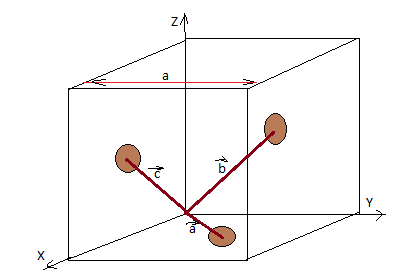
VI\_15: **Reciprocal lattice to fcc lattice:**

If we draw a fcc lattice and consider three face centered lattice point P, Q and R, we will get the translational lattice vectors , and as

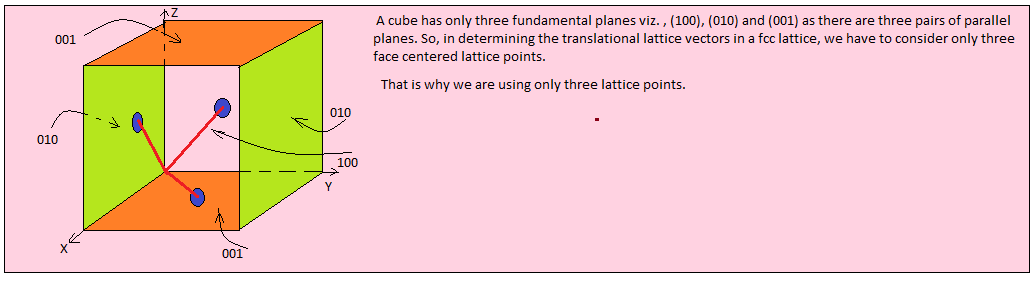
= ( + ), = ( + ) and = ( + )

(\* *See the box 2 in the previous note).*

**

Also, the reciprocal translational vectors are given by:

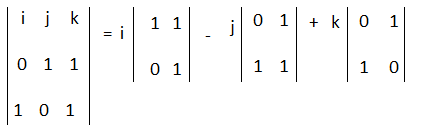
or a\* = 2л , or b\* = 2л and or c\* = 2л



Now,

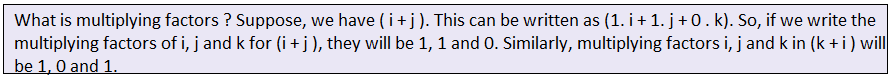
= ( + ) x ( + ) = ( a2 /4 ) [ (( + ) x ( + ) ]

If we make a determinant with the multiplying factors of the unit vectors, we get



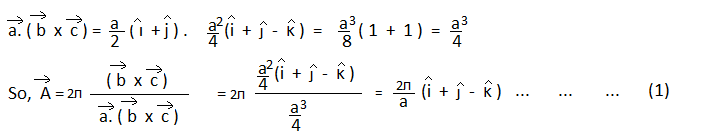
= ( 1 – 0 ) - (0 – 1 ) + ( 0 – 1 )

= + -



So, = ( a2 /4) ( + - )

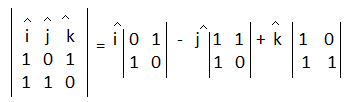
And,



Again,

= ( + ) x ( + ) = (a2/4) [( + ) x ( + ) ]

Making again a determinant, we have



= ( 0 – 1 ) - ( 0 – 1 ) + ( 1 – 0 )

= - + +

So,

= (a2/4) (- + + ) and . ( ) = a3/4.

Hence, or b\* = (- + + ) …. ……….. ………. ……… (2)

Similarly, we can determine

or c\* = ( - + ) … … … … … … … (3)

The vectors a\*, b\* and c\* are the reciprocal lattice vectors of fcc lattice. These are also the primitive translation vectors of a bcc lattice (real lattice). Thus, the reciprocal lattice to an fcc lattice is a bcc lattice.

