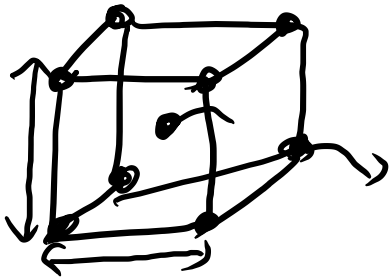


$$v = \sqrt{\frac{K}{\rho}}$$

$$\rho = \frac{M}{V} = \frac{M_{Fe}}{V}$$

$$\rho = \frac{2 \times M_{Fe}}{a_{bcc}^3}$$



$$V = a^3$$

$$56 \text{ g Fe } 1 \text{ mole}$$

$$6.023 \times 10^{23}$$

$$M_{Fe} = \frac{56}{6.023 \times 10^{23}} \text{ g}$$

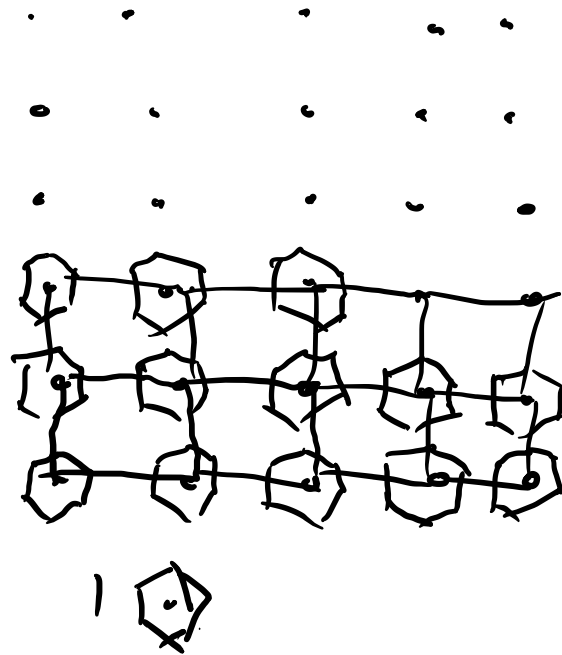
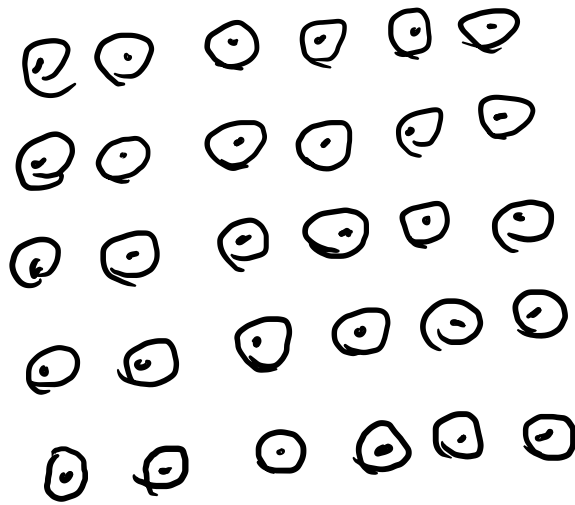
V

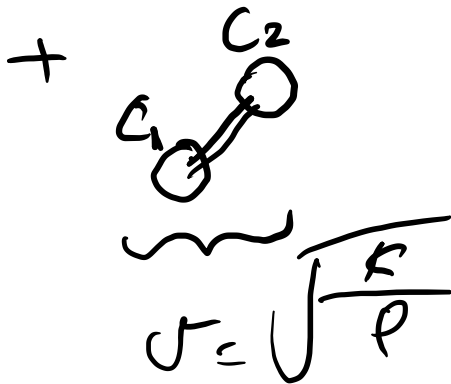
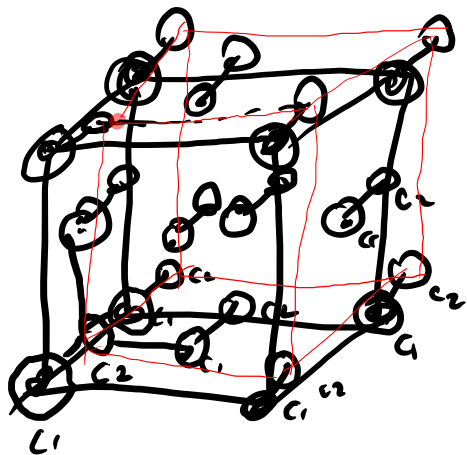
$$\rho = \frac{4 M_{Fe}}{a_{fcc}^3}$$

Crystal = Lattice + basis



A horizontal line is drawn under the equation. A bracket is placed below the line, spanning from the start of the line to the point before 'basis'. An arrow points down from the middle of this bracket to the word 'Lattice'. Another arrow points down from the line, starting at the '+' sign and ending at the word 'atoms'.





