CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0580 MATHEMATICS

0580/43 Paper 4 (Extended), maximum raw mark 130

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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.	Answers	Mark	Part Marks
1 (a) (i)	5.37[1...]	2	**M1** for [AD^2 =] $2.6^2 + 4.7^2$ oe or better
(ii)	54.1 or 54.11 to 54.12	3	**M2** for tan [BCD =] $\frac{4.7}{(17-11-2.6)}$ oe or **B1** for 3.4 seen
(iii)	65.8	2	**M1** for $\frac{11+17}{2} \times 4.7$ oe
(b)	263.2 or 263	3FT	**FT** *their* **(a)(iii)** × 4 correctly evaluated **M2** for *their* **(a)(iii)** × $\left(\frac{9.4}{4.7}\right)^2$ oe or **M1** for [scale factor =] $\left(\frac{9.4}{4.7}\right)^2$ or $\left(\frac{4.7}{9.4}\right)^2$ soi
2 (a) (i)	$\frac{920}{8} \times 7$ [=805] oe	1	$\frac{2990}{26} \times 7$ [= 805]
(ii)	30.8 or 30.76 to 30.77	2	**M1** for $\frac{8}{(11+8+7)}$ [× 100]
(b)	1211 final answer	5	**B4** for 13 926.5[0] [area A total sales] or **B3** for 11 040 [area B] **and** 10 867.50 [area C] or 21 907.5 [area B + area C] or **B2** for 11 040 [area B] **or** 10 867.50 [area C] or **M1** for 736 [B tickets] and **M1** for 483 [C tickets] After 0 scored **SC2** for answer of 1196 or **SC1** for 13754 (A total sales)

	(c)	37 720	**3**	**M2** for $\frac{35834}{0.95}$ oe or **M1** for 35834 associated with 95[%]
3	**(a) (i)**	52 Angles in **same segment**	**1** **1dep**	Accept same arc, same side of same chord
	(ii)	104 **Angle** at **centre** is **twice** angle at **circumference**	**1** **1**	Accept double, 2 × but not middle, edge
	(iii)	34 Angle between **tangent** and **radius = 90°**	**1** **1**	Accept right angle, perpendicular
	(b) (i)	7.65 to 7.651	**4**	**M2** for $8.9^2 + 7^2 - 2 \times 8.9 \times 7 \times \cos 56$ or **M1** for correct implicit formula and **A1** for 58.5 to 58.6
	(ii)	49.3 or 49.33 to 49.34…	**3**	**M2** for $[\sin BEC =] \frac{7 \sin 56}{\textit{their}\ \textbf{(b)(i)}}$ oe or **M1** for $\frac{\sin 56}{\textit{their}\ \textbf{(b)(i)}} = \frac{\sin BEC}{7}$ oe
4	**(a) (i)**	Ariven with comparable form for both shown or difference between the two fractions shown	**1**	Accept probabilities changed to decimals or percentages (to 2sf or better)
	(ii)	$\frac{6}{15}$ oe	**2**	**M1** for $\frac{3}{5} \times \frac{2}{3}$
	(iii)	$\frac{7}{15}$ oe	**3**	**M2** for $\frac{3}{5} \times \frac{1}{3} + \frac{2}{5} \times \frac{2}{3}$ oe $1 - \textit{their}\ \textbf{(a)(ii)} - \frac{2}{5} \times \frac{1}{3}$ or **M1** for $\frac{3}{5} \times \frac{1}{3}$ or $\frac{2}{5} \times \frac{2}{3}$ seen
	(b) (i)	Completes tree diagram correctly	**3**	**B2** for 5 values correct or **B1** for 1 value correct
	(ii)	$\frac{126}{350}$ oe $\left[\frac{9}{25}\right]$	**2**	**M1** for $\frac{3}{5} \times \frac{6}{7} \times \frac{7}{10}$

