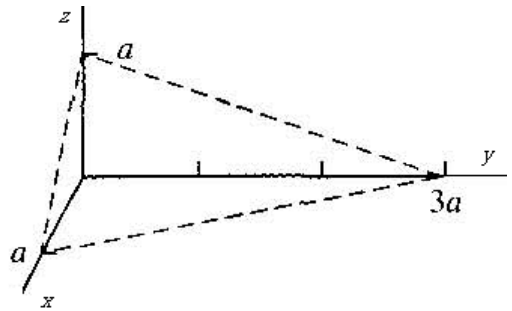




9. In a diamond structure, there are ..... atoms per unit cell.  
 (a) 1                    (b) 2                    (c) 4                    (d) 8
10. Silicon atoms are arranged in a ..... lattice structure.  
 (a) diamond            (b) zenclende          (c) simple cubic        (d) face-centered cubic.
11. Gallium Arsenide (GaAs) crystallizes in a ..... lattice structure.  
 (a) diamond            (b) zenclende          (c) simple cubic        (d) face-centered cubic.
12. The energy gap ( $E_g$ ) of an insulator material is usually:  
 (a) zero                    (b) greater than 4 eV    (c) less than 2 eV    (d) negative
13. The [110] direction in a cubic unit cell is parallel to ..... of the unit cell  
 (a) an edge (b) a body diagonal  
 (c) a face diagonal  
 (d) the normal of a face
14. The Miller indices for the plane shown in the figure are denoted by  
 (a) (113)                (b) (313)                (c) (131)  
 (d) (101)                (e) (133)



**Solve the following Problems:**

- [1] Copper has a F.C.C structure and its atomic radius is  $1.278 \text{ \AA}$ . Calculate its density. Atomic weight of Copper = 63.54 g/mole.
- [2] Calculate the densities of Ge where the lattice constants is  $5.66 \text{ \AA}$  and the atomic weight of Ge is 72.59 g/mole.
- [3] Show that for the closest packing of spheres, the atomic packing factor of the face-centered cubic (FCC), body-centered cubic (BCC), Simple Cubic (SC) and diamond lattices are approximately in the ratio of: 1.4 : 1.3 : 1 : 0.65 .
- [4] Draw the (110) and (111) planes and the [110] and [111] directions in a simple cubic crystal.
- [5] Given the following families of planes: {201}, {150}, and {312}:  
 a) Write down all possible combination of planes for each family.  
 b) Draw one plane for each family.
- [6] Write down the Miller indices for each of the following planes.

