

CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

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| 0580 MATHEMATICS | |
| 0580/41 | Paper 4 (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

| Question | Answers | Mark | Part Marks |
|------------|---|------|---|
| 1 | (a) (i) $\frac{13}{13+8+3} \times 12000$ with no subsequent errors | 1 | |
| | (ii) 4000 | 1 | |
| | (b) $2 \times 6500 + 5 \times \text{their(a)(ii)} + (12000 - 6500 - \text{their(a)(ii)})$ or $(13 \times 2 + 8 \times 5 + 3 \times 1) \times 500$ | 2 | B1 for any two of 2×6500 , $5 \times \text{their(a)(ii)}$, $(12000 - 6500 - \text{their(a)(ii)})$ seen or $13 \times 2 + 8 \times 5 + 3 \times 1$ |
| | (c) 37 500 | 3 | M2 for $\frac{34500}{100-8} \times 100$ oe or M1 for 34500 associated with $(100 - 8)\%$ |
| | (d) $\frac{11}{26}$ cao | 2 | M1 for any correct simplified version of $\frac{2750}{6500}$ |
| (e) 89 500 | 1 | | |
| 2 | (a) 1.5 1.25 -0.75 0.5 | 4 | B1 for each |
| | (b) Fully correct curve | 5 | B5 for correct curve over full domain or B3 FT for 11 or 12 points or B2 FT for 9 or 10 points or B1 FT for 7 or 8 points and B1 independent for one complete branch on each side of the y -axis and not touching or crossing the y -axis SC4 for correct curve with branches joined |

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| Question | Answers | Mark | Part Marks |
|----------|---|-----------|--|
| (c) | -1.35 to -1.25 | 1 | |
| | -0.27 to -0.251 | 1 | |
| | 1.51 to 1.55 | 1 | |
| (d) | $k < 1.2$ or 1.15 to 1.25 | 2 | SC1 for 1.15 to 1.25 seen or horizontal line drawn at min point |
| (e) | tangent ruled at $x = -1$ | B1 | No daylight at $x = -1$ Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -1.1$ and -0.9 |
| | -1.7 to -1.3 | 2 | dep on B1 or a close attempt at tangent at $x = -1$ or M1 for rise/run also dep on any tangent drawn or close attempt at tangent at any point. Must see correct or implied calculation from a drawn tangent |
| 3 (a) | (i) image at (1, 4) (1, 5) (2, 5) (4, 4) | 2 | SC1 for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ or 4 correct vertices plotted but not joined |
| | (ii) image at (-2, -1) (-5, -1) (-2, -2) (-3, -2) | 2 | SC1 for correct size and orientation, wrong position or 4 correct vertices plotted but not joined |
| | (iii) image at (2, -1) (2, -2) (3, -2) (5, -1) | 3 | B2 for 3 correct vertices plotted or if no / wrong plots allow SC2 for 4 correct coordinates in column matrix or shown in working or SC1 for any 3 correct coordinates or M1 for $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} 2 & 2 & 3 & 5 \\ 1 & 2 & 2 & 1 \end{pmatrix}$ oe |
| (b) | enlargement | B1 | |
| | [centre] (1, 0) | B1 | not as column vector |
| | [scale factor] -3 | B1 | |
| (c) | $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ | 2 | B1 for one correct row or column or $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ |

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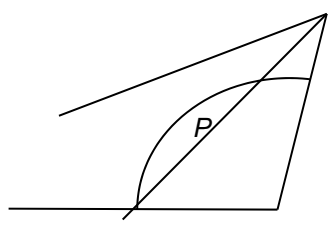
| Question | Answers | Mark | Part Marks |
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| 4 | (a) 5 | 1 | |
| | (b) $C \cap M$ oe | 1 | Allow e.g. $(B \cap C \cap M) \cup (C \cap M)$ |
| | (c) 3 | 1 | |
| | (d) (i) $\frac{8}{30}$ oe | 1 | 0.267 or better |
| | (ii) $\frac{14}{30}$ oe | 1 | 0.467 or better |
| | (e) $\frac{30}{272}$ oe | 3 | M2 for $\frac{6}{17} \times \frac{5}{16}$ or M1 for $\frac{6}{17}$ seen 0.110[2...] or better |
| 5 | (a) (i) 10.6 or 10.59... | 2 | M1 for $\tan = \frac{55}{294}$ oe |
| | (ii) 175 or 174.9[...] to 175.[1...] | 4 | M2 for [adj =] $\frac{55}{\tan 24.8}$ oe or M1 for implicit version and M1 dep on at least M1 for 294 – <i>their</i> adj |
| | (b) (i) 4.9 or 4.89 to 4.9 | 4 | M3 for $\sqrt{4^2 + \left(\frac{1}{2}\sqrt{4.8^2 + 3^2}\right)^2}$ or M2 for $\frac{1}{2}\sqrt{4.8^2 + 3^2}$ or M1 for $\sqrt{4.8^2 + 3^2}$ or $2.4^2 + 1.5^2$ |
| | (ii) 54.7 or 54.71 to 54.722 | 2 | M1 for $\sin = \frac{4}{\text{their } 4.9}$ |

