Task 1. Your aim is to construct the lattice.



Instructions: You may select only the small bricks. Select one and then try to identify all the identical bricks. After selecting of several bricks, you will be allowed to check your answer. Note which brick you first select.

Task 2. Outline a unit cell in each case and indicate the positions of all the symmetry elements within the unit cell. Notice in particular the differences in the distribution of the triad axes and mirror lines in the plane groups p31m and p3m1.

* * * * *	AR AR	
~ ~ ~ ~ ~ ~ ~ ~	₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩	د عد عد عد عد <u>ع</u> د
~ ~ ~ ~ ~ ~		<u>к</u> ж _ж ж ж ж
~ ~ ~ ~ ~ ~	AR AR AR	^ж як ³ ^с як ³ ^с я
p1 (1)	vor vor n31m (14)	د عد ^{عد} عد ^{عد} ع
AR AR AR	ps m (14)	^с я _с ^{эс} яс ^{эс} я
AR AR AR AR	RR RR ES ES	p2mg (7) 뜬꽃 뜬꽃 뚠꽃
AR AR AR AR AR	ЯR ЯR ЯR	AR AR AR
AR Ar Ar Ar Ar	\$\$`\$`\$` \$R\$\$R	K K K K K K K K K K K K K K K K K K K
AR AR AR AR	ちょうちょう	KA KA KA
pm (3)	p3m1 (15)	c2mm (9)

Task 3. Figure below is a design by M. C. Escher. Using a tracing paper overlay, indicate the positions of all the symmetry elements. With the help of the flow diagram, determine the plane lattice type.



Task 4. Construct a plan view of NaCl (sodium chloride). NaCl has a **face-centred cubic** lattice. The motif is: Cl @ (0,0,0); Na @ (0,0,1/2);

Treating the chlorine and sodium atoms as hard spheres calculate the packing efficiency of sodium chloride.

Note 1: The motif coordinates are positions relative to each lattice point Note 2: In a face centred cubic structure the lattice points are located at: (0,0,0), (1/2,1/2,0), (1/2,0,1/2), (0,1/2,1/2)

