CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0580 MATHEMATICS

0580/42 Paper 4 (Extended), maximum raw mark 130

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Abbreviations
cao correct answer only
cso correct solution only
dep dependent
ft follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
www without wrong working
art anything rounding to
soi seen or implied

Qu	Answers	Mark	Part Marks
1 (a) (i)	$\frac{6}{5+6+3}\times 560$ [= 240]	**2**	Accept 'of' used instead of × **M1** for 560 ÷ (5 + 6 + 3)
(ii)	120	**1**	
(b)	90	**2**	**M1** for $\frac{3}{8}\times 240$ oe
(c) (i)	96120 final answer	**2**	**M1** for *their*(*a*)(ii) × 75 + (560 – *their* (*a*)(ii)) × 198 oe
(ii)	187.5[0] final answer	**3**	**M2** for $\frac{198}{1+0.056}$ oe or **M1** for (100 + 5.6)[%] = 198 oe seen
(d)	184[.2....]	**3**	**M2** for $\frac{36\times 0.75-9.5}{9.5}\times 100$ oe **or M1** for $\frac{36\times 0.75}{9.5}\times 100$ or $36\times 0.75-9.5$ [17.5] used implied by answer 84.2 or **SC1** for final answer 284[.2..]
(e)	69.4 and 69[.0] cao	**3**	**SC2** for one correct or both correct but reversed **M1** for two of 10.85, 10.95, 23.65 or 23.75 seen or 2(23.7 + 10.9) + 4(0.05) or 2(23.7 + 10.9) – 4(0.05)

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2	**(a) (i)**	Translation, $\begin{pmatrix}-5\\8\end{pmatrix}$ oe	**1,1**	Brackets needed for vector Not (–5, 8), (–5 8)
	(ii)	correct trapezium at (2, 2) (4 , 3) (4 , 5) (2, 5)	**2**	**SC1** for reflection in $x = -1$ or vertices only
	(iii)	correct trapezium at (4, 2) (5, 4) (7, 4) (7, 2)	**3**	**M2** for 4 correct vertices on grid or in working or **M1** for $\begin{pmatrix}0 & -1\\1 & 0\end{pmatrix}\begin{pmatrix}2 & 2 & 4 & 4\\-4 & -7 & -7 & -5\end{pmatrix}$ **or SC1** for 3 vertices correct **or** complete shape in correct orientation but wrong position
	(b) (i)	Shear	**1**	
		x –axis (oe) invariant	**1**	
		2	**1**	
	(ii)	rectangle at (–3, 2) (1, 2) (1, 8) (–3, 8)	**2**	**SC1** for all vertices only **or** correct orientation and size, wrong position
3	**(a)**	0, 2, 0, – 3	**3**	**B2** for 3 correct or **B1** for 2 correct
	(b)	Correct curve	**B4**	**B3FT** for 8 points **B2FT** for 7 or 6 points **B1FT** for 5 or 4 points
	(c)	$y = -1$ indicated	**B1**	e.g. Could be mark[s] on curve isw other lines if not clearly used
		x = 1.3 to 1.4 and 4.1 to 4.2	**B1**	
	(d) (i)	line drawn from (0, 2) to touch curve	**M1**	No daylight at point of contact If short, must cross at (0, 2) within ½ small square when extended
		(2.5 to 2.75, 3 to 3.4)	**A1**	
	(ii)	rise/run e.g. (their y – 2)/their x	**M1**	dep on attempt at a tangent from (0, 2) in (d)(i) and uses scales correctly Can be implied from answer– check on tangent for their rise for a run of 1 (½ small square)
		0.4 to 0.48	**A1**	**ww2** dep on attempt at a tangent from (0, 2) in (d)(i)

