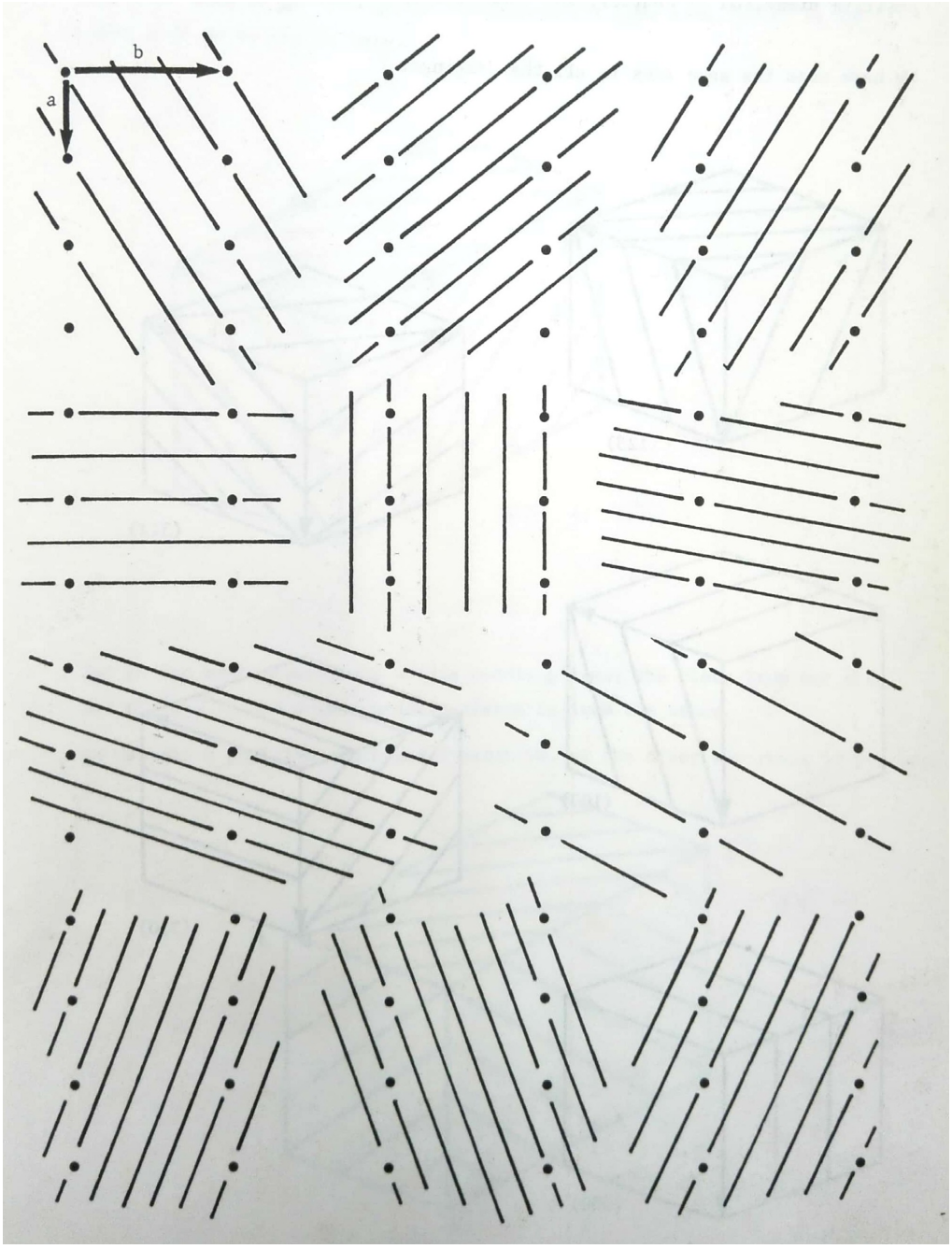
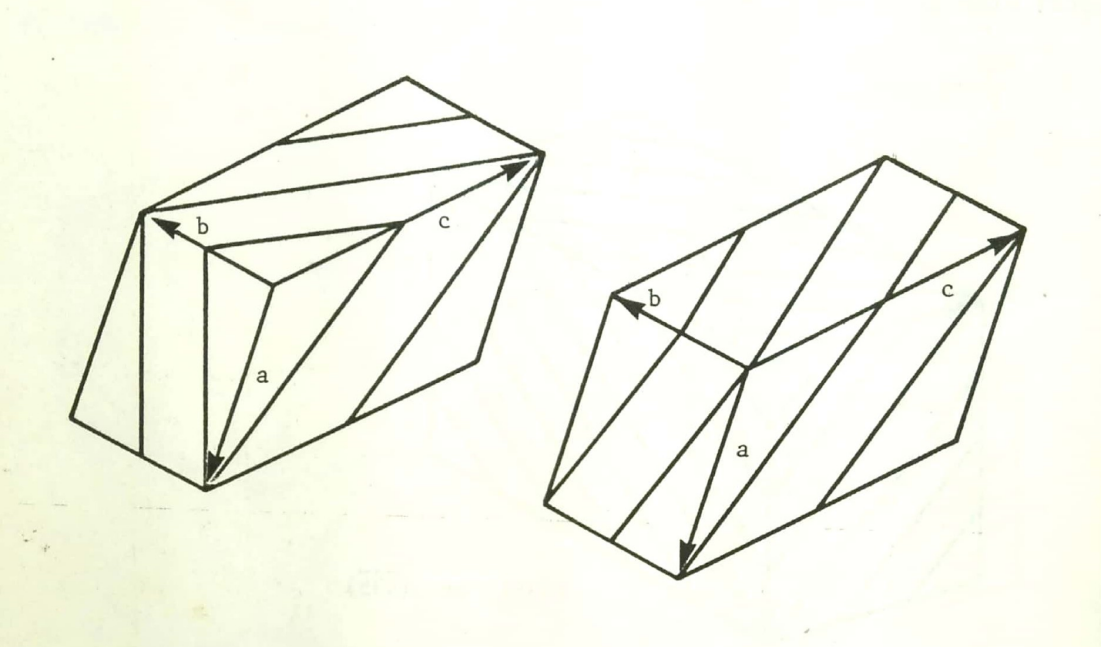
Assignment 3: Planes and directions in crystals

