3(l)
IH20		[aaaaaa;a]	p6m	d6
IH21	[3 <sup>4</sup> .6]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;e <sup>+</sup> c <sup>+</sup> b <sup>+</sup> d <sup>+</sup> a <sup>+</sup> ]	p6	c1
IH22	[3 <sup>2</sup> .4 <sup>2</sup> ]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>-</sup> e <sup>+</sup> d <sup>-</sup> c <sup>-</sup> b <sup>+</sup> ]	cm	c1
IH23		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>+</sup> e <sup>+</sup> c <sup>+</sup> d <sup>+</sup> b <sup>+</sup> ]	p2	c1
IH24		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>-</sup> e <sup>+</sup> c <sup>+</sup> d <sup>+</sup> b <sup>+</sup> ]	pmg	c1
IH25		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>+</sup> e <sup>+</sup> d <sup>-</sup> c <sup>-</sup> b <sup>+</sup> ]	pgg	c1
IH26		[ab <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ;ab <sup>-</sup> c <sup>+</sup> ]	cmm	d1
IH27	[3 <sup>2</sup> .4.3.4]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>+</sup> d <sup>-</sup> e <sup>-</sup> b <sup>-</sup> c <sup>-</sup> ]	pgg	c1
IH28		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> e <sup>+</sup> ;a <sup>+</sup> c <sup>+</sup> b <sup>+</sup> e <sup>+</sup> d <sup>+</sup> ]	p4	c1
IH29		[ab <sup>+</sup> c <sup>+</sup> c <sup>-</sup> b <sup>-</sup> ;ac <sup>+</sup> b <sup>+</sup> ]	p4g	d1
IH30	[3.4.6.4]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;a <sup>-</sup> b <sup>-</sup> d <sup>+</sup> c <sup>+</sup> ]	p31m	c1
IH31		[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;b <sup>+</sup> a <sup>+</sup> d <sup>+</sup> c <sup>+</sup> ]	p6	c1
IH32		[a <sup>+</sup> a <sup>-</sup> b <sup>+</sup> b <sup>-</sup> ;a <sup>-</sup> b <sup>-</sup> ]	p6m	d1
IH33	[3.6.3.6]	[a <sup>+</sup> b <sup>+</sup> c <sup>+</sup> d <sup>+</sup> ;d <sup>+</sup> c <sup>+</sup> b <sup>+</sup> a <sup>+</sup> ]	p3	c1

IH34		$[a^+b^+a^+b^+; b^+a^+]$	p6	c2
IH35		$[a^+b^+b^-a^-; a^-b^-]$	p3m1	d1(s)
IH36		$[a^+a^-b^+b^-; b^-a^-]$	p31m	d1(l)
IH37		$[a^+a^-a^+a^-; a^-]$	p6m	d2
IH38	[3.12 <sup>2</sup> ]	$[a^+b^+c^+; a^-c^+b^+]$	p31m	c1
IH39		$[a^+b^+c^+; a^+c^+b^+]$	p6	c1
IH40		$[a^+b^+b^-; ab^-]$	p6m	d1
IH41	[4 <sup>4</sup> ]	$[a^+b^+c^+d^+; c^+d^+a^+b^+]$	p1	c1
IH42		$[a^+b^+c^+d^+; c^+b^-a^+d^-]$	pm	c1
IH43		$[a^+b^+c^+d^+; c^-d^+a^-b^+]$	pg	c1
IH44		$[a^+b^+c^+d^+; b^-a^-d^-c^-]$	pg	c1
IH45		$[a^+b^+c^+d^+; c^-b^-a^-d^-]$	cm	c1
IH46		$[a^+b^+c^+d^+; a^+b^+c^+d^+]$	p2	c1
IH47		$[a^+b^+c^+d^+; c^+b^+a^+d^+]$	p2	c1
IH48		$[a^+b^+c^+d^+; a^-b^-c^-d^-]$	pmm	c1
IH49		$[a^+b^+c^+d^+; a^-b^+c^-d^+]$	pmg	c1
IH50		$[a^+b^+c^+d^+; c^+b^-a^+d^+]$	pmg	c1
IH51		$[a^+b^+c^+d^+; c^-b^+a^-d^+]$	pgg	c1
IH52		$[a^+b^+c^+d^+; c^-d^-a^-b^-]$	pgg	c1
IH53		$[a^+b^+c^+d^+; b^-a^-c^+d^+]$	pgg	c1
IH54		$[a^+b^+c^+d^+; a^-b^-c^-d^+]$	cmm	c1
IH55		$[a^+b^+c^+d^+; b^+a^+d^+c^+]$	p4	c1
IH56		$[a^+b^+c^+d^+; b^+a^+c^-d^-]$	p4g	c1
IH57		$[a^+b^+a^+b^+; a^+b^+]$	p2	c2
IH58		$[a^+b^+a^+b^+; a^-b^+]$	pmg	c2
IH59		$[a^+b^+a^+b^+; b^-a^-]$	pgg	c2
IH60		$[a^+b^+a^+b^+; a^-b^-]$	cmm	c2
IH61		$[a^+b^+a^+b^+; b^+a^+]$	p4	c2
IH62		$[a^+a^+a^+a^+; a^+]$	p4	c4
IH63		$[a^+a^+a^+a^+; a^-]$	p4g	c4
IH64		$[ab^+cb^-; cb^-a]$	pm	d1(s)
IH65		$[ab^+cb^-; ab^-c]$	pmm	d1(s)
IH66		$[ab^+cb^-; cb^+a]$	pmg	d1(s)
IH67		$[ab^+cb^-; ab^+c]$	cmm	d1(s)
IH68		$[a^+b^+b^-a^-; b^-a^-]$	cm	d1(l)
IH69		$[a^+b^+b^-a^-; a^+b^+]$	pmg	d1(l)
IH70		$[a^+b^+b^-a^-; a^-b^-]$	p4m	d1(l)
IH71		$[a^+b^+b^-a^-; b^+a^+]$	p4g	d1(l)



