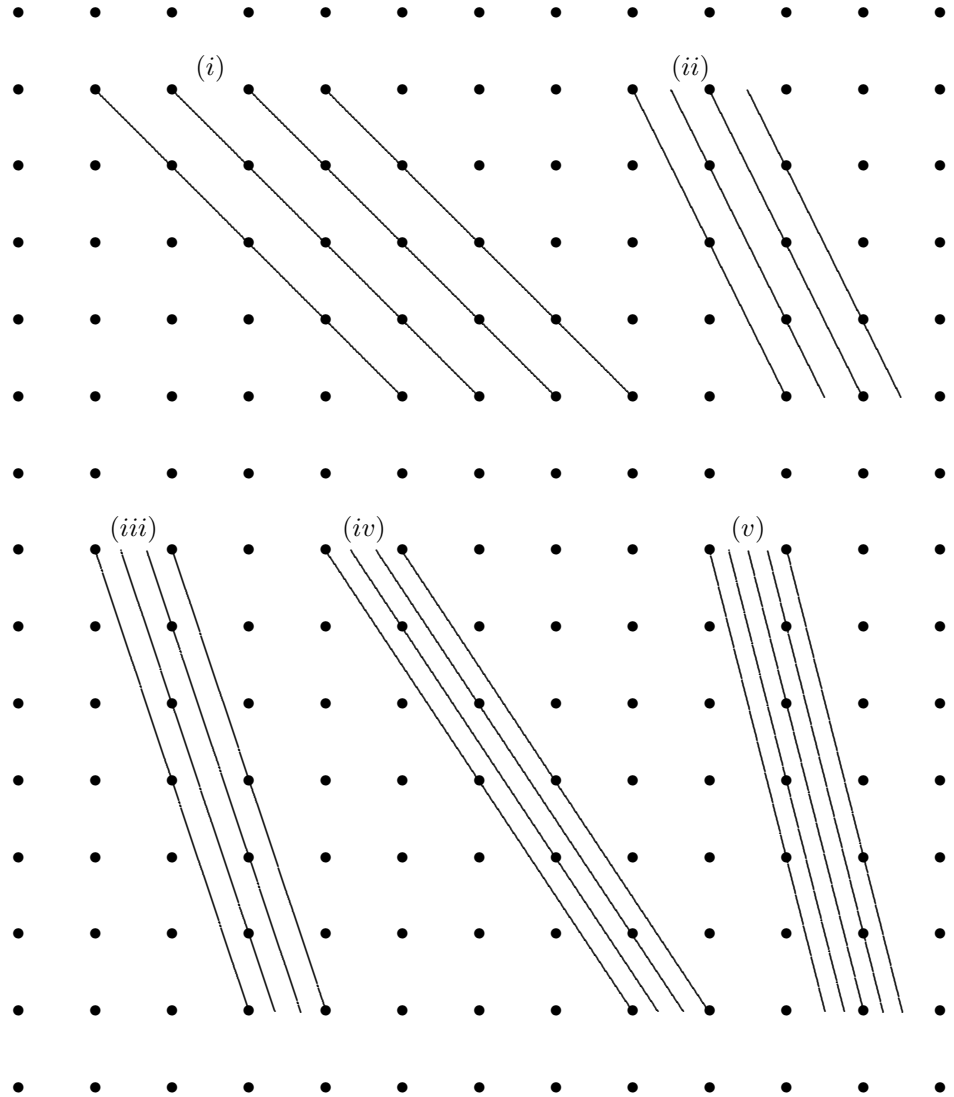


59. (a) The sets of planes with the next five smaller interplanar spacings (after a_0) are shown in the diagram below.



In terms of a_0 , the spacings are:

$$(i) : \quad a_0/\sqrt{2} = 0.7071a_0$$

$$(ii) : \quad a_0/\sqrt{5} = 0.4472a_0$$

$$(iii) : \quad a_0/\sqrt{10} = 0.3162a_0$$

$$(iv) : \quad a_0/\sqrt{13} = 0.2774a_0$$

$$(v) : \quad a_0/\sqrt{17} = 0.2425a_0$$

- (b) Since a crystal plane passes through lattice points, its slope can be written as the ratio of two integers. Consider a set of planes with slope m/n , as shown in the diagram below. The first and last planes shown pass through adjacent lattice points along a horizontal line and there are $m - 1$ planes between. If h is the separation of the first and last planes, then the interplanar spacing is $d = h/m$. If the planes make the angle θ with the horizontal, then the normal to the planes (shown dotted) makes the angle $\phi = 90^\circ - \theta$. The distance h is given by $h = a_0 \cos \phi$