

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] nfw | 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 | |

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|--------|---|----------|-------|
| 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 |

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|--------|---|----------|-------|
| 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) |
| | | 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 <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 | |
| | 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 | |
| (c) | 1 | | |
| | 1dep | Dependent on $180 - 37$ or $180 -$ [angle] <i>BAD</i> or $180 -$ [angle] <i>BED</i> | |

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|--------|---|----------|-------|
| 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 | |

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|--------|---|----------|-------|
| 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... 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 |

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|--------|---|----------|-------|
| 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 | 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 <i>their</i> 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 |

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|--------|---|----------|-------|
| 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 $-\frac{1}{5}(\text{their } \mathbf{a}) + \mathbf{b} - \frac{1}{2}\mathbf{a}$</p> <p>or $\frac{4}{5}(\text{their } \mathbf{a}) + \frac{1}{2}\mathbf{a}$</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> |