
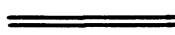

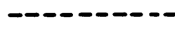




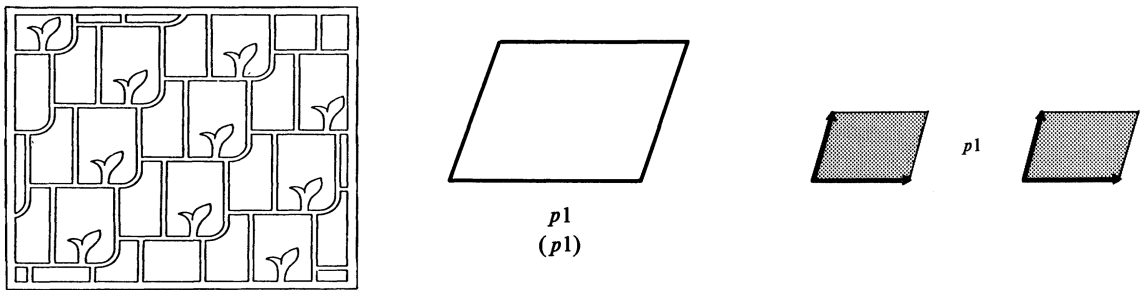


### Wallpaper Types

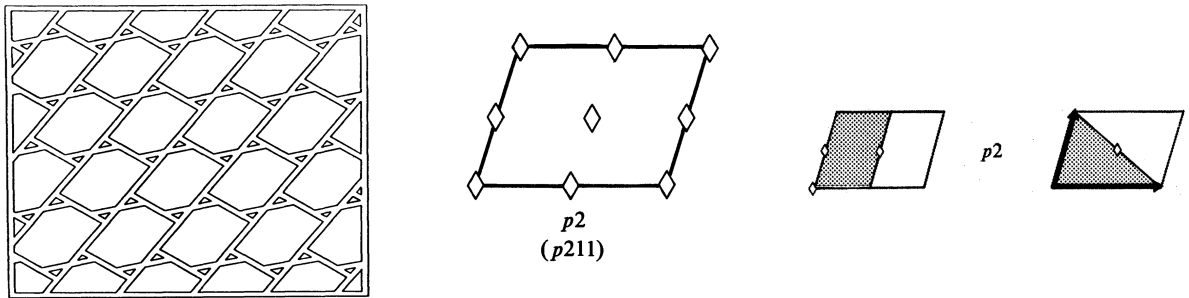
The following figures are taken from “D. Schattschneider, *The Plane Symmetry Groups: Their Recognition and Notation*. Amer. Math. Monthly, Vol. 85, No. 6 (1978), 439-450”.

	<b>2-fold</b>		<b>axis of reflection</b>
	<b>3-fold</b>		<b>axis of glide-reflection</b>
	<b>4-fold</b>		<b>outline of lattice unit</b>
	<b>6-fold</b>		<b>outline of “centered cell”</b>

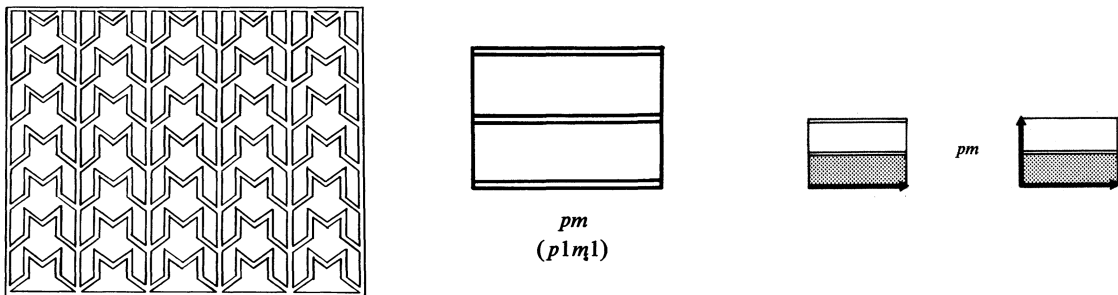
1.  $p1$ : Point group:  $J = \{I\}$ , trivial. Possible lattices: oblique, rectangular, centered, square, hexagonal.



