

CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0581 MATHEMATICS

0581/43

Paper 4 (Extended), maximum raw mark 130

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.

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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.

			Syllabus p r
P	age 2	Mark Scheme	
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Abbre cao	viations correct answer	only	ambridge
dep	dependent		38
FŤ	follow through	after error	e.c.
isw	ignore subsequ		TOM

oe

SC

or equivalent Special Case not from wrong working seen or implied nfww

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Qu		Answers	Mark	Part Marks
1	(a)	62100[.00] Final answer	2	B1 for 62074[. 35] or 62070
	(b)	39300	3	M2 for 45981÷ 1.17 oe or M1 for 45981 associated with 117 [%]
	(c)	20436	2	M1 for 45 981÷ (3+4+2) or 45 981 × 4
	(d)	4	3	M2 for $\frac{1.5 \times 1000}{330}$ oe
				or M1 for figs 4545 or 455
	(e)	25545	2	M1 for $45981 \times \frac{5}{9}$
2	(a)	$10 < x \le 25 25 < x \le 30$ $30 < x \le 35 35 < x \le 50$ $50 < x \le 60$	2	5 correct B1 for 3 or 4 correct or SC1 for all correct but in the form 10 to 25 or 10 – 25
		13 33 19 [4] 15 6	3	B2 for 4 correct or B1 for 3 correct
	(b)	25.1[0] or 25.13 to 25.14 nfww	4	M1 for mid-values soi, condone one error or omission 5 17.5 27.5 32.5 42.5 55 soi and M1 for $\sum fx$ for any x in intervals including boundaries, but all fs must be integers, condone one further error or omission
				and M1 dep for $\sum fx \div 90$
				Dep on 2nd M mark earned

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Qu			Answers	Mark	Part Marks
3	(a)	(i)	72[.0] or 71.98 to 71.99 nfww	3	Part Marks M2 for [sin P =] $\frac{97}{\frac{1}{2} \times 12 \times 17}$ oe or M1 for implicit version
		(ii)	16.2 or 16.18 to 16.19 nfww	4	M2 for $6^2 + 17^2 - 2 \times 6 \times 17 \times \cos(\text{their } 72)$ or M1 for implicit form
					and A1 for [<i>XR</i> ² =] 261.8 to 262
	(b)		7.61 or 7.612 nfww	4	M3 for $[a =]$ 9.4 × sin 37 ÷ cos 42 oe or $[a =]$ 9.4sin37/sin(90–42)
					or M2 for [a =] their height $\div \cos 42$ oe or $\frac{a}{\sin 37} = \frac{9.4}{\sin(90 - 42)}$ oe
					or M1 for their height $\div a = \cos 42$ or for [their height =] 9.4 × sin 37 oe
					or B1 for 48° correctly used or seen in correct position on diagram
	(c)		50	1	
			130	1	
4	(a)		0, 4.5, 3.11[1]	3	B1, B1, B1
	(b)		Complete correct curve with	5	B3 FT for 9 points correctly plotted
			minimum below $y = 2$		B2 FT for 7 or 8 points correctly plotted
					or B1 FT 5 or 6 points correctly plotted
					and B1 indep two separate branches not touching or cutting <i>y</i> -axis
	(c)		- 0.5 to - 0.6 0.6 to 0.7 2.8 to 2.9	1 1 1	if 0 SC1 for $y = 3$ indicated
	(d)		Correct line or no line and -0.7 to -0.6 nfww	3	Must check line - not if wrong line B2 for $y = 1 - x$ ruled correctly
					or SC1 for ruled line with either gradient -1 or <i>y</i> -intercept 1 but not line $y = 1$ or correct freehand line

