Relationship Between

Decay Constant – Linear Attenuation Coefficient

$$\lambda = \frac{\ln 2}{T_{1/2}} \qquad \mu = \frac{\ln 2}{HVL}$$

Fraction Decayed

$$\frac{A_t}{A_o}$$

Fraction Attenuated

$$\frac{I}{I_o}$$

Activity after decay (A_t)

$$A_t = A_o e^{-\lambda t}$$

Radiation after attenuation (I)

$$I = I_o e^{-\mu \chi} \quad I = I_o e^{-.693x(\chi/HVL)}$$

Time passed from decay

$$t = \frac{-\frac{T_{\frac{1}{2}}}{2} \times \ln \frac{A_t}{A_o}}{0.693}$$

Determine thickness of shield

$$\chi = \frac{-HVL \times \ln \frac{I}{I_o}}{0.693}$$

Determine half-life

$$T_{\frac{1}{2}} = -0.693 \times \frac{t}{\ln \frac{A_t}{A_o}}$$

Determine HVL

$$HVL = \frac{-0.693 \times \chi}{\ln \frac{I}{I_o}}$$