

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 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 |
| nfww | not from wrong working |
| soi | seen or implied |

| Qu. | Answer | Mark | Part marks |
|-----|---|------|--|
| 1 | (a) (i) 49.5[0] | 3 | M2 for $16.5[0] \div 5 \times (5 + 3 + 7)$ or M1 for $16.5[0] \div 5$ |
| | (ii) 66 | 1FT | FT <i>their</i> (a)(i) $\div 75 \times 100$ to 3 sf or better |
| | (b) 2 hours 39 mins 45 secs | 3 | B2 for 159.75 oe, e.g. 2.6625 [h] 9585 [s] or M1 for 3 hrs 33 mins oe / (2 + 9 + 1) oe |
| | (c) 18.75 final answer | 3 | M2 for $16.5[0] \div 0.88$ oe or M1 for 16.5[0] associated with 88[%] |
| 2 | (a) $x > 0.5$ oe final answer nfww | 3 | B2 nfww for 0.5 with no/incorrect inequality or equals sign as answer or M2 for $7x + 15x > 6 + 5$ or better or $-6 - 5 > -7x - 15x$ or better or M1 for $6 - 15x$ seen |
| | (b) (i) $(p - 2)(q + 4)$ final answer | 2 | M1 for $q(p - 2) + 4(p - 2)$ or $p(q + 4) - 2(q + 4)$ |
| | (ii) $(3p - 5)(3p + 5)$ final answer | 1 | |
| | (c) $(5x - 9)(x + 2)$ | M2 | M1 partial factorisation, e.g. $x(5x - 9) + 2(5x - 9)$ or SC1 for $(5x + a)(x + b)$ where $ab = -18$ or $a + 5b = 1$ |
| | $\frac{9}{5}$ oe and -2 final answer | B1 | |

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|---------|---|--|-----------------------------|--|
| 3 | (a) | $35 < t \leq 40$ | 1 | |
| | (b) | 22.5, 27.5, 32.5, 37.5, 42.5, 47.5 | M1 | At least 4 correct mid-values soi |
| | | $(2 \times 22.5 + 6 \times 27.5 + 7 \times 32.5 + 19 \times 37.5 + 9 \times 42.5 + 7 \times 47.5)$ | M1 | $\sum fx$ where x is in the correct interval allow one further slip [45 + 165 + 227.5 + 712.5 + 382.5 + 332.5 = 1865] |
| | (c) (i) | $\div 50$ or their $\sum f$ | M1dep | Dependent on second method |
| | | 37.3 | A1 | SC2 for correct answer with no working |
| (ii) | 15, 19, 16 | 1 | | |
| 4 | (a) | rectangular bars of height 1, 3.8 and 1.6 | B2FT | FT their (c)(i), on correct boundary lines B1FT for 2 correct heights If 0 scored for heights then SC1 for 3 correct frequency densities soi |
| | (b) (i) | correct widths of 15, 5, 10 and no gaps | B1 | |
| | | | | |
| | (ii) | | | |
| | (iii) | | | |
| (c) (i) | | | | |
| 4 | (a) | Enlargement [SF] $-\frac{1}{2}$ oe [centre] (2, 5) | 3 | B1 for each |
| | (b) (i) | Image at (-2, 6), (-8, 3), (-4, 3) | 2 | SC1 for reflection in any vertical line or for 3 correct points not joined |
| | | Image at (3, -2), (3, 2), (6, 4) | 2 | SC1 for rotation 90° [anti clockwise] around origin at (-3, 2) (-3, -2) (-6, -4) or for 3 correct points not joined |
| | (iii) | Image at (-5, 1), (-3, -2), (1, -2) | 2 | SC1 for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -5 \end{pmatrix}$ or for 3 correct points not joined |
| | (c) (i) | $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ | 2 | B1 for a correct row or column |
| (ii) | Rotation, 90° [anticlockwise] oe origin oe | 2 | B1 for two elements correct | |

