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CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 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

Question	Answer	Mark	Part marks
1 (a) (i)	$\frac{512}{7+11+14} \times 14$	M2	or M1 for $\frac{512}{7+11+14}$
(ii)	112	1	
(b)	10 100	2	M1 for 224×45 soi by 10080
(c)	19	2	M1 for $224 \div 12$ soi by 18.66 to 18.67 or 18.7 or $18\frac{2}{3}$
(d) (i)	4093000	1	
(ii)	4.093×10^6	1FT	FT <i>their</i> (d)(i)
(e)	198 or 198.1 to 198.2	3	M2 for $\frac{8.2-2.75}{2.75} \times 100$ oe or M1 for $\frac{8.2}{2.75} \times 100$ or $\frac{8.2-2.75}{2.75}$
2 (a)	0 4 0.625 0.875	1,1,1,1	
(b)	Fully correct smooth curve	4	B3 FT for 8 or 9 points or B2 FT for 6 or 7 points or B1 FT for 4 or 5 points
(c)	line $y = x + 1$ ruled and 0.2 to 0.3 and 1.8 to 1.95	3	Line must be fit for purpose ie at least from $x = 0$ to $x = 2$ B2 for correct line and 1 correct value or B1 for correct line or SC1 for no/wrong line and 2 correct values

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(d)	Tangent ruled at $x = -1.5$ 2.2 to 5	B1 2	No daylight between tangent and curve at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -1.6$ and $x = -1.4$ dep on B1 M1 for $\frac{\text{rise}}{\text{run}}$ also dep on any tangent drawn or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent
3 (a)	Correct diagram	3	B1 for correct vertical plots and B1 for correct horizontal plots and B1 dep on at least B1 for reasonable <u>increasing</u> curve or polygon through <i>their</i> 6 points If zero scored, SC1 for 5 out of 6 correct plots
(b) (i)	32 to 34	1	
(ii)	120 – reading at $r = 50$	2FT	B1FT for reading at $r = 50$ seen
(c)	8 18 27	2	B1 for 2 correct
(d)	35.2 or $35\frac{1}{6}$ or 35.16 to 35.17 nfw	4	M1 for mid-values soi M1 FT for $\sum fx$ with x in the correct interval including boundaries M1dep for $\sum fx \div 120$ dependent on second M1 earned
(e)	1.6 1.35 0.3	4FT	FT from (c) <i>their</i> $8 \div 5$ and <i>their</i> $27 \div 20$ B3FT for any 2 correct or B2FT for first or second answer correct or B1 for 0.3 only
4 (a)	1.6[0] or 1.601 to 1.602	3	M2 for $\frac{0.6}{\cos 68}$ oe or M1 for $\cos 68 = \frac{0.6}{AC}$
(b)	43.5 or 43.6 or 43.49 to 43.56	4	M2 for $\frac{1.9^2 + 2.3^2 - \text{their } 1.6^2}{2 \times 1.9 \times 2.3}$ or M1 for implicit statement A1 for $[\cos =]$ 0.724 to 0.726

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(c)	1.33 or 1.332...nfww	4	M2 for $\sqrt{2.3^2 - \left(\frac{1}{2} \times 1.2\right)^2}$ or M1 for $2.3^2 = h^2 + (0.5 \times 1.2)^2$ and M1 for $\frac{1}{2} \times 1.2 \times \text{their } 2.22$ (<i>their 2.22</i> must come from attempt at Pythag or from trig in triangle <i>BCD</i>)
(d)	41.1 or 41.13 to 41.14	3	M2 for $\sin = \frac{1.25}{1.9}$ oe or M1 for correct angle identified
5 (a) (i)	$4x(3x+13) - 2x(4x - \{3x-9\}) = 24$ oe $12x^2 + 52x - 2x^2 - 18x$ $5x^2 + 17x - 12 = 0$	M1 M1 A1	Correct removal of all <i>their</i> brackets Dep on two areas added or subtracted with no errors or omissions seen and at least one more line of working showing collection of like terms or division by 2
(ii)	$(5x-3)(x+4) [= 0]$ $\frac{3}{5}$ oe, -4	M2 A1	M1 for $(5x+a)(x+b)$ where $ab = -12$ or $5b + a = 17$ [a, b integers] If zero scored SC1 for correct answers with no working or from other methods.
(b)	For correctly eliminating one variable $x = 3$ $y = -7$	M1 A1 A1	SC1 if no working shown, but 2 correct answers given If zero scored SC1 for 2 values satisfying one of the original equations
(c)	$t = -2$ nfww	5	M1 for $2(t+3)(t+3) - t^2$ or better seen M1 for denominator[s] $t(t+3)$ isw or for $t(t+3)$ isw on RHS M1dep for $2t^2 + 12t + 18 - t^2 = t^2 + 3t$ oe dependent on both numerators and denominator expanding to give quadratics A1 for $9t + 18 = 0$ oe