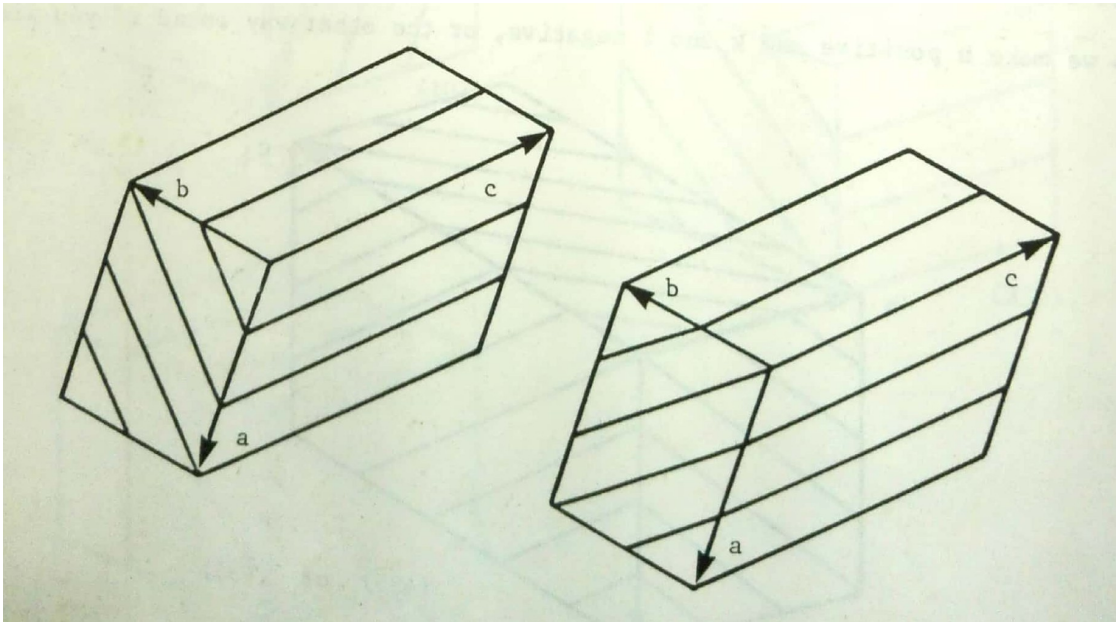
February 16, 2021

1. Index all the sets of planes below. Be sure of vectors **a** and **b** before attempting to index the planes. If we were to use different axes the indices (hkl) would change too.