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|---|---------|--|---|---|
| 5 | (a) (i) | 8 | 1 | |
| | (ii) | 4 | 2 | M1 for $[g(17) =] \frac{7}{14}$ or $2\left(\frac{7}{x-3}\right)^2 + 7\left(\frac{7}{x-3}\right)$ |
| | (b) | 4 or -4 | 3 | M2 for $x^2 = 16$ or $x^2 - 16 = 0$ or M1 for $7 = (x-3)(x+3)$ or better |
| | (c) | $2x^2 + 7x - 11 [= 0]$ soi $\frac{-7 \pm \sqrt{(7)^2 - 4(2)(-11)}}{2(2)}$ | B1 B1FT B1FT | FT $2x^2 + 7x \pm$ their k [$k \neq 0$] oe B1FT for $\sqrt{7^2 - 4(2)(-11)}$ or better or $\left(x + \frac{7}{4}\right)^2$ oe If in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$, B1FT for -7 and 2(2) or better or $-\frac{7}{4} +$ or $-\sqrt{\frac{137}{16}}$ oe |
| | | -4.68, 1.18 final answers | B1B1 | If B0 , SC1 for answers -4.7 and 1.2 or -4.676... and 1.176.. seen or for -4.68 and 1.18 seen or for answer 4.68 and -1.18 |
| | (d) | $\frac{x+2}{5}$ or $\frac{x}{5} + \frac{2}{5}$ | 2 | M1 for correct first step or better, e.g. $5y = x + 2$ or $x = \frac{y+2}{5}$ or $x = 5y - 2$ or $y + 2 = 5x$ or $\frac{y}{5} = x - \frac{2}{5}$ |
| | (e) | -2 | 1 | |

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| 6 | (a) | -3, 7.375, 8.875 | 1, 1, 1 | Accept 7.4 or 7.37 or 7.38 for 7.375 and 8.9 or 8.87 or 8.88 for 8.875 |
| | (b) | Correct curve | 4 | B3FT for 8 or 9 correct plots B2FT for 6 or 7 correct plots B1FT for 4 or 5 correct plots Point must touch line if exact or be in correct square if not exact (including boundaries) |
| | (c) (i) | Any integer less than 7 or greater than 10 | 1 | |
| | (ii) | 7, 8 or 9 | 1 | |
| | (d) | $y = 15x + 2$ ruled and fit for purpose | B2 | B1 for short line but correct or freehand full length correct line or for ruled line through (0, 2) (but not $y = 2$) or for ruled line with gradient 15 (acc ± 1 mm vertically for 1 horizontal unit) |
| | (e) | -1.45 to -1.35 and 0.4 to 0.5 Tangent ruled at $x = 1.5$ | B2 B1 | B1 for each No daylight at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = 1.4$ and 1.6 |
| 7 | (a) (i) | $120 \times 55 \times 75 [= 495000]$ $\div 1000 [= 495]$ or $495[1] \times 1000 = 495000[\text{ml}]$ | M1 M1 | |
| | (b) (i) | 11 | 2 | M1 for $495000 \div 750 [= \div 60]$ oe [660] After 0 scored, SC1 for answer figs 11 |
| | (ii) | 37.5 or 37.50 to 37.51 | 3 | M2 for $\sqrt{\frac{\text{figs}495}{112\pi}}$ oe or M1 for $[112r^2 =] \frac{\text{figs}495}{\pi}$ or $[\pi r^2 =] \frac{\text{figs}495}{112}$ or better |

