Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

MATHEMATICS B J567/04

Paper 4 (Higher Tier)

Specimen Mark Scheme

The maximum mark for this paper is **100**.

This document consists of **8** printed pages.

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1	**(a)** Correct triangle (4, 3), (4, ¯3), (1, ¯3).	**3**	**2** if two vertices correct or **1** for enlargement sf 3 drawn in wrong place or **1** for enlargement centre (¯5, ¯6) but wrong sf
	(b) 25 cm^2	**2**	**B1** for [×] $2{\cdot}5^2$ oe seen, eg × 2·5 × 2·5 or 6·25
2	**(a)** No, difficult to answer precisely	**1**	Award mark for answer implying respondents not remembering the number of books they borrowed
	(b) Reworded non-leading question	**1**	Or question with a 'don't know' option
	(c) No, only asking people who use the library at that time	**1**	Accept implication that it will be a poor sample
3	**(a)** Accept any reasonable rounding leading to 280 – 320 eg 3·5 × 80 = 280, 4 × 80 = 320, 4 × 70 = 280 or $3\frac{3}{4}$ × 80 = 300	**2**	**M1** for rounding evidenced by 3·5, 4 or 80 or correct 'product' but incorrect answer
	(b) 288·75 oe or 289 or 290	**2**	**M1** 77 × *their* time, for time allow 3·75, 345, 225, 3·45
	(c) Use of midpoints (*m*) (850, 950, 1050, 1150, 1250, 1350, 1450) and at least 4 must be correct Σ*mf* or 30450 ÷ '*their* 25' 1218	**B1** **M1** **M1** **A1**	
4	**(a)** 5 : 3	**2**	**M1** for any equivalent ratio to 5 : 3 including 140 : 84, or 3 : 5
	(b) 96	**2**	**M1** 240 ÷ (3 + 2)

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5	**(a)** $3x(2-x)$	**2**	**M1 for** $3(2x-x^2)$ or $x(6-3x)$
	(b)(i) $6x + 15$ '$6x$' = 9 – *their* '15' or better $x = \frac{k}{a}$ after $ax = k$ $^{-}1$	**B1** **M1** **M1** **A1**	Maximum of **2** from these 3 marks Must have correct answer and working for all three marks
	(ii)* Answer of 4·5 oe supported by correct and coherent algebraic notation. Each line of working must be an equation and any fractions must be written correctly. Correct answer obtained but with some errors in notation **or** minor errors in working but supported by correct and coherent algebraic notation. The answer is incorrect and there are no correct steps in any working.	**3** **2-1** **0**	For the lower mark – evidence of correctly combining like terms eg $4x = 18$, but incorrect or no final solution produced **or** incorrect solution with some evidence of attempt to combine like terms.
6	$\pi \times 0 \cdot 75^2$ 1·767(1…) or 1·77 50 cm per m^2 implied *their* 1·767' × 50 *'their* 88(·3…) ÷ 8 11	**M1** **A1** **M1** **M1** **M1** **A1**	 Accept integer answer only for final A1
7	Correct perpendicular bisector of AB with correct construction arcs **and** part circle radius 5 cm centre A **and** correct region shaded	**3**	allow tolerance of ± 2mm in all measurements and allow circle to be sufficiently drawn to intersect twice the perpendicular bisector of AB **M1** for perpendicular bisector of AB with correct construction arcs **M1** part circle radius 5 cm centre A

8	B, C, D, E, G, H are from the same tree A and F are outliers (can be implied) **and** evidence (see method)	**5**	Evidence : <u>Scatter Diagram</u> **M1** correct axes labelled **M2** for 7 correct points plotted (allow **M1** for 4 points correct) **M1** for identifying main cluster on diagram or in statement allow length on either axes <u>Ratios</u> **M3** for 8 correct ratios (in order: 1·24, 1·62, 1·87, 1·89, 1·88, 2·96, 1·69, 1·69) (allow **M2** for 4 correct ratios or **M1** for any attempt at ratios) **M1** for an identification of any acceptable cluster allow ratios either way round, these figures are correct to 3sf so allow figures to a greater degree of accuracy If ratio used, accept a cluster from B, G, H or C, D, E
9*	27 rolls with correct and clearly expressed supporting method showing area of loft/length of insulation required and converting to correct integer number of rolls. Area of loft found (52 m^2) or total length of strips of insulation found within a clearly presented method. Clearly identifying real dimensions from plan view or showing layout of strips of insulation on plan and some evidence of method used. Incorrect answer with no relevant content	**6-5** **4-3** **2-1** **0**	For lower mark **-** incorrect integer number of rolls with correct and clearly expressed supporting method showing area of loft/length of insulation required and converting to rolls **or** correct number of rolls but method not clearly presented. For lower mark –an incorrect area or number of strips is indicated within a clearly presented method or the correct area or number of strips is indicated but the method is not clearly presented. For lower mark – real dimensions or layout of strips shown but little evidence of any method or explanation provided.
10	x = 3·2 www	**3**	**2** trials with 3 and 4 **and** at least 1 intermediate value shown **1** at least 2 trials shown

