

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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Qu	Answers	Mark	Part Marks
1 (a) (i)	28236	2	B1 for $\frac{22}{100}$ or $\frac{78}{100} \times 36200$ or 7964
(ii)	140000	3	M1 for $\frac{8}{100}x = 36200 - 25000$ or figs $\frac{36200 - 25000}{8}$ Or B1 for figs $(36200 - 25000) \div 8$ or 11200
(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)	<i>HFG</i>	1	
(b)	$HEF + HFK = HEF + HFG$	1	
(b) (i)	(vertically) opposite same segment	2	B1 for either
(ii)	$\hat{P}LM = 180 - y$ $\hat{P}RM = 180 - (180 - y) = y$	2	B1 for either
(iii)	Similar justified	3	B1 for Similar B1 for both $\hat{M}\hat{S}\hat{Q}$ and $\hat{P}\hat{M}\hat{R}$
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 $\frac{2}{3}\pi 5^3$

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5	(a)	Correctly shown	2	M1 for $\tan x = \frac{4}{11}$
	(b)	Complete explanation	1	$\hat{BCA} = \hat{CDF}$ corresponding and $y + \hat{BCA} = 90 = x + \hat{CDF}$
	(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 $\frac{1}{2}(\text{their (c)} + \text{their } FD) \times 7$ 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 $\frac{1}{2} \times \text{their } 7.70 \times \text{their } 18.40 \times \sin 60$
8	(a) (i)	42.18 to 42.22	2	M1 for $\frac{260}{360}$ or $2\pi \times 9.3$

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(ii)	196 to 196.32	2	M1 for $\frac{260}{360} \times \pi \times 9.3^2$
(b) (i)	194 to 195	2	M1 for subtraction of two areas
(ii) (a)	0.578 confirmed	2	M1 for $(2\pi r =) \frac{260}{360} \times 2\pi \times 0.8$
(b)	18.1 to 18.2	2	M1 for $2\pi \times 0.578 \times 5$
(c)	5.24 to 5.25	2	M1 for $\pi \times 0.578^2 \times 5$
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 44×60+47×40+49×48+52×72+56×56+62×24 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 <i>their</i> reading at 225, or 75 seen

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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	