Question			Answer	Marks	Part marks and guidance	
1			9.5	3	**M2** for $\frac{262.80}{240}$ or $\frac{262.80-240}{240}$ oe OR **M1** for 262.80 – 240 or 22.80	implied by 0.095, 1.095 or 109.5
2	**(a)**		it has only one factor	1		Accept any correct reason see appendix if more than one statement mark the best as long as it is not contradicted or has an incorrect statement
	(b)		1, a, b, ab, a^2, a^2b	2	**B1** for at least 3 correct	Ignore repetitions, maximum of 6 values, if more than 6 apply choice, condone e.g $a \times a$, $a \times b$
3	**(a)**		a correct labelled pie chart with ruled lines	4	**B3** for a correct unlabelled/incorrectly labelled pie chart with ruled lines OR **B2** for 162, 90 and 108 or for two sectors within tolerance of ± 2° ignore label or **M1** for $\frac{360}{40}$ or 9 OR **B1** for one sector within tolerance ignore label	Correct means three sectors within tolerance of ± 2° for **B3** and **4** marks Do not accept frequency alone as labels May be seen in working, alongside table or on pie chart Note : maximum of 3 sectors for **B3, B2** and **B1**
	(b)		The pie charts do not show how many matches were played by each team	1		Accept any correct reason see appendix if more than one statement mark the best as long as it is not contradicted or has an incorrect statement

Question			Answer	Marks	Part marks and guidance	
4	(a)		4	1		
	(b)		23:04 or 11 04 pm	4	**B3** for 64[m] or 1[h] 4[m] or **M3** for $\frac{48}{45} \times 60$ oe or **M2** for $\frac{48}{45}$ implied by 1.06 to 1.07 or $1\frac{1}{15}$ or $\frac{3}{45} \times 60$ oe implied by 4 or **M1** for $\frac{k}{45}$	Not 11 04 [am] or 11h 4[m]
5	(a)		$1000x$ oe or x kg = $1000x$ oe	1		Accept e.g. $1000 \times x$ or $x1000$ or $x \times 1000$ Do not allow e.g. $x = 1000x$ or $w = x1000$ Ignore units e.g. k and g
	(b)		$\frac{y}{10\,000}$ oe or y cm^2 = $\frac{y}{10\,000}$ oe	1		Allow e.g. $\frac{y}{100^2}$ or $0.0001y$ or $y \times 10^{-4}$ or $y \div 10\,000$ or $0.0001 \times y$ or $\frac{1}{10000}y$ Ignore units e.g. m and cm

Question			Answer	Marks	Part marks and guidance	
6			[carrots =] 1.23 [potatoes =] 0.78 with correct working	5	**B4** for one correct answer with correct working OR **M1** for $2c + 5p = 6.36$ oe **M1** for $3c + 2p = 5.25$ oe **M1** for correct method to equate coefficients of one variable allowing one arithmetic error **M1** for correct method to eliminate one variable allowing one arithmetic error If **0** or **M1** scored award **SC2** for answers 1.23 and 0.78 with no working or insufficient working or if **0** scored **SC1** for two answers which satisfy one of the original conditions	"Correct working" requires evidence of at least **M1 M1 M1** Allow any letter for *c* and *p*, but not carrots or potatoes, and working in pence, answers in pence must have 'p' after, condone £ or pence in equations e.g. $6c+15p = 19.08$ and $6c+4p = 10.50$ or $4c+10p = 12.72$ and $15c+10p = 26.25$ e.g. $11p = 8.58$ or $11c = 13.53$ Note: A sign error is not an arithmetic error if substitution method used **M1** for correctly rearranging equation **M1** for correct substitution into other equation Correct answers from trial and improvement scores **5**
7			−3 −2 −1 0 1 2	3	**B2** for 5 correct and none incorrect or 6 correct and 1 incorrect OR **M1** for $-10 - 2 < 3x$ or better **M1** for $3x \leq 8 - 2$ or better If **0** scored **SC1** for $x = -4$ and $x = 2$	e.g. $\frac{-12}{3} < x$ or $-4 < x$ e.g. $x \leq \frac{6}{3}$ or $x \leq 2$

Question			Answer	Marks	Part marks and guidance	
8	(a)		C	1		
	(b)		E	1		
9	(a)		Expanding the brackets gives $-x$ oe $(x - 4)(x + 5)$	1 1		Accept any correct response, look for answers in the working space (see appendix)
	(b)		The third line should be $2 - 5$ $3x = 2 - 5$ $3x = -3$ $x = -1$	1 1		Accept any correct response, look for answers in the working space (see appendix)
10			4242 with correct working	6	**M2** for $\sqrt{42.5^2 - 20^2}$ or **M1** for $[...]^2 + 20^2 = 42.5^2$ or **B1** for 20 Accept any correct method for the area e.g. **M1** for (48 + *their* 37.5) × 54 or 4617 **M1** for $\frac{1}{2} \times$ *their* 37.5×20 or 375 **M1** for *their* 4617 – *their* 375 If **0**, **1** or **2** marks scored instead award **SC3** for answer 4242 with no or insufficient working If **0** or **M1** scored instead award **SC2** for 37.5 with no or insufficient working	"Correct working" requires evidence of either **M2** or **M1 M1** **M2** implied by 37.5 Alternative for area e.g. : **M1** for 48 × 54 implied by 2592 **M1** for $\frac{1}{2} \times (54 + 34) \times$ *their* 37.5 implied by 1650 **M1** for *their* 2592 + *their*1650 OR **M1** for 48 × 54 implied by 2592 **M1** for $34 \times$ *their* $37.5 + \frac{1}{2} \times$ *their* 37.5×20 implied by 1275 + 375 **M1** for *their* 2592 + *their 12*75 + *their 3*75 i.e adding all *their* areas together Note : **M1 M1 M1** for the area requires a correct method

Question			Answer	Marks	Part marks and guidance	
11			27 with correct working	5	**M2** for [56 =] 2×2×2×7 oe or better <u>and</u> [64 =] 2×2×2×2×2×2 oe or better or listing the correct multiples of 56 and 64 up to 448 or **M1** for [56 =] 2×2×2 × 7 or better <u>or</u> [64 =] 2×2×2×2×2×2 or listing the next 3 correct multiples of each or one complete list or [LCM =] 448*k* (*k* = 2,3,4 …) **A1** for 448 or $2^6 \times 7$ oe e.g 8 × 8 × 7 and **M1** for 12 463 ÷ *their* 448 If **0, 1** or **2** scored, instead award **SC3** for answer 27 with no working or insufficient working If **0** or **1** scored, instead award **SC2** for answer 27.8… with no working or insufficient working If **0** scored, instead award **SC1** for answer 448 with no working or insufficient working	"Correct working" requires evidence of at least either **M2** or **M1 M1** Allow factors in e.g. factor trees or tables and allow for **M2** any correct complete method e.g. [56=] 8 x 7 and [64=] 8 x 8 or multiples of 56 up to 448 **and** some indication of dividing these numbers by 64 or with multiples of 64 and dividing by 56 multiples of 56 and 64 are 112, 168, 224, 280, 336, 392, 448 and 128, 192, 256, 320, 384, 448 You might see this: | | 56 | 64 | | 2 | 28 | 32 | | 2 | 14 | 16 | | 2 | 7 | 8 | **M1** may be implied by 27.8… Alternative method : **M2** for an attempt at $\frac{12463}{56} - \frac{12463}{64}$ or **M1** for an attempt at $\frac{12463}{56}$ and an attempt at $\frac{12463}{64}$ AND **B2** for 27.8…. or **B1** for 27 < *their* 27.8 ≤ 28

Question			Answer	Marks	Part marks and guidance	
12	(a)		0.4 and 0.6 oe on the correct branches	3	**B1** for 0.4 or 0.6 oe **M1** for 0.4 and 0.6 on first branch or on all second branches in the correct places If **0** scored **SC1** for two probabilities consistently placed and adding to 1	Accept equivalent fractions $\frac{2}{5}$ and $\frac{3}{5}$
	(b)		0.64 or $\frac{16}{25}$ oe	3	**FT** for **M1** and **M2** and **3** from *their* 0.6 and *their* 0.4 throughout providing *their* 0.6 + *their* 0.4 = 1 **M2** for correct method e.g. 1 – *their* 0.6 × *their* 0.6 oe or **M1** for one correct branch e.g. *their* 0.6 × *their* 0.6 or *their* 0.4 × *their* 0.6	Accept 64% for **3** marks e.g. **M2** for $their\ \frac{2}{5} + their\frac{3}{5} \times their\frac{2}{5}$ for one correct branch condone just P(win) e.g. $their\ \frac{2}{5}$
	(c)		any correct reason e.g. the answer will be smaller	1		Their answer should explain the effect on the answer to part (b), ignore calculations, see appendix
13	(a)		Enlargement [centre] (−1,−1) [sf] −2	3	**B1** for each	If more than one transformation award **0**
	(b)		Reflection $y = -x$	2 1	**M1** for correct final image of their starting object	If more than one transformation award only **M1** if applicable If using triangle T the image will have vertices at (-1, -1) (-1, -4) and (-2, -1)

Question			Answer	Marks	Part marks and guidance	
14			Correct bar width and height of 0.6	**5**	**M2** for 10 × 1.7 + 10 × 1.5 + 30 × 1.2 or better e.g. 17 + 15 + 36 or 68 or **M1** for one correct frequency calculated e.g one of 17 or 15 or 36 AND **M1** for 80 – *their* 68 soi by 12 **M1** for *their* 12 ÷ 20 soi by 0.6 or a correct bar drawn from *their* frequency	
15			QMT and [diameter bisects chord] so VT [diameter] is perpendicular to PQ [chord] [MT is] common SAS	**1** **1** **1**		Also accept TMQ accept e.g. 'shared'
16	**(a)**		4.2	**1**		
	(b)		4479 to 4480	**2**	**M1** for 3800×1.042^4 oe	condone answer 4500 with **M1**
	(c)	**(i)**	[2034=] 6759 to 6760 and [2035=] 7043 to 7044	**3**	**B2** for 6759 to 6760 or 7043 to 7044 or **M1** for 3800×1.042^{14} oe or 3800×1.042^{15} oe	Also condone values of *n* between 14 and 15, for **3** marks one must be below 7000 and one at or above 7000, each rot to at least the nearest integer (see appendix)
	(c)	**(ii)**	It will take longer than 2034 [for the population to reach 7000]	**1**		*their* response must relate to the figures in **(c)(i)** e.g condone "decrease the number in part **(c)(i)**"

Question			Answer	Marks	Part marks and guidance	
17	(a)		1 10	**1** **1FT**	**FT** from *their* 1	
	(b)		[a =] 3 [b =] –5	**3**	**B2** for [a =] 3 or **B1** for [b =] –5 or **M1** for second difference +6 or for a correct pair of simultaneous equations	e.g. $a + b = -2$ and $4a + b = 7$
18			$2x^2 – 6x – 5x – 24 + 3$ [= 0] or better $(2x + 3)(x – 7)$ –1.5 oe 7	**M1** **M2** **B1**	 **M1** for two brackets giving two correct terms **FT** *their* brackets	e.g. $2x^2 – 11x – 21$ [= 0]
19			85.99… to 86 with correct working	**5**	**B4** for 7395[…] with correct working OR **M2** for correct method to find angle 125 e.g. 53 + 180 –108 or 360 – 108 – (180 – 53) or **M1** for correct method to find angle 72 or 127 e.g.180 –108 or 180 – 53 and **M2** for $\sqrt{35^2 + 61^2 - 2 \times 35 \times 61 \times \cos(their\ 125)}$ or **M1** for [AC^2=] $35^2 + 61^2$ – 2×35×61×cos (*their* 125) If **0, 1** or **2** marks scored, instead award **SC3** for answer 85.99… to 86 with no or insufficient working If **0** or **1** mark scored, instead award **SC2** for answer 7395[…] with no or insufficient working	"Correct working" requires at least **M1** from cosine rule **M2** implied by [angle ABC =] 125

