

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0580 MATHEMATICS

0580/41

Paper 4 (Extended), maximum raw mark 130

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Question	Answer	Mark	Part marks
1 (a)	6	3	B2 for $5\frac{1}{4}$ or 5.25 shown in working isw or M1 for $\frac{3}{4} \times 7$ soi by answer 5
(b)	21.45 cao final answer	2	M1 for 17.16×0.25 or 17.16×1.25
(c)	16.5[0] nfwf	3	M2 for $17.16 \div 1.04$ oe or M1 for 17.16 associated with 104[%] oe isw
(d)	1.34 cao final answer	2	M1 for $13.32 \div 0.72$ soi by 18.5[0] or for any correct complete longer method If zero scored, SC1 for 0.96 [euros] seen
(e) (i)	750	1	
(ii)	4.7 cao	3	B2 for 4.658 to 4.66 or M2 for $\sqrt{\text{their (e)(i)} \div 11\pi}$ or M1 for $11\pi^2 = \text{their (e)(i)}$
(iii)	6	2	M1 for 2^3 or $\frac{1}{2^3}$ oe seen or for $\pi \times (2 \times \text{their (e)(ii)})^2 \times 22$ If zero scored, SC1 for answer 6 000
(f)	8950	1	
(g)	210	2	M1 for $0.07 \times 3\ 000$
(h)	160 000	3	M2 for $2 \times 60 \times 100^3 \div 750$ oe or M1 for figs 16 as answer or 100^3 seen
2 (a)	1.62 or 1.62...	1	
(b) (i)	7	1	
(ii)	4	1	
(iii)	7	1	
(iv)	$\frac{1}{3}$ oe	1	

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
(c) (i)	0.25 oe and 1	2	B1 for each
(ii)	Correct curve	4	B3FT for 6 or 7 correct plots or B2FT for 4 or 5 correct plots or B1FT for 2 or 3 correct plots
(iii)	2.3	1FT	Correct or FT where $y = 5$ on <i>their</i> graph
(iv)	$y = 3x - 1$ oe 3 term equation	3	B2 for $3x - 1$ or $y = 3x [+ c]$ oe or for $m = 3$ and $c = -1$ or M1 for [gradient =] $\frac{8-2}{3-1}$ oe soi by $3x$ and M1 for substitution of (1, 2) or (3, 8) into <i>their</i> $y = mx + c$
(v)	-1.7 to -1.5 and 2	2	B1 for either or M1 for $y = x + 2$ seen or drawn
3 (a) (i)	25.4 or 25.35... nfw	5	M2 for $\sqrt{60^2 - 50^2}$ oe soi by 33.1 to 33.2 or M1 for $TB^2 + 50^2 = 60^2$ oe and M2 for $\tan = \frac{\text{their}TB}{70}$ oe or B1 for recognising angle TCB as required angle
(ii)	109 or 109.0 to 109.1	4	M2 for $50^2 + 70^2 - 2 \times 50 \times 70 \times \cos 130$ M1 for implicit cos rule A1 for 11 899 to 11 900
(iii)	1 340 or 1 340.0 to 1 341	2	M1 for $\frac{1}{2} \times 50 \times 70 \times \sin 130$ oe
(b)	51.5 or 51.50 to 51.51	4	M3 for $[XY] = \sqrt{45^2 + 22^2 + 12^2}$ or M2 for $[XY^2 =] 45^2 + 22^2 + 12^2$ soi by 2 653 or M1 for $45^2 + 22^2$ oe or $45^2 + 12^2$ oe or $12^2 + 22^2$ oe

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
4	(a) (i)		Condone $5 \leq x \leq 15$ Condone $0 < y \leq 8$
		4	B1 for each – 1 for first occurrence of strict inequalities used in first 3 inequalities
	(ii)	1 1 1 1	Allow $y = x + 1$ ruled only after $y \geq x + 1$ in (a)(i)
	Correct region indicated	1dep	Dependent on all marks for lines earned Accept R written in correct quadrilateral or any other unambiguous indication or accept in triangle if $y = x + 1$ used and all marks for lines earned
	(b)	2	B1 for (7, 8) chosen or M1 for a calculation shown of the form $6x + 4.5y$ where (x, y) is clearly in <i>their</i> region and both x and y are integers
5	(a)	1	
		1dep	Dependent on 37 or [angle] <i>BAD</i>
	(b)	1	
	74 or 2 [\times angle] <i>BAD</i> or 2 [\times angle] <i>BED</i>	1dep	Dependent on 2×37 or 2 [\times angle] <i>BAD</i> or 2 [\times angle] <i>BED</i> Must use the terms circumference, centre and angle
	Angle at <u>centre</u> is twice angle at <u>circumference</u>		
	(c)	1	
	143 or $180 -$ [angle] <i>BAD</i> or $180 -$ [angle] <i>BED</i>	1dep	Dependent on $180 - 37$ or $180 -$ [angle] <i>BAD</i> or $180 -$ [angle] <i>BED</i>
	[Opposite angles of] cyclic quad [are supplementary]		

