Question			Answer	Marks	Part Marks and Guidance	
1	**(a)**		5 points correct	2	**B1** for at least 2 points correct	± 1 whole square Ignore any connecting lines
	(b)	**(i)**	1146 to 1159	1		
		(ii)	106 to 119	1		

2	**(a)**		-- -- 12 -- 11.25 --	1,1		
	(b)		*Their* 6 points correctly plotted **Curve** through *their* 6 points	1 FT 1 FT	±½ small square. Allow 1 error/omission Within ½ small square of points	Ignore curve outside the 6 points
	(c)		$14 < h \leq 15$	1		
	(d)		3.2 to 3.6	1		

3	**(a)**		Vert. dist = 449 – 170 or 279 Unit conversion before Pythagoras/trig: Either Horiz. dist. = 1.293 × 1609 or 2080[.437..] Or Vert. dist. = *their* 279 ÷ 1609 or 0.17[3…] *Their* h^2 + *their* v^2 [= 4406059 or 1.7019..] $\sqrt{Their\ h^2 \pm their\ v^2}$ 2098.6 to 2100	M1 M1 M1 M1 A1	**M1** for 279 seen Allow **M1** for 449 ÷ 1609 or 170 ÷ 1609 or clear indication that either 449 [metres] = 0.279[…] or 0.28 [miles] or that 170 [metres] = 0.105[…] or 0.11 [miles] Allow even if units are not consistent Allow even if units are not consistent Square root step may be implied	<u>Alternative method using trig:</u> **M1** for vert. dist as opposite **M1** for unit conversion as opposite **M1** for use of $\tan^{-1}$ to find an angle (note they could be finding either angle) **M1** for correct selection of a length and trig ratio consistent with the angle found **A1** for 2098.6 to 2100
	(b)		Use at least two triangles/use interim point	1		See exemplars

4	(a)	(i)	6-10	**1**	0 if 8 also mentioned unless it is clearly given as reason	
		(ii)	11.4(3...)	**4**	nfww **M1** for midpoints 3, 8, 13 etc seen or used **and** **M1** for *their* midpoints × freq (0, 6, 64, 91, 108, 46, 28) **and** **M1** for (*their* sum of midpoints × freq) ÷ 30 Allow **A1** for 11 if **M3** earned and no errors seen	At least three of them seen; may be implied by products At least 3 correct or total 343 seen; Allow first two **M1**s if seen even if another method used for answer on answer line Second and third **M**s are available for '*their* midpoints' being an attempt using other points in interval, or endpoints (at least 3 seen) Answers of 9.7 or 13.16 -13.17 imply second and third M1s
	(b)	(i)	4	**2**	**M1** for $\frac{93}{1043} \times 50$ oe or for 4.4(...) rot to 2 or more sf	e.g. M1 for 93/20.86… after 1043/50 = 20.86 If nothing on answer line, allow 2 marks for 4 written by table by year 13

		(ii)	advantage: more reliable results	**1**	oe; accept 'more reliable' or 'more representative' 0 for 'more accurate' or 'more precise' without any reference to reliability or representation	see appendix for exemplar comments accept valid reasons even if qualified with additional comments
			disadvantage: takes longer to do survey	**1**	or longer to process results; or more difficult to collect/process results oe; or more work oe 0 for harder to interpret results	

5	**(a)**		At least 3 response boxes covering all eventualities from at least 1 m to 20 m	1	For this mark they must mention appropriate units Condone heights implicitly to nearest metre or better as having no gaps eg 0-2 m, 3-5 m etc	Condone < 20 m as upper limit; condone omission of 'no trees in garden' or 'no garden' category; top category must start from 3 m or more
			No overlaps between categories (must have at least 3 categories; categories must not be more than 1 m apart)	1	After **0** for question allow **SC1** if clear intent to cover all eventualities (as for first mark) but poor notation (eg of inequality signs) has meant they earned 0	**0** for eg ...10-15 then 15-20 etc but bod intent with ...10-14 then 15-20 then 20+ or with ...10-14 then 15-19 then 20+ Condone no boxes if clear categories
	(b)		12	2	nfww **M1** for $\frac{202}{823}$ × 50 oe or for 12.2 to 12.3	eg **M1** for 823 ÷ 50 [= 16.(46)] then 202 ÷ answer Or **M1** for 823 ÷ 202 [= 4.07(...)] then 50 ÷ answer

	(c)	**(i)**	Plots at midpoints of groups Heights correct Joins with ruled straight lines	1 1 1	At 2, 7, 12, 17; condone one error within the correct interval Tolerance 1 mm Within 1 mm of points; ignore joins to axes from endpoints, but **0** if endpoints are joined	Use overlay As well as correct, allow heights mark for bars or for plots not at midpoints but elsewhere in correct interval Ignore bars if a frequency polygon also seen; otherwise bars can earn the mark for heights correct
		(ii)	7.6	4	nfww **M1** for midpoints 2, 7, 12, 17 seen or used **M1** for *their* midpoints × frequency (14, 70, 72, 34; total 190) **M1** for (*their* sum of midpoints × frequency) ÷ *their* 25; FT *their* (7 + 10 + 6 + 2) **A1** for 7.6 Accept 8 for **A1** if M3 earned and no errors seen	At least three of them seen At least 3 correct or for total 190 nfww Allow first two **M1**s if seen even if not used for answer on answer line Second and third **M**s are available for '*their* midpoints' being an attempt using other points in interval, or endpoints (at least 3 seen) Answers of 5.6 or 9.6 imply second and third **M1**s

6	(a)		Large number of observations oe	1	Ignore extra statements	
	(b)		$\frac{\textit{Their}\text{ total of 275, 255 and 241}}{\textit{Their}(\text{total of all 6 values})}$ $\frac{771}{1310}$ isw Or 0.58 to 0.59 or 58% to 59% Or 0.6 or 60%	M2 A1	For M2, allow rounded or truncated values **B1** for 771 <u>or</u> 1310 seen Dependent on **M2** scored	**<u>Also allow</u>** **M2** for $\frac{275}{449}$ **and** $\frac{255}{450}$ **and** $\frac{241}{411}$ [0.61.., 0.56 to 0.57, 0.58 to 0.59 oe] Or **M1** for $\frac{275}{449}$ **or** $\frac{255}{450}$ **or** $\frac{241}{411}$ oe **<u>OR</u>** **M2** for $\frac{257}{436 \text{ to } 437}$ oe Or **M1** for (275 + 255 + 241) ÷ 3 soi by 257 or for (449 + 450 + 411) ÷ 3 soi by 436 to 437