1.

	eg 14 ÷ 5 (= 2.8) or a correct value on the FD scale or 10 small squares =1 adult oe or 1 large square = 2.5 adults oe or 51 **and** 8 assigned to correct bars (distances)		3	M1 for finding the frequency density **or** for finding the number of adults for squares **or** use of counting squares or blocks
	eg 14 + (15 × "3.4") + (20 × "0.4") (= 73) oe or 100 – [14 + (15 × "3.4") + (20 × "0.4")] (= 27) oe 14 + 51 + 8 (= 73) oe or 100 – [14 + 51 + 8] (= 27) oe or (140 + 510 + 80) × 0.1 (= 73) oe or [1000 – (140 + 510 + 80)] × 0.1 (= 27) oe or (140 + 510 + 80) (= 730) oe or [1000 – (140 + 510 + 80)] (= 270) oe or (5.6 + 20.4 + 3.2) × 2.5 (= 73) oe or [40 – (5.6 + 20.4 + 3.2)] × 2.5 (= 27) oe			M1 for a method to find the area of the bars given or for a method to find the missing area
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	Correct height of bar at 2.7 and correct width		A1 for correct bar(s) with frequency of 27 SC B2 for a bar of height 2.7 from 0 – 15 SC B2 for a bar of height 1.8 from 0 – 15
				Total 3 marks

2.

	5 ÷ 2 (= 2.5) oe 12 ÷ 3 (= 4) 18 ÷ 5 (= 3.6) oe 14 ÷ 10 (= 1.4) oe 9 ÷ 15 (= 0.6) oe		3	M1 for 3 correct frequency densities or 3 correct bars
				M1 for 4 correct frequency densities or 4 correct bars
	Correct answer scores full marks (unless from obvious incorrect working)	completely correct histogram		A1 completely correct histogram use overlay **SC**: award B2 for all 5 bars of correct width with heights in the correct ratio (eg drawn at 1.25, 2, 1.8, 0.7, 0.3)
				Total 3 marks

3.

(a)		7, 24, 42, 56, 66, 70	1	B1	Correct values for cumulative frequency
(b)	**USE OVERLAY** (NB: a 'bar chart' type graph scores zero marks) (ignore any part of the graph before (10, 7))	6 points plotted at ends of intervals and joined with curve or line segments	2	B2	Fully correct graph. (B1 for 5 correct points plotted and joined or B1for 5 or 6 points plotted but not joined or B1 for 5 or 6 points plotted consistently within each interval (not at upper end) at their correct heights and joined eg plotted at 5, 15, 25, 35, 45, 55 For any of the B1 options, you can ft a table with just one error provided values are ascending)
(c)	NB: readings are 16 – 18 and 36 – 38 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 17.5 and CF 52.5 with an indication on the distance axis at the correct points (or they can just show the correct readings))		2	M1ft	For a correct method to **allow** readings to be taken on the distance axis from cf 52.5 (or 53.25) and from cf 17.5 (or 17.75) oe Ft from their cf graph
	If a graph is drawn and answer is in the given range, then award the marks – unless from obvious incorrect working	18 - 22		A1ft	Accept a single value in range or ft from their cf graph
(d)			2	M1ft	A line up from 46 to the line and reading across – or a reading of 61 – 64 (can be non-whole number) from their cf graph
	If a graph is drawn and answer is in the given range, then award the marks – unless from obvious incorrect working	6 or 7 or 8 or 9		A1ft	ft their cf graph, must be a whole number
					Total 7 marks

4.

(a)	**USE OVERLAY** (NB: a 'bar chart' type graph scores zero marks) (ignore any part of the graph before (5, 6))		2	B2	for a fully correct cf graph – points at ends of intervals and joined with curve or line segments. (B1 for 5 correct points plotted and joined or B1 for 6 correct points plotted but not joined or B1 for 5 or 6 points plotted consistently within each interval (not at upper end) at their correct heights **and** joined eg plotted at 2.5, 7.5, 12.5, 17.5, 22.5, 27.5
(b)	Readings are [8 – 9.5] and [21 – 23] (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating a **correct use** of CF 15 and CF 45 with an indication on the time axis at the correct points (or they can just show the correct readings))		2	M1ft	for a correct method to **allow** readings to be taken on the time axis from cf 45 (or 45.75) and from cf 15 (or 15.25) oe ft from their cf graph
	If a graph is drawn, answer is in the given range then award the marks	11.5 – 13.5		A1ft	Accept a single value in the range **or** ft from their cf graph
(c)	35 or lines or marks indicating use of CF 35 or an indication on the time axis at the correct point (or they can just show the correct reading)		2	M1ft	for using or stating 35 (ft from incorrect graph if method shown)
	If a graph is drawn, answer is in the given range then award the marks	16.5 – 18.5		A1ft	ft from their cf graph
(d)		$\frac{11}{60}$	1	B1	Accept 0.18(333….) or 18.(333…)%
					Total 7 marks

