MARK SCHEME for the October/November 2015 series

0580 MATHEMATICS

0580/42

Paper 4 (Extended), maximum raw mark 130

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Abbrevi	ations		-Cloud.
cao	correct answer only		-On
dep	dependent		
БТ	follow through after arror		

Abbreviations

cao	correct answer only
dep	dependent

- dep \mathbf{FT} follow through after error
- ignore subsequent working isw
- oe or equivalent
- SC Special Case
- not from wrong working nfww
- seen or implied soi

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)	10100	2	M1 for 224 × 45 soi by 10080
	(c)	19	2	M1 for 224 ÷ 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 their (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 $x = -1.5$	B1	No daylight between tan of contact. Consider poin between two vertices of must be between $x = -1$.	gent and curve at of contact as daylight, the n 6 and $x = -1.4$	e at point 5 midpoint hidpoint
	2.2 to 5	2	dep on B1 M1 for $\frac{rise}{run}$ also dep of close attempt at tangent a Must see correct or impli- drawn tangent	n any tangent o at any point ied calculatior	lrawn or from a
3 (a)	Correct diagram	3	 B1 for correct vertical pl and B1 for correct horizontal and B1 dep on at least B1 for curve or polygon through If zero scored, SC1 for 5 	ots plots pr reasonable <u>i</u> h <i>their</i> 6 points 5 out of 6 corre	ncreasing s
(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 nfww	4	M1 for mid-values soi M1 FT for $\sum fx$ with x including boundaries M1dep for $\sum fx \div 12$ dependent on second M1	in the correc 0 I earned	t interval
(e)	1.6	4FT	FT from (c) <i>their</i> $8 \div 5$ a their $27 \div 20$	ind	
	1.35 0.3		B3FT for any 2 correct or B2FT for first or se or B1 for 0.3 only	cond answer c	orrect
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 $\frac{1.9^2 + 2.3^2 - their}{2 \times 1.9 \times 2.3}$ or M1 for implicit states A1 for [cos =] 0.724 to	$\frac{ir1.6^2}{3}$ ment 0.726	

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(c)	1.33 or 1.332nfww	4	M2 for $\sqrt{2.3^2 - (\frac{1}{2} \times 1.2)^2}$ or M1 for $2.3^2 = h^2 + (0.1)^2$	5×1.2) ²	
		and M1 for $\frac{1}{2} \times 1.2 \times their 2.22$ (the come from attempt at Pythag or from triangle <i>BCD</i>)			2.22 must rig in
(d)	41.1 or 41.13 to 41.14	3	M2 for $\sin = \frac{1.25}{1.9}$ oe or M1 for correct angle i	dentified	
5 (a) (i)	$4x(3x+13) - 2x(4x - \{3x - 9\}) = 24$ oe	M1			
	$12x^2 + 52x - 2x^2 - 18x$	M1	Correct removal of all <i>the</i> Dep on two areas added	<i>eir</i> brackets or subtracted	
	$5x^2 + 17x - 12 = 0$	A1	with no errors or omissio more line of working sho terms or division by 2	ons seen and a owing collecti	t least one on of like
(ii)	(5x-3)(x+4) [= 0]	M2	M1 for $(5x+a)(x+b)$ w 5b+a=17 [a, b intege	here <i>ab</i> = -12 rs]	2 or
	$\frac{3}{5}$ oe, -4	A1	If zero scored SC1 for co working or from other m	orrect answers ethods.	with no
(b)	For correctly eliminating one variable	M1			
	$\begin{array}{l} x = 3\\ y = -7 \end{array}$	A1 A1	SC1 if no working shown given If zero scored SC1 for 2 the original equations	n, but 2 correc values satisfy	ct answers
(c)	t = -2 nfww	5	M1 for $2(t+3)(t+3)-t$ M1 for denominator[s] $t(t+3)$ isw on RHS M1dep for $2t^2 + 12t + 18$	² or better see t(t+3) isw or $3-t^2 = t^2 + 3t$	n for
			dependent on both numeries expanding to give quadra A1 for $9t + 18 = 0$ oe	rators and der atics	nominator

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6 (a)	(i)	43	1			
	(ii)	62	1			
		Isosceles triangle or <i>OYZ</i> is isosceles	1			
		Angle at centre is twice angle at circumference	1			
((iii)	30 [Opposite angles of a]cyclic quadrilateral [add up to 180°]	2 1	M1 for $p + 5p = 180$ oe		
(b)	(i)	1 : 2 oe	1			
	(ii)	$\begin{array}{l} OQ\\ MQ = NQ \end{array}$	1 1			
		OM = ON	1			
		Centre or O	1	Not origin		
(a)	(i)	Rotation	1			
		[+]90 or 90 anticlockwise oe	1			
		(0,2)	1	Not as column vector		
	(ii)	Reflection $y = 1$ oe	1 1			
((iii)	Enlargement [s f] $-\frac{1}{2}$ oe Origin oe	1 1 1			
(b)		$ \begin{pmatrix} -\frac{1}{2} & 0\\ 0 & -\frac{1}{2} \end{pmatrix} $ oe	2FT	FT <i>their</i> 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 $\binom{k}{-3}$ or for 4 correct v	vertices not jo	oined
(d)		Reflection $y = x$ oe	1 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 <i>m</i> numerical			
	(d)		- 3	3	M1 for use of gradient × <i>their</i> $m = -1$ soi by $-\frac{1}{2}$ M1 for $r = their$ gradient × 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 $-2 \le x \le 20e$ 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 their $(n-1)^2$ – their $(n+2)$ 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			-loud com