CAMBRIDGE INTERNATIONAL EXAMINATIONS GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 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.

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Page 2	Mark Scheme	Syllabus	Paper
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Qu	Answers	Mark	Part Marks
1	(a) 4.28	2	M1 for $PQ = 4.5\cos 18$ oe
	(b) (i) 36 (.0)	2	M1 for $\sin A\widehat{B}C = \frac{6}{10.2}$ oe
	(ii) 5.68 or 5.69	4ft	M3 for $\sqrt{14.3^2 - (10.2^2 - 6^2)} - 6$ oe or M2 for a complete method for CD or M1 for BC ² = 10.2 ² - 6 ² or DC ² = 14.3 ² - their BC ² oe SC1 for their CD - 6
2	(a) (i) 10p + 1	2	B1 for 5 <i>p</i> – 1 + 5 <i>p</i> + 2
	(ii) $x < -1$	2	B1 for $-2x$, $5-3$ oe correctly isolated.
	(b) (i) 3	1	SC 2 for $\frac{A}{y+2}$ or $\frac{A}{2-y}$
	(ii) $(x =) \frac{A}{y-2}$	3	M2 for $\frac{A}{x} = y - 2$ or $yx - 2x = A$ or
			M1 for $y = \frac{A}{x} + 2$ or $yx = A + 2x$.
	(c) (i) $y = 6x - 5$ correctly derived	1	
	(ii) $y = 2x + 19$ correctly derived	1	
	(iii) $x = 6 \ y = 31$ isw	2	B1 for one correct or M1 for eliminating one variable
3	(a) (i) 30	1	
	(ii) 29 (.0)	3ft	SC 2 for the answer 51.7 or 51.8 or
			For the answer 129 $(200 - 2(i)) = 121.8$
			M2 for Figs $\frac{(200-a(1))-131.8}{131.8}$ or
			M1 for 200 – a (i) or
			for Figs $\frac{200 - 131.8}{131.8}$
	(b) 950	3	M2 for $x - \frac{15}{100} \times -647.5 = 160$ oe or B1 for 807.50 soi and B1 for division by 85.

Page 3Mark SchemeSyllabusPaperGCE 0 LEVEL - October/November 20124024214(a) (i) 20°1(ii) 70°1(iii) Rectangle stated and justified3B1 for Rectangle stated B1 for establishing a right angle using 20° and 70° B1 for 3 right angles stated.(b) (i) Similar triangles established (ii) 1.82B1 for $\frac{CO}{DO} = \frac{AO}{BO}$ oe or for $C\hat{O}A = D\hat{O}B$ 5(a) 15.71(b) 25.71ft(c) (i) Correct 4 lines drawn (ii) 41(d) (i) 251(ii) 14.33ftM2 for $\frac{1}{2}\pi r^2 - (d)(i)$ or M1 for area of a circle πr^2 soi								WW	w.dynamicpa	pers.com
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(d) (i) 25 (ii) 14.3 1 3ft M2 for $\frac{1}{2}\pi r^2 - (d)(i)$ or M1 for area of a circle πr^2 soi			(11)	4			1			
(d) (i) 25 (ii) 14.3 1 3ft M2 for $\frac{1}{2}\pi r^2 - (d)(i)$ or M1 for area of a circle πr^2 soi										
(ii) 14.3 3ft M2 for $\frac{1}{2}\pi r^2 - (d)(i)$ or M1 for area of a circle πr^2 soi		(d)	(i)	25			1			
(ii) 14.3 3ft M2 for $\frac{-\pi r^2 - (d)(1)}{2}$ or M1 for area of a circle πr^2 soi			(***)		•		• •	1	2 (1) (1)	
M1 for area of a circle πr^2 soi			(11)	14	.3		3ft	M2 for $\frac{-}{2}$	$\pi r^2 - (d)(1)$ or	
								M1 for ar	ea of a circle πr^2 soi	1
	6	(a)	00 /	`			2	D1 far		
6 (a) 98.2 5 B 10r $4 \times 70 + 10 \times 85 + 14 \times 92.5 + 20 \times 97.5 + 10 \times 10^{-10}$	0	(a)	98.2	2			3	BI for $4 \times 70 + 1$	$0 \times 85 + 14 \times 925$	$+20 \times 975 +$
$24 \times 105 + 8 \times 120$ and								24×105	$+ 8 \times 120$ and	1 20 × 77.5 1
B1 for division by 4+10+14+20+24+8								B1 for div	vision by 4+10+14+	20+24+8
									2	
(b) (i) $\frac{28}{28}$ or 1 ft		(h)	(i)	2	3 - oe		1ft			
		(~)	(-)	8)					
				0	0.2			22	21	
(ii) $\frac{992}{1000}$ oe 2ft B1 for $\frac{32}{100} \times \frac{31}{70}$ seen or			(ii)	- 9	$\frac{92}{200}$ oe		2ft	B1 for $\frac{32}{20}$	$\frac{31}{52}$ seen or	
6320				6.	320			80	002	
$\left \frac{32 \times 31}{20 - 20} \right = \frac{992}{5100} = 0.155$								$\frac{32 \times 31}{99} =$	$\frac{992}{6400} = 0.155$	
$80 \times 80 - 6400$								80×80	6400	
(c) Correct histogram 3 H2 for 3 correct additional columns		(c)	Cor	rec	t histogram		3	H2 for 3 c	correct additional co	olumns
H1 for 1 correct additional column					c			H1 for 1 c	correct additional co	lumn

