CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

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

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.

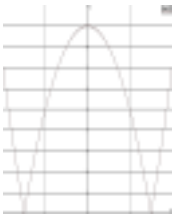
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

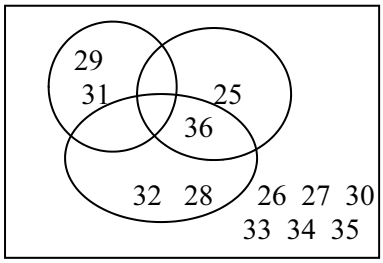
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

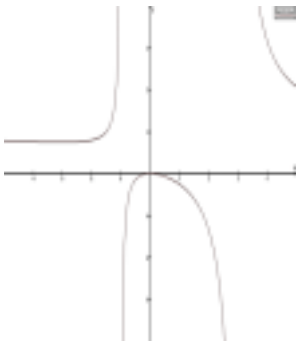
1	**(a)**	(1, –4)	**1**	
	(b)	(–1, –4)	**1**	
	(c)	(x, $-y$)	**2**	**B1** for each coord
	(d)	Reflection x-axis oe	**1** **1**	Any indication of second transformation scores 0.
2	**(a)**	$\begin{pmatrix} 6 \\ -2 \end{pmatrix}$	**1**	
	(b)	$-\frac{1}{3}$ oe	**1**	
	(c)	$-\frac{1}{3}x + 5$ oe	**2FT**	**FT** *their* **(b)** **B1** for $mx + 5$ or (*their* **(b)**)$x + k$ or **SC1** for – *their* **(b)** + 5
	(d)	(9, 10)	**2**	**B1** for each coordinate
	(e)	(15, 8)	**2**	**B1** for each coordinate
	(f)	8	**1**	
3	**(a)**	*BCA*	**1**	Must be in this order
	(b)	4.2	**3**	**B2** for $6.5x = 42 - 3.5x$ or better or $x = \frac{3.5}{10} \times 12$ oe **M1** for $\frac{3.5}{6.5} = \frac{x}{12-x}$ oe or $\frac{x}{12} = \frac{3.5}{10}$ oe
	(c)	24.1 or 24.13 to 24.14…	**2**	**M1** for $\left(\frac{6.5}{3.5}\right)^2$ or $\left(\frac{3.5}{6.5}\right)^2$

4	(a) (i)	129	1	
	(ii)	309	1FT	**FT** *their* **(a)(i)** + 180, but only if 270 < answer < 360
	(b)	41.6 or 41.60 to 41.61	2	**M1** for $\sin B = \frac{4.23}{6.37}$ oe
	(c)	4.92 or 4.915 to 4.916	3	**M1** for $4.23^2 + 7.42^2 - 2 \times 4.23 \times 7.42 \times \cos 39$ **A1** for 24.2 or 24.16 to 24.17
	(d)	162 or 161.6 to 161.9	4	**B3** for (ACD =) 108.1 to 108.4 or 71.6 to 71.9 or **M2** for $\sin C = \frac{7.42 \sin 39}{\textit{their}\ 4.92}$ oe (0.949...) or **M1** for $\frac{7.42}{\sin C} = \frac{\textit{their}\ 4.92}{\sin 39}$ oe If **0** scored **SC1** for angle ADC = 32.6 to 32.9
5	(a)	72	3	**M1** for one correct use of $p \log q = \log q^p$ **M1** for one correct use of $\log a$ +/– $\log b$ or **B1** for 1.86 or 1.857... **M1** for $10^{\textit{their}1.86}$ soi
	(b)	Equalise coefficients Correct addition/subtraction of their equations to eliminate one variable	M1 DM1	or **M1** for equation x = or y = from one equation **M1** for correct substitution of their x = or y = into other equation or **M1**, **M1** for sketch of each line
		$x = -3$ $y = -4$	B1 B1	
6	(a)		2	**1** for correct graph for $x > 1.5$ and correct graph for $x < -1.5$ **1** for correct graph for $-1.5 < x < 1.5$
	(b)	– 1.5 and 1.5 oe	1	
	(c)	3.25 1.98 or 1.975 to 1.976	1 1	
	(d) (i)	[k =] 9	1	
	(ii)	$0 < k < 9$	2FT	**B1FT** for $0 \le k \le 9$ or $a < k < 9$ or $0 < k < b$ or $a \le k < 9$ or $0 < k \le b$ **FT** *their* **(d)(i)**

7	(a)	2	1	
	(b)	10	1	
	(c)	3	1	
	(d)	5	2	**B1** for 2 and 7 seen
	(e)	4	2	**B1** for 5 and 8.5 soi by 50 and 68 or 300
	(f)	$\frac{380}{5550}$ oe	2	**M1** for $\frac{20}{75}\times\frac{19}{74}$ oe
8	(a)	29, 31	1	
	(b)		3	**B2** for 1 error, **B1** for 2 or 3 errors
	(c)	25, 26, 27, 30, 33, 34, 35	1 FT	**FT** from *their* diagram
	(d)	4	1FT	**FT** from *their* diagram
9	(a) (i)	216 n^3 oe	1 1	
	(ii)	54 $n^2 + 3n$ oe	1 2	**M1** for $an^2 + bn + c$, $a \neq 0$, or second differences of 2 obtained
	(b)	271 $n^3 + n^2 + 3n + 1$	1FT 2FT	**FT** *their* **(a)(i)** + **(a)(ii)** + 1 (numerical) **FT** *their* **(a)(i)** + **(a)(ii)** + 1 (f(n)) **M1** for $an^3 + bn^2 + cn + d$, $a \neq 0$, and both b and c not 0. or **M1** for third differences of 6 seen

10	(a)	[$] 27 500	3	**M2** $\frac{18\,700}{0.8\times0.85}$ or **M1** for $0.8 \times 0.85 \times a = 18\,700$ or **B1** for 23 375 or 22 000
	(b)	2018	3	**M2** for $\frac{\log\left(\frac{0.25 their(a)}{18\,700}\right)}{\log 0.85}$ oe soi by $n = 6.157$, 7.157 or 8.157 or 5994. ... oe or sketch showing solution or **M1** for $18700 \times 085^n = \frac{1}{4}$ (*their* **(a)**) oe **or** for trials going beyond 2012 or $18\,700 \times 085^n$ oe **or** sketch but not showing solution **SC2** for 2019
11	(a) (i)	44.2 or 44.17 to 44.18…	2	**M1** for $\frac{1}{16}\left(\pi \times 15^2\right)$ oe
	(ii)	0.00442 oe	1FT	**FT** *their* **(a)(i)** ÷ 10 000
	(iii)	$\pi r^2 = \frac{1}{4}\pi 15^2$ oe	M1	for Inner Area/outer area = $\frac{1}{4}$
		$r^2 = 56.25$ or $\sqrt{\frac{176.8 \text{ or } 177}{\pi}}$ oe	M1	Inner radius / outer radius = $\sqrt{\frac{1}{4}} = \frac{1}{2}$ **SC1** for verification of 7.5 e.g. $(\pi \times 7.5^2)/4 = 4.42$
	(b) (i)	26.8 or 26.78 ...	3	**M2** for $\frac{1}{12} \times 2\pi \times 15 + \frac{1}{12} \times 2\pi \times 7.5 + 7.5 + 7.5$ oe or **M1** for $\frac{1}{12} \times 2\pi \times 15$ or $\frac{1}{12} \times 2\pi \times 7.5$
	(ii)	303 or 302.5... to 302.8	3	**M2** for $8 \times$ **(b)(i)** $+ 2 \times$ *their* **(a)(i)** oe or **M1** for $8 \times$ **(b)(i)** oe or $2 \times$ *their* **(a)(i)** oe

12	**(a)**	$[y =]\ 15 - 3x$ oe	**2**	**B1** for $5x + x + 5x + x + 4y = 60$ oe
	(b) (i)	$5x^2 = (\textit{their}\ \textbf{(a)})^2$	**M1**	
		Bracket expanded and completion with no errors	**A1**	
	(ii)	$\dfrac{90 \pm \sqrt{(90^2 - 4 \times 4 \times 225)}}{2 \times 4}$	**M1**	or sketch of parabola with 2 positive zeros or $(x - \frac{45}{4})^2$ oe
		2.86 or 2.864 to 2.865	**B1**	
		19.6 or 19.63 to 19.64	**B1**	
	(iii)	2.86, because 19.6 would use more than 60m oe	**1**	Dependent on **B1 B1** in **(ii)** e.g. 19.6 would make y negative
	(iv)	81.78 to 82.44	**2FT**	**FT** $10 \times (\textit{their}\ \textbf{(b)(iii)})^2$ **M1** for $5 \times (\textit{their}\ \textbf{(b)(iii)})^2 \times 2$ oe **SC1** for 40.89 to 41.22
13	**(a) (i)**	7 points correctly plotted	**3**	$\pm \frac{1}{2}$ small square, **B2** for 5 correct or **B1** for 3 or 4 correct
	(ii)	Negative	**1**	
	(b) (i)	30	**1**	
	(ii)	3.05 or 3.045…	**1**	
	(c) (i)	$[y =]\ 7.22 - 0.139x$ oe	**2**	7.218… – 0.1391 to – 0.1390 **B1** for $y = mx + c$ with either m or c correct or **SC1** for $7.2 - 0.14x$
	(ii)	Rate of change or increase or decrease in time with temperature oe	**1**	e.g. change in time for every degree increase in temperature
	(iii)	3.74 or 3.75 or 3.740 to 3.745	**1FT**	**FT** *their* **(c)(i)**

14 (a) (i)		**4**	**B1** for left hand branch **B1** for right hand branch **B2** for middle branch, no overlaps and max close to (0,0) or **B1** for middle branch correct shape
(ii)	$y = 1,\ x = -1,\ x = 3$	**3**	**B1** for each
(iii)	(0, 0)	**1**	
(iv)	(–3, 0.75)	**2**	**B1** for each coord
(b)	$-1.1[0] < x < -1$ or $-1.098\ldots < x < -1$ $3 < x < 4.1[0]$ or $3 < x < 4.098$ ...	**3**	**B2** for either interval or **B1** for –1.1[0] or –1.098... **and** 4.1[0] or 4.098 ...