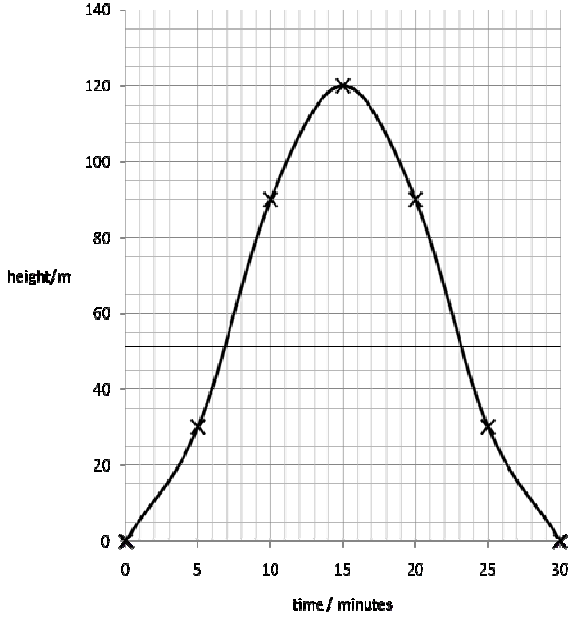| Question number	Answer	Notes	Marks
6 (a) (i)	170 x 0.74; 126 (m);	Correct final value = 2 irrespective of working If final value is incorrect, award one mark for correct working OR ACCEPT 125.8 (m) for one mark	2
(ii)	Any two of Miscounted number of paces; Guessed / estimated pace length; Uneven pace length; Measuring the shadow, not the wheel; Given to the nearest metre; ground may not be flat; shadow is different at different times of the day; shadow may have changed during measuring; may not have walked in a straight line; may not have walked across the centre of the shadow;	ACCEPT any other reasonable point IGNORE 'used no measuring equipment' IGNORE 'human error' alone	2
(iii)	Any one of Repeat and remove anomalies; check measurement of pace; use of tape measure / metre rule / trundle wheel / click wheel / step counter / GPS receiver;	ACCEPT other reasonable points 'Repeat' alone is insufficient IGNORE 'measure the actual London Eye' (doesn't improve the accuracy of *this* method)	1

Question number	Answer	Notes	Marks
6 (b) (i) cont	Suitable scale chosen (>50% of grid used); Axes labelled with scales <u>and units</u>; Plotting to nearest half square (minus one for each plotting / scale error);; Line (curve) of best fit acceptable; Sample graph:	 Units required on each axis On the time axis, accept 'min(s)' but not 'm' Two marks for plotting – lose one mark for each mistake to a maximum of losing two marks Judged by eye Not 'dot-to-dot', line should pass within one small square of each plotted point ACCEPT graph plotted with axes either way round	5

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
16	(a)		Any two of braking force; air resistance / drag; (road or tyre) friction;	ACCEPT Headwind/wind resistance in this case	2
	(b)	(i)	force = mass x acceleration;	ACCEPT mass = force ÷ acceleration ACCEPT acceleration = force ÷ mass ACCEPT standard symbols, F = m x a	1
		(ii)	Substitution in correct equation; Calculation; e.g. 1400 x 5.5 = 7700 (N) or 7.7 k(N)	correct answer = 2 marks	2
	(c)		Attempt at area under the graph (e.g. ½ x base x height); ½ x 4 x 22; Correct answer 44 (m); OR distance = (average) speed x time; 11 x 4; correct answer 44 (m)	correct answer = 3 marks first mark implied in correct substitution first mark implied in correct substitution	3
	(d)	(i)	(graph is a) curve(d line) /gradient changes / slope changes / (graph is) not a straight line / graph levels off;		1
		(ii)	Any two of <u>Increase</u> in air resistance / drag / wind resistance; <u>Increase</u> in road resistance / (tyre) friction; <u>Decrease</u> in resultant force; Road becomes <u>steeper</u> / goes uphill;	IGNORE references to terminal velocity IGNORE 'more weight in the car' IGNORE 'driver changed gear' IGNORE 'driver turned corner'	2

Total 11 Marks

PAPER TOTAL: 120 MARKS