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.

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.

BBCAMRRIDGE

www.PapaCambridge.com

D	age 2	Mark Scheme	Syllabus
F	aye z		
		IGCSE – May/June 2014	0581
			5
Abbrev	viations		andridge
ao	correct answer	only	Of.
lep	dependent		92
T	follow through	after error	100
SW	ignore subsequ	ent working	- Ox
e	or equivalent		
SC	Special Case		
£	not from riman	a recombring	

Abbreviations

correct answer only cao

dependent dep

not from wrong working nfww

seen or implied soi

Qu		Answers	Mark	Part Marks
1	(a)	62100[.00] Final answer	2	B1 for 62 074[. 35] or 62 070
	(b)	39300	3	M2 for 45 981÷ 1.17 oe or M1 for 45 981 associated with 117 [%]
	(c)	20436	2	M1 for $45981 \div (3+4+2)$ or 45981×4
	(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 f s must be integers, condone one further error or omission
				and M1 dep for $\sum fx \div 90$
				Dep on 2nd M mark earned

			~	
Page 3	Mark Scheme	Syllabus	.0	1
	IGCSE – May/June 2014	0581	100	-

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 $6^2 + 17^2 - 2 \times 6 \times 17 \times \cos(their 72)$ or M1 for implicit form
					and A1 for $[XR^2 =] 261.8$ to 262
	(b)		7.61 or 7.612 nfww	4	M3 for $[a =] 9.4 \times \sin 37 \div \cos 42$ oe or $[a =] 9.4 \sin 37/\sin(90-42)$
					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 =] $9.4 \times \sin 37$ 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
			4 3		or B1 FT 5 or 6 points correctly plotted
			1- 2- 4- 2-		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

Page 4	Mark Scheme	Syllabus	· 10
	IGCSE – May/June 2014	0581	123

Qu			Answers	Mark	Part Marks
	(e)		tangent ruled at $x = 2$ and 0.62 to 0.8	3	Part Marks Accept integer/integer provided in rang B1 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)		$\frac{1}{x^2} = -x \text{ or } 1 + x^3 = 0$	M1	
			$1 = -x^3$ or $x^3 = -1$	M1	dep M1
			$x = \sqrt[3]{-1}$	A1	dep M2
5	(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	
			$\overline{MS} = -\frac{2}{3}\mathbf{p} + \frac{4}{3}\mathbf{q}$ seen	B1	
			or $\overrightarrow{SM} = \frac{2}{3} \mathbf{p} - \frac{4}{3} \mathbf{q}$ seen		
			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		
			$\overrightarrow{PM} = \mathbf{p} + \overrightarrow{RM}$	M1	Any correct route for \overrightarrow{PM} eg $\overrightarrow{PR} + \overrightarrow{RM}$
			or $\mathbf{p} - \overline{MR}$		
			$or - \mathbf{p} + \mathbf{q} + QM$ $or - \mathbf{p} + \mathbf{q} - \overline{MQ}$		
			$\left[= -\frac{1}{3} \mathbf{p} + \frac{2}{3} \mathbf{q} \right]$		
			1 : 3 nfww	A1	After 0 scored, SC1 for 1:3

Dogo E	Mark Cahama	Cyllohuo	· O
Page 5	Mark Scheme	Syllabus	0.
	IGCSE – May/June 2014	0581	25-

Qu			Answers	Mark	Part Marks
6	(a)	(i)	$\frac{1}{6}$	1	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
	(c)		$\frac{48}{360}$ oe	3	or M1 for one of $\frac{2}{6} \times \frac{4}{6}$ or $\frac{4}{6} \times \frac{2}{6}$ soi by $\frac{2}{9}$ 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 $\frac{1}{2} \{ (their 720) - (p+q+t+90) \}$
	(b)	(i)	63	2	B1 for angle $RPS = 27$ or 90 at P or at S 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

Page 6	Mark Scheme	Syllabus	2
	IGCSE – May/June 2014	0581	Sp.

Qu		Answers	Mark	Part Marks Allow if bracket[s] omitted but recover
	() ()			All ich laft in the
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	
		$2x^2 + 3x - 6 = 0$	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 $-\frac{3}{4} + \text{or} - \sqrt{\frac{57}{16}}$
		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)	$\frac{4-x}{3}$ oe final answer	2	M1 for a correct first step $3x = 4 - y \text{ oe or } x = 4 - 3y \text{ or } \frac{y}{3} = \frac{4}{3} - x$
	(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 $3^{-(4-3x)}$

Page 7	Mark Scheme	Syllabus	3
	IGCSE – May/June 2014	0581	123

Qu		Answers	Mark	Part Marks
10	(a)	[r=] 2.30[9]	3	Part Marks B2 for [r =] 2.31 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 $n = 8$