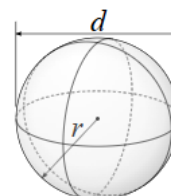
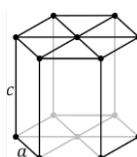
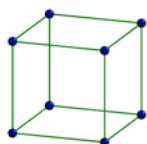


Tutorial N°02

Activity 1:

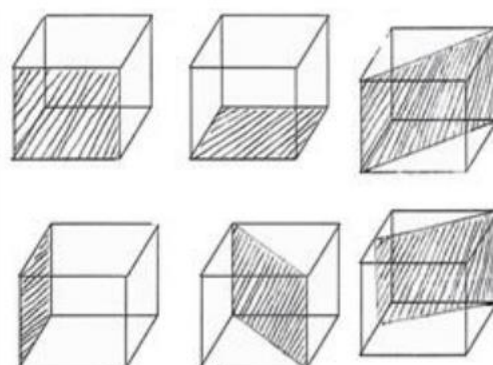
Give the expression of volume of the following structures:



Activity 2:

In a three-dimensional crystal lattice with lattice parameters a , b , and c :

- Draw the rows (direction $[100]$, $[210]$, $[111]$, $[112]$).
- Calculate the angle between the rows $[100]$ and $[111]$.
- Draw the crystallographic planes (111) , (210) , (001) , (100) , $(\bar{2}10)$, $(2\bar{1}0)$, and (222) .
- Provide the Miller indices for the following planes.



Activity 3:

If we consider that the constituent atoms of the crystals are solid spheres with a radius r , what is the packing efficiency or compactness in the following cases:

- Simple Cubic (cP)
- Body-Centered Cubic (cI)
- Face-Centered Cubic (cF)
- Hexagonal Close-Packed (hCP)
- Diamond

Activity 4:

The X-ray diffraction (XRD) analysis revealed that the structure of fluorite (CaF_2) is as follows: Fluoride ions (F^-) occupy the vertices, face centers, edge midpoints, and cube centers, while Ca^{2+} cations occupy the centers of the small face-centered cubes with an edge length of $a/2$. calculate the mentioned parameters:

- Coordination Number
- Multiplicity
- Packing Ratio
- Density (Volumetric Mass).

Data: $r_{\text{Ca}} = 1,00\text{\AA}$, $r_{\text{F}} = 1,33\text{\AA}$

