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CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0580 MATHEMATICS

0580/41

Paper 4 (Paper 4 – Extended), maximum raw mark 130

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfw	not from wrong working
soi	seen or implied

Question	Answers	Mark	Part Marks
1 (a) (i)	$\frac{13}{13+8+3} \times 12000$ with no subsequent errors	1	
	(ii) 4000	1	
	(b) $2 \times 6500 + 5 \times \text{their(a)(ii)} + (12000 - 6500 - \text{their(a)(ii)})$ or $(13 \times 2 + 8 \times 5 + 3 \times 1) \times 500$	2	B1 for any two of 2×6500 , $5 \times \text{their(a)(ii)}$, $(12000 - 6500 - \text{their(a)(ii)})$ seen or $13 \times 2 + 8 \times 5 + 3 \times 1$
	(c) 37 500	3	M2 for $\frac{34500}{100-8} \times 100$ oe or M1 for 34500 associated with $(100 - 8)\%$
	(d) $\frac{11}{26}$ cao	2	M1 for any correct simplified version of $\frac{2750}{6500}$
	(e) 89 500	1	
2 (a)	1.5 1.25 -0.75 0.5	4	B1 for each
	(b) Fully correct curve	5	B5 for correct curve over full domain or B3 FT for 11 or 12 points or B2 FT for 9 or 10 points or B1 FT for 7 or 8 points and B1 independent for one complete branch on each side of the y -axis and not touching or crossing the y -axis SC4 for correct curve with branches joined

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Question	Answers	Mark	Part Marks
(c)	-1.35 to -1.25	1	
	-0.27 to -0.251	1	
	1.51 to 1.55	1	
	(d) $k < 1.2$ or 1.15 to 1.25	2	
	(e) tangent ruled at $x = -1$	B1	
	-1.7 to -1.3	2	No daylight at $x = -1$ Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -1.1$ and -0.9 dep on B1 or a close attempt at tangent at $x = -1$ or M1 for rise/run also dep on any tangent drawn or close attempt at tangent at any point. Must see correct or implied calculation from a drawn tangent
3 (a) (i)	image at (1, 4) (1, 5) (2, 5) (4, 4)	2	SC1 for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ or 4 correct vertices plotted but not joined SC1 for correct size and orientation, wrong position or 4 correct vertices plotted but not joined B2 for 3 correct vertices plotted or if no / wrong plots allow SC2 for 4 correct coordinates in column matrix or shown in working or SC1 for any 3 correct coordinates or M1 for $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} 2 & 2 & 3 & 5 \\ 1 & 2 & 2 & 1 \end{pmatrix}$ oe
	(ii) image at (-2, -1) (-5, -1) (-2, -2) (-3, -2)	2	
	(iii) image at (2, -1) (2, -2) (3, -2) (5, -1)	3	
	(b) enlargement	B1	
	[centre] (1, 0)	B1	
	[scale factor] -3	B1	not as column vector
(c)	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$	2	B1 for one correct row or column or $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

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Question	Answers	Mark	Part Marks
4 (a)	5	1	
(b)	$C \cap M$ oe	1	Allow e.g. $(B \cap C \cap M) \cup (C \cap M)$
(c)	3	1	
(d) (i)	$\frac{8}{30}$ oe	1	0.267 or better
(ii)	$\frac{14}{30}$ oe	1	0.467 or better
(e)	$\frac{30}{272}$ oe	3	M2 for $\frac{6}{17} \times \frac{5}{16}$ or M1 for $\frac{6}{17}$ seen 0.110[2...] or better
5 (a) (i)	10.6 or 10.59...	2	M1 for $\tan = \frac{55}{294}$ oe
(ii)	175 or 174.9[...] to 175.[1...]	4	M2 for $[\text{adj}] = \frac{55}{\tan 24.8}$ oe or M1 for implicit version and M1 dep on at least M1 for $294 - \text{their adj}$
(b) (i)	4.9 or 4.89 to 4.9	4	M3 for $\sqrt{4^2 + \left(\frac{1}{2}\sqrt{4.8^2 + 3^2}\right)^2}$ or M2 for $\frac{1}{2}\sqrt{4.8^2 + 3^2}$ or M1 for $\sqrt{4.8^2 + 3^2}$ or $2.4^2 + 1.5^2$
(ii)	54.7 or 54.71 to 54.722	2	M1 for $\sin = \frac{4}{\text{their } 4.9}$

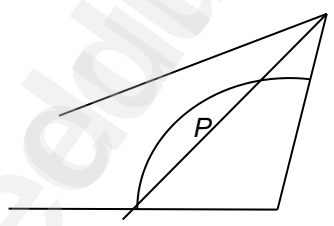
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6	(a) (i)	$24 < t \leq 30$	1	
	(ii)	30.9 or 30.875 nfw	4	M1 for midpoints soi (condone 1 error or omission) 5, 17, 27, 35, 50, 65 soi M1 for use of $\sum fx$ with x in correct interval including both boundaries (condone 1 further error or omission) (50, 1530, 3645, 2975, 3500, 650) and M1 (dep on 2 nd M1) for $\sum fx \div 400$
	(b) (i)	[10 100] 235 320 390 [400]	2	B1 for any two correct SC1 for 235, n , $n + 70$ $n > 235$
	(ii)	Correct curve or polygon	3	B1 for correct horizontal placement B1FT for correct vertical placement B1FT dep on at least B1 for reasonable increasing curve or polygon through their 6 points If zero scored SC1 for 5 out of 6 points correctly plotted
	(c) (i)	27.5 to 29	1	
	(ii)	12 to 14	2	B1 for 36 to 38 or 24 seen
	(iii)	18 to 20	2	B1 for 60 seen or marked on grid
	(iv)	30 to 45	2	B1 for 355 to 370 seen