Question			Answer	Marks	Part marks and guidance	
20	(a)		$x^2 + y^2 = 20$	2	**B1** for $x^2 + y^2 = k$	k could be r^2 or $\sqrt{20}^2$ but not 20
	(b)	(i)	[gradient =] $\frac{2}{4}$ or $\frac{1}{2}$ $m \times their\frac{2}{4} = -1$ used or implied	M1 M1	If **0** scored **SC1** for $-\frac{4}{2}$ or $-\frac{2}{1}$ without seeing $\frac{2}{4}$ or $\frac{1}{2}$	for **M1** allow $-2 \times \frac{2}{4} = -1$ or e.g. $-\frac{4}{2}$ after $\frac{2}{4}$ seen or $-\frac{2}{1}$ after $\frac{1}{2}$ seen
	(b)	(ii)	$y = -2x + 10$ oe	2	**B1** for $y = -2x + c$ seen oe or $-2x + 10$ or $c = 10$	'c' can be 0 but not 10
21			625 with no extras	3	**M1** for $\frac{x^{-\frac{1}{6}} \times x^{\frac{3}{4}}}{x^{\frac{1}{3}}} = 5$ or better **M1** for $-\frac{1}{6} + \frac{3}{4} - \frac{1}{3} = \frac{1}{4}$ or better e.g. $x^{\frac{1}{4}} = 5$	Alternative method : **M1** for $x^{\frac{1}{3}-\frac{3}{4}}$ or $x^{\frac{-5}{12}}$ or $x^{\frac{-1}{6}+\frac{3}{4}}$ or $x^{\frac{7}{12}}$ and **M1** for $x^{\frac{-1}{6}-their\frac{-5}{12}}$ or $x^{\frac{7}{12}-\frac{1}{3}}$ or $x^{\frac{3}{12}}$ or $x^{\frac{1}{4}}$ could be $x^{\frac{5}{12}}$ or $x^{\frac{-1}{4}}$ depends on which side of the equation

Question			Answer	Marks	Part marks and guidance	
22			[a =] 21 [b =] –31 with correct working	6	**M1** for $\frac{2-3\sqrt{18}}{\sqrt{18}+4} \times \frac{\sqrt{18}-4}{\sqrt{18}-4}$ **M1** for multiplying *their* numerator e.g. $2\sqrt{18} - 8 - 3 \times 18 + 12\sqrt{18}$ oe or better **M1** for simplifying *their* numerator e.g. $14\sqrt{18} - 62$ **M1** for multiplying *their* denominator e.g. $18 + 4\sqrt{18} - 4\sqrt{18} - 16$ oe or better e.g. 18 – 16 or 2 **M1** for $\sqrt{18} = 3\sqrt{2}$ at any stage and may be implied in working **A1dep** for [a =] 21 or [b =] –31 dep. on only **M4** awarded Alternative: **M1** for $[2 - 3\sqrt{18}] = (a\sqrt{2} + b)(\sqrt{18} + 4)$ **M1** for $a\sqrt{2}\sqrt{18} + 4a\sqrt{2} + b\sqrt{18} + 4b$ oe or better **M1** for $\sqrt{2}\sqrt{18} = 6$ or $\sqrt{18} = 3\sqrt{2}$ **M1** for $6a + 4a\sqrt{2} + 3b\sqrt{2} + 4b$ **M1** for $2 = 6a + 4b$ oe and $-9 = 4a + 3b$ oe **A1dep** for [a =] 21 or [b =] –31 dep. on only **M4** awarded If **0** scored **SC1** for [a =] 21 and [b =] –31	"Correct working" requires at least **M1M1M1M1** alternative : **M1** for $\sqrt{18} = 3\sqrt{2}$ **M1** for $\frac{2-9\sqrt{2}}{3\sqrt{2}+4} \times \frac{3\sqrt{2}-4}{3\sqrt{2}-4}$ **M1** for multiplying *their* numerator $6\sqrt{2} - 8 - 3 \times 18 + 36\sqrt{2}$ oe or better **M1** for simplifying *their* numerator e.g. $42\sqrt{2} - 62$ **M1** for $18 + 12\sqrt{2} - 12\sqrt{2} - 16$ oe or better e.g. 18 – 16 or 2 **A1dep** for [a =] 21 or [b =] –31 dep. on only **M4** awarded Note : working may be implied by use rather than explicitly seen and follow through from any errors if subsequent working is correct