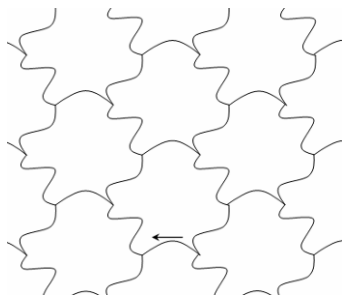
IH72		$[abab; ab]$	pmm	d2(s)
IH73		$[abab; ba]$	p4g	d2(s)
IH74		$[a^+a^-a^+a^-; a^+]$	cmm	d2(l)
IH75		$[a^+a^-a^+a^-; a^-]$	p4m	d2(l)
IH76		$[aaaa; a]$	p4m	d4
IH77	[4.6.12]	$[a^+b^+c^+; a^-b^-c^-]$	p6m	c1
IH78	[4.8 <sup>2</sup> ]	$[a^+b^+c^+; a^+b^-c^-]$	cmm	c1
IH79		$[a^+b^+c^+; a^+c^+b^+]$	p4	c1
IH80		$[a^+b^+c^+; a^-b^-c^-]$	p4m	c1
IH81		$[a^+b^+c^+; a^-c^+b^+]$	p4g	c1
IH82		$[ab^+b^-; ab^-]$	p4m	d1
IH83	[6 <sup>3</sup> ]	$[a^+b^+c^+; b^-a^-c^-]$	cm	c1
IH84		$[a^+b^+c^+; a^+b^+c^+]$	p2	c1
IH85		$[a^+b^+c^+; a^-b^+c^+]$	pmg	c1
IH86		$[a^+b^+c^+; b^-a^-c^+]$	pgg	c1
IH87		$[a^+b^+c^+; a^-b^-c^-]$	p3m1	c1
IH88		$[a^+b^+c^+; b^+a^+c^+]$	p6	c1
IH89		$[a^+a^+a^+; a^-]$	p31m	c3
IH90		$[a^+a^+a^+; a^+]$	p6	c3
IH91		$[ab^+b^-; ab^+]$	cmm	d1
IH92		$[ab^+b^-; ab^-]$	p6m	d1
IH93		$[aaa; a]$	p6m	d3

資料來源：

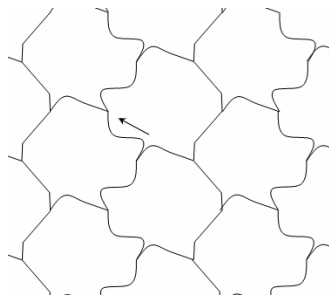
- [1] Grünbaum, B., Shephard, G. C., Tilings and Patterns, W. H. Freeman and Company, New York, 1987.



