HW #5: Reciprocal Lattice

*1. – **The most important meal of the day**: "Special K"*

For a two-dimensional Bravais lattice of the sort introduced in Hofmann Chapter 1, the position of any element in the lattice can be described using a linear combination of two basis vectors:

$$\mathbf{R} = m\mathbf{a_1} + n\mathbf{a_2}$$

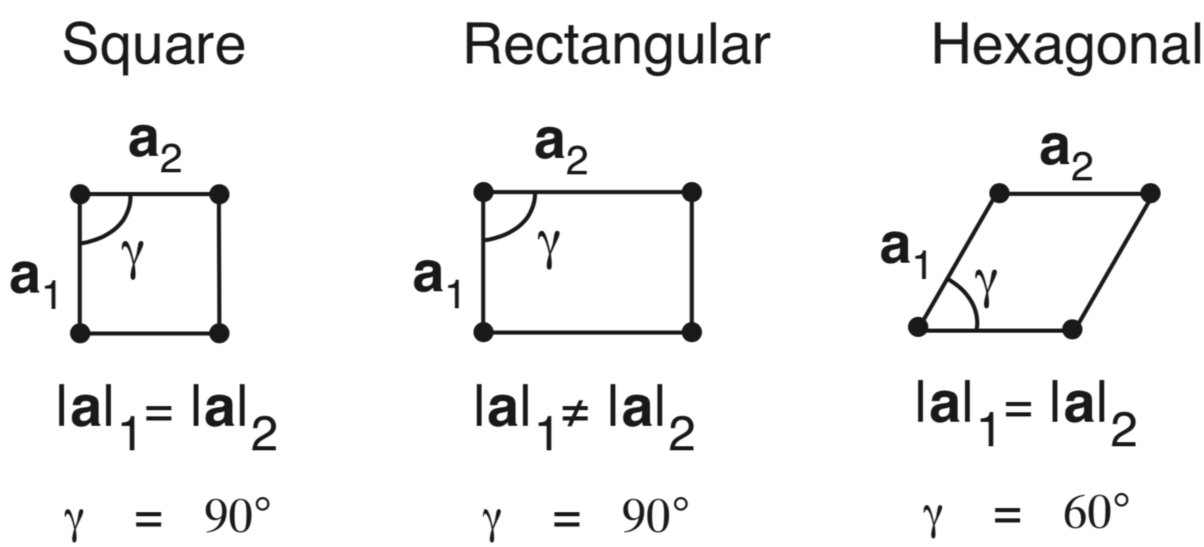
That allows us to describe a crystal lattice in "position space," but your reading (and our class on Wednesday) also suggest we consider a "reciprocal lattice," which for a two-dimensional Bravais lattice will also be two-dimensional:

$$\mathbf{G} = m'\mathbf{b_1} + n'\mathbf{b_2}$$

Often, the most practical way to construct the reciprocal lattice is to use the relation:

$$\mathbf{a_i} \cdot \mathbf{b_j} = 2\pi\delta_{ij}$$

Now, here's your problem: find the reciprocal lattice for the three cases given below:



2. – ***Miller Indices****:*

Hofmann Chapter 1 states that the reciprocal lattice vector $m\mathbf{b_1} + n\mathbf{b_2} + o\mathbf{b_3}$ is *perpendicular* to the lattice plane given by the Miller indices (m, n, o).

Verify that this is correct for the lattice planes drawn below: