Question			Answer	Marks	Part marks and guidance	
1			$2\frac{1}{2}$	3	Mark final answer **B2** for $\frac{175}{70}$ **oe** or **M1** for $\frac{25}{7}$ **seen**	
2	(a)		No oe and he has not written the answer in index form **oe**	1		e.g. it should be $2^3 \times 5$
2	(b)		$^{-}4$	1		
3			5000 [ml] or 0.45 [L] soi 9 × 450 oe Correct attempt to find 80% or 20% of 5000oe 4050 and 4000 or 950 **and** 1000 **and** [They are] correct **oe**	**B1** **M1** **M1** **A2**	 or $\frac{9\times450}{5000}[\times100]$ **oe** or $\frac{5000-9\times450}{5000}[\times100]$ **oe** or 81% [and 80%] or 19% [and 20%] After A0 scored **B1** for 4050 or 4000 or 950 or 1000	Correct conversion at any stage Alternate approaches are possible M1 may be implied by 4000 or 1000 or 81% or 19% seen For A2 accept in other correct consistent units for comparison e.g.4.05[L] and 4[L]and must have no incorrect statement For B1 accept e.g. 4.05[L] or 4[L]
4	(a)		Four correct plots (70, 86) (44, 60) (37, 48) (38, 50)	2	**B1** for 2 or 3 correct plots	Overlay gives guidance, tolerance ±½ small square
4	(b)		Positive	1		Ignore embellishments

Question			Answer	Marks	Part marks and guidance	
4	(c)	(i)	Circles (30, 66) only	1		Accept any clear indication
4	(c)	(ii)	120	3	**M2** for $\frac{66-30}{30}[\times 100]$ **oe** or for $\frac{66}{30}\times 100$ [–100] **oe** or **M1** for $\frac{66}{30}$ **oe** or for 66 – 30 **oe**	For M2 and M1 FT *their* (c)(i), point must be chosen for FT (table or graph) M2 implied by 1.2 or 220 M1 implied by 2.2 or 36
4	(d)		No and line of best fit should not extend beyond data provided **oe**	1		eg only have data up to 70 marks. No one scored that high [so the trend may not continue]. He would need to extrapolate beyond the line of best fit. Do not accept e.g. the graph only goes up to 90 for the second test

Question			Answer	Marks	Part marks and guidance	
5			32	4	**M2** for correct method to find area of L shaped face e.g 6 × 3 – 5 × 2 or **M1** for finding one of the relevant partial lengths of 2 or 5 **M1** for *their* area × 4 OR **M1** for 3 × 4 × 1 **M1** for 5 × 4 × 1 **A1** for 12 or 20 OR **M1** for 6 × 3 × 4 **M1** for 2 × 5 × 4 **A1** for 72 or 40	M1 could be on diagram Treat extra volumes as choice A1 Implies M1 Mark as oe for other correct products if split into two different cuboids that make the solid Not 6 × 3 × 4 × 1 × 1 Treat extra volumes as choice A1 implies M1 unless 72 comes from 6 × 3 × 4 × 1 × 1
6	(a)		C	1		
6	(b)		D	1		
7	(a)		$x < 4$	3	Mark final answer **M1** for $4x - 12 < x$ or $x - 3 < \frac{x}{4}$ **M1** for correct step[s] to $ax < b$ FT *their* first step	For method marks, condone incorrect inequality sign or 'equals' sign e.g. Answer $x = 4$, $x > 4$ implies M1M1

Question			Answer	Marks	Part marks and guidance	
7	(b)		Correct representation of *their* (a) on number line	2	**Strict FT** *their* (a) dep on an inequality in (a) **B1FT** for *their* correct hollow or solid circle **B1FT** for *their* correct arrow direction	If e.g. 3 on answer line and x < 3 in working then allow FT from x < 3 If answer 4 in (a) then allow *x* < 4 here Both B1's must be with *their* value from part (a) If no arrow then *their* line must stretch to end of line
8	(a)		- 3	1		
8	(b)		Correct graph	3	Curves must not be joined or touch either axis **B2FT** for 7 or 8 correct plots Or **B1FT** for 5 or 6 correct plots	Mark in 50% zoom, use overlay, mark curve first For 3 marks, curve must pass through or touch circles on overlay Condone slight feathering, no ruled segments If curve incorrect, mark the plots use the overlay, plots must lie inside or touch circles. If large blob for plot, check centre of blob