5.

(a)		25	1	B1 Allow 25 – 25.5
(b)	80 – [74, 76] (= [4, 6]) or 80 – (their value from a correct method) $\frac{"[74,76]"}{80}\times 100\,(=[92.5,95])$		3	M1 Allow a clear method to read off from cf diagram at 50 seconds and subtract this value from 80 **or** read the value and use a method to find this as a percentage of 80
	$\frac{"[4,6]"}{80}\times 100$ (=[5, 7.5]) oe or $100-\left(\frac{"[74,76]"}{80}\times 100\right)$ oe or "[4, 6]" ÷ 0.8 oe			M1ft if previous M1 awarded
	Working required	6.25		A1 dep on M1 Allow range 5 – 7.5
				Total 4 marks

6.

	24 ÷ 20 (= 1.2) or a correct value on the FD scale or 10 small squares = 1 orange or 25 small squares (1 large square) = 24 ÷ 9.6 = 2.5 oranges oe **or** 9 or 18 or 27 correctly assigned **or** $\frac{3x}{4}+\frac{y}{3}$ where x is their frequency of 3rd bar and y is their frequency of 4th bar		3	M1 for use of area to represent frequency **or** one correct frequency from the $\frac{1}{3}$ of 4th bar (9) or $\frac{2}{3}$ of 4th bar (18) or The 4th bar (27) [NOT 3rd bar = 44] or A method to show the student is finding $\frac{3}{4}$ of 3rd bar + $\frac{1}{3}$ of 4th bar (frequencies to be seen on diagram or identified in working)
	eg (15 × 2.2) + (5 × 1.8) oe or 33 + 9 or 44 + 27 – 11 – 18 or (330 + 90) ÷ 10 oe or (13.2 + 3.6) × 2.5 oe			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	42		A1
				Total 3 marks

7.

(a)		28	1	B1	allow 27.5 – 28.5
(b)		14	1	B1	cao
(c)			2	M1	for a reading of 38 from vertical axis **or** 50 – (their reading from a height of 35)
	Correct answer scores full marks (unless from obvious incorrect working)	12		A1	cao
					Total 4 marks

8.

	140 – (23 + 18 + 14) (= 85) **and** state the area of the 2 given bars, eg 34 (1 cm) squares or 8.5 large squares or 850 small squares oe **OR** 23 ÷ 5 (= 4.6 oe) **or** 18 ÷ 10 (= 1.8 oe) **or** 14 ÷ 20 (= 0.7 oe)		4	M1
	Use of frequency density for the given bars eg "85" ÷ 34 = 2.5 [(1 cm) square = 2.5 people] or "85" ÷ 8.5 = 10 [1 large square = 10 people] or "85" ÷ 850 = 0.1 [1 small square = 0.1 people] or 10 small squares = 1 person **OR** 23 ÷ 5 (= 4.6 oe) **and** 18 ÷ 10 (= 1.8 oe) **and** 14 ÷ 20 (= 0.7 oe)			M1 **or** 2 correct values in the table **or** 2 or 3 correct bars
	Correct answer scores full marks (unless from obvious incorrect working)	$5 < t \leq 15$ has frequency 25 $15 < t \leq 30$ has frequency 60 Bars of 4.6, 1.8, 0.7 correctly drawn to scale		A2 (A1 for **4** of $5 < t \leq 15$ has frequency 25 $15 < t \leq 30$ has frequency 60 bar of 4.6, bar of 1.8, bar of 0.7)
				Total 4 marks

9.