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4	**(a)**	227 or 226.95 to 227.01	**2**	**M1** for $\pi \times 8.5^2$
	(b)	5.35	**1**	
	(c)	39.0[0] to 39.0[1]	**2**	**M1** for sin [*MOB*]= $\frac{their\ b}{8.5}$ oe Dep on their $b < 8.5$
	(d)	30.2 or 30.3 or 30.24 to 30.27	**3**	**M2** for $\frac{360-4\times39}{360}\times2\times\pi\times8.5$ oe or **M1** for $\frac{a}{360}\times2\times\pi\times8.5$ oe where $0 < a < 360$ Implied by 5.78 to 5.79 or 11.5 to 11.6 or 23.14 to 23.15 or 23.1 or 23.2 or 41.83 to 41.84 or 41.8
	(e)	*AB* = *BC* *TA* = *TC* *TB* = *TB*	**1** **1** **1**	isw comments or reasons If **0** scored **SC1** for "all <u>three sides</u> the same" oe [SSS] and no mention of angles
5	**(a)**	$\frac{27}{x}$ final answer	**1**	
	(b)	$\frac{25}{x-2}$ final answer	**1**	
	(c)	$\frac{25}{x-2}-4=\frac{27}{x}$ oe	**M1**	**FT** *their* (b) – 4 = *their* (a) oe must be eqn in *x*
		$25x-4x(x-2)=27(x-2)$ oe	**M1**	**FT** $\frac{25}{x-2}+4=\frac{27}{x}$ oe **<u>only</u>** for 2nd and 3rd M mark If all on one side then condone omission of '= 0'
		$4x^2+27x-25x-8x-54[=0]$ oe	**M1dep**	Dep on 2nd M1 Must see brackets expanded before this award and terms on one side of eqn
		$2x^2-3x-27=0$ without error seen	**A1**	Must see $4x^2-6x-54=0$ first
	(d)	– 3, 4.5	**3**	**B2** for $(2x-9)(x+3)$ **or SC1** for $(2x+a)(x+b)$ where *a* and *b* are integers and $a + 2b = -3$ or $ab = -27$
	(e)	6 cao	**1**	

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6	**(a) (i)**	$\frac{12^2+21^2-15^2}{2\times12\times21}$ 44.41 to 44.42	**M2** **A2**	**M1** for $15^2 = 12^2 + 21^2 - 2.12.21\cos M$ **A1** for [cos =] 0.714 or 0.7142 to 0.7143 or $\frac{360}{504}$ oe
	(ii)	88.2 or 88.15 to 88.19	**2**	**M1** for $0.5 \times 12 \times 21 \times \sin(44.4)$ oe
	(b)	7.74 or 7.736 to 7.737…. www	**4**	**B1** for 55 soi **M2** $\frac{6.4}{\sin(their\ R)}\times\sin 82$ oe **or M1** for $\frac{6.4}{\sin(their R)}=\frac{PR}{\sin 82}$ oe
7	**(a) (i)**	$\begin{pmatrix}15\\21\end{pmatrix}$	**1**	
	(ii)	not possible oe	**1**	
	(iii)	(2) final answer	**2**	**M1** for 30 – 28
	(iv)	$\begin{pmatrix}4 & 13\\0 & 0\end{pmatrix}$	**1**	
	(v)	$\begin{pmatrix}-5 & -9\\1 & 0\end{pmatrix}$	**2**	**B1** for one correct row or column
	(b)	$\frac{1}{2}\begin{pmatrix}3 & -4\\-1 & 2\end{pmatrix}$ or better isw	**2**	**B1** for $k\begin{pmatrix}3 & -4\\-1 & 2\end{pmatrix}$ seen or implied or $\frac{1}{2}\begin{pmatrix}a & b\\c & d\end{pmatrix}$ seen
8	**(a)**	hat $\frac{5}{8}, \frac{3}{8}$ scarf $\frac{2}{3}\ \ \frac{1}{3}$ $\frac{1}{6}\ \ \frac{5}{6}$	**1** **1** **1**	1 mark per pair in correct place
	(b) (i)	$\frac{15}{48}$ oe $\left[\frac{5}{16}\right]$	**2FT**	**FT** *their* $\frac{3}{8}\times\frac{5}{6}$ correctly evaluated **M1** $\frac{3}{8}\times\frac{5}{6}$ FT from *their* tree
	(ii)	$\frac{5}{24}$	**2FT**	**FT** *their* $\frac{5}{8}\times\frac{1}{3}$ correctly evaluated **M1** $\frac{5}{8}\times\frac{1}{3}$ FT from *their* tree