Question			Answer	Marks	Part marks and guidance	
9			Shows actual increase is 21 [%] with correct working	5	**M3** for [*k* ×] 1.1 × 1.1 **oe** **A1** for 121[%] or for 1.21 OR **M1** for 1.1 **oe soi** **A1** for a correct evaluation of the first stage with *their* value If 0 scored **SC2** for answer 21[%] or **SC1** for 121% or 1.21 with no working	"Correct working" requires evidence of at least **M3** or alternate convincing approach Allow method marks if contained in correct method involving any invented starting price e.g. **M3** for 100 × 1.1 × 1.1 **oe** e.g. for M1A1 uses 80 as value then gives 88 in working
10			10 nfww	4	**M1** for 5 × 4 **M1** for 200 or 199 used **M1dep** for *their* 200 ÷ *their* area, **dep** on first M1	nfww for 4 marks no errors in calculating values and at least one of 5, 4, 200 or 199 used Allow for 20 or for 4.9 × 4.1 [20.09] or with one unrounded value [19.6 or 20.5] Allow for 198.5 ÷ (4.9 × 4.1)

Question			Answer	Marks	Part marks and guidance	
11			13 with correct working	7	**M1** for $\frac{BD}{10} = \sin 30$ **oe** **B1** for sin 30 = 0.5 **soi** **A1** for [BD =] 5 **M1** for *their* BD × 2.4 **oe** **A1** for CD = 12 **M1** for (*their* BD)^2 + (*their* CD)^2 [= BC^2] **oe** If 0 scored **SC3** for answer 13 with no working or **SC2** for CD = 12 with no working or **SC1** for BD = 5 with no working	"Correct working" requires evidence of at least M1 or B1 and M1M1 or alternate convincing approach Answer 12 gets A0 unless CD = 12 shown in working or on diagram SCs may be seen on the diagram
12	(a)		0.64	2	**M1** for 7.64 – 7 or 7 to 7.64	
12	(b)		45	2	**M1** for 0.75 × 60 **oe**	
12	(c)	(i)	Sam's mouse/median is longer than the box plot's median **oe**	1		With no incorrect statement Accept 'middle' for 'median' Accept 7.35 > 7.28 It is above the box plot median [7.28]
12	(c)	(ii)	Spread/range/IQR of Sam's lengths is not known **oe** or sample is too small **oe**	1		With no incorrect statement Accept 'He only measured the middle mouse' oe Accept 'Lengths of Sam's other mice are not known' oe Sam only has 5 mice which makes the data unreliable for comparison

Question			Answer	Marks	Part marks and guidance	
13	(a)		$0.\dot{2}\dot{7}$	2	**M1** for attempt to divide 3 by 11	For 2 marks accept 0.2727…. Implied by 0.27 to 0.28
13	(b)		$\frac{22}{45}$ final answer	3	**B2** for $\frac{44}{90}$ **oe** or **M1** for 4.88[8…] or 48.8[8...] **seen** or for 4/10 + 8/90 If 0 scored, **SC1** for answer $\frac{16}{33}$	B2 for e.g. $\frac{4.4}{9}$ For M1 accept any other decimal value[s] that would eliminate the recurrence when subtracted M1 implied by 44 and 90 (SC mark from 0.4848….)
14			400	2	**M1** for 2^3 **oe**	
15			$5\sqrt{5}$ final answer	3	**M2** for $2\sqrt{5}$ and $3\sqrt{5}$ or **M1** for $\sqrt{4\times5}$ or better or $\sqrt{9\times5}$ or better	

Question			Answer	Marks	Part marks and guidance	
16			$\frac{15}{27}$ **oe** with correct working	5	With x representing the number of smartphone and tablet: **B3** for [smartphone and tablet =] 15 may be on a Venn diagram **oe** or **M2** for [x =] 40 + 27 + 8 – 60 **oe** or **M1** for 40 – x + x + 27 – x + 8 = 60 **oe** or for Venn diagram with 40 – x, x and 27 – x correctly placed and **M1** for fraction $\frac{n}{27}$ or $\frac{15}{n}$ that leads to the answer If 0 scored **SC2** for $\frac{15}{27}$ **oe** with no working	isw cancelling/conversion to other forms For full marks "correct working" requires B3 ie [smartphone and tablet =] 15 with evidence of M1 or M2 or alternate convincing approach M1 FT *their* 15 provided < 27 For Venn diagrams, condone omission of universal set rectangle and 8 for M1, M2, B3 and full marks For M1 must be a proper fraction
17			$\frac{2(x-5)}{x+2}$ or $\frac{2x-10}{x+2}$ final answer	5	**M2** for 2(x – 5)(x + 5) or (2x – 10)(x + 5) or **M1** for 2(x^2 – 25) **M2** for (x + 2)(x + 5) or **M1** for x(x + 2) + 5(x + 2) or x(x + 5) + 2(x + 5) or for (x + a)(x + b) where a + b = 7 or ab = 10	For method marks condone omission of final bracket

