

Collaborative Learning Exercise
Definition of a Lattice
SOLUTIONS

1. As a group formulate definitions for:

Lattice: A 3-D framework which defines the backbone, it is combined with a basis to accurately describe the arrangement of atoms in a crystal

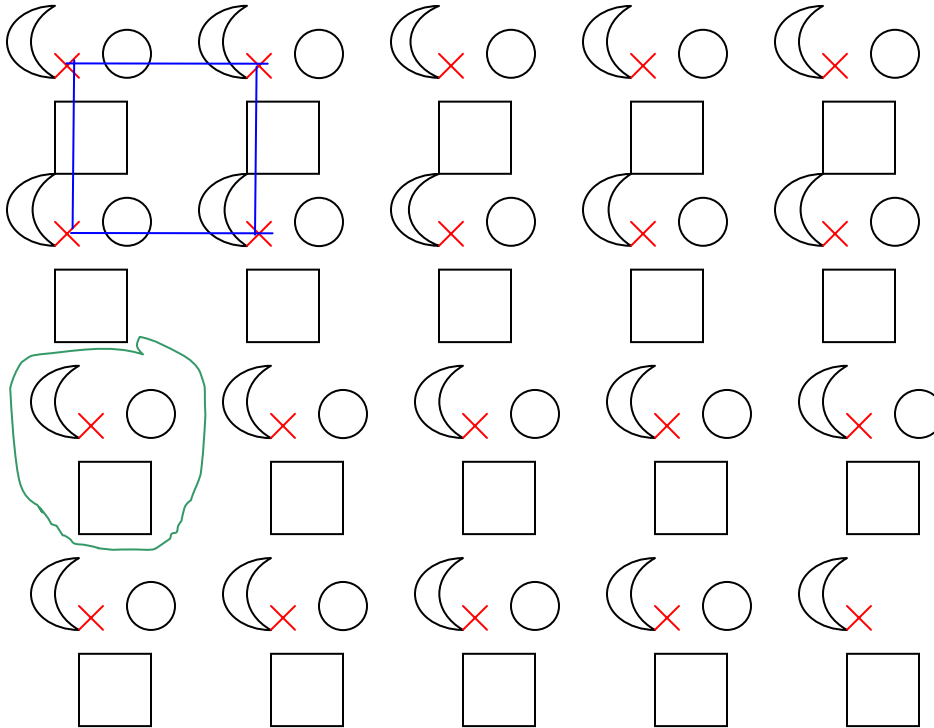
Lattice site: also known as lattice point, theoretical points (not atoms) where each site is identical (has the same pattern of atoms on it and surrounding it)

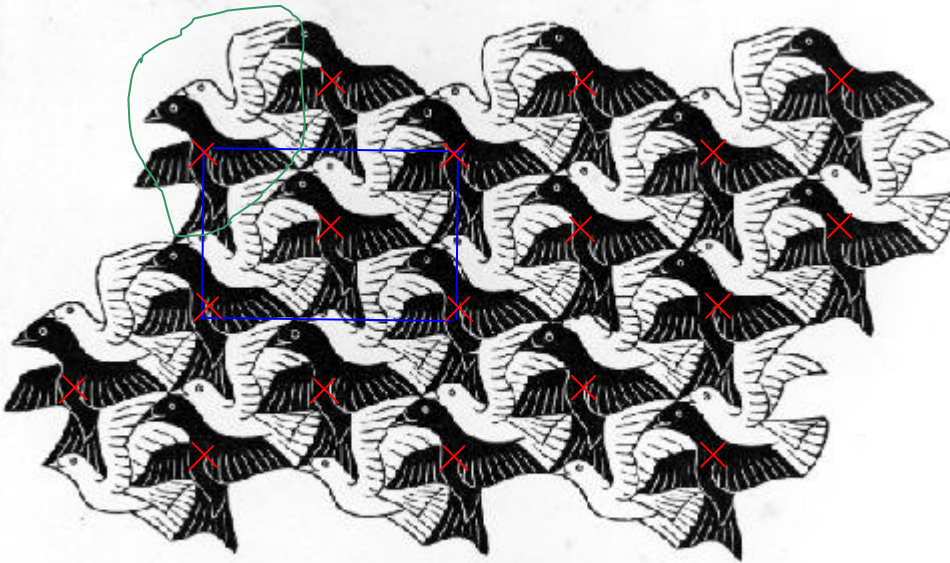
Basis: the pattern of atoms on a lattice site

Unit Cell: simplest choice to be the structural unit repeated through space to re-create a crystal structure

2. On each of the patterns below: a.) Determine the 2-d lattice. b.) Outline a unit cell. c.) Mark the lattice sites. d.) Circle 1 basis.

The 2-D lattice below is cubic. Lattice sites are marked with x (Note where I chose to put the sites are arbitrary. The whole grid of x's can be shifted.) A unit cell is outlined in blue. A basis is one pattern that surrounds each lattice site, circled in green.





The 2-D lattice above is face centered tetragonal (not really cubic..). Each black bird can be a lattice site, as marked by the x. (Note where I chose to put the sites are arbitrary. The whole grid can be shifted.) A unit cell is outlined in blue. A basis is one black bird and one white bird (see how that is repeated at each point).

Artwork by M.C. Escher: <http://www.mcescher.com/>