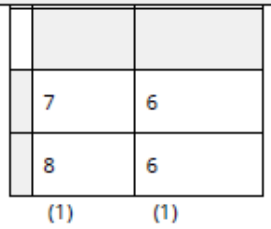
Question Number	Answer	Additional guidance	Mark
2(a)		one mark for each column must have both numbers in a column correct to get the mark	(2)

Question Number	Answer	Additional guidance	Mark
2(b)(I)	Geiger (Müller counter) (1)	GM (tube/meter) or other appropriate detector e.g. dosimeter, film badge, scintillation counter accept incorrect spellings such as "giga" ignore radioactive counter	(1)

Question Number	Answer	Additional guidance	Mark
2(b)(II)	any **two** acceptable sources from **cosmic** (rays) (1) Sun (1) rocks / ground (1) {nuclear / atomic} tests / nuclear waste (1) (nuclear) power stations (1) plant (sources) (1) buildings (1) food (1) water (1) medical (1) radon (1)	cosmic microwave background radiation (CMBR) accept nuclear accidents (Chernobyl, Fukushima etc) accept named foods accept X-rays, radiotherapy ignore alpha, beta, gamma	(2)

Question Number	Answer	Additional guidance	Mark
2(c)	processing (1) 125 000 1 000 000 OR 1 8 OR 3 half-lives or 3 x 5700 evaluation (1) 17 100	 accept an appropriate attempt using more than one halving 17 000 award full marks for the correct answer without working	(2)

Question Number	Answer	Additional guidance	Mark
2(d)	An explanation linking: neutron (decays) to proton (1) beta emitted (1)	 mass number stays the same but atomic number increases by 1 accept answers in terms of quarks (dud becomes uud) beta decay / β seen NOT β^+/beta plus allow (fast) electron emitted allow for 2 marks: n □ p + e OR $^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}\beta^{(-)}$	(2)

(Total for Question 2 = 8 marks)