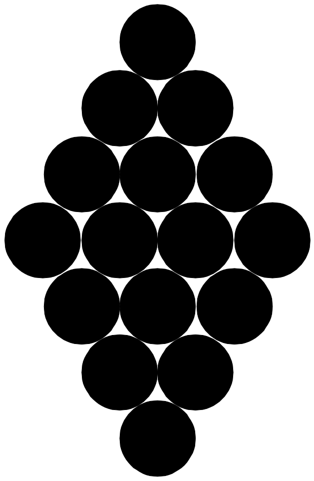
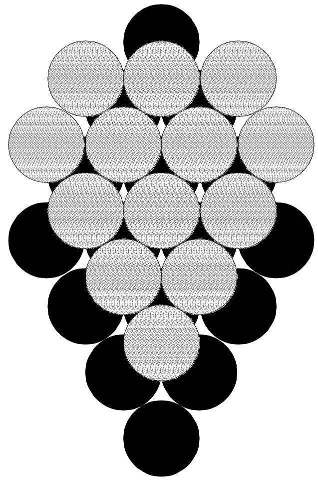
The Closest Packing Lattices



First Layer of Closest Packing Lattices

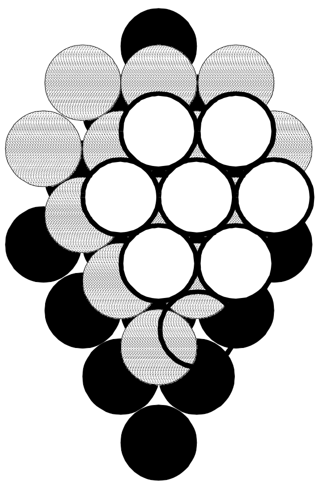


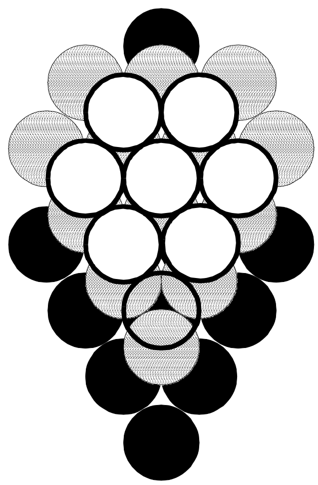
Second Layer of Closest Packing Lattices

Cubic Closest Packing (CCP).

Third layer covers holes through first and second layers.

This produces an ABC, ABC, ABC ... layering.



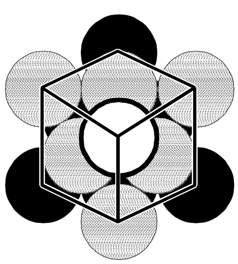


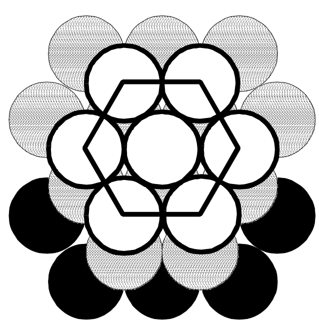
Hexagonal Closest Packing (HCP).

Third layer covers holes in second layer above first layer.

This produces an AB, AB, AB, ... layering.

The cube involves a total of 14 atoms in four layers. One atom on the bottom layer, six atoms in the second layer, six atoms in the third layer and one atom in the top layer. The cube is seen as standing on one corner.





The hexagonal lattice uses a total of 17 atoms in three layers. Seven atoms in the bottom layer, 3 atoms in the middle layer and seven atoms in the top layer directly over the bottom layer.

The Simple Cubic and Body Centered Cubic Lattices

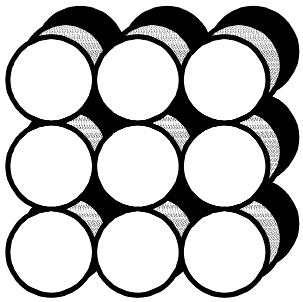


Figure 1. The Simple Cubic Lattice. In this lattice each layer is exactly like the other layers and fit directly above the previous layer. This produces an A, A, A, ... layering.

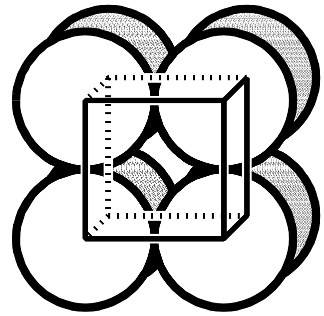


Figure 2. The Unit Cell for the Simple Cubic Lattice. The unit cell uses a total of eight atoms in two layers. Since only one-eighth of each atom is in the unit cell there is actually only one atom per unit cell. Also note the "cubic" shaped "hole" at the center of the cell which could be "filled" by another sphere.

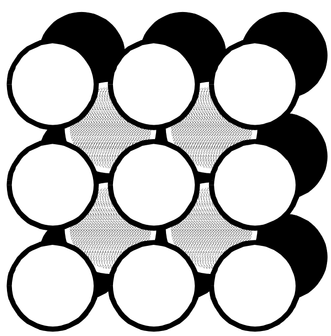


Figure 3. The Body Centered Lattice. In this lattice there are two alternating layers. In the upper layer the atoms sit in the depressions created by four adjacent atoms in the previous layer. This produces an AB, AB, AB, ... layering.

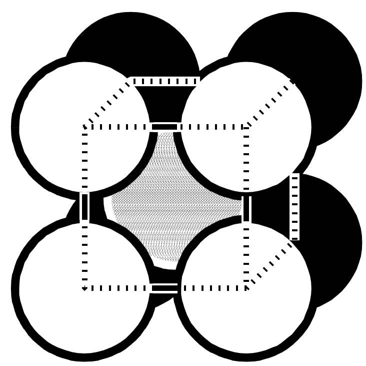


Figure 4. The Unit Cell for the Body Centered Lattice. The unit cell uses a total of nine atoms in three layers. The atoms touch along the body diagonal but not along the edges. Again only one-eighth of each atom on a cell corner is in the unit cell but here there is an atom at the cell center so there are actually two atoms per unit cell.