	(iii)	$\frac{344}{350}$ oe	**3**	**M2** for $1-their\frac{2}{5}\times their\frac{1}{7}\times their\frac{3}{10}$ oe or $\frac{3}{5}+\frac{2}{5}\times\frac{6}{7}+\frac{2}{5}\times\frac{1}{7}\times\frac{7}{10}$ **M1** for $their\frac{2}{5}\times their\frac{1}{7}\times their\frac{3}{10}$ oe or identifies the 7 routes or attempt to add 7 probabilities with at least 5 correct $\frac{9}{25}+\frac{27}{175}+\frac{3}{50}+\frac{9}{350}+\frac{6}{25}+\frac{18}{175}+\frac{1}{25}$ oe
5	**(a) (i)**	$\begin{pmatrix}0 & -4\\ 4 & 0\end{pmatrix}$	**1**	
	(ii)	$\begin{pmatrix}-1 & 1\\ 1 & -1\end{pmatrix}$	**1**	
	(iii)	$\begin{pmatrix}-1 & 0\\ 0 & -1\end{pmatrix}$	**2**	**B1** for three correct elements
	(iv)	$\begin{pmatrix}-13\\ 5\end{pmatrix}$	**2**	**B1** for either correct in this form
	(b)	$\begin{pmatrix}1 & 2\\ 0 & 1\end{pmatrix}$	**3**	**M1** for understanding to find the inverse of **Q** **and M1** for det = 1 or for $k\begin{pmatrix}1 & 2\\ 0 & 1\end{pmatrix}$ $k\neq 0$ Alternative $\begin{pmatrix}1 & -2\\ 0 & 1\end{pmatrix}\begin{pmatrix}a & b\\ c & d\end{pmatrix}=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}$ Leading to $a-2c=1$ and $c=0$ then $a=1$ and $b-2d=1$ and $d=1$ then $b=2$ **M2** all four equations, **M1** for a pair of correct equations
6	**(a) (i)**	$\frac{x^8}{3}$ final answer	**1**	
	(ii)	$15x^7y^3$ final answer	**2**	**M1** for 2 elements correct
	(iii)	$16x^8$ final answer	**2**	**M1** for $16x^k$ or kx^8

	(b)	$\sqrt{([-]7)^2 - 4.3 - 12}$ or better and $p = [--]7$ and $r = 2(3)$ oe	**B1** **B1**	or for $\left(x - \frac{7}{6}\right)^2$ Must see $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ or both or for $\frac{7}{6} \pm \sqrt{4 + \left(\frac{7}{6}\right)^2}$
		3.48, –1.15 cao	**B1B1**	After **B0**, **SC1** for answer 3.5 and –1.1 or 3.482… and –1.149 to –1.148 seen or for 3.48, –1.15 seen or for answer –3.48 and 1.15
	(c)	$\frac{x+5}{x^2}$ or $\frac{1}{x} + \frac{5}{x^2}$ final answer nfww	**3**	**B1** for $(x + 5)(x – 5)$ and **B1** for $x^2(x – 5)$
7	**(a)**	$\frac{1}{2} \times 8 \times 8 \times \sin 56$ oe 26.52 to 26.53	**M1** **A1**	or [½ × 2] 8sin28 × 8cos28 or [½ × 2] × 7.06… × 3.75…
	(b) (i)	72.[0] or 71.87 to 72.0	**3**	**M2** for $26.5/(\pi \times 6.5^2) \times 360$ oe or **M1** for $\frac{x}{360} \times \pi \times 6.5^2 = 26.5$ or better
	(ii)	21.1 or 21.2 or 21.14 to 21.17	**3**	**M2** for $\frac{\textit{their}\ \textbf{(b)(i)}}{360} \times \pi \times 2 \times 6.5 + 2 \times 6.5$ oe or **M1** for $\frac{\textit{their}\ \textbf{(b)(i)}}{360} \times \pi \times 2 \times 6.5$ oe or $\frac{\textit{their}\ \textbf{(a)}}{0.5 \times 6.5}$
	(c) (i)	$\frac{30}{360} \times \pi \times r^2 - \frac{1}{2} \times r^2 \times \sin 30$ oe $\frac{1}{12} \times \pi \times r^2 - \frac{1}{4} \times r^2$ $\frac{1}{4} r^2 \left(\frac{1}{3}\pi - 1\right)$	**M2** **A1** **A1**	**M1** for $\frac{30}{360} \times \pi \times r^2$ or $\frac{1}{2} \times r^2 \times \sin 30$ Dep on **M2 A1** and no errors seen
	(ii)	20.6 or 20.7 or 20.55 to 20.71	**3**	**M2** for $[r^2 =] \frac{5}{\frac{1}{4}\left(\frac{1}{3}\pi - 1\right)}$ or **M1** for one correct rearrangement step to r from $\frac{1}{4} r^2 \left(\frac{1}{3}\pi - 1\right) = 5$

