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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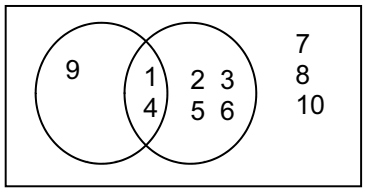
Abbreviations

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)	$5.9161... \times 10^{-2}$	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 $-\frac{6}{7}$ with incorrect inequality sign or equals sign

10		$\frac{5}{4}$ oe $\frac{5\times 9}{4\times 9}$ and $\frac{7\times 4}{9\times 4}$ oe or better $\frac{17}{36}$ **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 *their* $\frac{5}{4}$ 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 $y=kx+11.5$, $k\neq 0$ 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 $9 = \textit{their } m\times 5+c$ or $13 = \textit{their } m\times -3+c$

14		8.23 or 8.234 to 8.235	**3**	**M2** for $[PR=]\ \dfrac{12.5\times\sin 37}{\sin 66}$ or **M1** for $\dfrac{PR}{\sin 37}=\dfrac{12.5}{\sin 66}$ oe
15		427.8 427.4	**3**	**M2** for $2\times(127.35+86.55)$ or $2\times(127.35+86.45)$ 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 $\cos=\dfrac{5}{12}$ or $\dfrac{\sqrt{3^2+4^2}}{12}$ oe or **M1** for $\sqrt{3^2+4^2}$ and **M1** for clearly identifying angle *GAC*
17	**(a)**		**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)	$\frac{1}{7}\begin{pmatrix}3 & -2\\-4 & 5\end{pmatrix}$ 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		$3x+4y=10.8$ $5x+2y=14.50$ 2.6[0] 0.75	**1** **1** **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

20	**(a)**	34	**1**	
	(b)	16	**2**	**B1** for 24 or 40 seen
	(c)	30	**1**	
	(d)	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