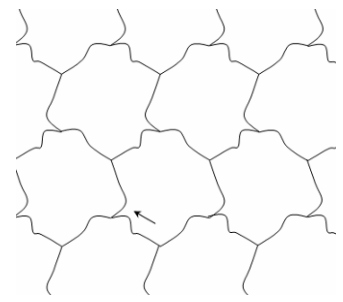
## 附錄十二：93種單瓦片等面鋪磚圖樣



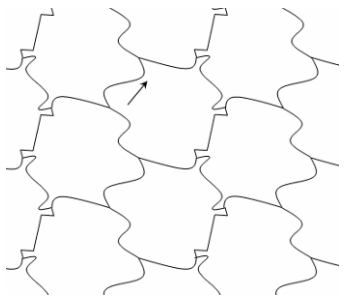
IH1



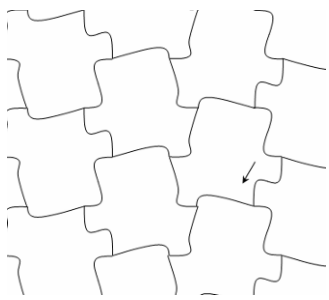
IH2



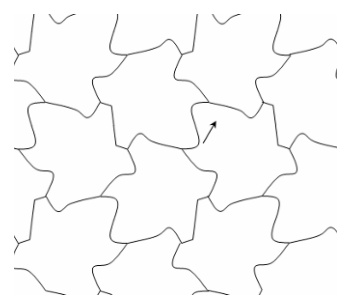
IH3



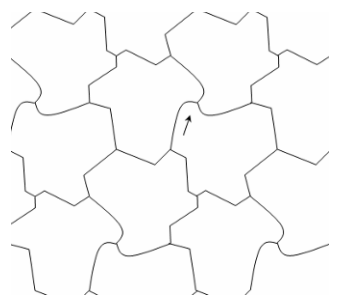
IH4



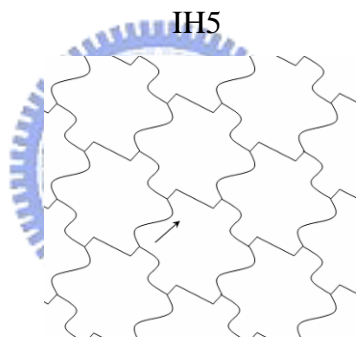
IH5



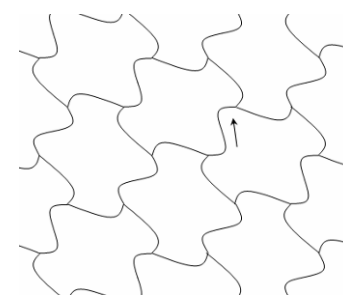
IH6



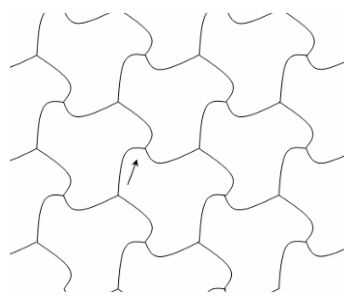
IH7



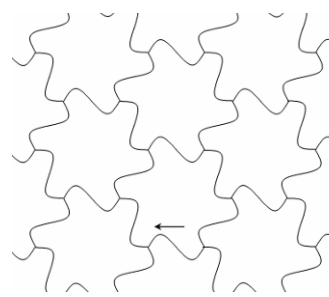
IH8



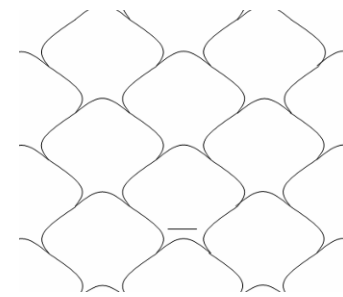
IH9



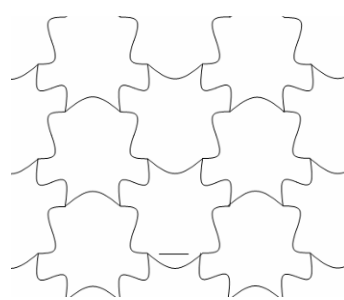
IH10



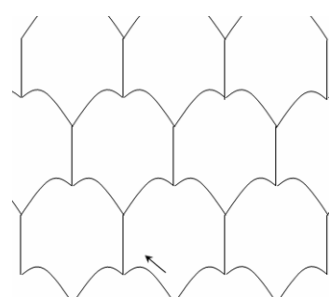
IH11



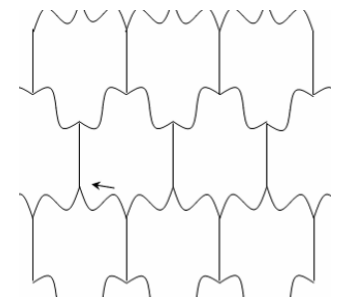
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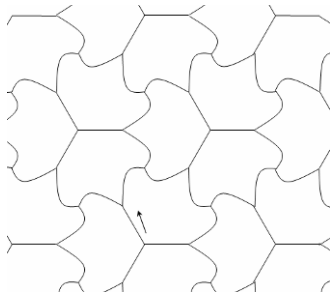
IH13