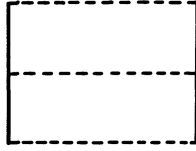
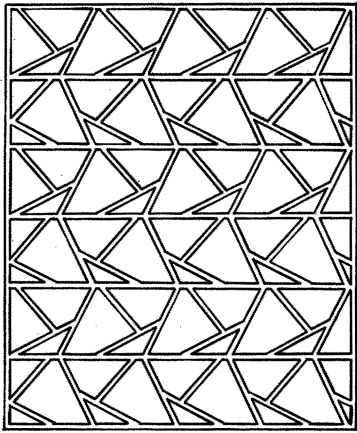
2.  $p2$ : Point group:  $J = \{I, -I\} \cong \mathbb{Z}_2$ . Possible lattices: oblique, rectangular, centered, square, hexagonal.



3.  $pm$ : Point group:  $J = \{I, B_0\} \cong \mathbb{Z}_2$ . Possible lattices: rectangular, centered, square, hexagonal.



4.  $pg$  Point group:  $J = \{I, B_0\} \cong \mathbb{Z}_2$ . Possible lattices: rectangular, centered, square, hexagonal.



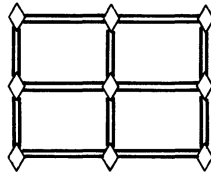
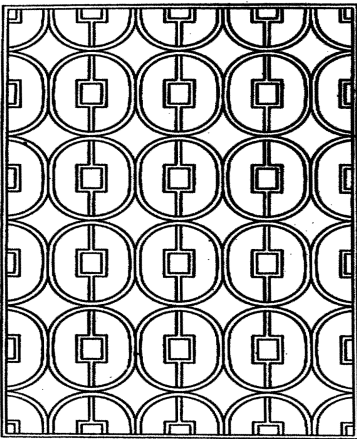
$pg$   
( $p1g1$ )



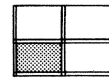
$pg$



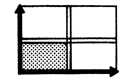
5.  $p2mm$ : Point group:  $J = \{I, -I, B_0, B_\pi\} \cong \mathbb{Z}_2 \times \mathbb{Z}_2$ . Possible lattices: rectangular, centered, square, hexagonal.



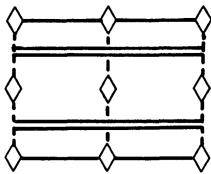
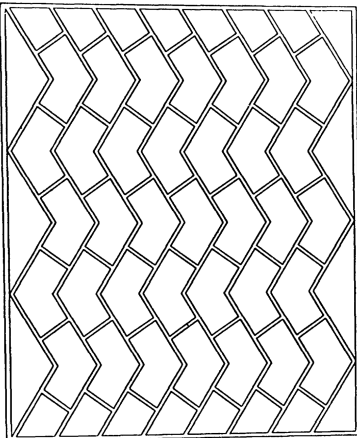
$pmm$   
( $p2mm$ )



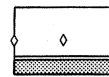
$pmm$



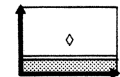
6.  $p2mg$ : Point group:  $J = \{I, -I, B_0, B_\pi\} \cong \mathbb{Z}_2 \times \mathbb{Z}_2$ . Possible lattices: rectangular, centered, square, hexagonal.