Question			Answer	Marks	Part marks and guidance	
18			44 with correct working	**5**	**B3** for angle BCD = 110 with correct working or **M1** for angle BAD = 70 or for angle BDE = 180 – 70 or 110 **M1** for angle BCD = 180 – *their* angle BAD AND **M2** for *their* angle BCD ÷ 5 × 2 **oe** or **M1** for *their* angle BCD ÷ 5 **oe** If 0 scored **SC2** for answer 44 or **SC1** for angle BCD = 110	For full marks "correct working" requires evidence of at least M1 AND M1 ie at least a correct angle and some ratio work Ignore geometric reasons if given For B3 "correct working" requires at least M1 or alternate convincing approach Angles may be indicated on diagram for part marks May be seen on diagram
19			$x^2 + y^2 = 123$ final answer	**4**	**B2** for 123 or **B1** for 98 or **M1** for $5^2 + (7\sqrt{2})^2$ **oe** **B1** for $x^2 + y^2 = k$ as final answer	Accept '= k' or numeric value where $k > 0$

Question			Answer	Marks	Part marks and guidance	
20			$z = 17 - 2x^2$ final answer	**4**	**B3** for answer $17 - 2x^2$ OR	
					M3 for $7 = 4\left(\frac{x^2-5}{2}\right) + z$ **oe** or $2x^2 + z = 17$	Correct unsimplified formula in x and z
					oe or $x^2 - 2\left(\frac{7-z}{4}\right) = 5$ or better	
					or **M2** for $y = \frac{2x^2-10}{4}$ **oe** or $y = \frac{7-z}{4}$ **oe** or $4y = 2x^2 - 10$ or $(2x^2 - 4y) + (4y + z) = 10 + 7$ **oe**	M2 sets up for substitution with y explicit or for method for elimination by equating coefficients of y and correct method to eliminate y
					or **M1** for $2x^2 - 4y = 10$ or $-2y = 5 - x^2$ or $4y = 7 - z$ or better	M1 equates coefficients of y or first step in rearrangement to eliminate

Question			Answer	Marks	Part marks and guidance	
21			$20 + 8\pi$ final answer with correct working	**6**	**B3** for [angle at centre]= 144 with correct working or $\frac{4}{10}$ [of circle] **oe** or **M2** for $\frac{[360\times]40\pi}{\pi\times10^2}$ **oe** or **M1** for $\frac{\theta}{360}\times\pi\times10^2$ **oe** AND **M2** for answer $20 + k\pi$ where $k = \frac{their\vartheta}{18}$ or **M1** for $\frac{their\theta}{360}\times2\times\pi\times10$ **oe** or answer $20 + k\pi$ If 0 scored **SC2** for answer $20 + 8\pi$	For full marks "correct working" requires evidence of at least M1 AND M1 ie use of formulas for sector area and arc length or alternate convincing approach For B3 "correct working" requires at least M1 for use of formula for sector area M2 method for finding fraction of circle M1 Implied by 8π For M1 $k \neq 0$ May be on diagram

Question			Answer	Marks	Part marks and guidance	
22			$2n^3 + 2n^2 + 8n - 6$ or $2(n^3 + n^2 + 4n - 3)$	**M5**	**M3** for $2n^3 + n^2 - 6n^2 + 4n^2 + 2n - 12n - 3n - 6$ **oe** or better or condone one error in coefficients in simplified expression $2n^3 + 2n^2 + 8n - 6$ or **M2** for one correct expanded pair or **M1** for 3 correct terms out of 4 in expanded pair (term in n counts as 2 terms) **M1** for $3n^2 + 21n$	$2n^3 - n^2 - 13n - 6$ when simplified ie $2n^2 + n - 6n - 3$ or better or $2n^2 + 4n + n + 2$ or better or $n^2 + 2n - 3n - 6$ or better
			$2(n^3 + n^2 + 4n - 3)$	**A1**	Accept e.g. each term is divisible by 2 or $(2n^3 + 2n^2 + 8n - 6) \div 2 = n^3 + n^2 + 4n - 3$ <u>Alt method</u> Alt method for **6** marks Fully correct reasoning with even and odds for n and for each term when n is even and when n is odd $(2n + 1)$ $(n - 3)$ $(n + 2)$ and $3n(n + 7)$ e.g. if n is even , $(2n + 1)$ is odd etc or **M3** for fully correct reasoning with even and odds but only considering n is even or n is odd not both	Must include e.g. if n is even, $2n + 1$ is odd, $n - 3$ is odd, $n + 2$, is even then odd × odd × even = even and $3n$ is even and $n + 7$ is odd, even × odd = even , then even + even = even **and** repeat when n = odd