2. Index all the planes shown in the following **10** diagrams.



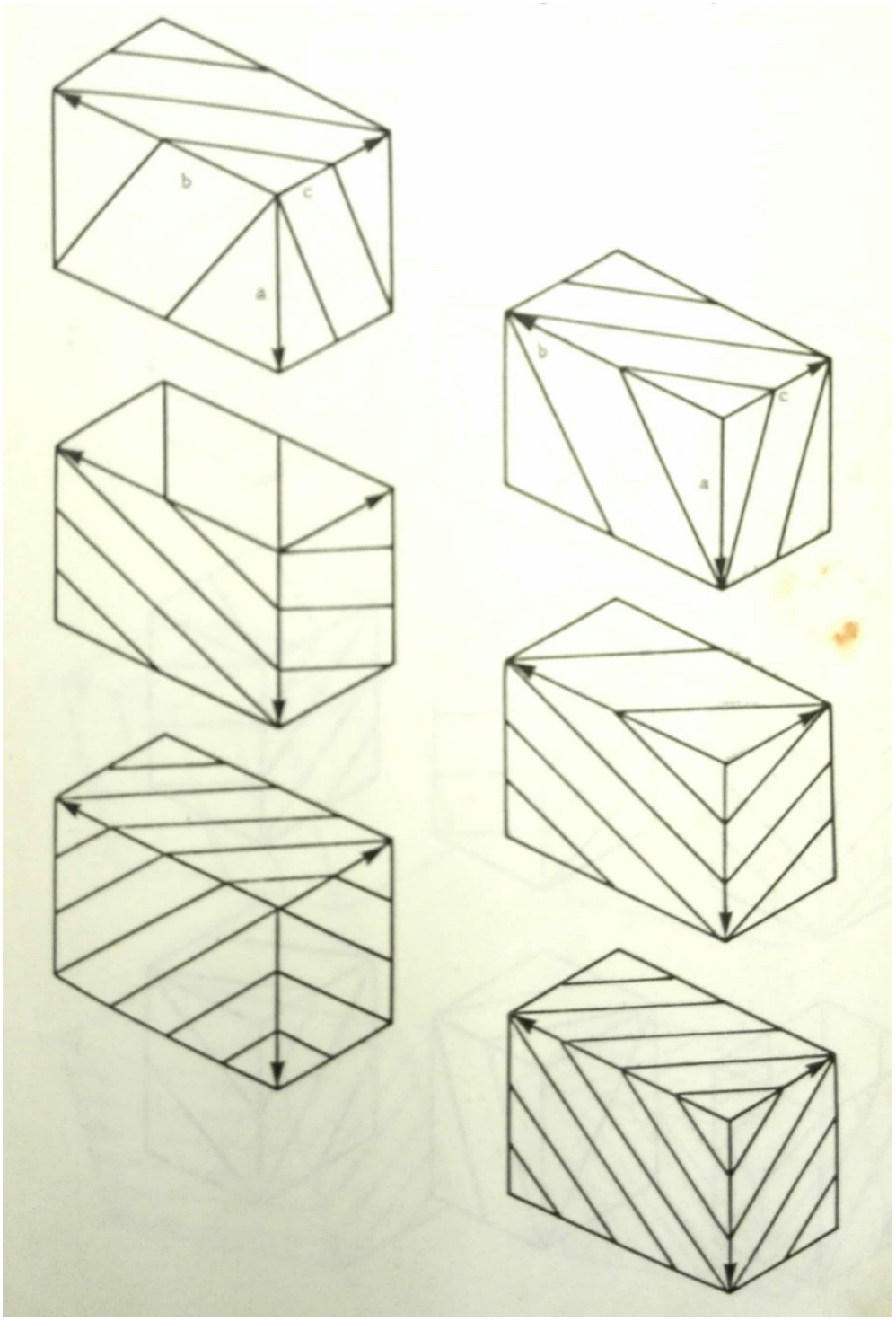


3. Give the indices $[uvw]$ of all the directions shown in the orthorhombic lattice and the monoclinic lattice, respectively on page 4 of this assignment. The method is the same, whatever the lattice, but be sure which axis is which before starting.

   For simplicity here, all directions shown are in the plane of the paper, so w is zero in all cases.

4. Give the indices $[uvw]$ of the each of the fourteen directions which are shown here radiating from two points in this orthorhombic P lattice. This is on page 5.

   Before starting, establish clearly in your mind the direction of $\mathbf{a}, \mathbf{b}, \mathbf{c}$ which are given in the far top left corner. The c-axis is intended to appear to be pointing towards you.

