CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2 (Paper 2), maximum raw mark 100

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CAMBRIDGE
International Examinations

Qu	Answers	Mark	Part Marks
1 (a) (i)	28 236	2	**B1** for $\frac{22}{100}$ or $\frac{78}{100} \times 36\,200$ or 7964
(ii)	140 000	3	**M1** for $\frac{8}{100}x = 36\,200 - 25\,000$ or figs $\frac{36\,200 - 25\,000}{8}$ Or **B1** for figs (36 200 – 25 000) ÷8 or 11 200
(iii)	30	2	**M1** for figs $\frac{1080 - 756}{1080}$
(b)	600	3	**B1** for 0.135 soi **M1** for figs $\frac{681}{113.5 \text{ or } 104.5}$
2 (a)	8.94	2	**M1** for $\sqrt{(-1-3)^2 + (2-10)^2}$
(b)	– 0.447	2	**M1** for $\frac{4}{\sqrt{80}}$
(c)	$x + 2y = 13$ oe correctly obtained	2	**M1** for $(x-(1))^2 + (y-2)^2 = (x-3)^2 + (y-10)^2$
(d)	(– 1, 7)	1	
3 (a) (i)	Convincing proof	1	
(ii) (a)	*HFG*	1	
(b)	*HEF* + *HFK* = *HEF* + *HFG*	1	
(b) (i)	(vertically) opposite same segment	2	**B1** for either
(ii)	$P\hat{L}M = 180 - y$ $P\hat{R}M = 180 - (180 - y) = y$	2	**B1** for either
(iii)	Similar justified	3	**B1** for Similar **B1** for both $M\hat{S}Q$ and $P\hat{M}R$
4 (a)	63.6 to 63.62	2	**M1** for πr^2
(b)	352 to 353	2	**B1** for 161(.2) or 190.9 or 191
(c)	10	2	**M1** for $\frac{1}{3}\pi 5^2 h$ or $\frac{2}{3}\pi 5^3$

5	**(a)**	Correctly shown	2	**M1** for $\tan x = \frac{4}{11}$
	(b)	Complete explanation	1	$B\hat{C}A = C\hat{D}F$ corresponding and $y + B\hat{C}A = 90 = x + C\hat{D}F$
	(c)	4.256 to 4.26(0)	3	**M2** for $(AC =)\frac{4}{\cos y}$ Or **M1** for $\frac{4}{AC} = \cos y$
	(d)	55.8 to 55.9	4ft	**M3** for $\frac{1}{2}$(*their* (c) + *their FD*)×7 Or **B2** for (*FD* =) 11.7 or $\sqrt{137}$ or $\sqrt{4^2 + 11^2}$ Or **B1** for $(DF^2) = 4^2 + 11^2$
6	**(a)**	$x^3 - 1$	2	**M1** for $x^3 + x^2 + x - x^2 - x - 1$
	(b)	0.4	3	**M1** for $\frac{3x(x-2) - 4(x+2)}{(x+2)(x-2)} (= 3)$ **B1** for $3x^2 - 6x - 4x - 8$ or $x^2 - 4$ soi
	(c)	$(x =) -0.5$ $(y =) -2$	4	**B3** for one correct value with supporting working Or **B2** for a pair of values satisfying one equation Or **M1** for attempt to equate coefficients
7	**(a) (i)**	20.9 to 21(.0)	1	
	(ii)	4.6(0) to 4.61	1	
	(b) (i)	$3x^2 + 9x - 247 (= 0)$ correctly obtained	4	**B3** for $16^2 = x^2 + 4x^2 + 12x + 9 - 2x^2 - 3x$ Or **M2** for $16^2 = x^2 + (2x+3)^2 - 2x(2x+3)\cos 60$ Or **M1** for $(16^2 =) x^2 + (2x+3)^2 \pm (2)x(2x+3)\cos 60$
	(ii)	7.70 and –10.70	3	**B2** for one correct solution Or 7.69 to 7.70 and –10.69 to –10.70 Or if in the form $\frac{p \pm \sqrt{q}}{r}$, **B1** for $p = -9$ and $r = 6$ or for $q = 3045$ (55.18)
	(iii)	7.70 18.40	1ft	
	(iv)	61.3 to 62(.0)	2ft	**M1** for $\frac{1}{2}$ × *their* 7.70 × *their* 18.40 × sin60
8	**(a) (i)**	42.18 to 42.22	2	**M1** for $\frac{260}{360}$ or $2\pi \times 9.3$

(ii)	196 to 196.32	2	**M1** for $\frac{260}{360}\times\pi\times9.3^2$
(b) (i)	194 to 195	2	**M1** for subtraction of two areas
(ii) (a)	0.578 confirmed	2	**M1** for $(2\pi r =)\frac{260}{360}\times2\pi\times0.8$
(b)	18.1 to 18.2	2	**M1** for $2\pi\times0.578\times5$
(c)	5.24 to 5.25	2	**M1** for $\pi\times0.578^2\times5$
9 (a)	–27 –8 – 1 0 1 8 27	1	
(b)	7 correct plots and smooth curve	2	**B1** for 5 plots
(c) (i)	– 2.4 to – 2.6	1	
(ii)	4 to 6	1	
(iii)	$t = u^3$	1	
(iv)	10 to 13	2	**M1** for a tangent at $x = 2$
(d) (i)	Correct line	2	**B1** for correct intercept (0, 3) or gradient 5
(ii)	(–1.95 to –1.7) (– 0.8 to –0.5) (2.4 to 2.6)	2	**B1** for one correct
10 (a) (i)	$\frac{1}{3}$ oe	1	
(ii)	$\frac{48}{1495}$ oe	2	**M1** for $(2\times)\frac{60}{300}\times\frac{24}{299}$ After **0**, allow **SC1** for $2\times\frac{60}{300}\times\frac{24}{300}$
(b)	50.8	3	**M1** for 15240, or $2640+1880+2352+3744+3136+1488$, or $44\times60+47\times40+49\times48+52\times72+56\times56+62\times24$ **B1** for division by 300
(c) (i)	100 148 220 276	1	
(ii)	**7** correct plots and smooth curve	2	**B1** for 5 correct plots
(d) (i)	50 to 50.5	1	
(ii)	7.25 to 8.00	2	**B1** for 46.5 to 47.0 or 54.25 to 54.50 seen or *their* reading at 225, or 75 seen

11 (a) (i)	**b**	1	
(ii)	2**b** correctly obtained	2	**M1** for $\overrightarrow{GB} + \overrightarrow{BA} + \overrightarrow{AE} + \overrightarrow{ED}$ soi
(iii) (a)	$\frac{8}{5}\mathbf{a} - \frac{8}{5}\mathbf{b}$	2	**B1** for $\overrightarrow{DC} = 2\mathbf{c} - 2\mathbf{b}$
(b)	$1 : \frac{8}{5}$ oe	1	
(b) (i) (a)	Reflection in $y = x$	2	**B1** for reflection
(b)	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	2	**M1** for either column
(ii)	Vertices (–3, 6) (–3, 0) (0, –2)	1	
(iii)	90	1	