CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2013 series

4024 MATHEMATICS (SYLLABUS D)

4024/22 Paper 2, maximum raw mark 100

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Abbreviations

cao correct answer only
cso correct solution only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
www without wrong working
soi seen or implied

Qu.		Answers	Mark	Part Marks
1	(a) (i)	\$720.7 – \$721.1	2	M1 for 25200 ÷ 72 (=350) or $\frac{2.06}{72}$ or $\frac{72}{2.06}$
	(ii)	\$1.45	1	
	(b) (i)	\$8272	2	M1 for 8000 × $\frac{3.4}{100}$ or better
	(ii)	8560 - 8562	1ft	
	(iii)	Lydia by \$1.52, final answer, cao	2	or C1 for Simone's 8560 seen or C1 for Simone by \$8.28 final answer
2	(a)	25, 21, 45	2	B1 for 2 correct
	(b)	n^2	1	
	(c)	32	2	B1 for (T =) 1024 seen
	(d)	$\frac{3}{2}n(n+1)$ oe	1	
	(e)	360	1ft	
	(f)	$\frac{1}{2}(n+1)(n+2)$ oe	2	or C1 for $\frac{1}{2}(n-1)(n-2)$ oe
3	(a)	$x = -4$ cao	2	M1 $\pm 2x =$ or $\pm 8 =$
	(b) (i)	$y \leq 4.25$ oe final answer	2	C1 for 4.25 oe seen
	(ii)	3,4	1	
	(c)	$x = 1.5$, $y = -3$	3	B2 for 1 correct value www Or B1 for pair of values satisfying either eqn
4	(a)	7	2	M1 for (AF + 16) × 6 = 138 or equiv seen
	(b) (i)	$EG = 5.75$	2	C1 for 11.5 seen or for 5.7 or 5.8 seen
	(ii)	$23k$: $41k$ where k is an integer	2	B1 for (*their* 5.75) : (16 – *their* 5.75) C1 for $41k$: $23k$

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5	**(a)**	**No** and 799.5 cm (or 7.995 m)	2	M1 for 180.5 and 15.5 seen
	(b) (i)	\$27	2	M1 for 130% ≡ 35.10 soi
	(ii)	\$1210 – 1211	3	M1 for 50.70×4 + 35.10×5 (378.30) M1 for *their* 378.30×2.2 (=832.26) Or their 202.80 × 2.2
6	**(a)**	35^{o}	1	
	(b)	286.7 to 287	2	M1 for sin their 35 = $\frac{x}{500}$ or better
	(c)	(0) 31 to (0)31.2	3	M1 for Tan $\theta = \frac{335}{500}$ or $\frac{500}{335}$ B1 for $\hat{SPQ}$ = 33.8 – 34
7	**(a) (i)**	Bar height 1.4 between 100 – 120	1	
	(ii)	$p = 48$ $q = 42$	2	B1 for p = 48 or B1 for q = 42
	(iii)	$\frac{57}{200}$ or 0.285 or 28.5%	1	
	(b) (i)	$40 < y \leq 60$	1	
	(ii)	39.9	3	M1 for 34 × 10+57 × 30+85 × 50+24×70 (= 7980) i.e. 340 + 1710 + 4250 + 1680 M1 for dividing by 200 (indep)

		SECTION B		
8	**(a)**	150 m	1	
	(b)	*C* due east of *B* (±2°) *and* *C* 12 cm (±2mm) from *A*	2	B1 for due E of B , B1 for 12 cm from A
	(c)	994.9 to 995 m	2	M1 for $1800^2 - 1500^2$ (= 990000) Or $12^2 - 10^2$ (= 44)
	(d)	$\frac{1800}{x}$ or $\frac{1500}{x+1}$ $\frac{1800}{x} - \frac{1500}{x+1} = 60$ oe Correct eqn with both denominators removed	3	B1 B1

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	(e)	$x = 7.83, -3.83$	3	B2 for one correct answer Or for 7.8 – 7.85 **AND** -3.8 – -3.85 OR B1 for $\frac{4 \pm \sqrt{136}}{2}$ or better. Or C1 for -7.83 AND 3.83
	(f)	229 – 230 s	1ft	
9	**(a)** **(i)**	$\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	1	
	(ii)	$\sqrt{45}$ or 6.7 to 6.71	2	B1 for $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ -6 \end{pmatrix}$ seen. Must be in vector form.
	(iii)	**(a)** Enlargement Scale Factor 3 Centre *B*	2	B1 for Enl, B1 for SF3 and Cent B oe
		(b) $\begin{pmatrix} 7.5 \\ 3 \end{pmatrix}$	2ft	B1 for 7.5 B1 for 3.
	(b) **(i)**	$f(-4) = -2$	1	
	(ii)	$g = 11$	2	M1 for $\frac{3g+2}{5} = 7$
	(iii)	$f^{1}(x) = \frac{5x-2}{3}$ oe	2	C1 for $\frac{5x+2}{3}$ or $\frac{5y-2}{3}$ oe
10	**(a)** **(i)**	$\frac{n}{24}$		B1
		$\frac{24-n}{24}$ oe	2	B1
	(ii)	**(a)** $\frac{n(25-n)}{25 \times 24}$ oe final answer	1	
		(b) $p = 4$	2	B1 for their (a) = $\frac{1}{p}$
	(iii)	$n = 15$ or 10	2	M1 for $(n-15)(n-10)$ or $\frac{25 \pm \sqrt{25}}{2}$ seen
	(iv)	$\frac{3}{20}$ oe	2	C1 for $\frac{7}{20}$ oe

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(b) (i)	300	1	
(ii)	$\frac{1}{12}$	1	
(iii)	25	1	
11 (a) (i)	– 8.5	1	
(ii)	8 points correctly plotted and joined with a smooth curve on correct axes	3	B1 for correct scale (condone rev axes) B1 for 6 or 7 given table points correctly plotted on their axes B1 for smooth curve through all 8 points on their consistent axes
(iii)	2.5 – 6.5 (dep on tangent soi)	2	M1 for tangent at $x = 1.5$ soi
(iv)	– 0.85 to – 0.95	2	M1 for $y = 1$ soi
(b) (i)	$p = 1.2$ $q = 0.5$	2	B1 for p = 1.2 , B1 for q = 0.5 ft
(ii)	$-\frac{4}{5}$ oe	2	M1 for $\frac{-2}{3-theirq}$ oe
12 (a)	$r = 22$ cao	3	B1 for 70000 soi M1 for $\pi \times r^2 \times$ figs46 (only term)
(b) (i)	18(.0) to 18.03 cm^2	2	M1 for $\frac{1}{2} \times 4 \times 11 \times \sin 125$
(ii)	360 to 360.6 cm^3	1ft	
(iii)	x =13.69 to 13.7	4	M1 for $4^2 + 11^2 \pm (2) \times 4 \times 11 \times \cos 125$ M1 for $x^2 = 4^2 + 11^2 - 2 \times 4 \times 11 \times \cos 125$ or better A1 for 187.4 – 187.5
(iv)	609.8 to 610.1 cm^2	2	M1 for at least 4 correct areas

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