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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/41 Paper 4 (Extended), maximum raw mark 120

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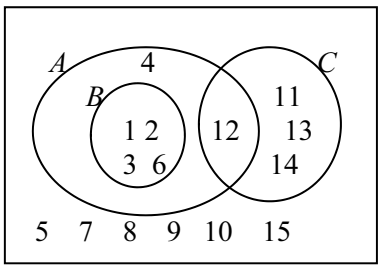
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Abbreviations

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

Qu.	Answer	Mark	Part Marks
1 (a)	8	**1**	
(b)	10	**1**	
(c)	6	**1**	
(d)	4.5	**2**	**B1** for [LQ =] 3.5 or [UQ =] 8
(e)	5.375	**1**	
2	Correctly equating one set of coefficients Correct method to eliminate one variable $x = 1.5$ $y = -2$	**M1** **M1** **B1** **B1**	or making x or y the subject of one equation or substituting into other equation or sketch of their two lines If 0 scored, **SC1** for correct substitution into one of original equations to find other variable
3 (a)	20	**1**	
(b)	13.225	**2**	or **M1** for (264.5 or 260 or 269) ÷ *their* **(a)** oe
4 (a)	Reflection $x = -1$ oe	**1** **1**	Any combination of transformations scores 0
(b)	(–1, 4), (–1, 2), (0, 2)	**3**	**M2** for any rotation 90° clockwise If 0 scored, **SC2** for rotation 90° anti-clockwise about (–1, 6) or **SC1** for any rotation 90° anti-clockwise
(c)	Reflection $y = x + 7$ oe	**1** **1FT**	Any combination of transformations scores 0 **FT** if **SC2** scored in **(b)** to $y = -x + 5$

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5	**(a) (i)**	3	**2**	**M1** for $y = \frac{k}{\sqrt{x}}$ or $\frac{y}{5} = \frac{\frac{1}{\sqrt{25}}}{\frac{1}{\sqrt{9}}}$ oe If 0 scored, **SC1** for 0.648 oe or $\frac{25}{3}$ oe
	(ii)	0.36 oe	**2FT**	**FT** $\left(\frac{their\ k}{25}\right)^2$ only from correct variation, $k \neq 1$ **B1** for $\left(\frac{their\ k}{25}\right)$ oe soi $k \neq 1$ If 0 scored, **SC1** for 4.02 or 4.024 to 4.025 or 225
	(iii)	$x = \frac{225}{y^2}$ or $\left(\frac{15}{y}\right)^2$	**2**	**M1** for $x = \frac{c}{y^2}$ or $\sqrt{x} = \frac{their\ k}{y}$ oe $k \neq 1$ If 0 scored, **SC1** for $\sqrt{\frac{405}{y}}$ or $\frac{9y^2}{25}$
	(b)	$y = -3(x-2)(x+4)$ or $-3x^2 - 6x + 24$	**3**	**M2** for [$y =$] $k(x-2)(x+4)$, $k \neq 1$ soi or **M1** for $(x-2)(x+4)$ seen OR **M1** for $k(x+1)^2 + c$, $k \neq 1$ and **M1** for substituting two points to get $24 = k + c$ and $0 = 9k + c$ OR **M1** for 3 correct equations in $y = ax^2 + bx + c$ and **M1** for eliminating one variable from all three equations. If 0 scored, **SC1** for $ax^2 + bx + 24$ soi
6	**(a)**	$A = \{1, 2, 3, 4, 6, 12\}$ $B = \{1, 2, 3, 6\}$	**1** **1**	
	(b)		**3**	**B1** for 4 in correct position **B1** for 12 in correct position

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	(c) (i)	{1, 2, 3, 6}	**1FT**	**FT** from *their* diagram
	(ii)	{11, 13, 14}	**1FT**	**FT** from *their* diagram
	(iii)	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15}	**1FT**	**FT** from *their* diagram
	(d) (i)	6	**1FT**	**FT** from *their* diagram
	(ii)	15	**1FT**	**FT** from *their* diagram
7	**(a)**	$\frac{15}{3}\times\frac{12}{3}\times\frac{3}{3}$	**1**	
	(b)	14.1 or 14.13 to 14.14	**2**	**M1** for $\frac{4}{3}\pi 1.5^3$
	(c)	282 or 283 or 282.6 to 282.8	**1FT**	**FT** *their* **(b)** × 20
	(d)	2.82×10^2 or 2.83×10^2 or $(2.826 \text{ to } 2.828) \times 10^2$	**1FT**	**FT** *their* **(c)** in standard form
	(e)	52.20 to 52.41	**2FT**	**FT** answer only if less than 100 **M1** for $\frac{\textit{their}\ \textbf{(c)}}{15\times12\times3}\times100$
8	**(a) (i)**	64	**1**	
	(ii)	26	**1FT**	**FT** 90 – *their* **(a)(i)**
	(iii)	64	**1**	
	(b)	Kite or Cyclic Quadrilateral	**1**	
	(c) (i)	*OAP*	**1**	
	(ii)	*OXB* or *OXA*	**1**	
9	**(a) (i)**	All points correctly plotted	**2**	**B1** for 4 or 5 correct points
	(ii)	Positive	**1**	
	(b) (i)	4.4 cao final answer	**1**	
	(ii)	98	**1**	
	(c) (i)	$31.7 + 15.1x$ or $31.66 \text{ to } 31.67 + (15.07 \text{ to } 15.08)$	**2**	**B1** for $31.7 \text{ (or } 31.66 \text{ to } 31.67) + px$ or $q + (15.1 \text{ (or } 15.07 \text{ to } 15.08))\, x$ or **SC1** for $15x + 32$
	(ii)	91.94 to 92.1	**1FT**	**FT** *their* **(c)(i)**

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10	**(a)**	86.1 or 86.08 to 86.09	**2**	**M1** for $65^2 + 80^2 - 2 \times 65 \times 80 \times \cos 72$
	(b)	39.1 or 39.07 to 39.09	**3**	**M2FT** for [sin A =] $\frac{64 \times \sin 58}{\textit{their}}$ **(a)** or **M1FT** for $\frac{64}{\sin A} = \frac{\textit{their}\ 86.1}{\sin 58}$ oe
	(c)	5210 or 5206 to 5207	**4FT**	**M1** for $0.5 \times 65 \times 80 \times \sin 72$ **M2FT** for $0.5 \times 64 \times$ *their* $86.1 \times \sin(180 - 58 -$ *their* **(b)**$)$ oe or **M1** for [angle ACD] = $180 - 58 -$ *their* **(b)**
11	**(a) (i)**	3374.59	**2**	**M1** for 3000×1.04^3 oe
	(ii)	8	**3**	**M2** for $\frac{\log\left(\frac{4000}{3000}\right)}{\log 1.04}$ oe or at least 2 trials, one of which goes beyond 4000, soi by 7.3 to 7.4 or **M1** for $3000 \times 1.04^n = 4000$ or at least 2 trials or if 0 scored, **SC1** for answer 7
	(b) (i)	3450	**1**	
	(ii)	7	**1**	
	(c)	12	**3**	**B2** for 11.91... or 11 or **M1** for sketch of both functions with intersection or for $3000 \times 1.04^n = 3000(1 + 0.05n)$ oe or T & I beyond $n = 8$
12	**(a)**	$\frac{4}{10}, \frac{9}{11}\ \frac{2}{11}, \frac{8}{11}\ \frac{3}{11}$	**2**	**B1** for one correct pair on 2nd bag
	(b) (i)	$\frac{54}{110}$ oe cao	**2**	**M1FT** for $\frac{6}{10} \times$ *their* $\frac{9}{11}$
	(ii)	$\frac{44}{110}$ oe cao	**3**	**M2FT** for $\frac{6}{10} \times$ *their* $\frac{2}{11} + \frac{4}{10} \times$ *their* $\frac{8}{11}$ oe or **M1FT** for one of above products
	(c)	$\frac{66}{110}$ oe cao	**3**	**M2FT** for $\frac{6}{10} \times$ *their* $\frac{9}{11} + \frac{4}{10} \times$ *their* $\frac{3}{11}$ or **(b)(i)** + $\frac{4}{10} \times$ *their* $\frac{3}{11}$ or 1 – *their* **(b)(ii)** oe or **M1FT** for $\frac{6}{10} \times$ *their* $\frac{9}{11}$ or $\frac{4}{10} \times$ *their* $\frac{3}{11}$

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13	**(a)**	$(6x + 1)^2 = (5x + 4)^2 + (2x – 1)^2$ oe Any one of $36x^2 + 6x + 6x + 1$ oe $25x^2 + 20x + 20x + 16$ oe $4x^2 – 2x – 2x + 1$ oe Completion to $7x^2 – 24x – 16 = 0$ with no errors or omissions	**M1** **B1** **A1**	
	(b)	$(x – 4)(7x + 4)$	**2**	**B1** for $(x + a)(7x + b)$ where $ab = – 16$ or $7a + b = –24$
	(c)	$0.5 \times 7 \times 24$ [=84]	**M2**	**B1** for $x = 4$
	(d)	8.22 or 8.219 to 8.22[0]	**4**	**B1** for $y(y + 2) = 84$ oe **M2** for $\frac{-2 \pm \sqrt{(2)^2 - 4(1)(-84)}}{2 \times 1}$ oe or suitable sketch or **M1** for formula with 1 error or $(y + 1)^2 – 1 = 84$ oe
14	**(a)**	$\frac{1}{6}pq$ oe final answer	**1**	
	(b)	$\frac{2}{3}p + \frac{1}{4} \times \frac{1}{3}p$ oe	**M2**	**M1** for $\frac{1}{4} \times \frac{2}{3}p$ or for $\frac{3}{4} \times \frac{1}{3}p$
	(c)	$\frac{21}{32}pq$ final answer	**2**	**M1** for $\frac{3}{4}q \times \frac{3}{4}p + \frac{1}{2} \times \frac{1}{4}p \times \frac{3}{4}q$ oe
	(d)	17 : 63 cao	**2**	isw attempt to change form of 17 : 63 to e.g. $1 : \frac{17}{63}$ **M1** for *pq – their* **(a)** – *their* **(c)** oe soi by any equivalent ratio
15	**(a)** **(i)**	$y = 1$ $x = 1$ $x = 3$	**1** **1** **1**	
	(ii)	(1.73, –13.9) or (1.732... , –13.93 to –13.92)	**2**	**B1** for each
	(iii)	(–1.73, –0.07 18) or (–1.732... , –0.07180 to –0.07179...)	**2**	**B1** for each

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(b) (i)	$-13.9 < k < -0.0718$	**2FT**	**FT** y coordinates from **(ii)** and **(iii)** **B1** for one inequality correct or **SC1** for $-13.9 \leqslant k \leqslant -0.0718$ or for $-13.9 < x < -0.0718$
(ii)	$-13.9,\ -0.0718$	**1FT**	**FT** y coordinates from **(a)(ii)** and **(a)(iii)**
(c)	$x < -3$ $-1 < x < 1$ $x > 3$	**1** **1** **1**	Not f(x)

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