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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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] nfww	3	**M2** for 17.16 ÷ 1.04 oe or **M1** for 17.16 associated with 104[%] oe isw
(d)	1.34 cao final answer	2	**M1** for 13.32 ÷ 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 $\sqrt{\textit{their}\ \textbf{(e)(i)} \div 11\pi}$ or **M1** for $11\pi r^2 =$ *their* **(e)(i)**
(iii)	6	2	**M1** for 2^3 or $\frac{1}{2^3}$ oe seen or for $\pi \times (2 \times \textit{their}\ \textbf{(e)(ii)})^2 \times 22$ If zero scored, **SC1** for answer 6 000
(f)	8 950	1	
(g)	210	2	**M1** for 0.07 × 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	

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 *their* 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 *their* $y = mx + c$
(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… nfww	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 = $\frac{theirTB}{70}$ 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

Qu	Answers	Mark	Part Marks
4 (a) (i)	$x \geqslant 5$ oe $y \leqslant 8$ oe $x + y \leqslant 15$ oe $y > x$ oe or $y \geqslant x + 1$	**4**	Condone $5 \leqslant x \leqslant 15$ Condone $0 < y \leqslant 8$ **B1** for each – 1 for first occurrence of strict inequalities used in first 3 inequalities
(ii)	$x = 5$ ruled $y = 8$ ruled $x + y = 15$ ruled $y = x$ ruled broken line	**1** **1** **1** **1**	Allow $y = x + 1$ ruled only after $y \geqslant x + 1$ 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)	78	**2**	**B1** for (7, 8) chosen or **M1** for a calculation shown of the form $6x + 4.5y$ where (x, y) is clearly in *their* region and both x and y are integers
5 (a)	37 or [angle] *BAD*	**1**	
	[Angles in] same segment [are equal]	**1dep**	Dependent on 37 or [angle] *BAD*
(b)	74 or 2 [× angle] *BAD* or 2 [× angle] *BED*	**1**	
	Angle at <u>centre</u> is twice angle at <u>circumference</u>	**1dep**	Dependent on 2 × 37 or 2 [× angle] *BAD* or 2 [× angle] *BED* Must use the terms circumference, centre and angle
(c)	143 or 180 – [angle] *BAD* or 180 – [angle] *BED*	**1**	
	[Opposite angles of] cyclic quad [are supplementary]	**1dep**	Dependent on 180 – 37 or 180 – [angle] *BAD* or 180 – [angle] *BED*

Qu	Answers	Mark	Part Marks
6 (a)	1.35 nfww	**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 **M1**dep 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 increasing curve or polygon through *their* 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** *their* reading at 42 **B1** for 42 soi
(c) (i)	30 and 18	**2**	**B1** for each
(ii)	0.75 and 0.3	**3FT**	**FT** (*their* 30) ÷ 40 and (*their* 18) ÷ 60 **B2FT** for either 0.75 or 0.3 or **M1** for *their* 30 ÷ 2 or ÷ 20 or for *their* 18 ÷ 3 or ÷ 20
7 (a)	123 to 127	**1**	
(b)	288 to 292	**1**	
(c)	[1:] 1 000 000	**1**	

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 $x^2 + 2x + 3x + 3 = 3x^2 + 3x$	**M2**	**M1** for $x(x + 2) + 3(x + 1)$ or better seen Allow recovery of omitted brackets for M marks but not A mark
	$0 = 2x^2 - 2x - 3$	**A1**	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 $0.5 \pm \sqrt{1.75}$	**B2**	**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
	– 0.823 and 1.823 final answer	**B1 B1**	If **B0B0** for answers, **SC1** for – 0.82 or – 0.822… and 1.82 or 1.822.. as final answers or – 0.823 and 1.823 seen or –1.823 and 0.823 as final answers

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 nfww	**4**	**M1** for $(2x + 3)(x + 1) - x(x + 2)$ oe isw **B1** for common denominator $= (x + 2)(x + 1)$ isw or $x^2 + 3x + 2$ isw **B1** for $2x^2 + 2x + 3x + 3$ or better or $-x^2 - 2x$ or $x^2 + 3x + 3$
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**	**M1** for any correct substitution eg $\frac{2}{3}(2)^3 + 2^2a + 2b$ **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 **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 **M1** for correctly eliminating one variable from two of *their* equations in a and b **A1** for $a = \frac{5}{2}$ oe **A1** for $b = \frac{5}{6}$ oe After zero scored, **SC2** for 2 correct answers without supporting working or **SC1** for 2 of 17, 43, 86, 150, 239 seen

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