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

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

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 $\frac{2}{3}\pi 5^3$

© Cambridge International Examinations 2015

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 $2\pi \times 9.3$

© Cambridge International Examinations 2015

(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

© Cambridge International Examinations 2015

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	

© Cambridge International Examinations 2015