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(iii)	$\frac{13}{48}$ cao	**2**	**M1** for *their* $\frac{3}{8}\times\frac{1}{6}$ + *their* (b)(ii) soi
(c)	$\frac{170}{240}$ or $\frac{85}{120}$ *or* $\frac{34}{48}$ *or* $\frac{17}{24}$ cao	**3**	**M2** for $1-\frac{5}{8}\times\frac{2}{3}\times\frac{7}{10}$ FT *their* tree or $\frac{3}{8}+\frac{5}{8}\times\frac{1}{3}+\frac{5}{8}\times\frac{2}{3}\times\frac{3}{10}$ oe **or M1** for ["wears all" =] $\frac{5}{8}\times\frac{2}{3}\times\frac{7}{10}$ FT *their* tree seen
9 (a)	371 or 371.1...	**4**	**M3** for $(6\times4\times12)+(2\times6\times0.5\times4\times4\times\sin60)$ oe **or M2** for area of 1 or 2 hexagons **or M1** for area of one relevant triangle or trapezium or rectangle within hexagon If **0** scored **SC1** for 288 shown
(b) (i)	1740 or 1743.6 to 1744.2	**4**	**M3** for $\frac{12000}{4}\div(\pi\times0.74^2)$ oe or **SC2** for figs 174[3..] or 174[4..] or **B1** for $\pi\times0.74^2$ seen [1.72..] or **B1** for 12000 / 4 soi by 3000
(ii)	87 cao www 5	**5**	**B4** for 87.39 to 87.43 or **M3** for [r=] $\sqrt{\frac{figs\,12}{\pi\times figs\,5}}$ oe or **M2** for [r^2 =] = $\frac{figs\,12}{\pi\ figs\,5}$ oe or **M1** for figs$12=\pi r^2\times figs5$
10 (a) (i)	final answer $\frac{25-8x}{20}$	**2**	**M1** for $\frac{5\times5-4\times2x}{5\times4}$ or better seen
(ii)	final answer $\frac{2x^2+5x+9}{3(x+3)}$	**3**	**B1** for $2x^2+6x-x-3$ soi **and B1** for denom $3(x+3)$ or $3x+9$ seen
(b)	$x = \frac{2}{3}$ oe or 0.667 or 0.6666 to 0.6667 $y = -3$	**3**	**M1** for correct method to eliminate one variable **A1** for $x = \frac{2}{3}$ oe or 0.667 or 0.6666 to 0.6667 or $y = -3$

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(c)	final answer $\frac{7}{2x+3}$ www	**4**	**B1** for $7(x+3)$ in numerator and **B2** for $(2x+3)(x+3)$ in denominator or **SC1** for $(2x+a)(x+b)$ where a and b are integers and $a + 2b = 9$ or $ab = 9$ After **B1** scored, **SC1** for final answer $\frac{7}{2(x+1.5)}$ *or* $\frac{3.5}{x+1.5}$
11 (a)	$3^2 + 1^2$	**1**	Ignore attempt to evaluate $\sqrt{10}$
(b) (i)	$\frac{\sqrt{10}}{3}$ final answer	**1**	
(ii)	$\frac{10}{3}$ final answer	**2**	**M1** for *their* $\frac{\sqrt{10}}{3} \times \sqrt{10}$ or *their* $\left(\frac{\sqrt{10}}{3}\right)^2 + \left(\sqrt{10}\right)^2$ implied by 3.33 seen
(c)	$\frac{100}{27}$ or $3\frac{19}{27}$ isw conversion or 3.7[03] to 3.7[04]	**2**	**M1** for $3 \times \left(\frac{\sqrt{10}}{3}\right)^n$ oe where n is 3 or 4 or for $[OP_4 =] \sqrt{\frac{1000}{81}}$ or for their (b)(ii) $\times \left(\frac{\sqrt{10}}{3}\right)^n$ where n is 1 or 2
(d) (i)	18.43...	**2**	**M1** for $\tan [P_1OP_2] = \frac{1}{3}$ oe
(ii)	18.4[3…]	**1**	
(iii)	20	**3**	**SC2** for 19 **or M1** for $\frac{360}{18.4[3...]}$

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