

i) The rotation is of order 3 ✓

ii) The rotation is of order 3 ✓

iii) The rotation is of order 2 ✓

iv) The rotation is of order 4 ✓ 4/4

d) W:

Highest order of a rotation? 3 ✓

W is type $p3m1$, $p31m$ or $p3$.

Any reflections? Yes ✓

W is type $p3m1$ or $p31m$.

All 3 centres on reflection axes? Yes ✓

W is type $p3m1$. ✓ 3/3

X:

Highest order of a rotation? 4 ✓

X is type $p4mm$, $p4gm$ or $p4$.

Any reflections? Yes ✓

X is type $p4mm$ or $p4gm$.

Reflections in four directions? No ✓

X is type $p4gm$. ✓ 3/3

e) If a wallpaper pattern contains rotations of order 3 or 6, then the associated lattice L must be hexagonal.

The hexagonal lattice is rhombic,

and the presence of reflection

axes implies the presence of

glide axes parallel to those

reflection axes. Moreover, glide

and reflection axes alternate. ✓ 4/4