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)u			Answers	Mark	Part Marks	
	(e)		tangent ruled at $x = 2$ and 0.62 to 0.8	3	Syllabus r 0581 0581 Part Marks 0581 Accept integer/integer provided in rangel for correct tangent drawn and M1 for change in y / change in x dep on any tangent or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent	
	(f)		$\frac{1}{x^2} = -x$ or $1 + x^3 = 0$	M1		
			$\frac{1}{x^2} = -x \text{ or } 1 + x^3 = 0$ 1 = -x ³ or x ³ = -1	M1	dep M1	
			$x = \sqrt[3]{-1}$	A1	dep M2	
;	(a)	(i)	$\begin{pmatrix} 2\\4 \end{pmatrix}$	1		
		(ii)	5.83 to 5.831	2	M1 for $3^2 + 5^2$ seen	
	(b)	(i)	$-2\mathbf{p}+\mathbf{q}$ oe	1	accept unsimplified	
		(ii)	$\overrightarrow{PS} = -\mathbf{p} + 2\mathbf{q} \text{ or } \overrightarrow{SP} = \mathbf{p} - 2\mathbf{q}$	B1		
			$\overline{MS} = -\frac{2}{3}\mathbf{p} + \frac{4}{3}\mathbf{q} \text{ seen}$ or $\overline{SM} = \frac{2}{3}\mathbf{p} - \frac{4}{3}\mathbf{q} \text{ seen}$	B1		
			or $\overrightarrow{RM} = \frac{2}{3} (-2\mathbf{p} + \mathbf{q})$ soi or $\overrightarrow{MR} = \frac{2}{3} (2\mathbf{p} - \mathbf{q})$ soi			
			or $\overline{MQ} = \frac{1}{3}(-2\mathbf{p} + \mathbf{q})$ soi or $\overline{QM} = \frac{1}{3}(2\mathbf{p} - \mathbf{q})$ soi			
			$\overrightarrow{PM} = \mathbf{p} + \overrightarrow{RM}$ or $\mathbf{p} - \overrightarrow{MR}$	M1	Any correct route for \overrightarrow{PM} eg $\overrightarrow{PR} + \overrightarrow{RM}$	
			or $-\mathbf{p} + \mathbf{q} + \overline{QM}$			
			$\operatorname{or} - \mathbf{p} + \mathbf{q} - \overline{MQ}$			
			$\left[=-\frac{1}{3}\mathbf{p}+\frac{2}{3}\mathbf{q}\right]$			
			1 : 3 nfww	A1	After 0 scored, SC1 for 1 : 3	

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Qu			Answers	Mark	Part Marks	
6	(a)	(i)	$\frac{1}{6}$	1	Syllabus 0581 Part Marks	
		(ii)	$\frac{4}{6}$ oe	1		
		(iii)	$\frac{2}{6}$ oe	1		
	(b)		$\frac{16}{36}$ oe	3	M2 $\frac{2}{6} \times \frac{4}{6} + \frac{4}{6} \times \frac{2}{6}$ only oe	
					or M1 for one of $\frac{2}{6} \times \frac{4}{6}$ or $\frac{4}{6} \times \frac{2}{6}$ soi by $\frac{2}{9}$	
	(c)		$\frac{48}{360}$ oe	3	M2 for $\frac{4}{6} \times \frac{3}{5} \times \frac{2}{4} \times \frac{2}{3}$ only oe	
					or M1 for denominators 6, 5, 4, 3 soi in product of four fractions	
7	(a)	(i)	148	1		
		(ii)	122	2	B1 for 58 seen at <i>A</i> or 32 seen at <i>Y</i>	
		(iii)	148	1		
		(iv)	106 nfww	3	B1 for [sum of interior angles =] 720	
					and M1 for $\frac{1}{2}$ {(<i>their</i> 720) – (<i>p</i> + <i>q</i> + <i>t</i> +90)}	
	(b)	(i)	63	2	B1 for angle $RPS = 27$ or 90 at <i>P</i> or at <i>S</i> seen or stated	
		(ii)	54	2	B1 for <i>their x</i> or 63 or letter <i>x</i> at <i>Q</i> seen or state	

