CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0580 MATHEMATICS

0580/23 Paper 2 (Extended), maximum raw mark 70

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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Abbreviations

cao correct answer only

dep dependent

FT follow through after error isw ignore subsequent working

oe or equivalent SC Special Case

nfww not from wrong working

soi seen or implied

Qu.	Part	Answers	Mark	Part Marks
1		- 16	1	
2		84	2	M1 for $\frac{7}{6+8+9+7}$ or $\frac{360}{6+8+9+7}$
3		1030	2	M1 for 1350 ÷ 1.313
4		$5a(3a^2-b)$	2	B1 for $a(15a^2 - 5b)$ or $5(3a^3 - ab)$
5	(a)	0.059161	1	
	(b)	5.9161×10 ⁻²	1FT	ft their part (a)
6		$3x^6y^4$	2	B1 for x^6 or y^4 in a product on answer line
7	(a)	74	1	
	(b)	8.69	1	
8		48	2	M1 for 15^2 or $\left(\frac{1}{15}\right)^2$ or $\frac{1}{15^2}$
				or $\sqrt{10800}$ or $\frac{1}{\sqrt{10800}}$
9		$t < -\frac{6}{7}$	2	M1 for $5t + 2t < 17 - 23$ If zero scored SC1 for $\frac{6}{2}$ with incorrect
		,		If zero scored SC1 for $-\frac{6}{7}$ with incorrect inequality sign or equals sign

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10		$\frac{5}{4} \text{ oe}$ $\frac{5 \times 9}{4 \times 9} \text{ and } \frac{7 \times 4}{9 \times 4} \text{ oe or better}$ $\frac{17}{36} \text{ oe working must be shown}$	B1 M1 FT A1	Do not allow decimals for the B1 , M1 , or A1 e.g. $\frac{45}{36}$ and $\frac{28}{36}$ Follow through <i>their</i> $\frac{5}{4}$ for the M1 mark. Alt method 1: B1 for $\frac{1}{4} + \frac{2}{9}$ M1 for $\frac{1 \times 9}{4 \times 9}$ and $\frac{2 \times 4}{4 \times 9}$ oe e.g. $\frac{9}{36}$ and $\frac{8}{36}$ Alt method 2: B1 for $\frac{1}{4} - \frac{7}{9} + 1$ M1 for oe e.g. $\frac{9}{36}$ and $\frac{8}{36}$ ISW converting fraction answer to a decimal.
11		3.5	3	M1 for $y = k \sqrt[3]{x+3}$ A1 for $k = \frac{1}{2}$ Alternative method: M2 for $\frac{y}{\sqrt[3]{340+3}} = \frac{1}{\sqrt[3]{5+3}}$ oe
12	(a) (b)	$(3x-4)(x+2)$ $1\frac{1}{3}, -2$	2 1FT	M1 for $(3x + a)(x + b)$ where $a + 3b = 2$ or $ab = -8$ if M0 then SC1 for $3\left(x - \frac{4}{3}\right)(x + 2)$ dep on M1
13		y = -0.5x + 11.5 oe	3	B2 for $y = -0.5x + k$ oe or $y = kx + 11.5$, $k \ne 0$ oe or $-0.5x + 11.5$ oe or B1 for gradient = -0.5 oe and B1 for y-intercept = 11.5 oe If zero scored then, SC1 for $9 = their \ m \times 5 + c$ or $13 = their \ m \times -3 + c$

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14		8.23 or 8.234 to 8.235	3	M2 for $[PR=]$ $\frac{12.5 \times \sin 37}{\sin 66}$ or M1 for $\frac{PR}{\sin 37} = \frac{12.5}{\sin 66}$ oe
15		427.8	3	M2 for $2 \times (127.35 + 86.55)$ or
		427.4		$2 \times (127.35 + 86.45)$
				or B1 for two of these figures: 127.35, 86.55, 127.25, 86.45 seen
				If zero scored, SC2 for upper bound 427.8 or lower bound 427.4 provided nfww
16		65.4 or 65.37 to 65.4	4	M3 for $\cos = \frac{5}{12}$ or $\frac{\sqrt{3^2 + 4^2}}{12}$ oe
				or M1 for $\sqrt{3^2 + 4^2}$ and M1 for clearly identifying angle <i>GAC</i>
17	(a)	9 1 2 3 8 10	2	B1 for 2 of the 4 regions correct
	(b)	7 8 10	1FT	
	(c)	1	1FT	
18	(a)	$ \begin{pmatrix} 33 & 16 \\ 32 & 17 \end{pmatrix} $	2	B1 for one column or row correct
	(b)	$\begin{bmatrix} \frac{1}{7} \begin{pmatrix} 3 & -2 \\ -4 & 5 \end{pmatrix} \text{ oe }$	2	B1 for $\frac{1}{7} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ seen or $k \begin{pmatrix} 3 & -2 \\ -4 & 5 \end{pmatrix}$ seen
19		3x + 4y = 10.8 $5x + 2y = 14.50$	1 1	
		2.6[0] 0.75	3	M1 FT for correctly eliminating one variable Al for 2.6 A1 for 0.75 If M0 then or SC1 for correct substitution and correct evaluation to find the other value

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20	(a)	34	1	
	(b)	16	2	B1 for 24 or 40 seen
	(c)	30	1	
	(d)	120	1	
	(u)	120	1	
21		62.3 or 62.26 to 62.272	5	M1 for $\frac{2}{3} \times 2\pi \times 6$
				and M2 for $(\frac{2}{3} + \frac{1}{3}) \times 2\pi \times 4$ oe
				or M1 for $\frac{2}{3} \times 2\pi \times 4$ or $\frac{1}{3} \times 2\pi \times 4$
				and M1 for $2 \times (2 + 4) + k\pi, k \neq 0$
22	(a)	Triangle at (2,-1) (2,1) (1,-2)	2	B1 for translation by $\begin{pmatrix} k \\ -4 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ k \end{pmatrix}$
	(b)	Rotation [centre] (1,0) 180° or half turn	1 1 1	OR enlargement [centre] (1,0) [scale factor] -1
	(c)	Triangle at (2,3) (4,2) (2,5)	3	B2 for 2 correct vertices plotted
				or If no/wrong plots allow SC2 for 3 correct coordinates shown in working or SC1 for any 2 correct coordinates shown or a triangle of the correct size and orientation but wrong position
				or M1 for $\begin{pmatrix} -2 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -1 & -1 & -2 \\ 3 & 5 & 2 \end{pmatrix}$ oe shown