CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2013 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

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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

SECTION A

Qu.	Answers	Mark	Part Marks
1 (a)	$x = 3$	2	**M1** for $\pm 5x = \pm 15$ =
(b)	$x = 4, y = -1$	3	**B2** for one correct value www
(c) (i)	–1, 0, 1	1	
(ii)	$y > -2$ final answer	2	**B1** for –2 seen
2 (a)	24	2	**B1** for 15 seen
(b) (i) (a)	$180 - q$ cao	1	
(i) (b)	$p - q$ cao	1	
(ii) (a)	8 cm	1	
(ii) (b)	4.9 cm	1	
3 (a) (i)	10, 12	1	
(ii)	$2m$ oe	1	
(b) (i)	25, 36	1	
(ii)	n^2	1	
(iii)	18	1	
(c) (i)	$t^2 + 2t$ oe	1	
(ii)	675	1	

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4	**(a) (i)**	$\frac{10}{11}, \frac{1}{11}, \frac{9}{10}, \frac{1}{10}, \frac{10}{10}, \frac{0}{10}$ oe correctly placed	2	**B1** for 3 correct values correctly placed
	(ii) (a)	$\frac{6}{11}$ oe	1	
	(ii) (b)	$\frac{9}{22}$	2	**M1** for 3 ×
	(b) (i)	1	1	
	(ii)	2	1	
5	**(a) (i)**	€ 216	1	
	(ii)	($1 = €) 0.68	1	
	(b) (i)	Profit $43.3(0)	3	**B2** for Loss $43.40 or **M1** for two of 87.50, 48.60 and $27.20 and **M1** for attempt at adding any three prices and then subtracting 120
	(ii)	36 to 36.1%	1 ft	
6	**(a) (i)**	68.7°	2	**M1** for $\tan A = \frac{18}{7}$
	(ii)	257 to 257.5	4	**M1** for $\tan 55 = \frac{18}{DE}$ **A1** for DE = 12.6 to 12.61 cm **M1** for $\frac{1}{2}(9 + 7 + \textit{their}\,12.6) \times 18$ or for a complete alternative method
	(b)	26°	2	**M1** for 41.5 or 112.5 used
7	**(a)**	0.01 m/s cao	2	**M1** for 200/19.94 or 100/9.98
	(b) (i)	$\frac{120}{x}$ or $\frac{120}{x+3}$	3	**B1**
		$\frac{120}{x} - \frac{120}{x+3} = \frac{6}{60}$ oe Correct eqn with denominator removed		**B1**
	(ii)	x = 58.5 or – 61.5	3	**B2** for 1 correct answer Or for 58 – 59 AND –61 – –62 **B1** for $\frac{-3 \pm \sqrt{14409}}{2}$ **C1** for –58.5 AND 61.5
	(iii)	123 – 123.1 minutes	2	**M1** for 120/*their* positive 58.5

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SECTION B

8	**(a) (i)**	-5.5 or $-5\frac{1}{2}$	1	
	(ii)	$f^{-1}(x) = \frac{2x+3}{4}$	2	**C1** for $\frac{2x-3}{4}$ or $\frac{2y+3}{4}$ oe
	(iii)	$g = 0.5$ or $\frac{1}{2}$	2	**M1** for $\frac{8g-3}{2} = g$
	(b) (i)	Enlargement Scale factor –3, Centre *A*	2	**B1** **B1**
	(ii)	2.2 to 2.24 or $\sqrt{5}$	1	
	(iii)	$\begin{pmatrix} 0 \\ -7 \end{pmatrix}$	2	**B1** for 0 **B1** for –7
	(iv)	$\begin{pmatrix} 10 \\ 1 \end{pmatrix}$	2	**M1** for use of $\overrightarrow{DF} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ or $\overrightarrow{AF} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$
9	**(a) (i)**	$h = 29.8$ to 29.85	2	**M1** for $\pi \times 4^2 \times h\,(=1500)$
	(ii)	100	1	
	(b)	$x = 2.5$	2	**M1** for $\frac{1}{2} \times 12x \times 5x$ or better for cross section
	(c) (i)	$(2y - 3)(2y + 11)$	1	
	(ii)	$y = 1.5$ or -5.5	1	
	(iii)	67.5 cm^2	1 ft	
	(iv)	495 cm^2	3	**B1** 2 × *their* **(iii)** **B1** 240 × *their* 1.5
	(d)	$\frac{9}{25}$ cao	1	

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10 (a) (i)	$\frac{2}{3}, \frac{2}{3}$ oe	1	
(ii)	8 points correctly plotted and one set of 5 joined with a curve	2 ft	**B1** for at least 6 correct plots
(iii)	1.7 to 1.8 AND –1.7 to –1.8	1 ft	**M1** for tangent to curve at –1.5 soi After M0, SC1 for 3 to 4
(iv)	–2.5 to –5 (dep on M1)	2	**M1** for $x + y = 2$ drawn
(v)	–1.3 to –1.4 (dep on M1)	2 ft	One mark for each
(b) (i)	$a = 3$, $b = 405$ (cao)	2	
(ii)	(0, 5) cao	1	
(iii)	20	1 ft	
11 (a) (i)	510 – 520 m	1	
(ii)	C positioned 7 cm from A and 6 cm from B with both construction arcs drawn	2	**B1** for c positioned 7 cm from A and/or 6 cm from B
(iii)	$146° \pm 2$	1 ft	
(iv)	D positioned 10.3 cm ± 0.8 from A and $D\hat{A}C = 34° \pm 2°$	2	**B1** for DAC = 34 ($\pm 2°$)
(b) (i)	164 to 164.11° www	4	**B3** for QPR = 110 to 110.11 Or **B2** for $\frac{-2750}{80000}$ or –0.343 to 0.344 Or **B1** for (cos P =) $\frac{160^2 + 250^2 - 340^2}{(2\times)160 \times 250}$ And **M1** for their P + 54°
(ii)	18780 – 18800	2ft	**M1** for $\frac{1}{2} \times 250 \times 160 \times \sin 110.1$

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12 (a) (i)	14.8 kg www	3	**M1** for 15×3+14×8+20×12+24×15+31×17+24×20+12×26 (= 2076) **M1** for dividing by 140 (indep)
(ii)	Correct histogram	3	**M2** for 5 correct bars or **M1** for 3 correct bars or all correct heights seen
(iii)	$\frac{11}{35}$ oe	2	**M1** for 15 + 14 + 15 (= 44) used
(b) (i)	9	1	
(ii)	35%	1	
(iii)	96°	2	**M1** for (15 + 2) ÷ 64 (× 360)

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