

CAMBRIDGE INTERNATIONAL EXAMINATIONS

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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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

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 $(264.5 \text{ or } 260 \text{ or } 269) \div \textit{their (a)}$ 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 $y = -x + 5$

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

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	(c) (i)	{1, 2, 3, 6}	1FT	FT from <i>their</i> diagram
	(ii)	{11, 13, 14}	1FT	FT from <i>their</i> diagram
	(iii)	{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15}	1FT	FT from <i>their</i> diagram
	(d) (i)	6	1FT	FT from <i>their</i> diagram
	(ii)	15	1FT	FT from <i>their</i> 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 <i>their</i> (b) $\times 20$
	(d)	2.82×10^2 or 2.83×10^2 or $(2.826 \text{ to } 2.828) \times 10^2$	1FT	FT <i>their</i> (c) in standard form
	(e)	52.20 to 52.41	2FT	FT answer only if less than 100 M1 for $\frac{\text{their (c)}}{15 \times 12 \times 3} \times 100$
8	(a) (i)	64	1	
	(ii)	26	1FT	FT $90 - \text{their (a)(i)}$
	(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 to 31.67 + (15.07 to 15.08)	2	B1 for 31.7 (or 31.66 to 31.67) + px or q + (15.1 (or 15.07 to 15.08)) x or SC1 for 15x + 32
	(ii)	91.94 to 92.1	1FT	FT <i>their</i> (c)(i)

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 $[\sin A =] \frac{64 \times \sin 58}{\text{their (a)}}$ or M1FT for $\frac{64}{\sin A} = \frac{\text{their } 86.1}{\sin 58}$ oe
	(c)	5210 or 5206 to 5207	4FT	M1 for $0.5 \times 65 \times 80 \times \sin 72$ M2FT for $0.5 \times 64 \times \text{their } 86.1 \times \sin (180 - 58 - \text{their (b)})$ oe or M1 for $[\text{angle } ACD] = 180 - 58 - \text{their (b)}$
11	(a) (i)	3374.59	2	M1 for 3000×1.04^3 oe
	(ii)	8	3	M2 for $\frac{\log(\frac{4000}{3000})}{\log 1.04}$ 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 $\frac{6}{10} \times \text{their } \frac{9}{11}$
	(ii)	$\frac{44}{110}$ oe cao	3	M2FT for $\frac{6}{10} \times \text{their } \frac{2}{11} + \frac{4}{10} \times \text{their } \frac{8}{11}$ oe or M1FT for one of above products
	(c)	$\frac{66}{110}$ oe cao	3	M2FT for $\frac{6}{10} \times \text{their } \frac{9}{11} + \frac{4}{10} \times \text{their } \frac{3}{11}$ or (b)(i) + $\frac{4}{10} \times \text{their } \frac{3}{11}$ or $1 - \text{their (b)(ii)}$ oe or M1FT for $\frac{6}{10} \times \text{their } \frac{9}{11}$ or $\frac{4}{10} \times \text{their } \frac{3}{11}$

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	
	(b)	$(x - 4)(7x + 4)$	B1	
	(c)	$0.5 \times 7 \times 24 [=84]$	A1	
	(d)	8.22 or 8.219 to 8.22[0]	2	B1 for $(x + a)(7x + b)$ where $ab = -16$ or $7a + b = -24$
			M2	B1 for $x = 4$
			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 $-13.9 \leq k \leq -0.0718$ 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)