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
6 (a)	1.35 nfw	4	M1 for 0.5, 1.5, 2.5, 3.5, 4.5, 5.5 soi, M1 for Σfm soi by 162 where m is in correct interval including boundaries M1dep for $\Sigma fm \div 120$ or $\Sigma fm \div \Sigma f$ dependent on second M1 earned
(b) (i)	93, 102, 113, 118	2	SC1FT for 1 error
(ii)	Correct diagram	3	B1FT for correct vertical plots and B1 for correct horizontal plots and B1FT dep on at least B1 for reasonable <u>increasing</u> curve or polygon through <i>their</i> 6 points If zero scored, SC1FT for 5 out of 6 correct plots
(iii) (a)	0.6 to 0.85	1	
(b)	1.3 to 1.7	2	B1 for UQ = 1.7 to 1.9 or LQ = 0.2 to 0.4
(c)	0.3 to 0.6	2FT	Allow in correct range provided there is no evidence of reading at 35 or FT <i>their</i> reading at 42 B1 for 42 soi
(c) (i)	30 and 18	2	B1 for each
(ii)	0.75 and 0.3	3FT	FT (<i>their</i> 30) \div 40 and (<i>their</i> 18) \div 60 B2FT for either 0.75 or 0.3 or M1 for <i>their</i> 30 \div 2 or \div 20 or for <i>their</i> 18 \div 3 or \div 20
7 (a)	123 to 127	1	
(b)	288 to 292	1	
(c)	[1:] 1000000	1	

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
(d)	Correct ruled perpendicular bisector of CB with correct arcs Correct two pairs of arcs	2	B1 for correct perpendicular bisector without/wrong arcs
	Correct ruled bisector of angle ACB with correct pair of arcs	2	B1 for correct bisector of angle ACB without/wrong arcs
	Ruled line parallel to CB in triangle	1	Provided this line is not the perpendicular bisector of AC
	1.3 to 1.7 cm from CB in triangle	1	
	Correct region indicated	1dep	Dependent on at least B1,B1,1,1 earned
(e)	40	2	M1 for 0.4×10^2 oe
8 (a)	$(x - 5)(x + 2)$ final answer	2	B1 for $(x - 5)(x + 2)$ seen and then spoiled or M1 for $(x + a)(x + b)$ where $a + b = -3$ or $ab = -10$ [a, b integers]
	(b) (i) $x(x + 2) + 3(x + 1) = 3x(x + 1)$ or $x^2 + 2x + 3x + 3 = 3x^2 + 3x$ $0 = 2x^2 - 2x - 3$	M2 A1	M1 for $x(x + 2) + 3(x + 1)$ or better seen Allow recovery of omitted brackets for M marks but not A mark Brackets expanded correctly and/or no errors or omission of brackets seen
	(ii) $\frac{[-]2 \pm \sqrt{([-]2)^2 - 4(2)(-3)}}{2(2)}$ or $0.5 \pm \sqrt{1.75}$ -0.823 and 1.823 final answer	B2 B1 B1	B1 for $\sqrt{([-]2)^2 - 4(2)(-3)}$ or $\sqrt{28}$ or $\sqrt{1.75}$ oe in completion of square and B1 for in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$, $p = -2$ and $r = 2(2)$ or better or $(x - 0.5)^2$ oe in completion of square If B0B0 for answers, SC1 for -0.82 or $-0.822\dots$ and 1.82 or $1.822\dots$ as final answers or -0.823 and 1.823 seen or -1.823 and 0.823 as final answers

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
(c)	$\frac{x^2 + 3x + 3}{(x + 2)(x + 1)}$ or $\frac{x^2 + 3x + 3}{x^2 + 3x + 2}$ final answer nfw	4	<p>M1 for $(2x + 3)(x + 1) - x(x + 2)$ oe isw</p> <p>B1 for common denominator = $(x + 2)(x + 1)$ isw or $x^2 + 3x + 2$ isw</p> <p>B1 for $2x^2 + 2x + 3x + 3$ or better or $-x^2 - 2x$ or $x^2 + 3x + 3$</p>
9 (a) (i)	16	1	
(ii)	n^2	1	
(b) (i)	43	1	
(ii)	7	1	
(c)	$a = \frac{5}{2}$ oe, $b = \frac{5}{6}$ oe with supporting working	6	<p>M1 for any correct substitution eg $\frac{2}{3}(2)^3 + 2^2a + 2b$</p> <p>A1 for one of eg $\frac{2}{3} + a + b = 4$ or better eg $\frac{16}{3} + 4a + 2b = 17$ or better eg $\frac{54}{3} + 9a + 3b = 43$ or better</p> <p>A1 for another of eg $\frac{2}{3} + a + b = 4$ or better eg $\frac{16}{3} + 4a + 2b = 17$ or better eg $\frac{54}{3} + 9a + 3b = 43$ or better</p> <p>M1 for correctly eliminating one variable from two of <i>their</i> equations in a and b</p> <p>A1 for $a = \frac{5}{2}$ oe</p> <p>A1 for $b = \frac{5}{6}$ oe</p> <p>After zero scored, SC2 for 2 correct answers without supporting working or SC1 for 2 of 17, 43, 86, 150, 239 seen</p>

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	41

Qu	Answers	Mark	Part Marks
10 (a)	$\mathbf{b - a}$ or $-\mathbf{a + b}$	1	
(b)	$\frac{4}{5}\mathbf{b} - \frac{3}{10}\mathbf{a}$ or $\frac{1}{10}(8\mathbf{b} - 3\mathbf{a})$	4	<p>B3 for correct unsimplified expression in a and b</p> <p>or</p> <p>M1 for $\vec{XA} + \vec{AC} + \vec{CM}$ or $\vec{XB} + \vec{BM}$</p> <p>or $-\frac{1}{5}(\mathbf{their (a)}) + \mathbf{b} - \frac{1}{2}\mathbf{a}$</p> <p>or $\frac{4}{5}(\mathbf{their (a)}) + \frac{1}{2}\mathbf{a}$</p> <p>and M1 indep for $\pm\frac{1}{5}$ oe or $\pm\frac{4}{5}$ oe used</p> <p>After zero scored, SC2 for answer $\frac{1}{4}(3\mathbf{b} - \mathbf{a})$ or $\frac{3}{4}\mathbf{b} - \frac{1}{4}\mathbf{a}$</p>