CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0580 MATHEMATICS

0580/43   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

1	(a)		2814 final answer	2	**M1** for 2345 ÷ 5 soi by 469 or ans = 2810
	(b)		257.95 final answer	2	**M1** for 2345 × 0.11 oe or ans = 258
	(c)	(i)	280.5[0] final answer	2	**M1** for 330 × (1 – 0.15) oe or ans = 281
		(ii)	375	3	**M2** for 330 ÷ (1 – 0.12) oe Or **M1** for 330 = (100 – 12)% oe
	(d)		1605.89 or 1605.9[0]	3	**M2** for 1500 × (1 + 0.023)^3 oe soi by 1605.898751 or 1500 × 1.07(05…) Or **M1** for 1500 × (1 + 0.023)^2 oe
	(e)		23.1 or 23.07 to 23.08	3	**M2** for $\dfrac{325 - 250}{325} \times 100$ oe Or **M1** for $\dfrac{325 - 250}{325}$ soi by 0.2307… 3sf or better or $\dfrac{250}{325} \times 100$ soi by 76.9…

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2	(a)	(i)	Perpendicular bisector of QR ruled with 2 correct sets of arcs centred Q and R	2	**B1** for correct bisector ruled
			Bisector of angle SPQ ruled with correct arcs. (Marks on PS and PQ and correct pair of arcs)	2	**B1** for correct angle bisector ruled
			Compass drawn arc centre R with radius 6 cm (±2 mm)	B2	**B1** for any compass drawn arc centre R not used in any construction with no feathering
			Correct region shaded cao	1dep	Dependent on all **B4** marks for the correct loci
		(ii)	217 to 221	1	
	(b)	(i)	6360 or 6361 to 6363	2	**M1** for $\pi \times 45^2$
		(ii)	165 or 164.9 to 165	2	**M1** for $\dfrac{210}{360} \times 2\pi \times 45$
3	(a)	(i)	$x \geq 5$	1	−1 once for strict inequalities in (i) to (iii)
		(ii)	$y \geq 11$	1	
		(iii)	$x + y \geq 20$	1	
	(b)		$4x + 8y \leq 160$ **and** divide by 4	1	If there is a final inequality it must be the given one
	(c)	(i)	$x = 5$ ruled	1	Must be on correct grid line
			$y = 11$ ruled	1	Must be on correct grid line
			$x + y = 20$ ruled	2	**B1** for one axis intercept correct when extended if necessary but not parallel to an axis
			$x + 2y = 40$ ruled	2	**B1** for one axis intercept correct when extended if necessary but not parallel to an axis
			Correct shading of **unwanted** region	1dep	Dependent on 6 marks earned for the boundaries
		(ii)	29	2	**M1** for $x + y$ evaluated where (x, y) is a point in their **quadrilateral and** x and y are integers

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4	(a)	3080	2	**M1** for ½ × 7 × 22 × 40
	(b)	46.2 or 46.18 to 46.2 www	4	**M3** for $\sqrt{7^2 + 22^2 + 40^2}$ **or M2** for $7^2 + 22^2 + 40^2$ soi by 2133 **or M1** for correct Pythagoras on one face
	(c)	8.7 or 8.7 to 8.72 www	3	**M2** for $\sin^{-1}\dfrac{7}{\textit{their(b)}}$ oe **or M1** for $\sin = \dfrac{7}{\textit{their(b)}}$ oe
	(d)	217	3	**M1** for $\dfrac{4}{3} \times \pi \times 1.5^3$ soi by 14.1 to 14.14 **and M1 dep** for *their* (a) ÷ *their* 14.14 soi by 218. Dependent on **M1** earned
	(e) (i)	25.13875 final answer	2	**B1** for 4.55 **and** 11.05 seen or 25.13875 seen and then spoiled
	(ii)	25.14	1FT	**Strict FT** *their* (e)(i) correct to 4s.f. if rounding is possible
5	(a)	–5.04, 1.75, 0	3	**B1** for each correct value
	(b)	Fully correct curve	5	**B3FT** for 10 correct plots from *their* (a) **B2FT** for 8 or 9 correct plots **or B1FT** for 6 or 7 correct plots **and SC1** for two branches not joined
	(c)	–1.6 to – 1.5 –0.4 to –0.3 1.8 to 1.9	1 1 1	
	(d)	–2.6 to –2.5 www –0.4 to –0.3 1	1 1 1	 After **0** scored, **M1** for $y = 2x – 2$ drawn
	(e)	3.25 to 4.25 with correct tangent	3	**B1** for correct tangent **B2** for answer in range dep on close attempt at tangent **M1dep** for $[-]\dfrac{\text{rise}}{\text{run}}$ used with values soi from tangent, dep on correct or close attempt at tangent

