UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2009 question paper

for the guidance of teachers

4024 MATHEMATICS

4024/01 Paper 1, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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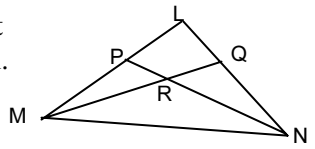
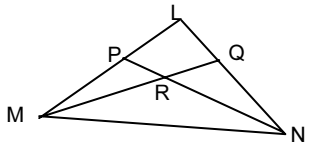
		Mark scheme details	Part Marks	Comments	Sub Marks
1	**(a)**	3	1		
	(b)	82	1	Here and elsewhere, ignore superfluous zeros.	
2	**(a)**	$\frac{2}{3}$ cao	1		
	(b)	$\frac{1}{12}$ cao	1		
3	**(a)**	27, 64	1	Accept 3^3, 4^3 if 27, 64 seen. Ignore the additional cube number 125	
	(b)	31, 37	1		
4	**(a)**	$(x - y)(x + y)$	1		
	(b)	800	1	(102 – 98)(102 + 98) must be evaluated	
5	**(a)**	(0).0035	1	Accept standard form.	
	(b)	(0).8	1		
6	**(a)**	1,2,3,6,9,18	1	Condone embellishments such as $2 \times 9 = 18$ etc. if all the correct factors seen. Missing factors or incorrect factors seen gets 0.	
	(b)	$2^3 \times 7^2$	1	Accept other forms such as $2 \times 2 \times 7^2 \times 2$ but ignore = 392 Factor Tree not sufficient.	
7	**(a)**	$4a^5$	1		
	(b)	$3x^2 + 13x + 6$	2 *	Condone further "simplification" www and solution of quadratic equation $3x^2 + 15x - 2x + 6$ or better seen	M1
8	**(a)**	800 000	1	Accept standard form. Condone notation such as 800.000.	
	(b)	7×10^3	2	Any correct equivalent using fig. 7	C1

9	**(a)**	**(i)** 54 to 56	1		
		(ii) 28 to 30	1		
	(b)	Mathematics + valid reason	1	e.g. because median is lower or both medians stated. because the curve for Maths is to the left of/higher than the curve for English. Comparisons at arbitrarily chosen points will be 0	
10	**(a)**	14 00	1	Condone embellishments. Accept 2 **p.m.**	
	(b)	14 40	2 *	Accept 2 40 **p.m**. 19 40 ,(0)7 40 (p.m.) , (0)6 30 (a. m.) or (0)2 40 seen	B1
11	**(a)**	15	1		
	(b)	6 800	2 *	Ratio of corresponding lengths **cubed** soi	B1
12	**(a)**	(±)2$\sqrt{x}$	2 *	$k\sqrt{x}$ or using $y = k\sqrt{x}$ **NB** for C or M, must be k or $k = 2$ seen	C1 M1 B1
	(b)	25 cao	1		
13	**(a)**	3	1		
	(b)	2	1		
	(c)	1	1		
14	**(a)**	36	1	Degree sign optional	
	(b)	18	1	Accept ½(a) ft	
	(c)	108	1	Accept 90 + (b) ft	
	(d)	72	1	Accept 180 – (c) or 90 – (b) ft	

15	**(a)**	9 (minutes) 20 (seconds)	1		
	(b)	2 (minutes) 20(seconds) cao	2 *	$\Sigma t \div 4$	M1
	(c)	2 (minutes) 45 (seconds)	1		
16	**(a)**	– 8	1		
	(b)	–1	1		
	(c)	$\frac{12-x}{5}$ oe (e.g. asc)	2	$\frac{12-y}{5}$ oe or a + bx with a = $\frac{12}{5}$,b ≠ 0, or a ≠ 0, b = $-\frac{1}{5}$ or $\frac{x-12}{5}$	C1 SC1
17	**(a)**	1.5 oe	2 *	e.g. $\frac{3}{2}$, 1 2/4 $9x - 6 = 5x$	M1
	(b)	2,3,4	2 *	1.5 < y < 5 or 1.5<y and y<5 separately. oe but must be y.	M1
18	**(a)**	**(i)** 1,2,3,4	1	Condone extra brackets 3 repeated is 0.	
		(ii) 1,2	1		
	(b)	22	2 *	$(35 - x) + x + (29 - x) + 3 = 60$ or better or $(35 - x)$, x, $(29 - x)$, 3 correctly placed in a Venn Diagram 28,7,22,3 in diagram	M1 SC1

19	**(a)**	$LM = LN$ stated	**M1	For both M's, accept if clear on a diagram. Independent But 0 if measured. 	
		$\hat{L}$ is common or $L\hat{M}Q = L\hat{N}P$ stated	M1		
		Remaining angle pair and conclusion – congruent stated or accept ASA.	A1	Dependent on M1 + M1 and www. Condone wrong case quoted if "Congruent" stated	
	(b)	$M\hat{P}N = 180 - L\hat{P}N$ and $M\hat{Q}N = 180 - L\hat{Q}M$ seen	**	This mark can be earned for a convincing diagram. 	
		or $P\hat{R}M = Q\hat{R}N$			
		or $Q\hat{M}N = P\hat{N}M$ and $Q\hat{N}M = P\hat{M}N$			
		with convincing conclusion.	M1	Not available if dependent on measured angles	
	(c)	Kite	1		
20	**(a)**	ΔC : (-1,3),(1,3),(1,4)	1	Plotting points in **(a)** and **(b)**: allow the usual tolerance, judged by eye. Is the intention clear?	
	(b)	ΔD : (3,0), (3,-2), (4,-2)	2	Two vertices correct or a 90° clockwise rotation	C1
	(c)	Reflection (in the line) $x = 1$	2	Dependent on only one transformation stated. Either Reflection or $x = 1$ seen	C1
21	**(a)**	4, 1, $\frac{4}{9}$	1	Accept 0.4.. if $\frac{4}{9}$ seen.	
	(b)	20	2 *	$\frac{4}{k^2} = \frac{1}{100}$ soi	M1
	(c)	26	2 *	25	C1
				$4/m^2 <$ or $= 0.0064$	M1

22	**(a)**	Either $\sqrt{13^2 - 5^2} = 12$ seen or 12 used in verification	1	**AG** so www essential	
	(b)	**(i)** 116	2 *	30 + 30 + (30 –12) + 15 + 13 + (15 –5) soi Condone one omission or error 120	M1 SC1
		(ii) 690	2 *	Methodically correct attempts to evaluate all the relevant areas required e.g.(30 – 12) × 15, 30 × (30 –15), ½ × 12 × 5 soi	M1
	(c)	$-\frac{5}{13}$	1	Condone embellishments	
23	**(a)**	200	1	Throughout, allow the usual tolerance judged by eye	
	(b)	BC = 6.5 cm and AC = 5.1 cm	2	Either C due West of B or $C\hat{A}N = 150^\circ$	C1
	(c)	AD = BD = 6 cm	1		
	(d)	ABE = 10 cm	2	E lies on AB or AB produced or AE = 10 cm	C1