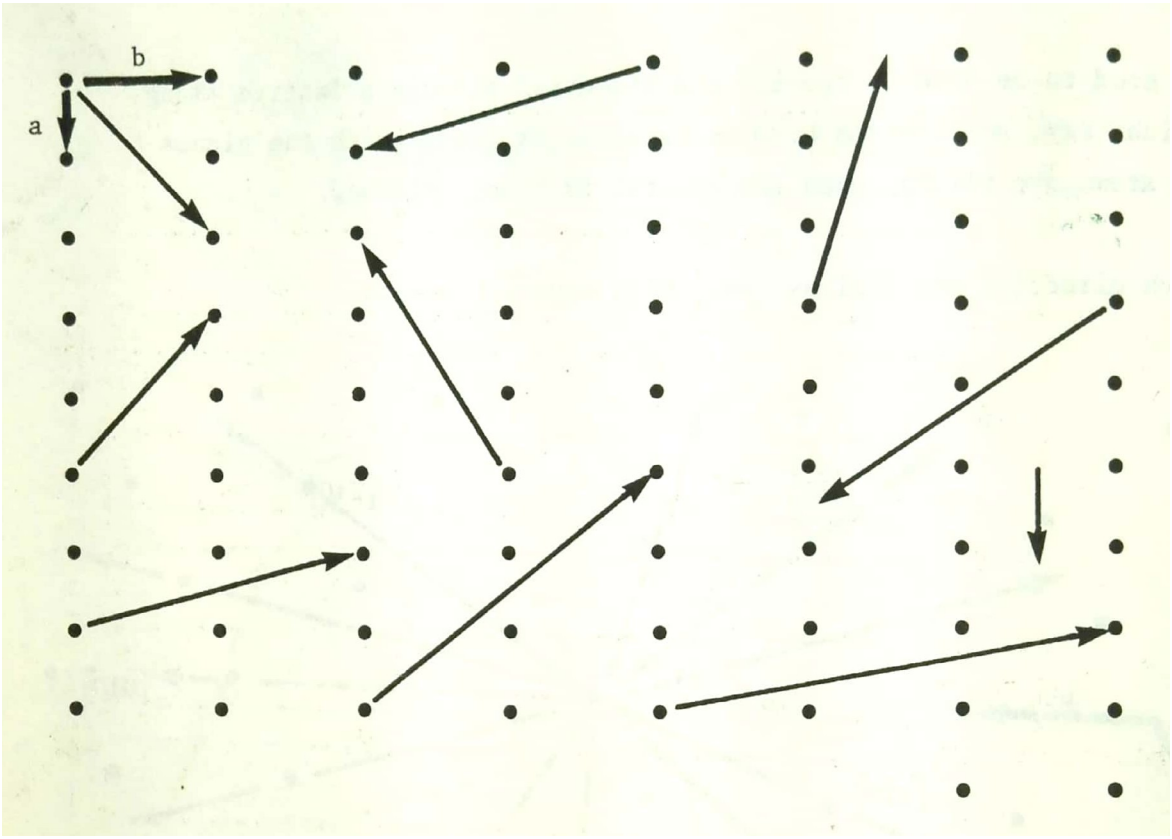


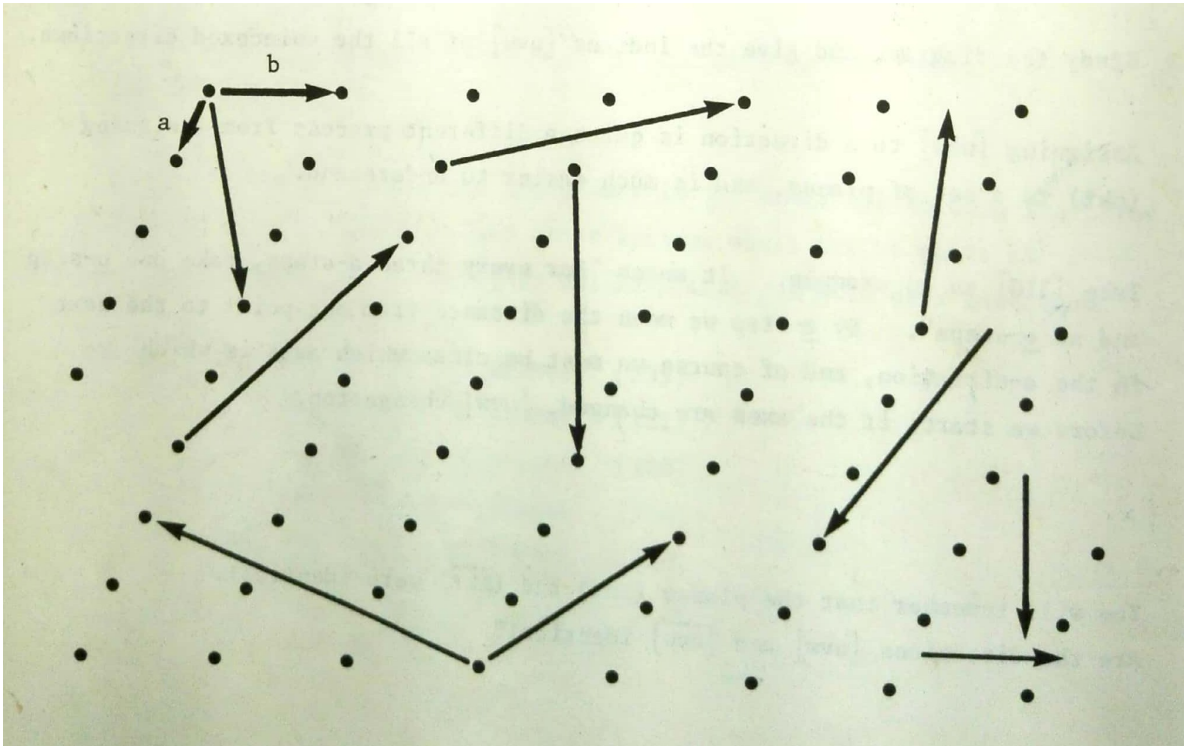
5. a) Find two directions that lie in the (212) plane.

   b) Along what direction do the planes $(\bar{2}10)$ and (011) intersect?