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Qu		Answers	Mark	Part Marks
8	(a) (i)	$7 \times 2 + (2x - 3)(x + 4) = 2(x + 4)$	M1	Allow if bracket[s] omitted but recover
		$2x^2 + 8x - 3x - 12$ or better seen	B1	Part Marks Allow if bracket[s] omitted but recover
		$2x^2 + 3x - 6 = 0$	A1	with no errors seen and brackets correctly expanded on both sides and no omission of brackets
	(ii)	$\sqrt{(3)^2 - 4(2(-6))}$ or better p = -3 and $r = 2(2)$	B1	or $\left(x+\frac{3}{4}\right)^2$
			B1	Must see $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ or both
				Or $-\frac{3}{4}$ + or $-\sqrt{\frac{57}{16}}$
		1.14 and – 2.64 cao	B1B1	SC1 for 1.1 and -2.6 final answer or 1.137 and -2.637 final answer or 1.14 and -2.64 seen in working or for -1.14 and 2.64 as final ans
	(b)	$\pi \times x^2 + \pi \times x \times 3x$	M2	or M1 for $\pi \times x \times 3x$
		$4[\pi]x^2 = [\pi]r^2$	M1	Dep on M2
		2x = r	A1	with no errors seen
9	(a)	4 - 6x final answer	1	
	(b)	9x - 8 final answer	2	M1 for $4 - 3(4 - 3x)$ seen
	(c)	$\frac{1}{27}$ final answer	3	M2 for 3^{-3} soi by final answer 0.037037 to 3sf or better or M1 for $[g(-1) =]$ 3 soi
	(d)	$\frac{4-x}{3}$ of final answer	2	M1 for a correct first step $3x = 4 - y$ oe or $x = 4 - 3y$ or $\frac{y}{3} = \frac{4}{3} - x$
	(e)	$\frac{4}{3}$ or $1\frac{1}{3}$ or 1.33 or better	3	M2 for $3x - 4 = 0$ or better
				or M1 for $3^{-(4-3x)}$

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Qu		Answers	Mark	Part Marks
10	(a)	[<i>r</i> =] 2.30[9]	3	Part Marks Canning B2 for [r =] 2.31 000000000000000000000000000000000000
				or M2 for 4 tan 30
				or M1 for $\frac{r}{4} = \tan 30$
	(b)	333 or 332.5 to 332.6	4	M3 for $0.5 \times 8 \times 8 \times \sin 60 \times 12$ oe or M2 for $0.5 \times 8 \times 8 \times \sin 60$ oe or M1 for <i>their</i> triangle area $\times 12$ shown
				dep on $(\frac{1}{2})$ used within <i>their</i> area of triangle method
	(c) (i)	30	3	M2 for 12 ÷ 0.4 or 120 ÷ 4 or SC1 for figs 3
	(ii)	6.65 or 6.647 to 6.648[]	2	M1 for $\pi \times 2.3^2 \times 0.4$
				or SC1 for $\pi \times 2.3^2 \times 4$ soi by 66.5 or 66.47 to 66.48[]
	(iii)	40[.0] or 40.1 or 40.0 to 40.2 nfww	3	M2 for $100 - \frac{their(c)(i) \times their(c)(ii)}{their(b)} \times 100$
				or $\frac{their(b) - their(c)(i) \times their(c)(ii)}{their(b)} \times 100$
				or M1 for $\frac{their(c)(i) \times their(c)(ii)}{their(b)} \times 100$
				or $\frac{their(b) - their(c)(i) \times their(c)(ii)}{their(b)}$
11	(a)	$\frac{1}{8} \frac{1}{16} \frac{1}{32}$	2	B1 for 2 correct
		$\frac{1}{2^{n-1}}$ oe	2	SC1 for $\frac{1}{2^n}$ oe
		$2^{-3} 2^{-4} 2^{-5}$	1	
		2^{1-n} or $2^{-(n-1)}$	1	
	(b) (i)	64 256 1024	1	
		$2^{6} 2^{8} 2^{10}$	1	
	(ii)	$2^{2(n-1)}$ or 2^{2n-2}	1	
	(c)	16384	2	B1 for <i>n</i> = 8