(7.11) A human body may be considered as consisting of water. Radiation from ^{137}Cs is absorbed by a 15 cm thick body. How much is the γ -ray flux reduced by the body, and how much of the beam energy (β plus γ) is absorbed?

$E_{max} := 0.5 \quad MeV$ $\qquad E_{\gamma} := 0.662 \quad MeV$

$E_{eabs} := \frac{E_{max}}{3}$

Beta particles: Totally stopped by ca 1.7 mm tissue. $\qquad E_{eabs} = 0.167$

Gamma radiation is damped by a factor d.

$x := 15 \cdot cm$ (average thickness of the body) $\qquad \rho := 1.0 \cdot gm \cdot cm^{-3}$ (density of water)

Flux reduction: $\qquad \mu_a := 0.086 \cdot cm^2 \cdot gm^{-1}$

$d_a := exp(-\mu_a \cdot \rho \cdot x) \qquad 1 - d_a = 0.725$ or $\qquad 1 - d_a = 72.473 \cdot \%$

Energy absorption: $\qquad \mu_e := 0.034 \cdot cm^2 \cdot gm^{-1} \qquad B := 1$

$d_e := B \cdot exp(-\mu_e \cdot \rho \cdot x) \qquad d_e = 0.6$

$E_{\gamma} := 0.662 \quad MeV \qquad E_{\gamma abs} := (1 - d_e) \cdot E_{\gamma} \qquad E_{\gamma abs} = 0.264 \quad MeV$

$E_{totabs} := E_{eabs} + E_{\gamma abs}$

$\frac{E_{totabs}}{E_{eabs} + E_{\gamma}} = 52.028 \cdot \%$