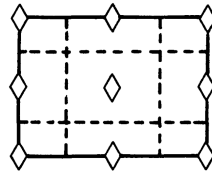
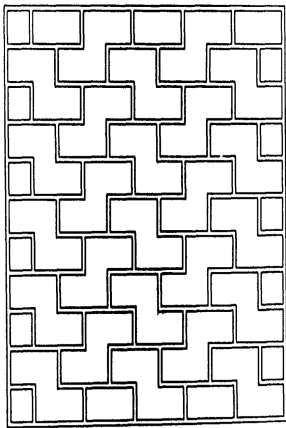
$pmg$   
( $p2mg$ )



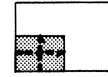
$pmg$



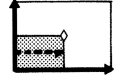
7.  $p2gg$ : Point group:  $J = \{I, -I, B_0, B_\pi\} \cong \mathbb{Z}_2 \times \mathbb{Z}_2$ . Possible lattices: rectangular, centered, square, hexagonal.



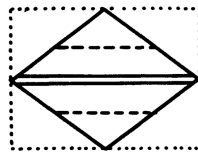
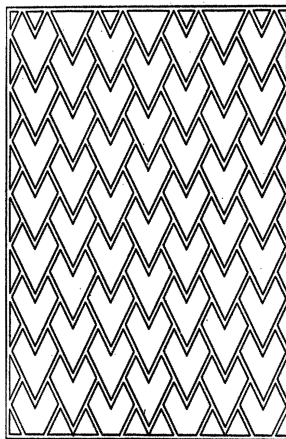
$p2g$   
 $(p2gg)$



$pgg$



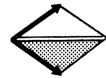
8.  $cm$ : Point group:  $J = \{I, B_0\} \cong \mathbb{Z}_2$ . Possible lattices: centered, square, hexagonal.



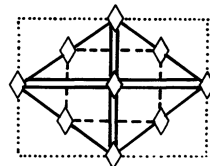
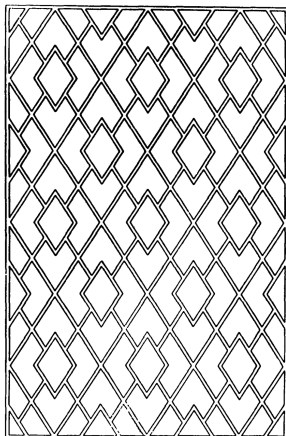
$cm$   
 $(c1m1)$



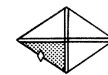
$cm$



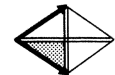
9.  $c2mm$ : Point group:  $J = \{I, -I, B_0, B_\pi\} \cong \mathbb{Z}_2 \times \mathbb{Z}_2$ . Possible lattices: centered, square, hexagonal.