11	**(a)** $2{\cdot}4 \times 10^{11}$	**1**	
	(b) 62 400 000 000 or $6{\cdot}24 \times 10^{10}$ oe	**2**	**M1** $0{\cdot}26 \times$ *their* '$2{\cdot}4 \times 10^{11}$' oe or figs 624 ft from *their* (a) for 2 marks and accept numbers not in standard index form, Allow answers in GB if GB marked on answer line
	(c) *their* $6{\cdot}24 \times 10^{10} + 1{\cdot}44 \times 10^{11}$ figs 2064 $2{\cdot}1 \times 10^{11}$	**M1** **1** **A1**	
12	**(a)** 173 and 16·5/17	**3**	**W1** 173 **W1** for either correct end of IQR seen eg 180·5/181 or 164
	(b) Allow any correct comment reference to heights not just median/IQR	**1**	Eg 10A are taller on average , or 10A heights are more spread out Note: not 10A have a larger mean
13	$x = 4$, $y = {}^{-}2$ with correct supporting working	**4**	**M2** for eq.1 × 5 and eq.2 × 2, or eq.1 × 2 and eq.2 × 3 (**M1** for each operation) AND **M1dep** for correctly + or – *their* two equations Correct answers without working scores **1** Allow any pairs of multipliers that will eliminate x or y Allow one error in each operation
14	**(a)** $y = \frac{150}{x^2}$ oe	**3**	**M1** $y = \frac{k}{x^2}$ oe **M1(dep)** substitute $x = 5$ and $y = 6$ into *their* expression or $k = 150$ soi
	(b) 1·5	**1**	ft *their* expression in (a) providing it involves x^2
15	**(a)** 8	**1**	
	(b) All *their* points correctly plotted and joined with a single curve	**2**	**M1** for all points correctly plotted Allow ±1 mm in plotting points and in drawing the line
	(c) Draw the line $y = 1 - x$ and give answers in ranges ${}^{-}1{\cdot}8$ to ${}^{-}1{\cdot}9$ and 0·7 to 0·8	**3**	**M1** for the line $y = 1\text{-}x$ drawn **A1** each answer correct ft *their* graph (± 0·1)
16	**(a)** 6 (and) ${}^{-}5$	**3**	**M2** $(x - 6)(x + 5)$ OR **M1** $(x \pm 6)(x \pm 5)$
	(b) $\frac{-1+\sqrt{17}}{4}$ **and** $\frac{-1-\sqrt{17}}{4}$	**3**	**B1** each and **M1** correct subst'n: $\frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times -2}}{2 \times 2}$

17	$9+3\sqrt{3}+3\sqrt{3}+3$ oe or better $\frac{12+6\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 6+4\sqrt{3}$	**M2** **M1**	**M1** for three terms correct
18	29·45% or 29·5% or 30% or 29% oe	**3**	**M2** P(flu) = 0·33 × 0·06 + 0·67 × 0·41 or correct tree and both 'branches' identified OR **M1** correct tree diagram, or one of the two possibilities listed 0·33 × 0·06, or 0·67 × 0·41
19	<u>Cosine rule method:</u> (b^2=) $125^2 + 184^2 - (2 \times 125 \times 184 \times \cos 50°)$ 19912·76995….. (b=) $\sqrt{19912 \cdot 76995...}$ (b=) 141·1126144… Answer = 140 or 141·(11..) or 141·113 (An answer in range 140 – 142 but not in the above list would be awarded 4 marks) <u>Alternative method:</u> Base = $125\sin 30° + 184\sin 20°$ = 125·4317064… Height = $184\cos 20° - 125\cos 30°$ = 64·65026675[…] Base^2 + Height^2 = 19912·76995….. Distance = $\sqrt{19912 \cdot 76995...}$ Answer = 140 or 141·(11..) or 141·113	**M1** **M1** **M1** **M1** **A1** **M1** **M1** **M1** **M1** **A1**	**ft** *their* $\sqrt{19912 \cdot 76995...}$ **ft** *their* $\sqrt{19912 \cdot 76995...}$
20	∠ABE = 90° (angle in a semi-circle) ∠CDF = 90° (angle between a radius and a tangent) AB = 5 cm (given) CD = 5 cm (radius of circle) AE = 10 cm (diameter of circle) CF = 10 cm (radius of both circles = 5 cm so 5 + 5 = 10) Hence RHS	**3**	**M1** showing right angles are equal **M1** showing both pairs of sides equal **A1** statement of RHS condition

21	38 and 35	**2**	**M1** 4 correct frequencies added and divided by 4 OR **W1** 38 or 35
22	**(a)** 1200	**1**	
	(b) 97 200	**1**	
	(c) 7	**1**	

Paper Total: 100 marks

Assessment Objectives and Functional Elements Grid

GCSE MATHEMATICS B

J567/04

Mathematics B Paper 4 (Higher Tier)

	Topic	Context	Ref	AO1	AO2	AO3	Functional
1	Transformations		HBG7 HSG7	5			
2	Questionnaire	Library	HIS5		3		3
3	Speed, estimation	Cars	HIN6 HBG2 HBS2		8		4
4	Ratio	School	HIN5	2	2		
5	Factorising, equations		HIA3 HIA2	8			
6	Area of circle, compound measures	Fish pond	HIG3 HBG2			6	6
7	Constructions and loci		HBG6	3			
8	Scatter diagram	Leaves	HBS3			5	5
9	Area, plans	Loft insulation	HIG4 HIG5			6	6
10	Trial and improvement		HIA5	3			
11	Standard index form	Computer	HSN3		6		
12	Cumulative frequency	Pupils' heights	HSS2 HSS3		4		1
13	Simultaneous linear equations		HSA4	4			
14	Inverse proportionality		HGA1	4			
15	Quadratic graph		HSA5 HGA3	6			
16	Factorise, solve quadratics		HSA2 HGA2 HGN2	6			
17	Simplify surds		HGN2	3			
18	Probability	Vaccination	HGS1			3	3
19	Cosine rule	Plane journey	HGG3			5	
20	Geometric proof		HGG1	3			
21	Moving averages	Caravan sales	HSS4		2		
22	Exponential growth	Bacteria	HGN5		3		2
	TOTALS			**47**	**28**	**25**	**30**

Paper Total: 100 marks

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