Nuclear radiation:

Particle	Description	Charge	Penetration & ionisation	Nuclear equations
Alpha	2 protons 2 Neutrons Same as helium nucleus	+2	Stopped by paper Highly ionising	Mass number: take away 4 Atomic number: take away 2
Beta	A neutron turns into a proton, a high speed electron is ejected from the nucleus	-1	Stopped by aluminium Medium ionisation	Mass number stays the same Atomic number increases by 1
Gamma	EM wave	N/A	Stopped by lead Low ionisation	N/A

Nuclear equations:

Atom before decay -> Atom after decay + Radiation emitted

Total mass & atomic numbers are equal on both sides

Alpha decay

$$^{235}_{92}U \longrightarrow ^{231}_{90}Th + ^{4}_{2}He$$

Beta decay

$$^{235}_{92}U \longrightarrow ^{235}_{93}Np + ^{0}_{-1}e$$

Gamma decay

$$^{235}_{92}U \longrightarrow ^{231}_{92}Th + ^{0}_{0}Y$$

Half life:

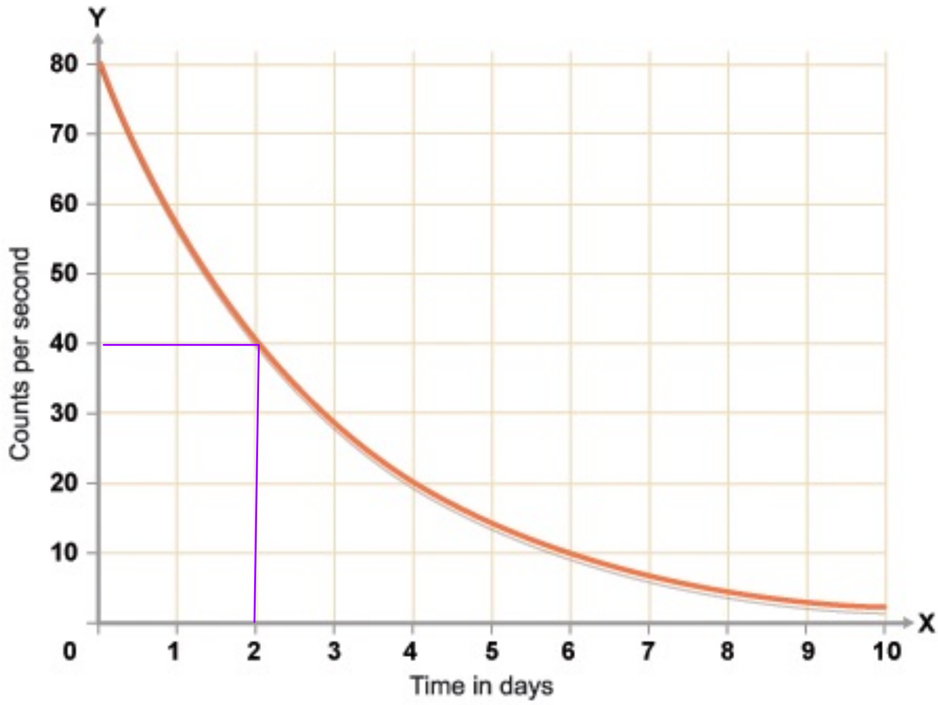
Radioactive decay = RANDOM process which atoms use to become stable

Geiger-Müller counter: measures count rate (radiation/sec)

Activity = rate of decay in Becquerels, Bq (1Bq = 1 decay/sec) but never reaches 0

Half life = the time taken for the number of radioactive nuclei in an isotope to halve

Short half life: activity falls quickly = dangerous at the start (emit high amount of radiation) then become safe
Long half life: activity gradually drops = dangerous in the long run as emits radiation over decades



$80 \div 2 = 40$

So 1 half life = 2 days

Contamination:

Unwanted radioactive atoms get on a substance
Object begins to emit radiation too
Safety: wear gloves & protective suits, use tongs to handle materials

Irradiation:

Objects are exposed to radiation
Object does not begin emitting radiation
Safety: keep sources in lead lined boxes, stand behind barriers

Harm:

Outside the body: Gamma
Gamma can penetrate through the skin to organs (but will come out eventually)

Inside the body: Alpha
Cannot leave the body so will continue to ionise cells, causing mutations & cancer in a localised area