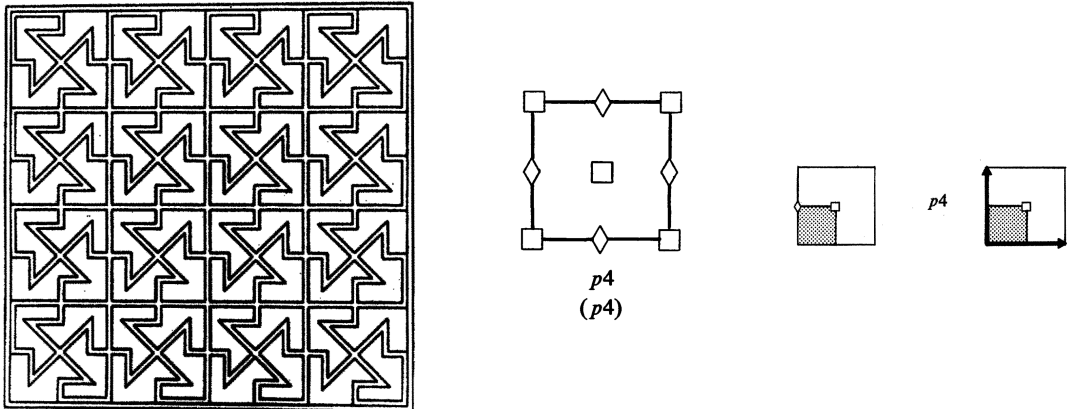
$cm$   
 $(c2mm)$



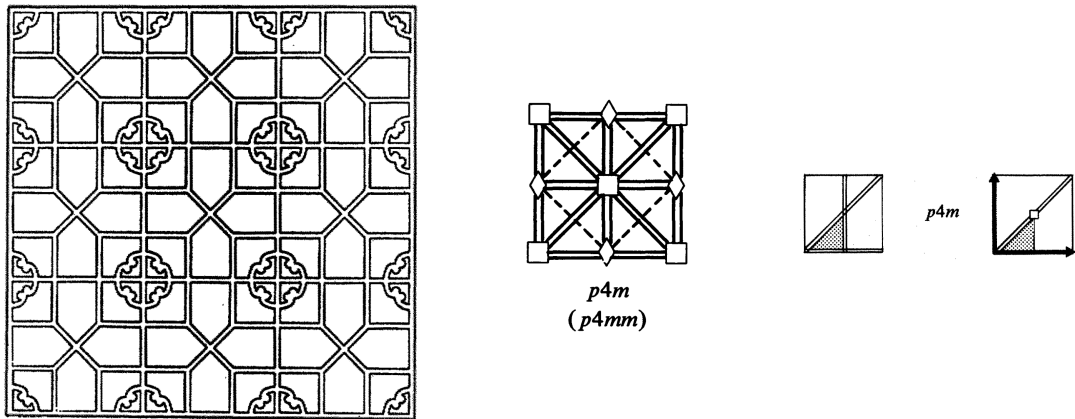
$cm$



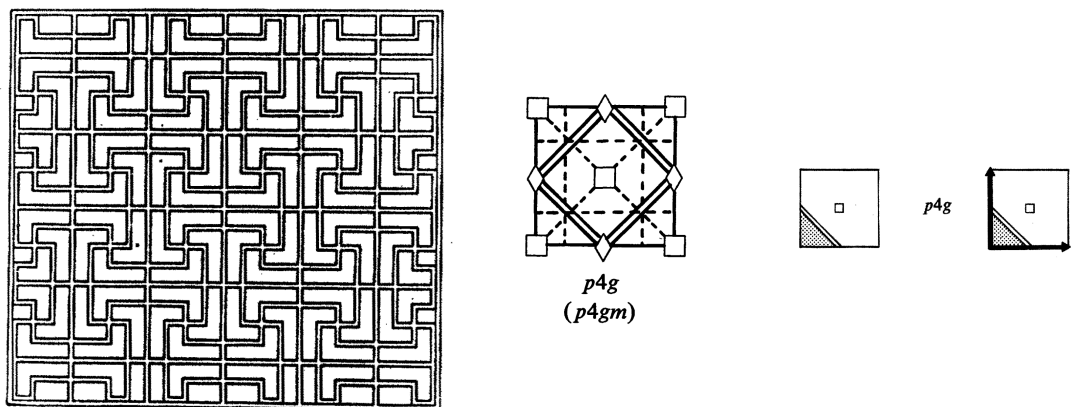
10.  $p4$ : Point group:  $J = \langle A_{\pi/2} \rangle \cong \mathbb{Z}_4$ . Possible lattices: square.



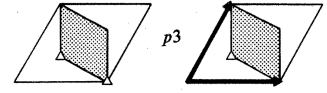
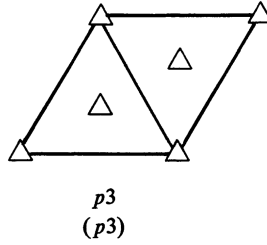
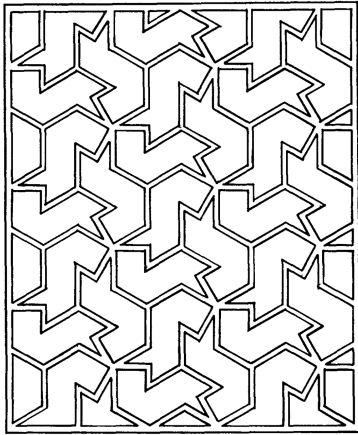
11.  $p4mm$ : Point group:  $J = \langle A_{\pi/2}, B_0 \rangle \cong D_8$ . Possible lattices: square.