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7	(a) (i)	8.27 or 8.269... nfw	4	M2 for $7.6^2 + 8.4^2 - 2 \times 7.6 \times 8.4 \times \cos(62)$ oe or M1 for implicit form A1 for $[PQ^2 =]$ 68.3 to 68.5
	(ii)	28.2 or 28.18..	2	M1 for $0.5 \times 7.6 \times 8.4 \times \sin 62$ oe
	(b)	55.8 or 55.78 to 55.79 nfw	5	B1 for $[HGJ] = 81$ B1 for $[GHJ] = 61$ M2 for $[GJ =] \frac{63}{\sin(\text{their } 81)} \times \sin(\text{their } 61)$ or M1 for implicit form After M0, SC1 for final answer of 68.1...
8	(a)	$5x = 75$ or $5x + 48 = 123$ 15	B2 B1	M1 for $x + (x + 12) + 3(x + 12) = 123$ oe
	(b)	6, 7	3	B2 for answer of 6 or 7 OR M1 for $t < 8$ M1 for $t \geq \frac{37}{7}$ OR SC2 for final answer of 5, 6, 7 or 6, 7, 8 or SC1 for final answer of 5, 6, 7, 8
	(c) (i)	1.8 oe	3	M1 for $21 - x = 4(x + 3)$ or better B1 for $[\pm]5x = k$ or $kx = [\pm]9$
	(ii)	$\sqrt{7^2 - 4 \times 3 \times (-5)}$ or better nfw and $\frac{-7 + \sqrt{q}}{2(3)}$ or $\frac{-7 - \sqrt{q}}{2(3)}$ oe -2.91 and 0.57 final ans cao	B1 B1 B1B1	or for $\left(x + \frac{7}{6}\right)^2$ or for $-\frac{7}{6} \pm \sqrt{\frac{5}{3} + \left(\frac{7}{6}\right)^2}$ SC1 for 0.6 or 0.573... and -2.9 or -2.907 or -2.906... or -0.57 and 2.91 or 0.57 and -2.91 seen in working

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9	(a) (i)	42	2	B1 for $BAC = 90 - 48$
	(ii)	111	2	B1 for 111 or 69 or $ACD = 27$ correctly placed on diagram or indicated
	(b) (i)	37.7 or 37.69 to 37.704 nfw	2	M1 for $6\pi + 4\pi \pm 2\pi$ oe
	(ii)	12100, 12060, 12070, 12062.4 to 12065.6 nfw	5	SC4 for answer with figs 121 or 1206 to 1207 OR M2 for total area = $\frac{1}{2}\pi 6^2 + \frac{1}{2}\pi 4^2 - \frac{1}{2}\pi 2^2$ or $\frac{1}{2}\pi 60^2 + \frac{1}{2}\pi 40^2 - \frac{1}{2}\pi 20^2$ or M1 for $\frac{1}{2}\pi 6^2$ or $\frac{1}{2}\pi 4^2$ or $\frac{1}{2}\pi 2^2$ or $\frac{1}{2}\pi 60^2$ or $\frac{1}{2}\pi 40^2$ or $\frac{1}{2}\pi 20^2$ A1 for area = 75.39 to 75.41 or 7539 to 7541 and M1 dep for volume = <i>their</i> area $\times$ thickness
10	(a)	475 or 465 to 485	2	B1 for 9.3 to 9.7 [cm] seen
	(b)	Correct perpendicular bisector with two pairs of intersecting arcs	2	B1 for accurate with no/wrong arcs or M1 for correct intersecting arcs
	(c)	Compass drawn arc centre B radius 5.8	2	M1 for compass drawn arc centre B or B1 for 5.8 cm stated or used
		Accurate angle bisector at C with correct intersecting arcs 	2	B1 for accurate with no/wrong arcs or M1 for correct intersecting arcs
			1	cao

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11	(a)	$\frac{At}{t+r}$ final answer oe nfww	4	B1 for $t(A-x) = xr$ or $tA - tx = xr$ or $A = \frac{xr}{t} + x$ M1 for correctly completing multiplication by t (eliminating any bracket) and x terms isolated M1 for correct factorisation M1 dep for correct division
	(b)	$[a =] \ 64$ $[b =] \ -8$	3	B1 for $2b = -16$ or $(x-8)^2$ B1 for $a = (their\ b)^2$ If 0 scored, SC1 for $x^2 + 2bx + b^2$ soi
	(c)	$\frac{13x+8}{(x-4)(3x-2)}$ final answer nfww	3	B1 for $6(3x-2) - 5(x-4)$ or better seen B1 for $(x-4)(3x-2)$ oe seen as denom or SC2 for final answer $\frac{13x-32}{(x-4)(3x-2)}$