Question number	Answer	Notes	Marks
8 (a)	A (background radiation)		1
(b)	Any TWO of 1. Range / penetration of alpha radiation is low; 2. Radon (is a gas so) particles /atoms mobile OR americium (solid so) particles / atoms stay in place; 3. Radon can be inhaled / damage internal tissue OR radiation from americium stays within smoke detector / absorbed by the plastic;	WTTE throughout this part ACCEPT 'cannot penetrate skin' / 'travel a few cm in air' ACCEPT 'all around us', 'more likely to come into contact', ACCEPT 'contained', 'stays in detector' ACCEPT 'can be breathed in', 'can get inside body', 'can damage (internal) cells /organs' ACCEPT 'high up', 'far from people'	2
(c) (i)	A (86)		1
(ii)	B (134)		1
(d) (i)	Bq / becquerel(s);	ACCEPT approximate / phonetic spellings of becquerel / Becquerel / bekerel REJECT B, BQ, bQ, bq	1

Question number	Answer	Notes	Marks
13 (a)	A (chemical → electrical → kinetic)		1
(b) (i)	KE = ½ x m x v^2 ;		1
(ii)	substitution into correct equation; Calculation; e.g. ½ x 600 x 28^2 ; 240000 (J);	correct answer = 2 marks ACCEPT 235200 (J);	2
(c) (i)	gpe = mass x *g* x height;	ACCEPT GPE = mgh ACCEPT gravitational field strength/acceleration due to gravity for g	1
(ii)	substitution into correct equation; Calculation; e.g. 600 x 10 x 1000 6 000 000 (J) or 6000 k(J) or 6 M(J)	correct answer = 2 marks ALLOW 5 880 000 (from *g* = 9.8)	2
(iii)	EITHER <u>Calculation of energy supplied (by fuel cells)</u> 24 kW x 180 s OR 4 320 000 (J); <u>Comparison with energy required</u> 4 320 000 < 6 000 000; OR <u>Calculation of power required</u> 6 000 000 J ÷ 180 s OR 33.3 kW; <u>Comparision with fuel cells</u> 33.3 kW > 24 kW;	 ALLOW ECF if 6 000 000 not seen ALLOW ECF if 6 000 000 not seen	2