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

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

CAMBRIDGE
International Examinations

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	

© Cambridge International Examinations 2014

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

© Cambridge International Examinations 2014

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**	

© Cambridge International Examinations 2014

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

© Cambridge International Examinations 2014

	(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)	$\sin PQL = \frac{58 \sin \text{their } P}{39.5}$ oe	**M2**	**M1** for $\frac{\sin PQL}{58} = \frac{\sin(\text{their } P)}{39.5}$ 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 $\frac{x}{58}$ = sin *their P* oe or $\frac{x}{39.5}$ = 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* $4n - 3 \leqslant 200$

© Cambridge International Examinations 2014

(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 $\frac{n}{36}$

© Cambridge International Examinations 2014