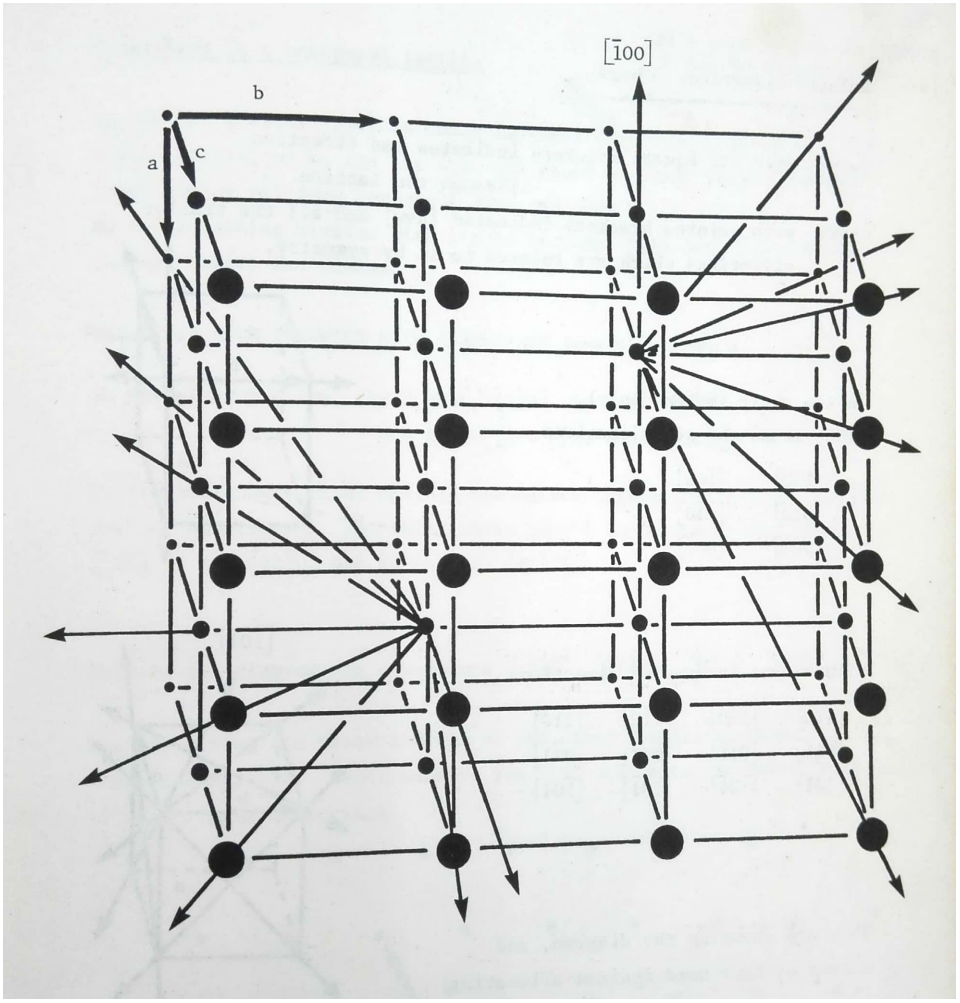
   c) Find the plane in which the directions [132] and $[21\bar{2}]$ lie.

   d) Are the planes $(102), (\bar{1}2\bar{2})$ and (122) members of a zone?