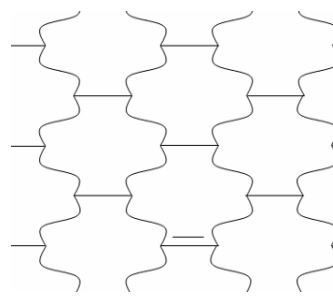
IH14



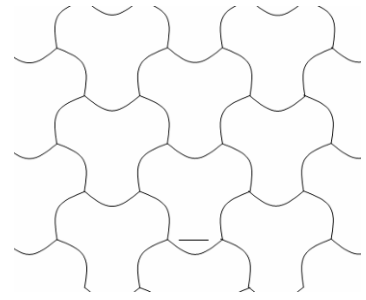
IH15



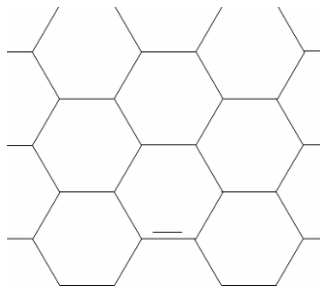
IH16



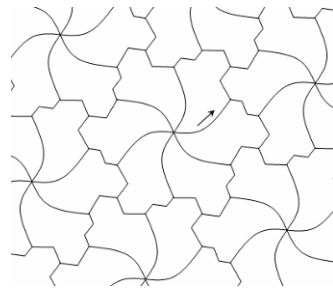
IH17



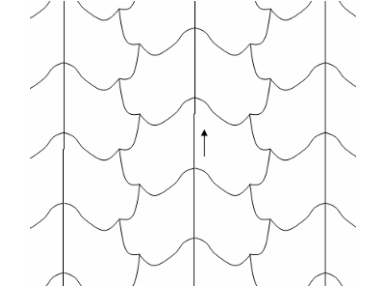
IH18



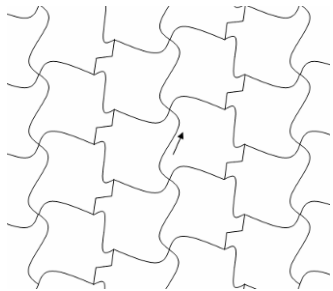
IH20



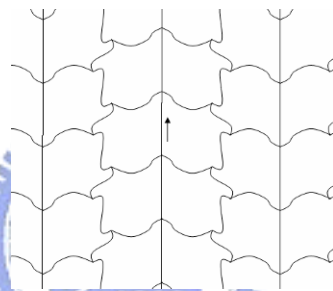
IH21



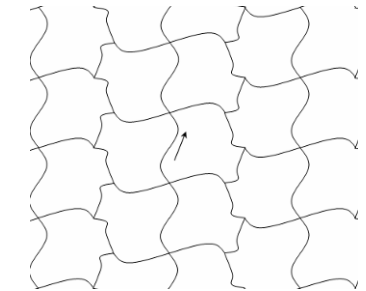
IH22



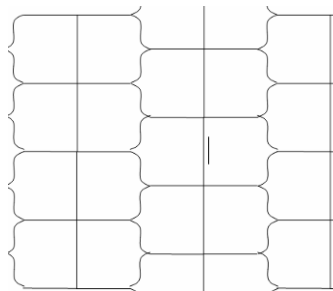
IH23



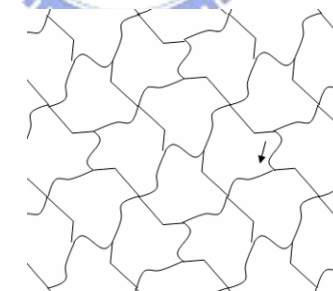
IH24



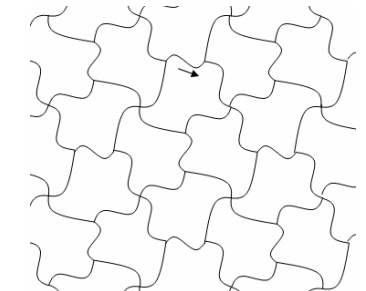
IH25



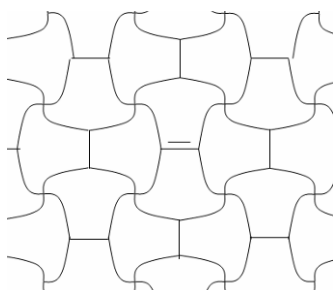
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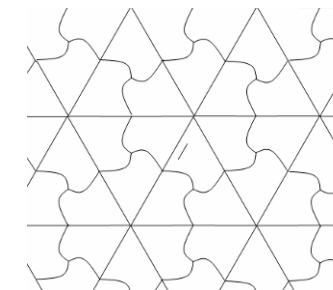
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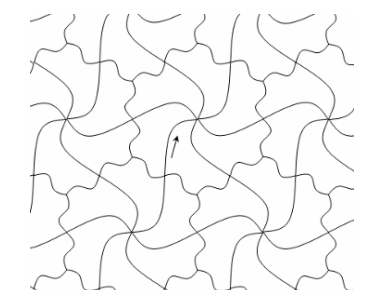
IH28



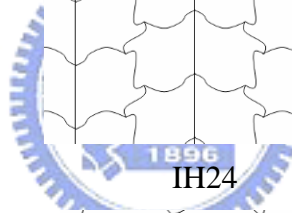
IH29

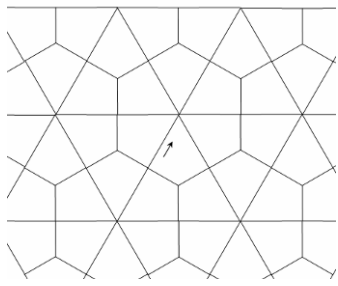


IH30

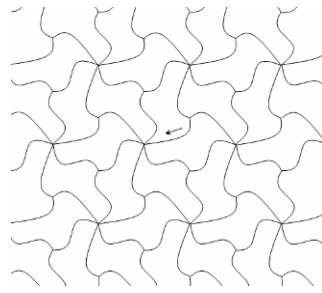


IH31

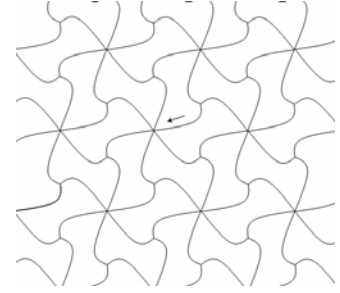




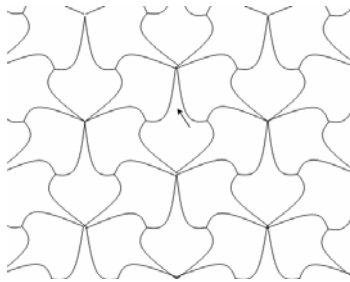
IH32



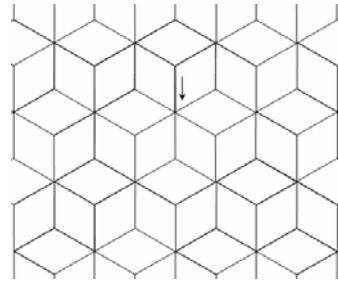
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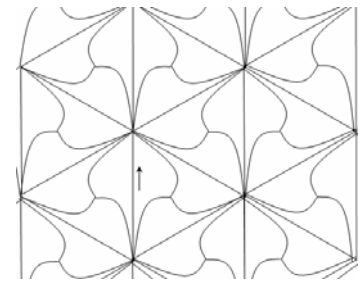
IH34



