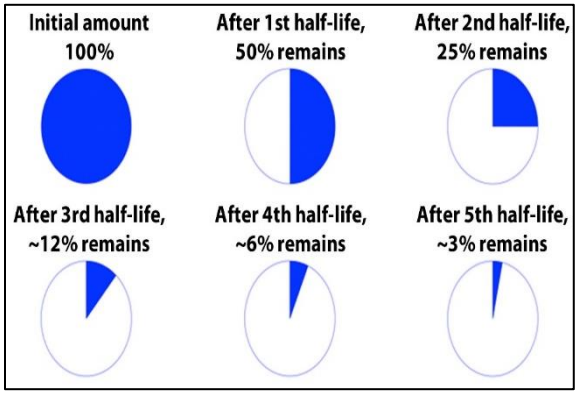
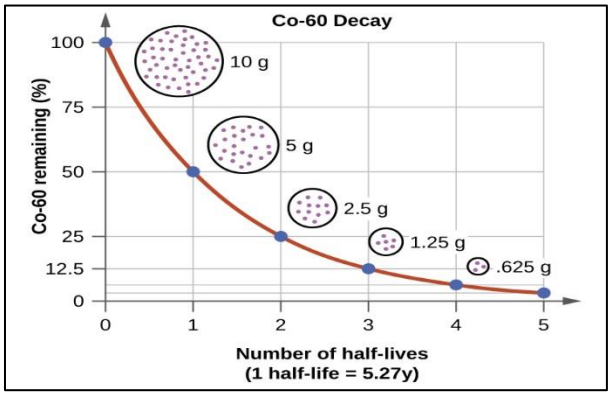
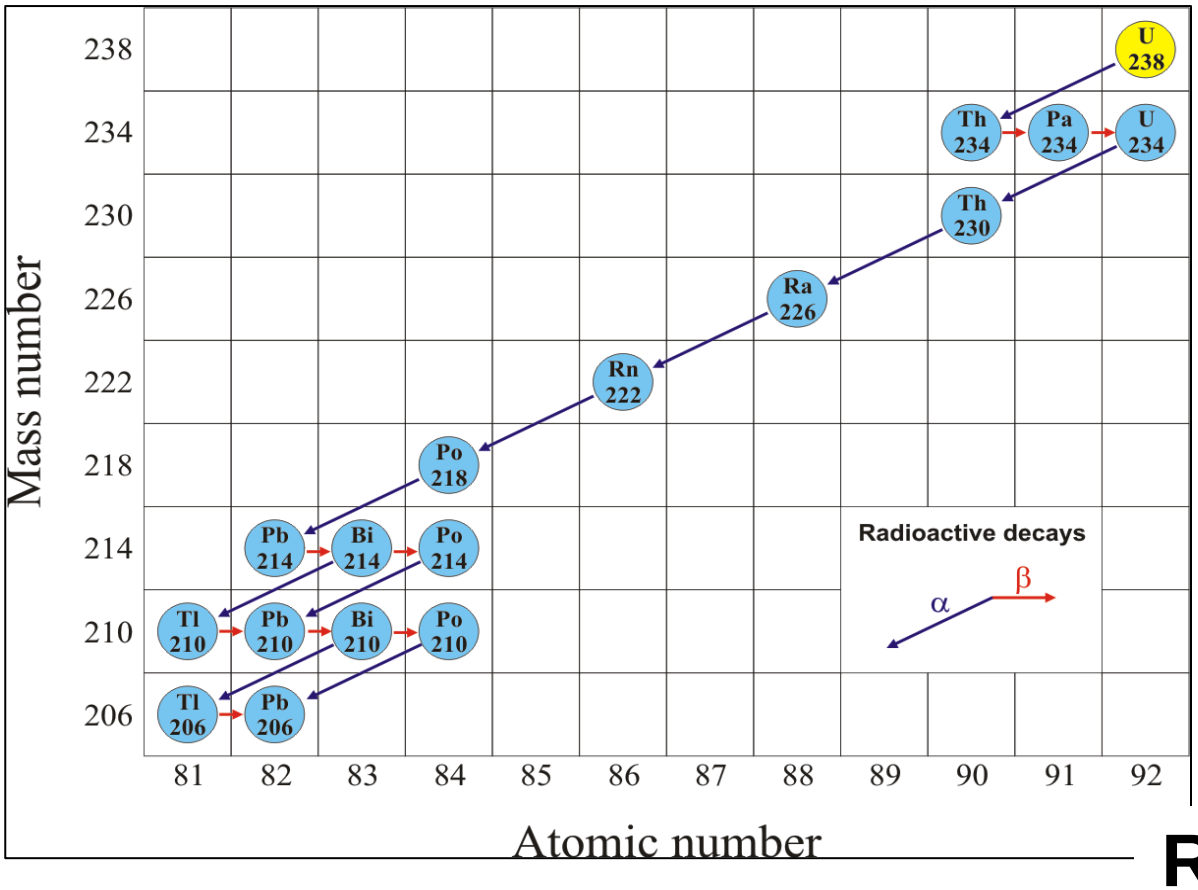
Nuclear Info Sheet

	Alpha Particle Emission	Beta Particle Emission	Gamma Ray Emission
Symbol	${}_2^4He^{2+}$ or ${}_2^4\alpha^{2+}$	${}_{-1}^{0}e$ or ${}_{-1}^{0}\beta$	${}_{0}^{0}\gamma$
Mass	Heavy	Light	No mass
How it changes the nucleus	• Decreases the mass number by 4 • Decreases the atomic number by 2	• Converts a neutron into a proton • Increases the atomic number by 1	• No change to nucleus numbers • Release of energy
Penetration	Low	Medium	High
Protection provided by	Skin	Paper, clothing	Lead, thick concrete
Danger	Low	Medium	High







R-14

Half Life Equation

$$A_E = A_s \times 0.5^n$$

A_E = amount ending
A_S = amount starting
n = number of half lives

of Half Lives

$$n = \frac{t}{h}$$

n = number of half-lives
t = time that has passed
h = length of a half life

% still radioactive or % decayed

$$\%_{still\ r.a.} = \frac{A_E}{A_S} \times 100$$

$$\%_{still\ r.a.} = 0.5^n \times 100$$

$$\%_{decayed} = 100 - \%_{still\ r.a.}$$

A_E = amount ending
A_S = amount starting
n = number of half lives

Solving for t, or h

$$\log\left(\frac{A_E}{A_S}\right) = n \times log(0.5)$$

Same as this version:

$$\log\left(\frac{A_E}{A_S}\right) = \frac{t}{h} \times log(0.5)$$

Simply isolate the variable you are trying to solve for

$$t = \frac{h \times \log\left(\frac{A_E}{A_S}\right)}{log(0.5)}$$

$$h = \frac{t \times \log(0.5)}{log\left(\frac{A_E}{A_S}\right)}$$