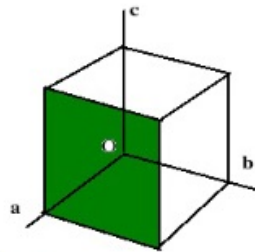
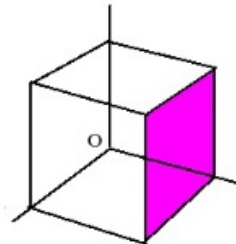


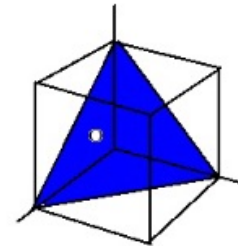
MILLER INDICES:



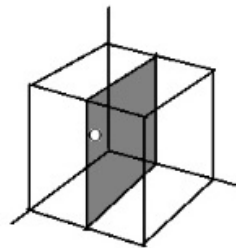
$(hkl) = (100)$



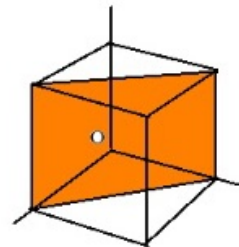
(010)



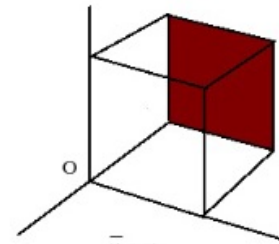
(111)



(020)



(110)



$(\bar{1}00)$

RECIPROCAL VECTOR: $\vec{G} = h\vec{b}_1 + k\vec{b}_2 + l\vec{b}_3$

$\vec{G} \perp$ to the plane (h, k, l)

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EXERCISE SHEET 2:

$$d_{hkl} = \frac{2\pi}{|h\vec{b}_1 + k\vec{b}_2 + l\vec{b}_3|} \propto \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

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EXERCISE SHEET 2:

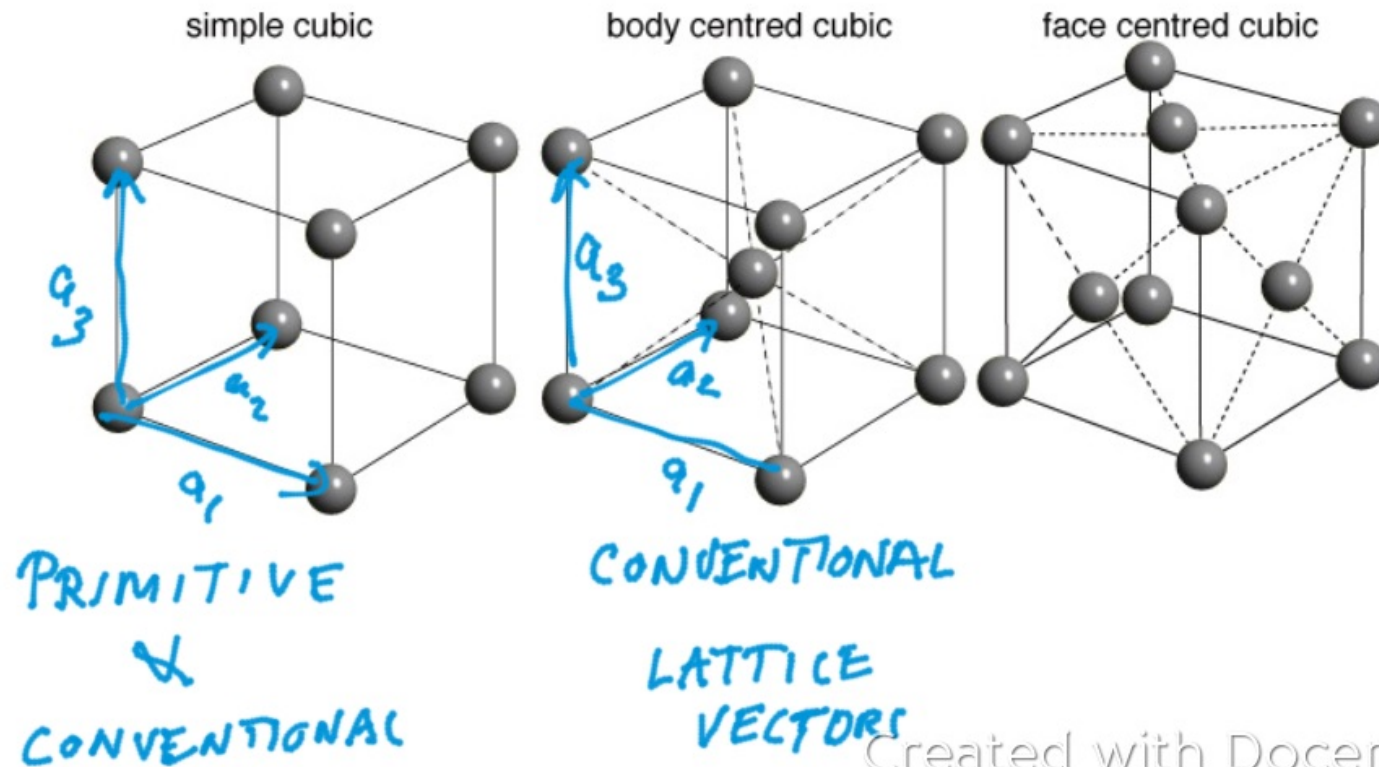
$$d_{hkl} = \frac{2\pi}{|h\vec{b}_1 + k\vec{b}_2 + l\vec{b}_3|}$$

