Accordingly, we can write for the true magnetic field $2\pi\mathbf{H}$ in a vacuum:

$$2\pi\mathbf{H} =\int= \begin{cases} 2\pi\mathcal{E}/v = 2\pi\mathcal{E}/W_k^{0.5}\, W_v^{0.5} = 2\pi(\lambda_e\, \lambda_{y2})^{-0.5} = 2\pi\ \mathbf{H}_{MB} & \text{MB: ELECTRON} \\ 2\pi\mathcal{E}/v = 2\pi\mathcal{E}/W_v = 2\pi(\lambda_{y1})^{-1} = 2\pi\ \mathbf{H}_{MF} & \text{MF} \end{cases}$$

and for its corresponding magnetic field in a material medium:

$$\mathbf{B} =\int= \begin{cases} 2\pi F_{cyclo}/W_k = r^{-1} = \mathbf{B}_{MB} & \text{MB: ELECTRON} \\ 2\pi F_{cyclo}/W_v = r^{-1} = \mathbf{B}_{MF} & \text{MF} \end{cases}$$

And for the magnetic field wavelengths:

IN VACUUM

$$\mathbf{H}^{-1} =\int= \begin{cases} v/\mathcal{E} = W_k^{0.5}\, W_v^{0.5}/\mathcal{E} = (\lambda_e\, \lambda_{y2})^{0.5} = \mathbf{H}_{MB}^{-1} & \text{MB: ELECTRON} \\ v/\mathcal{E} = W_v/\mathcal{E} = \lambda_{y1} = \mathbf{H}_{MF}^{-1} & \text{MF} \end{cases}$$

IN MATTER

$$2\pi(\mathbf{B})^{-1} =\int= \begin{cases} W_k/F_{cyclo} = 2\pi r = 2\pi\ \mathbf{B}_{MB}^{-1} & \text{MB: ELECTRON} \\ W_v/F_{cyclo} = 2\pi r = 2\pi\ \mathbf{B}_{MF}^{-1} & \text{MF} \end{cases}$$

23. It follows from the preceding that the permeability of a medium, as a dimensionless ratio, should be expressed not as a ratio between **B** and **H**, but between **B**/2π and **H** - or, instead, between **B** and 2π**H**. Either way -

$$\mu = \mathbf{B}/2\pi\ \mathbf{H}$$

For massfree waves, this gives

$$\mu_{MF} = \frac{2\pi\ F_{cyclo}/W_v}{2\pi\ \mathcal{E}_{MF}/W_v} = \frac{F_{cyclo}}{\mathcal{E}_{MF}} = \frac{\mathbf{B}_{MF}}{2\pi\ \mathbf{H}_{MF}}$$

and for electronic massbound charges: