

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.

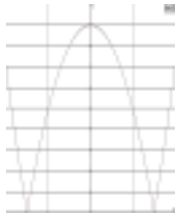
Cambridge will not enter into discussions about these mark schemes.

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.

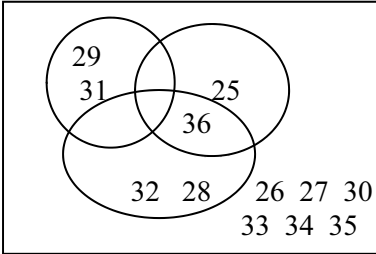
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1	(a)	$(1, -4)$	1	B1 for each coord Any indication of second transformation scores 0.
	(b)	$(-1, -4)$	1	
	(c)	$(x, -y)$	2	
	(d)	Reflection x -axis oe	1 1	
2	(a)	$\begin{pmatrix} 6 \\ -2 \end{pmatrix}$	1	FT <i>their (b)</i> B1 for $mx + 5$ or <i>(their (b))x + k</i> or SC1 for $-their (b) + 5$
	(b)	$-\frac{1}{3}$ oe	1	
	(c)	$-\frac{1}{3}x + 5$ oe	2FT	
	(d)	$(9, 10)$	2	
	(e)	$(15, 8)$	2	
	(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 $\left(\frac{3.5}{6.5}\right)^2$

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

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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 <i>their</i> diagram
	(d)	4	1FT	FT from <i>their</i> 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 <i>their</i> (a)(i) + (a)(ii) + 1 (numerical) FT <i>their</i> (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

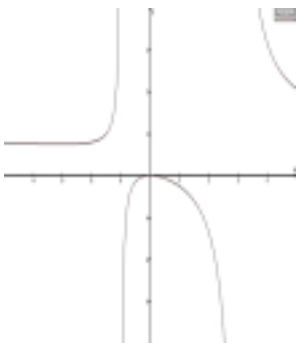
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10	(a)	[\$] 27 500	3	M2 $\frac{18\,700}{0.8 \times 0.85}$ or M1 for $0.8 \times 0.85 \times a = 18\,700$ or B1 for 23 375 or 22 000
	(b)	2018	3	M2 for $\frac{\log\left(\frac{0.25\text{their}(a)}{18\,700}\right)}{\log 0.85}$ oe soi by $n = 6.157, 7.157$ or 8.157 or 5994. ... oe or sketch showing solution or M1 for $18700 \times 085^n = \frac{1}{4}$ (<i>their (a)</i>) 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 $\frac{1}{16}(\pi \times 15^2)$ oe
	(ii)	0.00442 oe	1FT	FT <i>their (a)(i)</i> $\div 10\,000$
	(iii)	$\pi r^2 = \frac{1}{4}\pi 15^2$ oe $r^2 = 56.25$ or $\sqrt{\frac{176.8 \text{ or } 177}{\pi}}$ oe	M1	for Inner Area/outer area = $\frac{1}{4}$
			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) $+ 2 \times$ <i>their (a)(i)</i> oe or M1 for $8 \times$ (b)(i) oe or $2 \times$ <i>their (a)(i)</i> oe

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12	(a)	$[y =]15 - 3x$ oe	2	B1 for $5x + x + 5x + x + 4y = 60$ oe	
	(b) (i)	$5x^2 = (\textit{their (a)})^2$ Bracket expanded and completion with no errors	M1 A1		
		(ii)	$\frac{90 \pm \sqrt{(90^2 - 4 \times 4 \times 225)}}{2 \times 4}$ 2.86 or 2.864 to 2.865 19.6 or 19.63 to 19.64	M1 B1 B1	or sketch of parabola with 2 positive zeros or $(x - \frac{45}{4})^2$ oe
	(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 $10 \times (\textit{their (b)(iii)})^2$ M1 for $5 \times (\textit{their (b)(iii)})^2 \times 2$ 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)	(i)	30	1	
		(ii)	3.05 or 3.045...	1	
	(c) (i)	(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 <i>their (c)(i)</i>

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<p>14 (a) (i)</p>		<p>4</p>	<p>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</p>
<p>(ii)</p>	<p>$y = 1, x = -1, x = 3$</p>	<p>3</p>	<p>B1 for each</p>
<p>(iii)</p>	<p>(0, 0)</p>	<p>1</p>	
<p>(iv)</p>	<p>(-3, 0.75)</p>	<p>2</p>	<p>B1 for each coord</p>
<p>(b)</p>	<p>$-1.1[0] < x < -1$ or $-1.098... < x < -1$ $3 < x < 4.1[0]$ or $3 < x < 4.098 ...$</p>	<p>3</p>	<p>B2 for either interval or B1 for $-1.1[0]$ or $-1.098...$ and $4.1[0]$ or $4.098 ...$</p>