CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0580 MATHEMATICS

0580/42 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.	Answer	Mark	Part marks
1 (a) (i)	49.5[0]	3	**M2** for 16.5[0] ÷ 5 × (5 + 3 + 7) or **M1** for 16.5[0] ÷ 5
(ii)	66	1FT	**FT** *their* **(a)(i)** ÷ 75 × 100 to 3 sf or better
(b)	2 hours 39 mins 45 secs	3	**B2** for 159.75 oe, e.g. 2.6625 [h] 9585 [s] or **M1** for 3 hrs 33 mins oe / (2 + 9 + 1) oe
(c)	18.75 **final answer**	3	**M2** for 16.5[0] ÷ 0.88 oe or **M1** for 16.5[0] associated with 88[%]
2 (a)	$x > 0.5$ oe **final answer nfww**	3	**B2 nfww** for 0.5 with no/incorrect inequality or equals sign as answer or **M2** for $7x + 15x > 6 + 5$ or better or $-6 - 5 > -7x - 15x$ or better or **M1** for $6 - 15x$ seen
(b) (i)	$(p - 2)(q + 4)$ **final answer**	2	**M1** for $q(p - 2) + 4(p - 2)$ or $p(q + 4) - 2(q + 4)$
(ii)	$(3p - 5)(3p + 5)$ **final answer**	1	
(c)	$(5x - 9)(x + 2)$	M2	**M1** partial factorisation, e.g. $x(5x - 9) + 2(5x - 9)$ or **SC1** for $(5x + a)(x + b)$ where $ab = -18$ or $a + 5b = 1$
	$\frac{9}{5}$ oe and -2 **final answer**	B1	

3 **(a)**	$35 < t \leqslant 40$	**1**	
(b)	22.5, 27.5, 32.5, 37.5, 42.5, 47.5	**M1**	At least 4 correct mid-values soi
	$(2 \times 22.5 + 6 \times 27.5 + 7 \times 32.5 + 19 \times 37.5 + 9 \times 42.5 + 7 \times 47.5)$	**M1**	$\sum fx$ where x is in the correct interval allow one further slip [45 + 165 + 227.5 + 712.5 + 382.5 + 332.5 = 1865]
	$\div 50$ or their $\sum f$	**M1dep**	**Dependent** on second method
	37.3	**A1**	**SC2** for correct answer with no working
(c) **(i)**	15, 19, 16	**1**	
(ii)	rectangular bars of height 1, 3.8 and 1.6	**B2FT**	**FT** their **(c)(i)**, on correct boundary lines **B1FT** for 2 correct heights If 0 scored for heights then **SC1** for 3 correct frequency densities soi
	correct widths of 15, 5,10 and no gaps	**B1**	
4 **(a)**	Enlargement [SF] – ½ oe [centre] (2, 5)	**3**	**B1** for each
(b) **(i)**	Image at (–2, 6), (–8, 3), (–4, 3)	**2**	**SC1** for reflection in any vertical line or for 3 correct points not joined
(ii)	Image at (3, –2), (3, 2), (6, 4)	**2**	**SC1** for rotation 90° [anti clockwise] around origin at (–3, 2) (–3, –2) (–6, –4) or for 3 correct points not joined
(iii)	Image at (–5, 1), (–3, –2), (1, –2)	**2**	**SC1** for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -5 \end{pmatrix}$ or for 3 correct points not joined
(c) **(i)**	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	**2**	**B1** for a correct row or column
(ii)	Rotation, 90° [anticlockwise] oe origin oe	**2**	**B1** for two elements correct

5 (a) (i)	8	**1**	
(ii)	4	**2**	**M1** for [g(17) =] $\frac{7}{14}$ or $2\left(\frac{7}{x-3}\right)^2 + 7\left(\frac{7}{x-3}\right)$
(b)	4 or – 4	**3**	**M2** for $x^2 = 16$ or $x^2 - 16 = 0$ or **M1** for $7 = (x-3)(x+3)$ or better
(c)	$2x^2 + 7x - 11$ [= 0] soi	**B1**	
	$\frac{-7 \pm \sqrt{(7)^2 - 4(2)(-11)}}{2(2)}$	**B1FT** **B1FT**	**FT** $2x^2 + 7x \pm$ their k [$k \neq 0$] oe **B1FT** for $\sqrt{7^2 - 4(2)(-11)}$ or better or $\left(x + \frac{7}{4}\right)^2$ oe If in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$, **B1FT f**or – 7 and 2(2) or better or $-\frac{7}{4} +$ *or* $-\sqrt{\frac{137}{16}}$ oe
	–4.68, 1.18 **final answers**	**B1B1**	If **B0**, **SC1** for answers –4.7 and 1.2 or –4.676... and 1.176.. seen or for –4.68 and 1.18 seen or for answer 4.68 and –1.18
(d)	$\frac{x+2}{5}$ or $\frac{x}{5} + \frac{2}{5}$	**2**	**M1** for correct first step or better, e.g. $5y = x + 2$ or $x = \frac{y+2}{5}$ or $x = 5y - 2$ or $y + 2 = 5x$ or $\frac{y}{5} = x - \frac{2}{5}$
(e)	– 2	**1**	