BRAGG'S LAW:

$$\lambda = 2d_{hkl} \sin \theta$$

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PRIMITIVE VS. CONVENTIONAL LATTICE VECTORS:



STRUCTURE FACTOR:

$$S(\mathbf{q}) = \sum_i e^{-i\mathbf{q} \cdot \mathbf{r}_i}$$

$$= N \sum_i^{\text{BASIS}} e^{-i\mathbf{q} \cdot \mathbf{r}_i}$$

$$\propto \sum_i^{\text{BASIS}} e^{-2\pi i (hx_i + ky_i + lz_i)}$$

RECIPROCAL
POINTS

$$\mathbf{q} = (h, k, l) \frac{2\pi}{a}$$

with h, k, l integers

BASIS NOTATION

$$\mathbf{r}_i = (x_i, y_i, z_i) a$$

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STRUCTURE FACTORS:



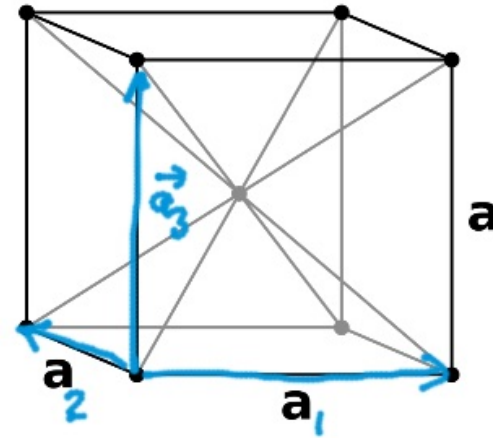
$$S(\vec{q}) = \sum_i e^{-i\vec{q} \cdot \vec{r}_i}$$

$$= N \sum_i^{\text{BASIS}} e^{-i\vec{q} \cdot \vec{r}_i}$$

$$\propto \sum_i^{\text{BASIS}} e^{-2\pi i(hx_i + ky_i + lz_i)}$$

$$= 1 + e^{-\pi i(h+k+l)}$$

$$= \begin{cases} 2 & \text{for } h+k+l \text{ even} \\ 0 & \text{for } h+k+l \text{ odd} \end{cases}$$



$$\text{BASIS} = \left\{ \begin{matrix} (0,0,0) \\ (\frac{1}{2}, \frac{1}{2}, \frac{1}{2}) \end{matrix} \right\}$$

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