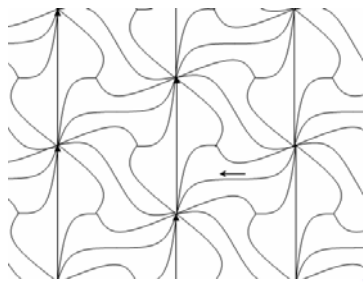
IH36



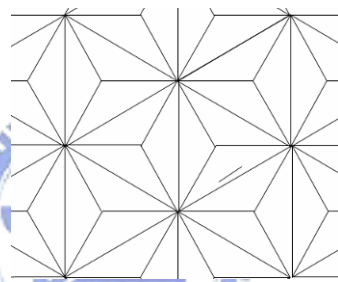
IH37



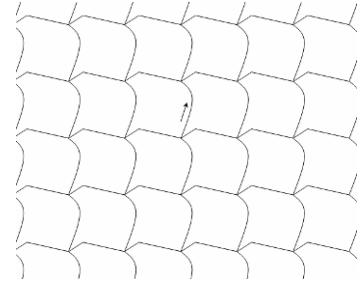
IH38



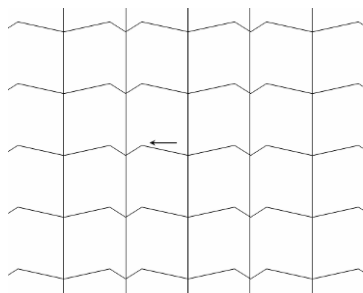
IH39



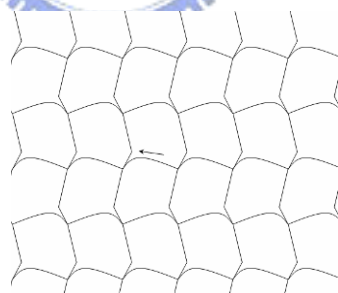
IH40



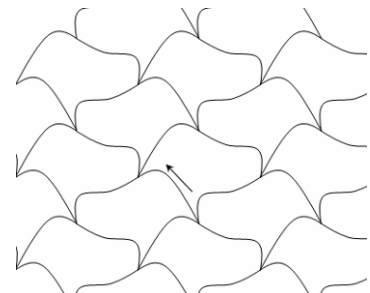
IH41



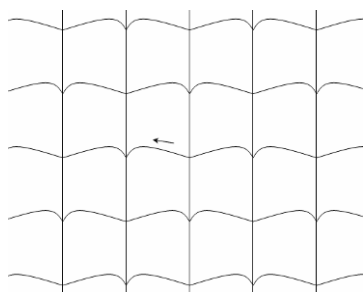
IH42



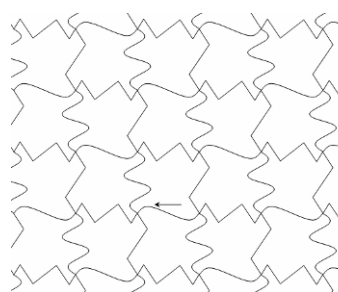
IH43



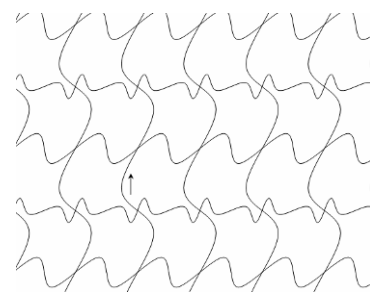
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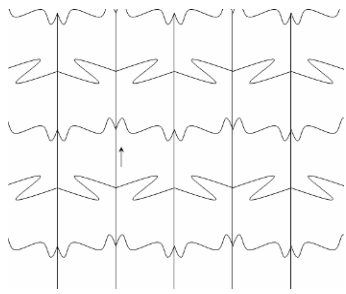
IH45