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6	(a)	$\frac{3}{10}$ correctly placed	1	Accept 0.3
		$\frac{6}{9}$ and $\frac{3}{9}$ correctly placed	1	Accept 0.667 or better and 0.333 or better
		$\frac{7}{9}$ and $\frac{2}{9}$ correctly placed	1	Accept 0.778 or better and 0.222 or better
	(b)	$\frac{42}{90}$ or $\frac{21}{45}$ or $\frac{14}{30}$ or $\frac{7}{15}$	3	**M2** for $\frac{7}{10} \times \frac{3}{9} + \frac{3}{10} \times \frac{7}{9}$ soi by 0.467 or better **or M1** for $\frac{7}{10} \times \frac{3}{9}$ **or** $\frac{3}{10} \times \frac{7}{9}$ soi by 0.233 or better
7	(a) (i)	Triangle at (1, 3) (1, 9) (3, 3)	2	**SC1** for correct vertices not joined or triangle(1, 1) (3, 1) (1, 7)
	(ii)	$\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$	2	**SC1** for $\begin{pmatrix} 1 & 0 \\ 0 & k \end{pmatrix}$, $k \neq \pm 1$ or 0 or $\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$
	(b) (i)	Shear x-axis oe invariant [factor] 2	1 1 1	
	(ii)	$\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$	2FT	**FT** from *their* 2 in (b)(i) **SC1** for $\begin{pmatrix} 1 & k \\ 0 & 1 \end{pmatrix}$, $k \neq 0$ or $\begin{pmatrix} 1 & 0 \\ 2FT & 1 \end{pmatrix}$
8	(a) (i)	27	1	
	(ii)	54	1	
	(iii)	153	1	
	(b) (i)	59.6 or 59.57… www	4	**M2** for $45^2 + 32^2 - 2 \times 45 \times 32 \times \cos100$ **or M1** for implicit cos rule **and A1** for 3549….
	(ii)	22.[0] or 21.99… www	3	**M2** for $324 \div (\frac{1}{2} \times 32 \times \sin67)$ **or M1** for [324 =] $\frac{1}{2} \times 32 \times x \times \sin67$
	(iii)	81[.0]	2	**B1** for 2^2 or $(\frac{1}{2})^2$ oe seen or $\frac{1}{2} \times 16 \times \frac{1}{2}$ *their*(b)(ii) $\times \sin67$

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9	(a)	(i)	14	1	
		(ii)	8	1	
		(iii)	30 – *their* (ii)	1FT	
	(b)		$\dfrac{11}{80}$	2	**SC1** for $\dfrac{69}{80}$
	(c)		16, 4	2	**B1** for each correct value
	(d)		18.0625 rot to 3sf or better or 18.1 www	3	**M1** for Σ*mf* for *m* as mid values of 5, 12.5, 22.5, 35 and 45 (= 1445) and **M1 dep** for Σ*mf* ÷ 80, dep on **M1** earned
	(e)		Correct widths with no gaps 2nd block w = 5, fd = 2.4 3rd block w = 15 fd = 1.2 4th block w = 10 and fd = 1.6 5th block w = 10 and fd = 0.4	1 1 1 1FT 1FT	 **Strict FT** from *their* (c) **Strict FT** from *their* (c) After **0** scored for blocks, **SC1** for 4 correct fds soi by correct heights
10	(a)	(i)	4.5 or 4½	3	**M2** for a complete correct method or **M1** for one correct step at any stage.
		(ii)	$(x – 6)(x – 1)$	M2	**M1** for $(x +a)(x +b)$ where $ab = 6$ or $a + b = - 7$
			1, 6	A1FT	**FT** their brackets **dep** on **M1** earned After **M0** scored **SC1** for 1, 6 as answer
		(iii)	6	4	**B1** for $2(3x – 2) + x + 2 = 4×10$ oe and **B1** for correct multiplication of a bracket and **M1** for correct rearrangement of their linear equation without brackets to $ax = b + c + d$ or better
	(b)		$a = 1/3$ oe, $b = 1/2$ oe	6	**B1** for any one of $1 = a + b + 1/6$ oe $5 = 8a + 4b + 2/6$ oe $14 = 27a + 9b + 3/6$ oe $30 = 64a + 16b + 4/6$ oe Or any other correct equation and **B1** for another of the above equations and **M1** for equating one coefficient or correct rearrangement to give a or b as subject and **M1** for subtracting to eliminate a or b or correct substitution for *their a* or their b **A1** for $a = 1/3$ oe or $b = 1/2$ oe