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| (c) | 15 | 4 | B3 for answer 60 or M3 for $75 - \sqrt{145^2 - (55^2 + 120^2)}$ oe M2 for $\sqrt{145^2 - (55^2 + 120^2)}$ oe or M1 for $\sqrt{55^2 + 120^2}$ |
| (d) | 24.4[4..] to 24.45 | 3 | M2 for $\cos^{-1}(\sqrt{55^2 + 120^2}/145)$ oe, e.g. or $\sin^{-1}(75 - \text{their (c)})/145$ or $\tan^{-1}((75 - \text{their (c)})/\sqrt{55^2 + 120^2})$ or M1 for $\cos = \sqrt{55^2 + 120^2}/145$ oe or $\sin = (75 - \text{their (c)})/145$ or $\tan = (75 - \text{their (c)})/\sqrt{55^2 + 120^2}$ |
| 8 (a) | Angle $LPQ = 32$ soi $58^2 + 74^2 - 2 \times 58 \times 74 \cos \text{their } P$ 39.50[1...] | B1 M2 A2 | M1 for correct implicit cos rule A1 for 1560.3 to 1560.4 or 1560 |
| (b) | $\sin PQL = \frac{58 \sin \text{their } P}{39.5}$ oe 51.1 or 51.08 to 51.09 | M2 B1 | M1 for $\frac{\sin PQL}{58} = \frac{\sin(\text{their } P)}{39.5}$ oe B1 |
| (c) (i) | 322 | 2 | M1 for $180 + 142$ oe |
| (ii) | [0]13[.1] or 13.08 to 13.09 | 1FT | FT <i>their (b)</i> – 38 |
| (d) | 17.8 or 17.77 to 17.78 | 3 | M1 for $74 \div 2.25$ oe soi by 32.888... to 3 sf or better M1 for dist or speed $\div 1.85$ |
| (e) | 30.7 or 30.73 to 30.74... | 3 | M2 for $58 \sin \text{their } P$ oe or $39.5 \sin \text{their (b)}$ or M1 for $\frac{x}{58} = \sin \text{their } P$ oe or $\frac{x}{39.5} = \sin \text{their (b)}$ |
| 9 (a) | 28 45 17 21 45 66 | 1, 1 1 1 | |
| (b) (i) | $4n - 3$ oe | 2 | M1 for $4n + k$ |
| (ii) | 237 | 1 | |
| (iii) | 50 | 2FT | FT <i>their (b)(i)</i> = 200 solved and then answer truncated dep on linear expression of form $an + k$ M1 for <i>their</i> $4n - 3 = 200$ or <i>their</i> $4n - 3 \leq 200$ |

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| (c) | $p = 2$ and $q = -5$ with some correct supporting working leading to the solutions | 5 | <p>M2 for any 2 of $p + q + 3 = 0$ oe, $2^2 p + 2q + 3 = 1$ oe, $3^2 p + 3q + 3 = 6$ oe, $4^2 p + 4q + 3 = 15$ oe , $5^2 p + 5q + 3 = \text{their } 28$ oe, etc. or M1 for any one of these M1 indep for correctly eliminating p or q from pair of linear equations A1 for one correct value If 0 scored SC1 for 2 values that satisfy one of their original equations After M0, 2 correct answers SC1</p> |
| (d) | $2n^2 - n$ or $n(2n - 1)$ | 2 | <p>B1 for answer $2n^2 + k[n]$ or M1 for <i>their quadratic</i> from (c) + <i>their linear</i> from (b)(i)</p> |
| 10 (a) (i) | $\frac{1}{36}$ final answer | 2 | M1 for $\frac{1}{6} \times \frac{1}{6}$ |
| (ii) | $\frac{1}{12}$ final answer | 3 | <p>M2 for $3\left(\frac{1}{6} \times \frac{1}{6}\right)$ oe or M1 for identifying 3 correct pairs (4, 6), (6, 4) and (5, 5)</p> |
| (b) | 7 | 1 | |
| | Refers to most combinations oe | 1 | Dependent on previous mark |
| (c) | $\frac{141}{1296}$ oe $\left[\frac{47}{432}\right]$ | 5 | <p>M4 for $\frac{2}{36} + \left(\left[1 - \frac{3}{36}\right] \times \frac{2}{36}\right) + \left(\frac{1}{36} \times \frac{3}{36}\right)$ oe or M3 for 2 correct probabilities shown <u>added</u> from those above</p> <p>or M1 for $\left(1 - \frac{3}{36}\right) \times \frac{2}{36}$ seen oe And M1 for $\frac{1}{36} \times \frac{3}{36}$ seen oe or $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$ oe alone or added to a probability not of the form $\frac{n}{36}$</p> |