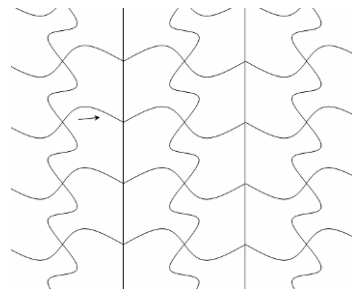
IH46



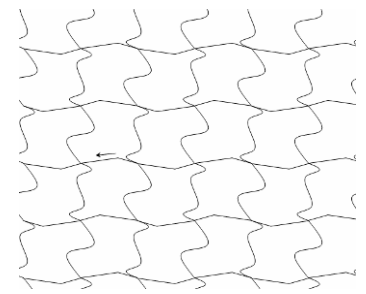
IH47



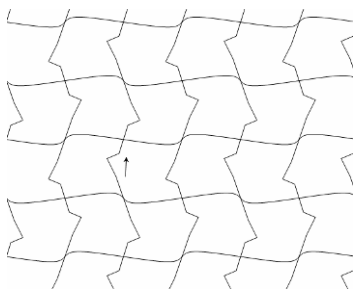
IH49



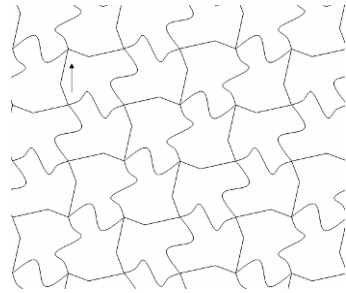
IH50



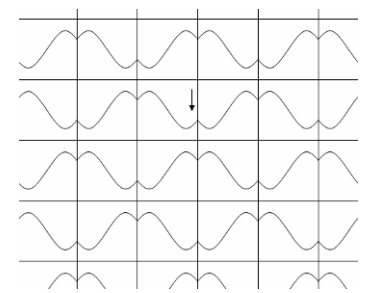
IH51



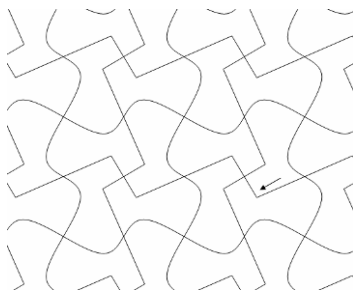
IH52



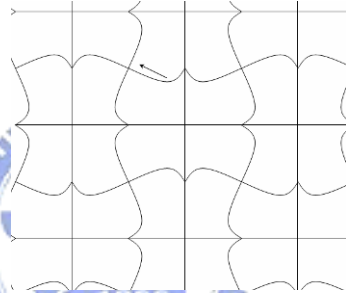
IH53



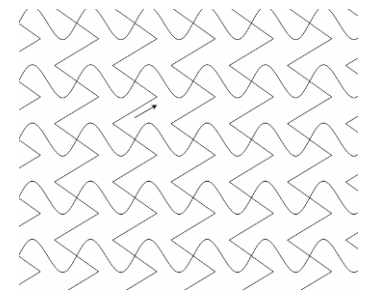
IH54



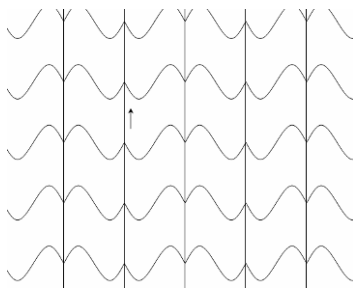
IH55



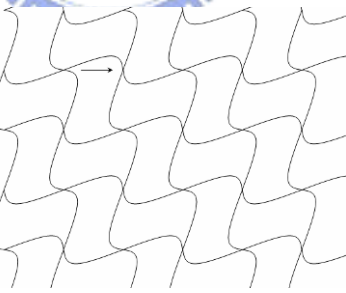
IH56



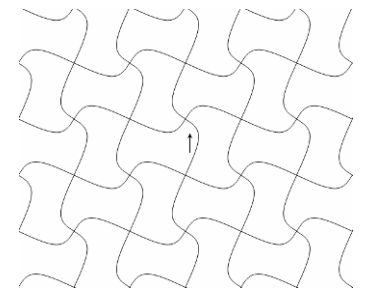
IH57



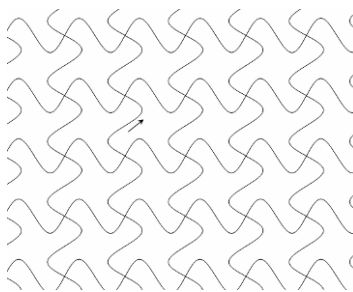
IH58



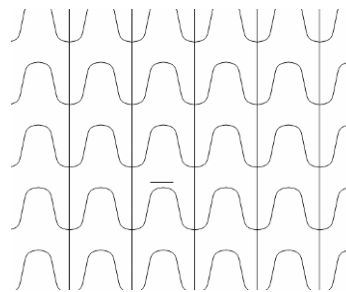
IH59



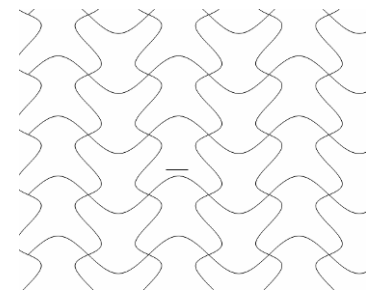
IH61



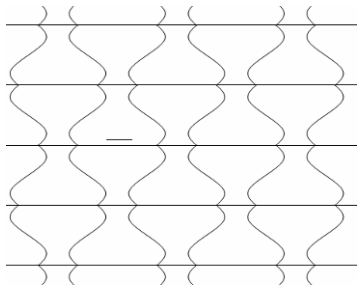
IH62



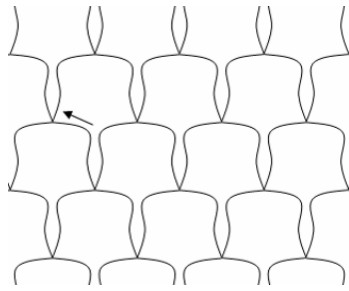
IH64



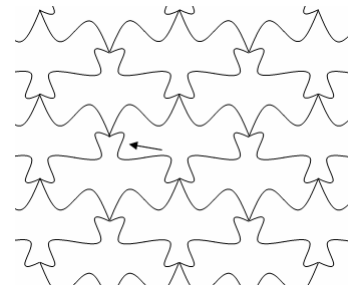
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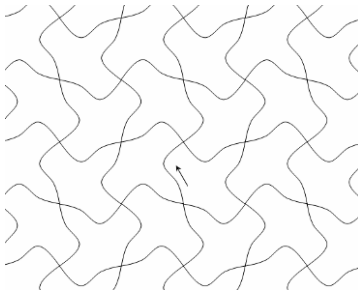
IH67