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6	(a) (i)	43	1	
	(ii)	62	1	
		Isosceles triangle or OYZ is isosceles	1	
		Angle at centre is twice angle at circumference	1	
	(iii)	30	2	M1 for $p + 5p = 180$ oe
		[Opposite angles of a]cyclic quadrilateral [add up to 180°]	1	
	(b) (i)	1 : 2 oe	1	
	(ii)	OQ	1	
		$MQ = NQ$	1	
		$OM = ON$	1	
		Centre or O	1	Not origin
7	(a) (i)	Rotation	1	
		[+]90 or 90 anticlockwise oe	1	
		(0 , 2)	1	Not as column vector
	(ii)	Reflection	1	
		$y = 1$ oe	1	
	(iii)	Enlargement	1	
		[s f] $-\frac{1}{2}$ oe	1	
		Origin oe	1	
	(b)	$\begin{pmatrix} -\frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$ oe	2FT	FT their s f from (a)(iii) SC1 for $\begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$, $k \neq 1$ or 0
	(c)	Image at (4 , 1) (6 , 1) (6 , 5) (4 , 3)	2	ruled or good freehand SC1 for translation $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ or for 4 correct vertices not joined
	(d)	Reflection	1	
		$y = x$ oe	1	

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8	(a)	(4, 6)	1, 1	
	(b)	4.47 or 4.472	3	M2 for $\sqrt{(8-4)^2 + (5-3)^2}$ or better or M1 for $(8-4)^2 + (5-3)^2$ or better
	(c)	$y = 2x - 2$ oe	3	B2 for $2x - 2$ or $y = 2x + c$ oe or M1 for $[m =] \frac{8-4}{5-3}$ oe soi by $2x$ and M1 for (3, 4) or (5, 8) or <i>their</i> midpoint substituted into <i>their</i> $y = mx + c$ with m numerical
	(d)	-3	3	M1 for use of gradient $\times$ <i>their</i> $m = -1$ soi by $-\frac{1}{2}$ M1 for $r =$ <i>their</i> gradient $\times 6$ [+0]
9	(a) (i)	11	1	
	(ii)	256	2	M1 for $[g(3) =] 8$ or 2^3 or 2^{2^x}
	(b)	$\frac{x-5}{2}$ oe final answer	2	M1 for $x = 2y + 5$ or $2x = y - 5$ or better or $\frac{y}{2} = x + \frac{5}{2}$
	(c)	$19 - 6x$ final answer	2	M1 for $2(7 - 3x) + 5$
	(d)	-1, 0, 1, 2	3	Additional values count as errors B2 for one error /omission or B1 for two errors/omissions or M2 for $-2 < x \leq 2$ oe seen or M1 for $-2 < x$ or $x \leq 2$ or $x = -2$ and $x = 2$ or $-4 < 2x \leq 4$
10	(a)	8 25 17	2	B1 for 2 correct
	(b)	$n + 2$ oe	1	
	(c) (i)	$(n - 1)^2$ oe	2	M1 for $(n + k)^2$ for integer k
	(ii)	92	2	M1 for $\sqrt{8281}$ or 91 seen
	(d) (i)	$n^2 - 3n - 1$ final answer	2	M1 for <i>their</i> $(n - 1)^2 -$ <i>their</i> $(n + 2)$ soi
	(ii)	39	1	

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(e)	1 and $-\frac{1}{2}$ oe $\frac{1}{4}$ oe $-\frac{1}{8}$ oe	1 1 1	
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