6 **(a)**	–3, 7.375, 8.875	**1, 1, 1**	Accept 7.4 or 7.37 or 7.38 for 7.375 and 8.9 or 8.87 or 8.88 for 8.875
(b)	Correct curve	**4**	**B3FT** for 8 or 9 correct plots **B2FT** for 6 or 7 correct plots **B1FT** for 4 or 5 correct plots Point must touch line if exact or be in correct square if not exact (including boundaries)
(c) **(i)**	Any integer less than 7 or greater than 10	**1**	
(ii)	7, 8 or 9	**1**	
(d)	$y = 15x + 2$ ruled and fit for purpose	**B2**	**B1** for short line but correct or freehand full length correct line or for ruled line through (0, 2) (but not $y = 2$) or for ruled line with gradient 15 (acc ±1 mm vertically for 1 horizontal unit)
	–1.45 to –1.35 and 0.4 to 0.5	**B2**	**B1** for each
(e)	Tangent ruled at $x = 1.5$	**B1**	No daylight at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = 1.4$ and 1.6
	7 to 12	**2**	**Dep** on **B1** or close attempt at tangent at $x = 1.5$ **M1** for y – step/x – step for their tangent
7 **(a)** **(i)**	120 × 55 × 75 [= 495000]	**M1**	
	÷ 1000 [= 495] or 495[l] × 1000 = 495000[ml]	**M1**	
(b) **(i)**	11	**2**	**M1** for 495000 ÷ 750 [÷ 60] oe [660] After 0 scored, **SC1** for answer figs 11
(ii)	37.5 or 37.50 to 37.51	**3**	**M2** for $\sqrt{\frac{figs495}{112\pi}}$ oe or **M1** for $[112r^2 =]\frac{figs495}{\pi}$ or $[\pi r^2 =]\frac{figs495}{112}$ or better

	(c)	15	4	**B3** for answer 60 or **M3** for $75 - \sqrt{145^2 - (55^2 + 120^2)}$ oe **M2** for $\sqrt{145^2 - (55^2 + 120^2)}$ oe or **M1** for $\sqrt{55^2 + 120^2}$
	(d)	24.4[4..] to 24.45	3	**M2** for $\cos^{-1}(\sqrt{55^2 + 120^2}/145)$ oe, e.g. or $\sin^{-1}$ (75 – their **(c)**)/145 or $\tan^{-1}$ ((75 – their **(c)**)/$\sqrt{55^2 + 120^2}$) or **M1** for cos = $\sqrt{55^2 + 120^2}$ /145 oe or sin = (75 – their **(c)**)/145 or tan = (75 – their **(c)**)/$\sqrt{55^2 + 120^2}$
8	(a)	Angle LPQ = 32 soi $58^2 + 74^2 - 2 \times 58 \times 74 \cos$ *their P*	**B1** **M2**	 **M1** for correct implicit cos rule
		39.50[1...]	**A2**	**A1** for 1560.3 to 1560.4 or 1560
	(b)	$\sin PQL = \dfrac{58 \sin \textit{their } P}{39.5}$ oe	**M2**	**M1** for $\dfrac{\sin PQL}{58} = \dfrac{\sin(\textit{their } P)}{39.5}$ oe
		51.1 or 51.08 to 51.09	**B1**	
	(c) (i)	322	**2**	**M1** for 180 + 142 oe
	(ii)	[0]13[.1] or 13.08 to 13.09	**1FT**	**FT** *their* **(b)** – 38
	(d)	17.8 or 17.77 to 17.78	**3**	**M1** for 74 ÷ 2.25 oe soi by 32.888… to 3 sf or better **M1** for dist or speed ÷ 1.85
	(e)	30.7 or 30.73 to 30.74…	**3**	**M2** for 58 sin *their P* oe or 39.5 sin *their* **(b)** or **M1** for $\dfrac{x}{58}$ = sin *their P* oe or $\dfrac{x}{39.5}$ = sin *their* **(b)**
9	(a)	28 45 17 21 45 66	**1, 1** **1** **1**	
	(b) (i)	$4n - 3$ oe	**2**	**M1** for $4n + k$
	(ii)	237	**1**	
	(iii)	50	**2FT**	**FT** *their* **(b)(i)** = 200 solved and then answer truncated **dep** on linear expression of form $an + k$ **M1** for *their* $4n - 3 = 200$ or *their* $4n - 3 \leqslant 200$

(c)	$p = 2$ and $q = -5$ with some correct supporting working leading to the solutions	**5**	**M2** for any 2 of $p + q + 3 = 0$ oe, $2^2 p + 2q + 3 = 1$ oe, $3^2 p + 3q + 3 = 6$ oe, $4^2 p + 4q + 3 = 15$ oe , $5^2 p + 5q + 3 =$ *their* 28 oe, etc. or **M1** for any one of these **M1** indep for correctly eliminating p or q from pair of linear equations **A1** for one correct value If 0 scored **SC1** for 2 values that satisfy one of their original equations After **M0**, 2 correct answers **SC1**
(d)	$2n^2 - n$ or $n(2n - 1)$	**2**	**B1** for answer $2n^2 + k[n]$ or **M1** for *their quadratic* from **(c)** + *their linear* from **(b)(i)**
10 (a) (i)	$\frac{1}{36}$ **final answer**	**2**	**M1** for $\frac{1}{6} \times \frac{1}{6}$
(ii)	$\frac{1}{12}$ **final answer**	**3**	**M2** for $3\left(\frac{1}{6} \times \frac{1}{6}\right)$ oe or **M1** for identifying 3 correct pairs (4, 6), (6, 4) and (5, 5)
(b)	7	**1**	
	Refers to most combinations oe	**1**	**Dependent** on previous mark
(c)	$\frac{141}{1296}$ oe $\left[\frac{47}{432}\right]$	**5**	**M4** for $\frac{2}{36} + \left(\left[1 - \frac{3}{36}\right] \times \frac{2}{36}\right) + \left(\frac{1}{36} \times \frac{3}{36}\right)$ oe or **M3** for 2 correct probabilities shown <u>added</u> from those above or **M1** for $\left(1 - \frac{3}{36}\right) \times \frac{2}{36}$ seen oe And **M1** for $\frac{1}{36} \times \frac{3}{36}$ seen oe or $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$ oe alone or added to a probability not of the form $\frac{n}{36}$