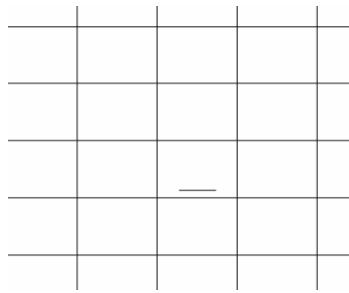
IH68



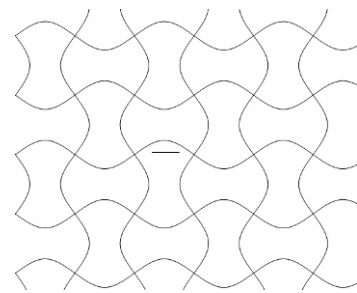
IH69



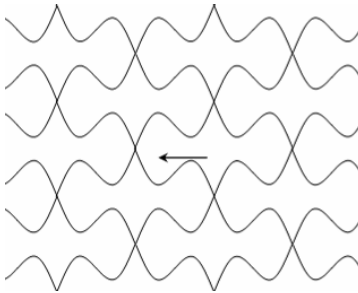
IH71



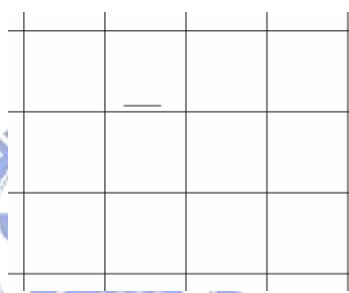
IH72



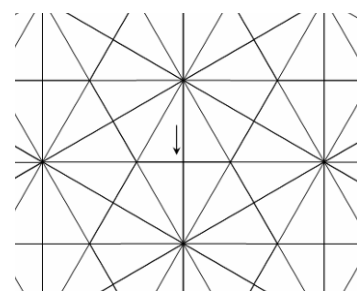
IH73



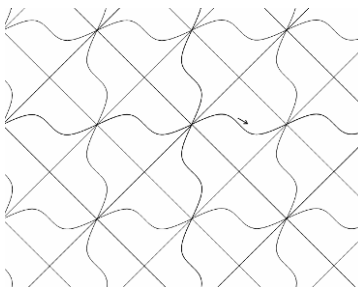
IH74



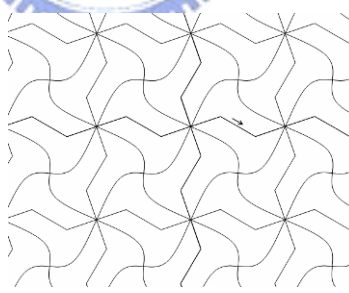
IH76



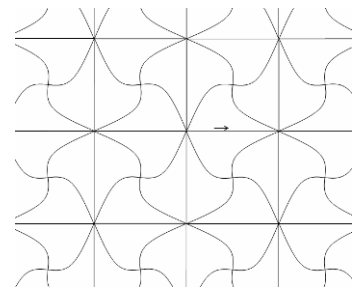
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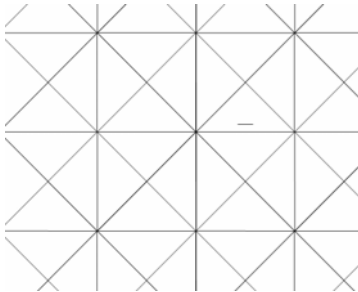
IH78



