Question number	Answer	Notes	Marks
6 (b) (ii)	120 (m)	ACCEPT 120 ± 5 (m);	1
(b) (iii)	Yes (no mark) Because 122 m is within tolerance / error zone / uncertainty of altimeter reading / (altimeter is) correct to nearest 5m / reading may not have been at the very top;	Accept NO if back up by incorrect value for (b) (ii) REJECT inconsistent answers (e.g. 'no' followed by reasoning that supports 'yes') IGNORE 'only 2m away', 'very close to', 'nearly the same', 'rough estimate' – key marking point is uncertainty, not closeness	1

Total 12 Marks

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
9 (a)	C (longitudinal waves)		1
(b)	FIVE marking areas –	ACCEPT points made on a labelled diagram	5
	Reference to speed = distance travelled ÷ time taken;	Need not be explicit, could be through description, e.g. 'and then divide the 100m by the time measured'	
	Measuring a time (of travel) for a known distance / measuring distance for a known time (of travel);	examples – 'stand a known distance away from a wall and time how long it takes for an echo to come back' 'put two microphones on a bench connected to a CRO to measure the time it takes for a sound to go from one microphone to the other'	
	Further appropriate detail for making a measurement;	stand at opposite sides of a room and time how long it takes for sound to go across' examples –stating suitable equipment and some indication of how to use it, e.g. 'have your partner facing away from you and start the timer when you make a sound – when they hear the sound they turn round and you stop the timer'	
	Idea of repeats / averaging / range of values;		
	Realistic values for experiment to work suggested;	Details of ALL relevant measurements NOT required, just one example e.g. – realistic – 'have your partner stand 100m away' 'stand 50m from a wall...time echo' 'place two microphones 1m apart...'	

Question number	Answer	Notes	Marks
11 (a) (i)	Reference to a (magnetic) field / flux / field lines; Which changes in the coil / cuts the coil ORA ;	MUST refer to relative motion between coil / wire and (magnetic) <u>field</u> – references to moving magnet insufficient (and repeat of stem) 'wire cuts (magnetic) field' = 2 marks	2
(ii)	Faster/more energetic movement (shaking);	ACCEPT More <u>turns</u> on the coil (not bigger coil); ACCEPT Stronger magnet / magnetic field (not bigger magnet); REJECT 'more coils' / 'more loops' REJECT 'add another magnet'	1
(b) (i)	C (there is a current in the circuit)		1
(ii)	LED wastes less energy / produces less heat (than a filament lamp); ORA Useful energy output ÷ total energy input is larger for the LED / useful output is closer to total (energy) input; ORA		2

Total 6 Marks

Question number	Answer	Notes	Marks
15 (a) (i)	Terminal (velocity);		1

(ii)	upward force = downward force / forces balanced / no resultant force / resultant force = 0;
	reference to F = ma / reference to (Newton's) 1st or 2nd Law;
	no acceleration / acceleration = 0;
		IGNORE descriptions of *reaching* terminal velocity	3

(iii)	faster speed / higher velocity / fell more quickly; Any one of – smaller (surface) area; Initially less resistive force / air resistance / drag; different time (to reach terminal velocity); less deceleration (before reaching terminal velocity);	 NOT ACCEPT '<u>no</u> air resistance' IGNORE upthrust	2
(b)	(Stopping distance) increased / further / longer; Suitable reason, e.g. Since less braking force / air resistance / drag / takes longer to decelerate / reduced deceleration / smaller resultant force;	IGNORE references to 'longer time' must be comparative, e.g. less / slower / longer	2

Total 8 Marks