

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
nfw	not from wrong working
soi	seen or implied

Qu.	Answer	Mark	Part marks
1	(a) (i) 49.5[0]	3	M2 for $16.5[0] \div 5 \times (5 + 3 + 7)$ or M1 for $16.5[0] \div 5$
	(ii) 66	1FT	FT <i>their (a)(i)</i> $\div 75 \times 100$ 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 $16.5[0] \div 0.88$ oe or M1 for 16.5[0] associated with 88[%]
2	(a) $x > 0.5$ oe final answer nfw	3	B2 nfw 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	

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3	(a)	$35 < t \leq 40$	1	
	(b)	22.5, 27.5, 32.5, 37.5, 42.5, 47.5 $(2 \times 22.5 + 6 \times 27.5 + 7 \times 32.5 + 19 \times 37.5 + 9 \times 42.5 + 7 \times 47.5)$ $\div 50$ or their $\sum f$ 37.3	M1 M1 M1dep A1	At least 4 correct mid-values soi $\sum fx$ where x is in the correct interval allow one further slip [45 + 165 + 227.5 + 712.5 + 382.5 + 332.5 = 1865] Dependent on second method SC2 for correct answer with no working
	(c) (i)	15, 19, 16	1	
	(ii)	rectangular bars of height 1, 3.8 and 1.6 correct widths of 15, 5, 10 and no gaps	B2FT B1	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
4	(a)	Enlargement [SF] – $\frac{1}{2}$ 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

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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 $\frac{-7 \pm \sqrt{(7)^2 - 4(2)(-11)}}{2(2)}$ -4.68, 1.18 final answers	B1 B1FT B1FT B1B1	FT $2x^2 + 7x \pm \text{their } k \ [k \neq 0]$ 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 for -7 and 2(2) or better or $-\frac{7}{4} +$ or $-\sqrt{\frac{137}{16}}$ oe 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	

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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)
	(e)	–1.45 to –1.35 and 0.4 to 0.5	B2	B1 for each
7	(a)	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 $y - \text{step}/x - \text{step}$ for their tangent
	(b) (i)	$120 \times 55 \times 75 [= 495000]$ $\div 1000 [= 495]$ or $495[1] \times 1000 = 495000[\text{ml}]$	M1 M1	
	(ii)	11	2	M1 for $495000 \div 750 [\div 60]$ oe [660] After 0 scored, SC1 for answer figs 11
	(b) (i)	37.5 or 37.50 to 37.51	3	M2 for $\sqrt{\frac{\text{figs}495}{112\pi}}$ oe or M1 for $[112r^2 =] \frac{\text{figs}495}{\pi}$ or $[\pi r^2 =] \frac{\text{figs}495}{112}$ or better

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(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 $\sin^{-1}(75 - \text{their (c)})/145$ or $\tan^{-1}((75 - \text{their (c)})/\sqrt{55^2 + 120^2})$ or M1 for $\cos = \sqrt{55^2 + 120^2}/145$ oe or $\sin = (75 - \text{their (c)})/145$ or $\tan = (75 - \text{their (c)})/\sqrt{55^2 + 120^2}$
8 (a)	Angle $LPQ = 32$ soi $58^2 + 74^2 - 2 \times 58 \times 74 \cos \text{their } P$ 39.50[1...]	B1 M2 A2	M1 for correct implicit cos rule A1 for 1560.3 to 1560.4 or 1560
(b)	$\sin PQL = \frac{58 \sin \text{their } P}{39.5}$ oe 51.1 or 51.08 to 51.09	M2 B1	M1 for $\frac{\sin PQL}{58} = \frac{\sin(\text{their } P)}{39.5}$ oe B1
(c) (i)	322	2	M1 for $180 + 142$ oe
(ii)	[0]13[.1] or 13.08 to 13.09	1FT	FT $\text{their (b)} - 38$
(d)	17.8 or 17.77 to 17.78	3	M1 for $74 \div 2.25$ oe soi by 32.888... to 3 sf or better M1 for dist or speed $\div 1.85$
(e)	30.7 or 30.73 to 30.74...	3	M2 for $58 \sin \text{their } P$ oe or $39.5 \sin \text{their (b)}$ or M1 for $\frac{x}{58} = \sin \text{their } P$ oe or $\frac{x}{39.5} = \sin \text{their (b)}$
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 $\text{their (b)(i)} = 200$ solved and then answer truncated dep on linear expression of form $an + k$ M1 for $\text{their } 4n - 3 = 200$ or $\text{their } 4n - 3 \leq 200$

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(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 , $5^2 p + 5q + 3 = \text{their } 28$ 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 <i>their quadratic</i> from (c) + <i>their linear</i> 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 $\frac{n}{36}$