CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2014 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

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Question	Answers	Mark	Part marks
1 (a)	$\frac{8-x}{(x-4)^2}$	2	**M1** for $\frac{x-2(x-4)}{(x-4)^2}$ or better
(b)	$x = 2.5$ o.e., $y = -3$	3	**B2** for one correct with supporting working Or **B1** for pair of values satisfying one equation
(c)	$x = 6$ or -1	3	**M1** for $x^2 - 5x - 6 = 0$ **M1** for $(x-6)(x+1) = 0$ Or **M2** for $\frac{5 \pm \sqrt{49}}{2}$ Or **M1** for 5 and 2 correct or $\sqrt{49}$
(d)	$\frac{y+3}{2y+5}$ final answer	3	**M1** for $(y+3)(y-3)$ seen **M1** for $(2y+5)(y-3)$ seen
2 (a) (i)	0 or none	1	
(ii)	7, 8, 11, 13, 14	1	All correct
(iii)	$\frac{3}{11}$ or 0.27 or better	1	
(iv)	5	1	
(b) (i)	3	1	
(ii)	11	1	
(iii)	18	1	

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3 (a) (i)	37.5[%]	2	**M1** for 5.5 ÷ (240 ÷ 60) soi by 1.375 Or **B1** for either 150 seen and 90 seen
(ii)	73.5[0]	2	**M1** for 45 × 5.5 + (60 – 45) × 5.5 × 0.8 oe Or **B1** for 247.5 seen or for 66 seen
(iii)	208.7[0]	2	**M1** for 240 ÷ 1.15 oe
(iv)	2837.5[0]	2	**M1** for 2500 × 0.045 × 3 oe soi by 337.5
(b) (i)	160	1	
(ii)	1.21875 to 1.22	2	**M1** for 0.78 ÷ 0.64
4 (a) (i)	24°	1	
(ii)	18°	1	
(iii)	42°	1	
(iv)	108°	1	
(b) (i)	14.56 to 14.6	2	**M1** for $\cos 72 = \frac{4.5}{AD}$
(ii)	13.3 to 13.304…	2	**M1** for $\frac{DE}{\sin 66} = \frac{4.5}{\sin 18}$ Or for '*their* **(b)(i)**' × cos('*their* **(a)(i)**')
5 (a) (i)	$n + 6$, $n + 7$	1	
(ii)	$(n + 1)(n + 6) – n(n + 7)$ $= n^2 + 7n + 6 – n^2 – 7n = 6$	2	**M1** for $(n + 1)(n + 6) – n(n + 7)$ or reversed Or **B1** for $n^2 + 7n + 6$
(b) (i)	$5n + 50$ or $5(n + 10)$	2	**M1** for $[n]$, $n + 9$, $n + 10$, $n + 11$, $n + 20$ seen
(ii)	56, 65, 66, 67, 76 completed in cross	2	**M1** for $n = 56$ Or for 66 in centre of cross

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6	**(a) (i)**	60.28 to 60.35	2	**M1** for $\pi \times 1.6^2 \times 7.5$
	(ii)	**(a)** length 9.6, width 6.4	1	Condone reversed
		(b) 98.7 to 99.2	2	**M1** for '*their* 9.6 × 6.4' × 7.5 – 6 × '*their* 60.3' Or **B1** for 460.8, or 361.68 to 362.1
	(b) (i)	224.5[375]	2	**M1** for 17.75 and 12.65 seen
	(ii)	No, frame could measure 17.5 cm by 12.5 cm	1	Accept statement involving lower bound of either length or width
7	**(a)**	–3.5, 5.5	2	**B1** for each
	(b)	7 correct plots joined with smooth curve	2	**P1** for at least 5 correct plots
	(c)	$x = -2.7$ to -2.6, 0.3 to 0.4, 2.2 to 2.3	2	**FT** *their* curve **B1** for 2 correct solutions
	(d)	Tangent drawn at $x = -2$ 2 to 3	M1 A1	On *their* curve
	(e) (i)	$y = 5 - 4x$ oe	2	**M1** for $y = -4x + k$ or $y = mx + 5$ or $-4x + 5$
	(ii)	$C = 1$, $D = -4$	2	**M1** for $\frac{x^3}{2} - 3x + 1 = 5 - 4x$ FT

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8	**(a)**	32.25 or 32.75	3	**M1** for (4×5 + 12×15 + 16×25 + 23×35 + 20×45 + 5×55) [= 2580] **M1** for ÷ 80
	(b) (i)	[4], 16, 32, 55, 75, 80	1	
	(ii)	6 correct plots joined with smooth curve using correct axes	3	**B2** for 6 correct plots Or **B1** for 4 correct plots
	(iii)	**(a)** 33 to 35	1	
		(b) 18 to 20	2	**B1** for 41 to 43 or 21.5 to 23.5
	(c)	$\frac{1}{30}$	2	**M1** for $\frac{5}{25}\times\frac{4}{24}$
9	**(a)**	248.6 to 249	3	**M1** for $130^2+164^2+or-[2]\times130\times164\times\cos115$ And **M1** for $AC^2=130^2+164^2-2\times130\times164\times\cos115$
	(b)	9660 or 9661.2(…)	2	**M1** for $\frac{1}{2}\times130\times164\times\sin115$
	(c)	7	2	**M1** for $\frac{their\,9660\times3.25}{5000}$ or 6(.2) or 6.3
	(d)	43.49 to 43.5	2	**M1** for 130 tan 18.5
	(e)	148.6 to 149	3	**B1** for 65° or 25° seen **M1** for 164 × sin '65' or 164 × cos '25' soi

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10	**(a) (i)**	3.16 to 3.163 or $\sqrt{10}$	1	
	(ii)	vector $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ drawn	2	**B1** for two correct movement without arrow Or one correct movement with arrow
	(iii)	$a = 2$, $b = 3$	2	**B1** for each Or **SC1** $a = -2$ and $b = -3$
	(b) (i)	Enlargement Scale factor –2 Centre (3, 1)	B1 B1 B1	**B0** for question if second transformation mentioned
	(ii)	**(a)** (5, 4), (7, 4), (5, 6)	2	**B1** for 2 correct
		(b) Stretch Factor 2 x-axis invariant	B1 B1	
11	**(a)**	$\frac{100}{x}$	1	
	(b)	$x^2 - 77x + 200 = 0$ derived www	4	**B1** for $\frac{80}{x-5}$ seen **M1** for $\frac{100}{x} + \frac{80}{x-5} = 2.5$ oe **M1** for $100(x-5) + 80x = 2.5x(x-5)$
	(c)	74.31 and 2.69 final answer	4	**B3** for one correct root seen or for 74 to 74.31 **and** 2.69 to 2.7 If in the form $\frac{p \pm (or + or -)\sqrt{q}}{r}$ **B1** for $p = 77$ **and** $r = 2$ And **B1** for $q = 5129$ or $\sqrt{q} = 71.6...$
	(d)	74.31, because 2.69 would give negative speed for second part	1	
	(e)	11	2	**M1** for $\frac{100}{74.31} - \frac{80}{74.31-5}$ or 0.191 [hours]

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