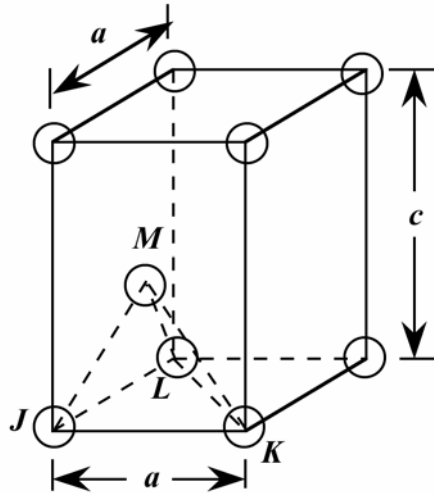
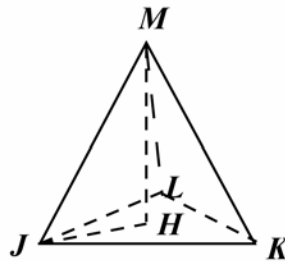


3.4 We are asked to show that the ideal c/a ratio for HCP is 1.633. A sketch of one-third of an HCP unit cell is shown below.



Consider the tetrahedron labeled as $JKLM$, which is reconstructed as



The atom at point M is midway between the top and bottom faces of the unit cell--that is $\overline{MH} = c/2$. And, since atoms at points J , K , and M , all touch one another,

$$\overline{JM} = \overline{JK} = 2R = a$$

where R is the atomic radius. Furthermore, from triangle JHM ,

$$(\overline{JM})^2 = (\overline{JH})^2 + (\overline{MH})^2$$

or

$$a^2 = (\overline{JH})^2 + \left(\frac{c}{2}\right)^2$$