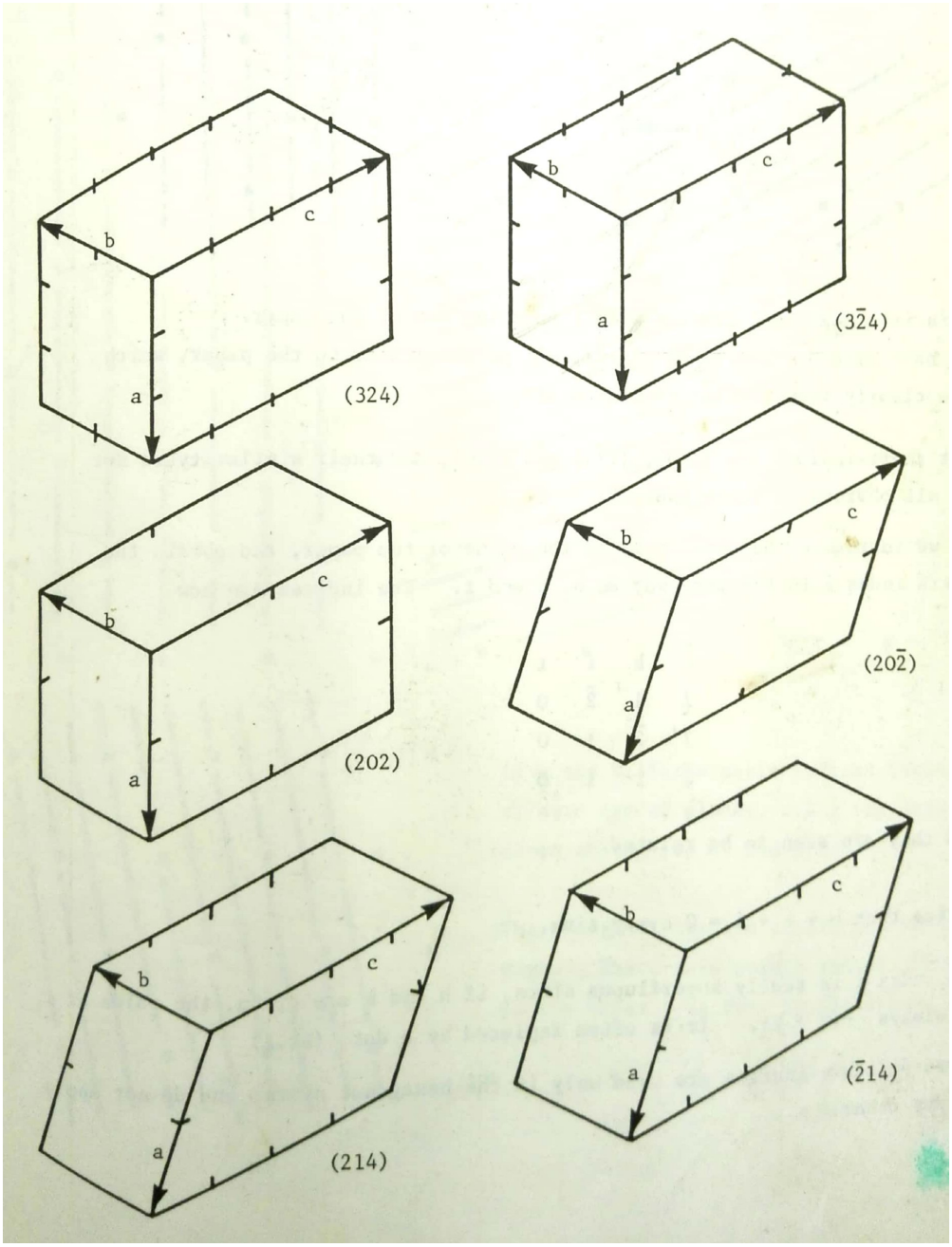




e) What is the angle between the directions [210] and [$1\bar{2}1$]?



6. Try sketching the indicated sets of planes in the unit cells on the last page of this assignment; the edges are marked out for the purpose. It's a tricky job, particularly with negative indices, and usually requires two or three attempts.


b
c
a
(324)
b
c
a
(3$\bar{2}$4)
b
c
a
(202)
b
c
a
(20$\bar{2}$)
b
c
a
(214)
b
c
a
($\bar{2}$14)