(a)		15, 31, 52, 66, 74, 80	1	B1	
(b)			2	M1	ft from table for at least 5 points plotted correctly at end of interval **or** ft from sensible table for all 6 points plotted consistently within each interval in the **freq table** at the correct height
		Correct cf curve		A1	accept curve or line segments accept curve that is not joined at (50,0)
(c)	*Correct answer scores full marks (unless from obvious incorrect working)*	73 – 75	1	B1ft	ft their cumulative frequency graph
(d)	NB: readings are 62.5 – 64 and 85 – 86.5 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Time Taken axis at the correct points (or they can just show the correct readings))		2	M1ft	For correct use of LQ and UQ, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Time Taken axis (even if wrongly read scale) **or** clear marks on the graph and Time Taken axis that correspond to the correct readings **or** correct values from the Time Taken axis
	If answer is in the given range, then award the marks – unless from obvious incorrect working	21 to 24		A1ft	Accept a single value in range 21 to 24 or ft from their cumulative frequency graph provided method is shown
	Correct answer scores full marks (unless from obvious incorrect working)				**Total 6 marks**

10.

	e.g. 20×9 (= 180) or 20×0.9 (= 18) or 20×1.8 (= 36) or $(4 \times 25) + (4 \times 20)$ (= 180) oe or 4×0.9 (= 3.6) or 4×1.8 (7.2)		4	M1	for a method to find the area of the 55 - 75 bar
	e.g. $5 \times 16 + 5 \times 50 + 10 \times 33 + 10 \times 19 + 25 \times 9$ (= 1075) or $5 \times 1.6 + 5 \times 5 + 10 \times 3.3 + 10 \times 1.9 + 25 \times 0.9$ (= 107.5) or $5 \times 3.2 + 5 \times 10 + 10 \times 6.6 + 10 \times 3.8 + 25 \times 1.8$ (= 215) or $(3\times25 + 5) + (10\times25) + (12\times25 + 2\times15) + (6\times25 + 2\times20) +$ $(5\times25 + 5\times20)$ (= 1075) or $1 \times 1.6 + 1 \times 5 + 2 \times 3.3 + 2 \times 1.9 + 5 \times 0.9$ (= 21.5) or $1 \times 3.2 + 1 \times 10 + 2 \times 6.6 + 2 \times 3.8 + 5 \times 1.8$ (= 43)			M1	for a method to find the total area **Using 5 bars** (products or areas) eg 80 + 250 + 330 + 190 + 225 or 16 + 50 + 66 + 38 + 45 allow one error or omission **Using 6 bars** (products or areas) eg 80 + 250 + 330 + 190 + 45 + "180" or 16 + 50 + 66 + 38 + 9 + "36" allow one error or omission
	e.g. $\frac{180}{1075}(\times100)$ or $\frac{18}{107.5}(\times100)$ or $\frac{36}{215}(\times100)$ or $\frac{3.6}{21.5}(\times100)$ or $\frac{7.2}{43}(\times100)$ or 0.167(441…) (× 100)			M1	for a method to find a fraction aged 55+ or percentage aged 55+ using all **correct** values only
	Correct answer scores full marks (unless from obvious incorrect working)	16.7		A1	awrt 16.7
					Total 4 marks

11.

(a)		7, 17, 32, 64, 80	1	B1	values seen in table
(b)			2	M1ft	for at least 4 points plotted correctly at end of interval **or** for all points plotted consistently within each interval of the associated frequency table (eg at 5, 15, 25, 35, 45 or 0, 10, 20, 30, 40) at the correct height. ft their table dep on one error only in the table
	(NB: a 'bar chart' type graph scores zero marks)	correct cf graph		A1	All points plotted correctly at end of interval (tolerance 1 small square – **there is an overlay**) and joined with a curve or line segments accept curve that is not joined at (0, 0).
(c)	*Accept a single value in the range OR ft their cf graph*	33	1	B1ft	Accept a single value in range 32 – 34 **or** ft their cf graph
(d)	NB: readings are 21 - 23 and 37 - 39 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Time axis at the correct points (or they can just show the correct readings))		2	M1ft	For correct use of LQ and UQ and subtraction, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Time axis(even if wrongly read scale) **or** clear marks on the graph and Time axis that correspond to the correct readings **or** correct values from the Time axis
	Accept a single value in the range OR ft their cf graph	16		A1ft	Accept a single value in range 15 to 17 or ft from their cumulative frequency graph provided method is shown eg subtraction of values that would be correct for their graph
					Total 6 marks

12.