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	_							
7	(a) 130 g	tin	2	B1 for one 0.769 (cent	correct rate such a /g) seen.	s 1.3 (g/cen)t or		
	(b) (i) 4	23 to 424	2	M1 for $\pi \times$	$r^2 \times 11.$			
	(ii) 3	19	3	M2 for $2\pi r^2 + 2\pi r 11$ or M1 for either of these				
	(iii) 1	050	2ft	M1 for Fig B1 for ÷ 10	M1 for Figs (their $319 + 30$)×3 B1 for $\div 10^4$			
	(c) 7.2		3	M2 for $\frac{x}{9}$ = B1 for $\sqrt[3]{51}$	2 for $\frac{x}{9} = \sqrt[3]{\frac{512}{1000}}$ oe or 1 for $\sqrt[3]{512} \div \sqrt[3]{1000}$ soi			
8	(a) 4.1		1					
	(b) Correc	ct plots and curve.	3	P2 for 7 or P1 for at le (dep) C1 for a sm points	8 correct plots ft c east 4 correct plots nooth curve throug	or ft and h all plotted		
	(c) <i>a</i> ft 1	cao <i>b</i> ft	2ft	B1 for at le	east one solution			
	(d) 1 to 2		2	B1 for the	correct tangent dra	wn		
	(e) (i) –	1	1					
	(ii) –	1 1 2	3ft	B2 for at let M1 for the SC1 for all equation	east one ft and line ir $y = x + a$ drawn. three found by so	drawn or lving the		

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9	(a) 59.2		3	M2 for (<i>A</i>	$B =) \frac{65\sin 60}{\sin(180 - (60 - 60))}$) + 48)) or
				M1 for $\frac{4}{\text{si}}$	$\frac{AB}{n60} = \frac{65}{\sin(180 - 66)}$	$(\overline{(0+48))}$ oe
	(b) 2360		2	M1 for $\frac{1}{2}$	× 84 × 65sin((180	–) 60)
	(c) 129		4	M3 for $\sqrt{84^2 + 65}$ M2 for 84 or M1 for 84 and a dep	$x^{2} - 2 \times 84 \times 65 cos($ $x^{2} + 65^{2} - 2 \times 84 \times 65^{2}$ $x^{2} + 65^{2} + 2 \times 84 \times 65^{2}$	180–60) or 55cos(180–60) 55cos(180–60)
	(d) 31.9°		3	A1 for 76 M2 for tar M1 for tar B1 for for	$n^{-1} \frac{35}{65 \sin 60} \text{ oe or}$ $n^{-1} \frac{35}{d} \text{ or } \frac{d}{35} \text{ and}$ $n^{-1} \frac{35}{d} \text{ or } \frac{5}{35} \text{ and}$	

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I	Page 6 Mark Schem			•		Syllabus	Paper			
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10	(a) $\frac{320}{x}$ oe isw (b) $\frac{320}{x}$ isw				1	B1 for <i>x</i> –	- 80 seen			
	x - 80									
	(c)	x^2-	- 80x	-10240 = 0 corre	ectly obtained	3	M2 for $-\frac{1}{\lambda}$ M1 for (a	$\frac{320}{x-80} - \frac{320}{x} = \frac{5}{2} c$ (b) = \pm their 2 ¹ / ₂)e	
	(d)	148	.8 –	68.8		4	B1 for $\sqrt{(}$ B1 for $-$	$(-80)^{2} - 4 \times 1 \times (-1)^{2}$ -(-80) $\pm \sqrt{\text{their} 4736}^{2}$ 2 × 1	$\overline{0240}$ soi and $\overline{50}$ soi and	
							After B0F B2 for 14 B1 for ond 148.81. a 149 and -	81 , allow SC1 for a 8.8 and – 68.8 Final e correct solution se nd – 68.81 or – 69.	correct ft. or answer or en or	
	(e)	2 h	9 m	ins		2ft	B1 for 2.1	5		
11	(a)	(i)	(a)	$\frac{1}{2}\mathbf{p} + \frac{1}{2}\mathbf{r}$		1				
			(b)	$\mathbf{r} + \mathbf{p} - \mathbf{q}$		1				
			(c)	$\frac{1}{2}\mathbf{p} + \frac{1}{2}\mathbf{r}$		2ft	B1 for un	simplified		
		(ii)	Eq	ual and Parallel		1				
	(b)	(i)	Со	rrect triangle		2	B1 for two size and o	o correct vertices or rientation	triangle correct	
		(ii)	Co	rrect triangle		2	B1 for two size and o	o correct vertices or rientation	triangle correct	
		(iii)	Co	mplete description v	www	3	B1 for Ro B1 for eit	tation her 90 anticlockwise	e or centre (0,3)	