8	(a) (i)	(1, 2)	1+1	
	(ii)	$y = 3x - 1$ cao final answer	3	**M1** for gradient = $\frac{8--4}{3--1}$ oe and **M1** for substituting (3, 8) or (–1, –4) into *their* $y = 3x + c$ or for finding y-intercept is –1
	(b) (i)	$(x + 5)(x - 2)$ isw solutions	2	**SC1** for $(x + a)(x + b)$ where $ab = -10$ or $a + b = 3$
	(ii)	$[a =]$ –5 $[b =]$ 2 $[c =]$ –10	3FT	**B1FT** for each of *their* 5 and *their* –2 from **(b)(i)** and **B1** for c = –10
	(iii)	$x = -1.5$	1FT	**FT** $x = (their\ (a + b))/2$
	(c)	Inverted parabola	B1	
		x-axis intercepts at –2 and 9	B2	**B1** for each After **B0** allow **SC1** for $(9 - x)(2 + x)$ oe
		y-axis intercept at 18	B1	
	(d) (i)	$p = 6$ $q = 43$	3	**B2** for $(x + 6)^2 - 43$ or $p = 6$ or $q = 43$ or **M1** for $(x + 6)^2$ or $x^2 + px + px + p^2$ and **M1** for $-7 - (their\ 6)^2$ or $p^2 - q = -7$ or $2p = 12$
	(ii)	–43	1FT	**FT** – *their q*
9	(a) (i)	7	4	**M2** for $\frac{16\times11+17\times10+18p+19\times4+20\times8}{11+10+4+8+p} = 17.7$ or better or **M1** for sum of two correct products or better or for [total =] $11 + 10 + 4 + 8 + p$ and **B1** for $582 + 18p = 17.7\ (33 + p)$
	(ii)	17	1FT	**STRICT FT** median for *their p* if integer
	(b) (i)	64	2	**M1** for $\frac{320}{6.4} \times 1.28$ oe
	(ii)	40	2	**M1** for $\frac{320}{480} \times 60$ oe
	(iii)	1.6[0]	2FT	FT *their* **(b)(i)** / *their* **(b)(ii)** evaluated correctly to 2dp **M1** for *their* **(b)(i)** / *their* **(b)(ii)** or $\frac{480}{6.4} \times 1.28 \div 60$

(c)	9.9125 cao	**5**	**B4** for answer 9912.5 or **M1** for 25 to 35 × 290 to 310 oe and **B1** for 32.5 used and **B1** for 305 or 5 mins 5 secs used and **M1** indep for any correct conversion seen m to km
10 (a) (i)	$5x + 14$ final answer	**2**	**M1** for $5x + k$ or $kx + 14$
(ii)	14.2	**3**	**M1** for $5x = 32 - 14$ **FT** *their* expression in **(a)(i)** **A1FT** for $x = 3.6$
(b)	$8a - 3b + 14 = 32.5$ or better $5a + 4b + 13.5 = 39.75$ or better	**B1** **B1**	$8a - 3b = 18.5$ $5a + 4b = 26.25$
	Equates coefficients of either a or b $40a - 15b = 92.5$ $40a + 32b = 210$ or $32a - 12b = 74$ $15a + 12b = 78.75$	**M1**	or rearranges one of *their* equations to make a or b the subject e.g. $a = \frac{3b + 18.5}{8}$
	Adds or subtracts to eliminate $47b = 117.5$ $47a = 152.75$	**M1**	**Dep** on previous method or correctly substitutes into the second equation e.g. $\frac{5(3b + 18.5)}{8} + 4b = 26.25$
	$[a =]$ 3.25	**A1**	After **M0** scored
	$[b =]$ 2.5	**A1**	**SC1** for 2 correct values with no working or for two values that satisfy one of their original equations