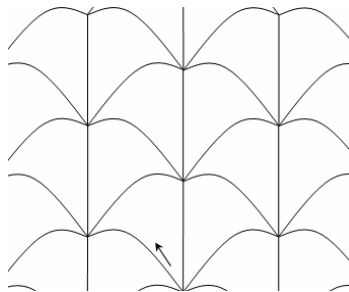
IH79



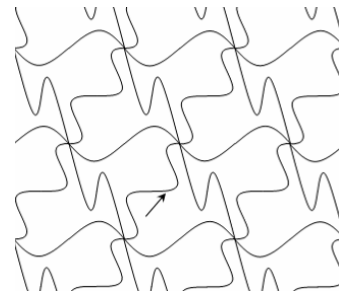
IH81



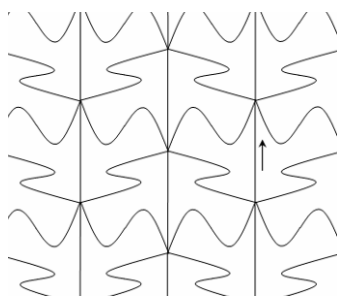
IH82



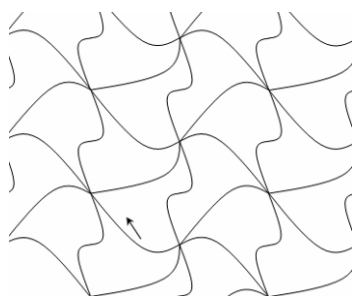
IH83



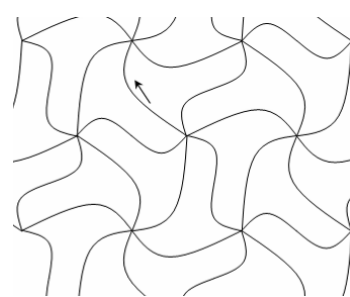
IH84



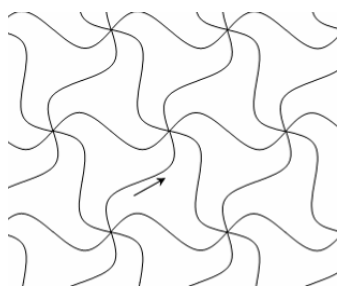
IH85



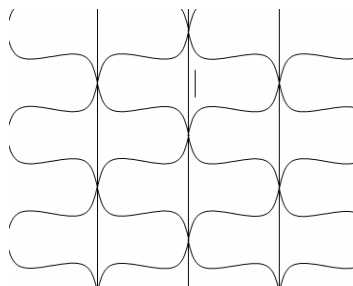
IH86



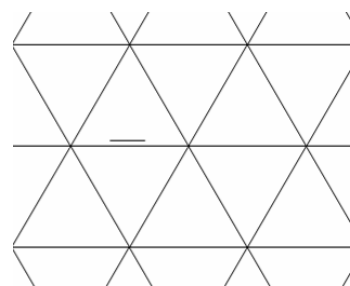
IH88



IH90



IH91

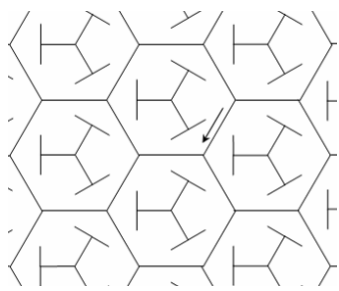


IH93

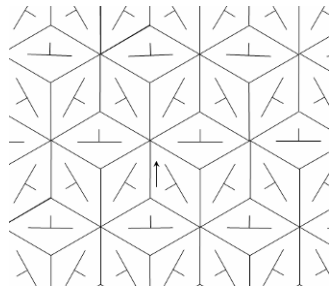
※以上 81 種等面鋪磚圖樣其對稱的樣式型態請見附錄十一，爲了方便了解其與附錄十一關聯符號的對應關係，我們在每一鋪磚中的一邊，以「↑」表示「 $a^+$ 」，或以「|」表示「 $a$ 」。



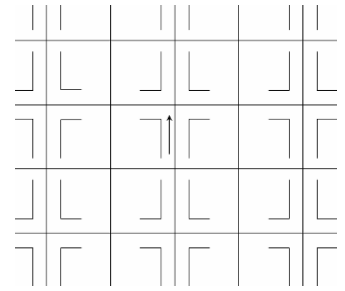




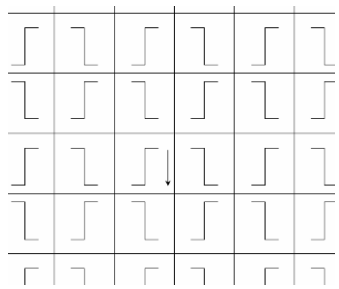
IH19



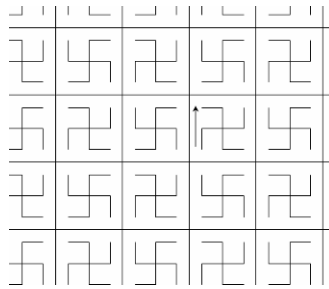
IH35



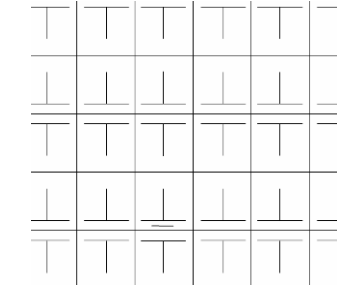
IH48



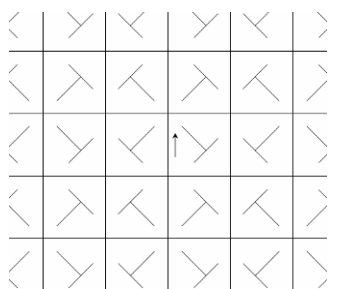
IH60



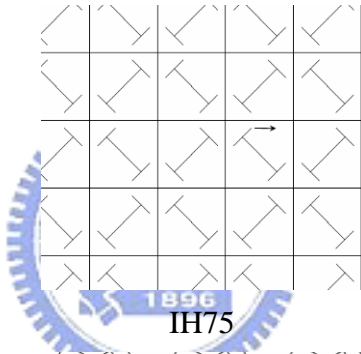
IH63



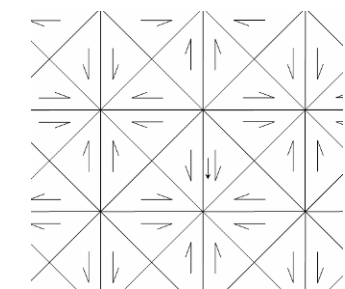
IH65



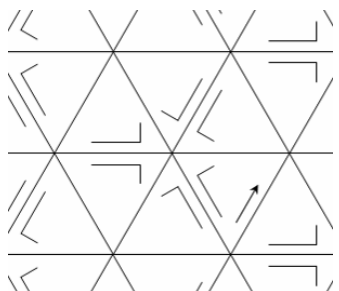
IH70



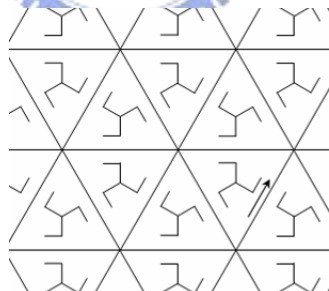
IH75



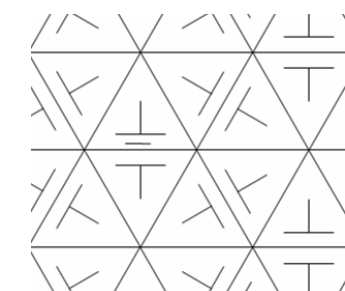
IH80



IH87



IH89



IH92

※以上 12 種具標誌的等面鋪磚圖樣其對稱的樣式型態請見附錄十一，爲了方便了解其與附錄十一關聯符號的對應關係，我們在每一鋪磚中的一邊，以「↑」表示「 $a^+$ 」，或以「|」表示「 $a$ 」。

資料來源：

[1] Grünbaum, B., Shephard, G. C., Tilings and Patterns, W. H. Freeman and Company, New York, 1987.