	(a)		43.5 - 44.5	1	B1	±0.5 small square
	(b)	eg reading of 48 - 49		2	M1	For correct method to start the question eg a vertical line from 55 up to the line and a horizontal line from the correct point on the cur or a mark on the curve at the correct point and a mark on the vertical axis at the correct point or a correct reading of 48 to 49
		Correct answer scores full marks (unless from obvious incorrect working)	11 or 12		A1	Allow an answer of 11 or 12 (ie must be whole number)
	(c)			2	B2	All values correctly filled in (NB: first 2 are already completed) (B1 for 3 or 4 correct values from 7, 10, 15, 15,

Time taken to shop in the market (m minutes)	Frequency
$0 < m \leq 10$	3
$10 < m \leq 20$	5
$20 < m \leq 30$	7
$30 < m \leq 40$	10
$40 < m \leq 50$	15
$50 < m \leq 60$	15
$60 < m \leq 70$	5

					Total 5 mar

13.

	USE OVERLAY PROVIDED				
(a)	FD are: 6, 7, 5, 4, 1.8		3	M1	For at least two frequency densities correct or at least two correct bars
				M1	For at least 4 correct frequency densities or 4 correct bars
	A fully correct histogram gains full marks	Correct histogram		A1	Fully correct histogram SCB2 for all five bars of correct width with heights in the correct ratio (eg drawn at 0.6, 0.7, 0.5, 0.4, 0.18) SCB1 for three bars of correct width with heights in the correct ratio
(b)	$(9 + \frac{2}{3} \times 12)$ (= 17) oe eg 9 + 8 (= 17) or $55 - (12 + 7 + 15 + \frac{1}{3} \times 12)$		2	M1	may be seen as numerator of fraction (ft their graph dep on M1 in (a))
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{17}{55}$		A1cao	Or 0.30909…or 30.909….% (to at least 2 sf) SCB1 for $\frac{38}{55}$ (0.6909…)
					Total 5 marks

14.

(a)	$15 \div 15 (= 1)$ $18 \div 5 (= 3.6)$ $32 \div 20 (= 1.6)$ $4 \div 10 (= 0.4)$	Correct histogram	3	B3	for a fully correct histogram If not B3 then B2 for 3 correct frequency densities (can be implied by heights) or 3 correct bars drawn If not B2 then B1 for 2 correctly calculated frequency densities (can be implied by heights) or 2 correct bars drawn
					SC: award B2 for all 4 bars of correct width with heights in the correct ratio (eg drawn at 0.5, 1.8, 0.8, 0.2) **SC:** award B1 for 3 bars of correct width with heights in the correct ratio
(b)	eg $\frac{15}{20}\times 32 (=24)$ **or** $\frac{5}{20}\times 32 (=8)$ **or** $\frac{15}{20}\times 32+18 (=42)$ **or** $32+18-\frac{5}{20}\times 32 (=42)$		2	M1 ft	for a method to find an estimate for the number of students who took between 30 and 45 minutes **or** between 45 and 50 minutes **or** between 25 and 45 minutes ft incorrect histogram
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{42}{50}$		A1	oe eg $\frac{21}{25}$, 0.84, 84%
					Total 5 marks

15.

(a)		7, 33, 57, 71, 78, 80	1	B1	
(b)			2	B2	Fully correct cf graph – points at ends of intervals and joined with curve or line segments. If not B2 then B1(ft from a table with only one arithmetic error) for 5 or 6 of their points at ends of intervals and joined with curve or line segments **OR** for 5 or 6 points plotted correct at ends of intervals not joined **OR** for 5 or 6 points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments.
(c)		21 – 24	1	B1ft	any value in range or ft their cf curve
(d)			2	M1ft	eg reading of 72 – 74 or 6 – 8 could be seen as the numerator of a fraction ft their cf graph
		$\frac{8}{80}$		A1ft	oe, ft their cf graph fractional answers must have an integer numerator and denominator
					Total 6 marks

16.