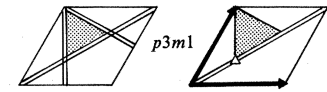
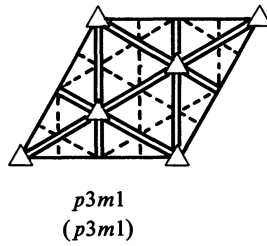
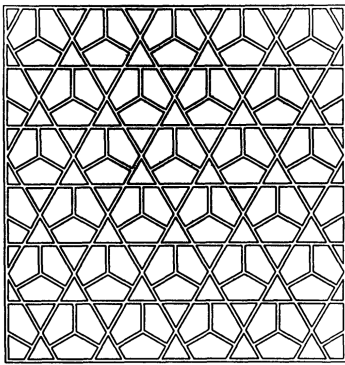
12.  $p4gm$ : Point group:  $J = \langle A_{\pi/2}, B_0 \rangle \cong D_8$ . Possible lattices: square.



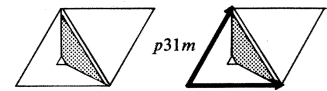
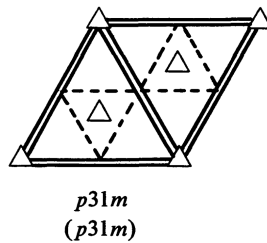
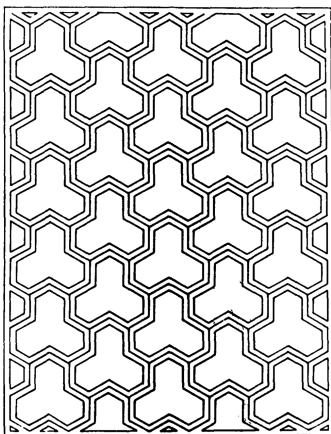
13.  $p3$ : Point group:  $J = \langle A_{2\pi/3} \rangle \cong \mathbb{Z}_3$ . Possible lattices: hexagonal.



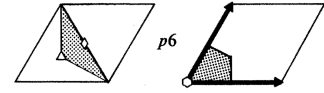
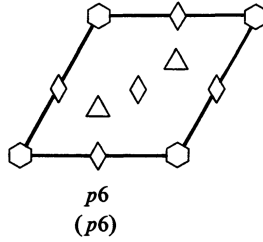
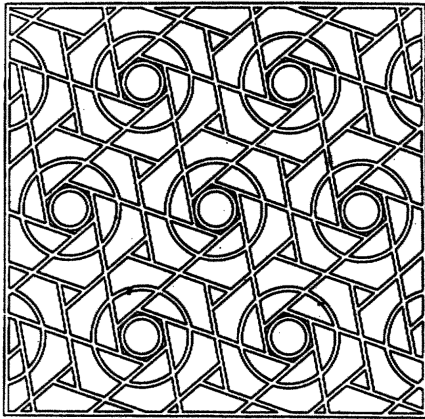
14.  $p3m1$ : Point group:  $J = \langle A_{2\pi/3}, B_{\pi/3} \rangle \cong D_6$ . Possible lattices: hexagonal.  
**Caution:** Armstrong does not adapt to the general consensus.



15.  $p31m$ : Point group:  $J = \langle A_{2\pi/3}, B_0 \rangle \cong D_6$ . Possible lattices: hexagonal.  
**Caution:** Armstrong does not adapt to the general consensus.



16.  $p6$ : Point group:  $J = \langle A_{\pi/3} \rangle \cong \mathbb{Z}_6$ . Possible lattices: hexagonal.



17.  $p6mm$ : Point group:  $J = \langle A_{\pi/3}, B_0 \rangle \cong D_{12}$ . Possible lattices: hexagonal.