FCC

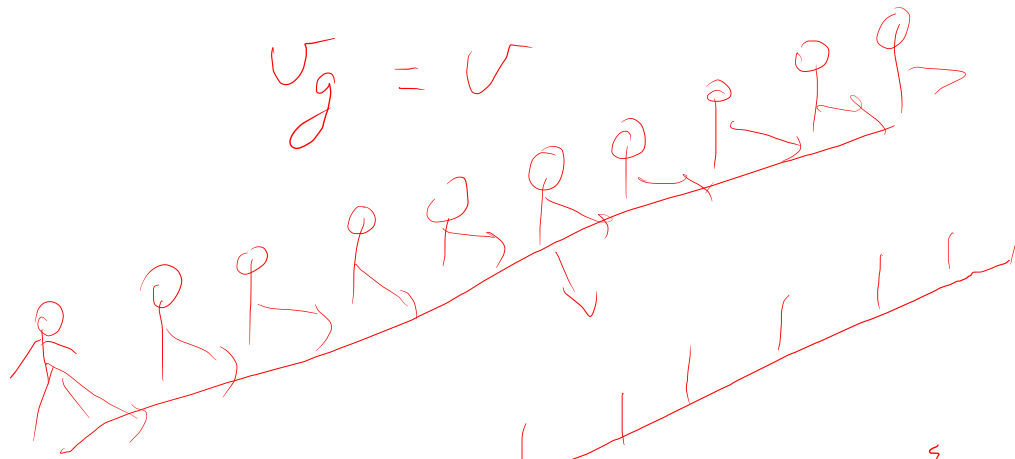
4 Lattice points * $v^2 = \frac{K}{\rho}$

2 atom per lattice points

$$k = \frac{v^2 \rho}{1}$$

8C

$$v_g = v$$



t_1

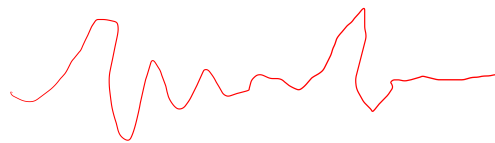
v_3

v_1

v_2



v_g



$$v_g = \frac{d\omega}{dk}$$

$$\omega \propto k$$

$$\omega = c k \rightarrow$$

$$\omega(k)$$

$$y = \sin \omega_1 t + \sin \omega_2 t + \sin \omega_3 t + \sin \omega_4 t + \sin \omega_5 t$$

$$\omega \propto k^2$$

$$\omega \propto f(k)$$

$$v_g = \frac{d\omega}{dk}$$

velocity of the wave in the medium

$$= \frac{d(vk)}{dk}$$

$$v_g = k \frac{dv}{dk} + v \frac{dk}{dk}$$

$$v_g = \underbrace{v}_v + k \frac{dv}{dk}$$

==

$$V_g = V_p + k \frac{dV}{dk}$$

$$= V_p + k \frac{dV}{d\lambda} \frac{d\lambda}{dk}$$

$$V_g = V_p + k \frac{dV}{d\lambda} \left(-\frac{\lambda}{k} \right)$$

$$\left\{ V_g = V_p - \lambda \frac{dV}{d\lambda} \right\}$$

$$V_g - V_p = -i v_e$$

$$\omega \propto k$$

$$\omega \propto k^2$$

$$\frac{d\omega}{dk} = A k \leftarrow$$

$$\frac{d\omega}{dk} = v$$

$$\lambda = \frac{2\pi}{k}$$

$$\frac{d\lambda}{dk} = -\frac{2\pi}{k^2}$$

$$\frac{d\lambda}{dk} = -\frac{2\pi}{k \left(\frac{2\pi}{\lambda} \right)}$$

$$\boxed{\frac{d\lambda}{dk} = -\frac{\lambda}{k}}$$

$$\omega = \lambda v$$

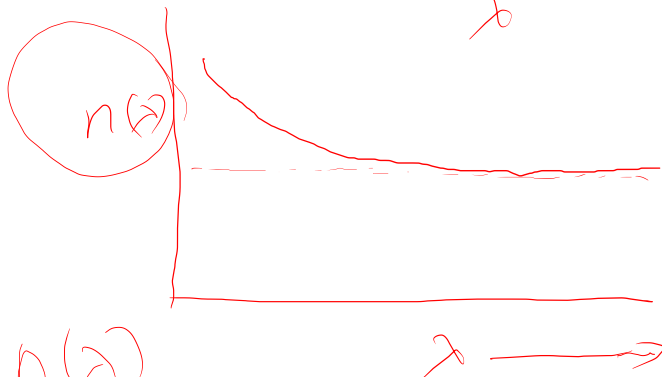
$$v = \frac{c}{n}$$

$n(x)$

$$v_g = v_p - \lambda \frac{dv}{d\lambda}$$



$$v = \frac{\text{OP. path}}{\Delta t}$$



$$\frac{c}{n} \Delta t = \text{OP path}$$