	16 ÷ 0.5 (= 32) or a correct value on the FD scale or 10 small squares =1 watermelon oe 25 small squares (1 large square) =16 ÷ 6.4 = 2.5 watermelon oe			M1 for use of area to represent frequency or one correct frequency from the 4 remaining bars
	15 × 1 + 16 + 23 × 1 + 30 × 1 + 12 × 1.5 **or** 15 + 16 + 23 + 30 + 18 **or** 16 + 0.1 × (15 × 10 + 23 × 10 + 30 × 10 + 12 × 15) oe **or** (150 + 160 + 230 +300 +180) × 0.1 oe **or** (6 + 6.4 + 9.2 + 12 + 7.2) × 2.5 oe			M1 (dep on M1) for a fully correct method, allow one error in products or number of squares but must be the sum of 5 parts
		102		A1
				Total 3 marks

17.

	at least **two** of 3, 8, 5, 2 seen **or** at least **two** correct frequency densities from 0.6, 0.8, 1, 1.2, 0.4 **or** eg one cm on FD axis = 0.25 **or** eg top of FD axis labelled 2 **or** eg 1 plant = 20 small squares **or** total small squares in at least 2 bars (60, 160, 100, 240, 40) **or** total number of 1 cm squares for at least 2 bars (2.4, 6.4, 4, 9.6, 1.6) oe		4	M1 At least 2 frequencies for other bars **or** scale on FD axis **or** eg 20 small squares represents 1 plant oe
	3 + 8 + 5 + 12 + 2 (= 30) **or** adding the number of small squares in all bars: 60 + 160 + 100 + 240 + 40 (= 600) **or** adding the number of 1 cm squares in all bars: 2.4 + 6.4 + 4 + 9.6 + 1.6 (= 24) oe			M1 add up 5 frequencies (allow one error) or adding the number of small squares in all bars (allow one error) or adding the number of 1 cm squares in all bars (allow one error) oe
	$\frac{0.25\times"12"+"2"}{"30"}$ **or** $\frac{0.25\times"240"+"40"}{"600"}$ **or** $\frac{0.25\times"9.6"+1.6}{"24"}$ **oe**			M1 ft their figures dep on the previous M1
		$\frac{1}{6}$		A1 oe eg $\frac{100}{600}$ allow 0.16(66…) ie 2 dp truncated or rounded or better
				Total 4 marks

18.

(a)		48	1	B1 allow 47 – 49 Accept $\frac{n}{110}$ where n is in the range 47 – 49
(b)		46	1	B1 allow 45.5 – 46.5
(c)	40 **and** 56		2	M1 for both values. LQ of 40 – 41 and UQ in the range 56 – 58. **or** for use of 15 and 45 (eg indicated by marks on horizontal axis that correspond to 15 and 45 on the vertical axis.) **or** for use of 15.25 and 45.75 (eg indicated by marks on horizontal axis that correspond to 15.25 and 45.75 on the vertical axis.
		16 to 18		A1 accept 16 to 18
(d)		Yes and correct reason	1	B1ft dep on M1 in (c) but ft their reading of the horizontal axis. For stating yes **and** the IQR for the Algebra test is greater than IQR for the Geometry test oe If using value in (c) less than 9, only accept 'no' and IQR for the Algebra test is less than the IQR for the Geometry test oe.
(e)	60 – '50' (= 10)		3	M1 may be seen embedded as $\frac{10}{60}$ $(=\frac{1}{6})$ oe (eg reading of 50 from graph stated or indicated by marks on vertical axis that correspond to 64 on the horizontal axis). Allow 60 – '50' – 1 (= 9) oe
	$\frac{'10'}{60} \times \frac{'10'-1}{59}$			M1 for use of $\frac{n}{60} \times \frac{n-1}{59}$ with any integer n such that $2 \le n \le 59$
		$\frac{3}{118}$		A1 oe (accept 0.025 or better) Allow $\frac{6}{295}$ (= 0.02 or better) if using $\frac{9}{60} \times \frac{8}{59}$
				Total 8 marks

19.

	10 ÷ 20 (= 0.5) or a correct value on the FD scale and no errors or 25 small squares = 5 children or 5 small squares = 1 child oe or 1 small square = 0.2 children oe or 29 oe or 48 oe or 10 (associated with 75-80 bar)		3	M1
	(10 × 2.9) + (15 × 3.2) + (5 × 2) or 29 + 48 + 10 or (5.8 + 9.6 + 2) × 5 oe or (145 + 240 + 50) × 0.2 oe			M1for a fully correct method
		87		A1
				Total 3 marks