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| 6 | (a) (i) | $24 < t \leq 30$ | 1 | |
| | (ii) | 30.9 or 30.875 nfw | 4 | <p>M1 for midpoints soi (condone 1 error or omission) 5, 17, 27, 35, 50, 65 soi</p> <p>M1 for use of $\sum fx$ with x in correct interval including both boundaries (condone 1 further error or omission) (50, 1530, 3645, 2975, 3500, 650) and M1 (dep on 2nd M1) for $\sum fx \div 400$</p> |
| | (b) (i) | [10 100] 235 320 390 [400] | 2 | <p>B1 for any two correct SC1 for 235, $n, n + 70 \quad n > 235$</p> |
| | (ii) | Correct curve or polygon | 3 | <p>B1 for correct horizontal placement B1FT for correct vertical placement</p> <p>B1FT dep on at least B1 for reasonable increasing curve or polygon through their 6 points</p> <p>If zero scored SC1 for 5 out of 6 points correctly plotted</p> |
| | (c) (i) | 27.5 to 29 | 1 | |
| | (ii) | 12 to 14 | 2 | B1 for 36 to 38 or 24 seen |
| | (iii) | 18 to 20 | 2 | B1 for 60 seen or marked on grid |
| | (iv) | 30 to 45 | 2 | B1 for 355 to 370 seen |

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| 7 | (a) (i) | 8.27 or 8.269... nfw | 4 | M2 for $7.6^2 + 8.4^2 - 2 \times 7.6 \times 8.4 \times \cos(62)$ oe or M1 for implicit form A1 for $[PQ^2 =]$ 68.3 to 68.5 |
| | (ii) | 28.2 or 28.18.. | 2 | M1 for $0.5 \times 7.6 \times 8.4 \times \sin 62$ oe |
| | (b) | 55.8 or 55.78 to 55.79 nfw | 5 | B1 for $[HGJ] = 81$ B1 for $[GHJ] = 61$ M2 for $[GJ =] \frac{63}{\sin(\text{their } 81)} \times \sin(\text{their } 61)$ or M1 for implicit form After M0, SC1 for final answer of 68.1... |
| 8 | (a) | $5x = 75$ or $5x + 48 = 123$ 15 | B2 B1 | M1 for $x + (x + 12) + 3(x + 12) = 123$ oe |
| | (b) | 6, 7 | 3 | B2 for answer of 6 or 7 OR M1 for $t < 8$ M1 for $t \geq \frac{37}{7}$ OR SC2 for final answer of 5, 6, 7 or 6, 7, 8 or SC1 for final answer of 5, 6, 7, 8 |
| | (c) (i) | 1.8 oe | 3 | M1 for $21 - x = 4(x + 3)$ or better B1 for $[\pm]5x = k$ or $kx = [\pm]9$ |
| | (ii) | $\sqrt{7^2 - 4 \times 3 \times (-5)}$ or better nfw and $\frac{-7 + \sqrt{q}}{2(3)}$ or $\frac{-7 - \sqrt{q}}{2(3)}$ oe -2.91 and 0.57 final ans cao | B1 B1 B1B1 | or for $\left(x + \frac{7}{6}\right)^2$ or for $-\frac{7}{6} \pm \sqrt{\frac{5}{3} + \left(\frac{7}{6}\right)^2}$ SC1 for 0.6 or 0.573... and -2.9 or -2.907 or -2.906... or -0.57 and 2.91 or 0.57 and -2.91 seen in working |

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| 9 | <p>(a) (i) 42</p> <p>(ii) 111</p> <p>(b) (i) 37.7 or 37.69 to 37.704 nfw</p> <p>(ii) 12100, 12060, 12070, 12062.4 to 12065.6 nfw</p> | <p>2</p> <p>2</p> <p>2</p> <p>5</p> | <p>B1 for $BAC = 90 - 48$</p> <p>B1 for 111 or 69 or $ACD = 27$ correctly placed on diagram or indicated</p> <p>M1 for $6\pi + 4\pi \pm 2\pi$ oe</p> <p>SC4 for answer with figs 121 or 1206 to 1207</p> <p>OR</p> <p>M2 for total area = $\frac{1}{2}\pi 6^2 + \frac{1}{2}\pi 4^2 - \frac{1}{2}\pi 2^2$ or $\frac{1}{2}\pi 60^2 + \frac{1}{2}\pi 40^2 - \frac{1}{2}\pi 20^2$ or M1 for $\frac{1}{2}\pi 6^2$ or $\frac{1}{2}\pi 4^2$ or $\frac{1}{2}\pi 2^2$ or $\frac{1}{2}\pi 60^2$ or $\frac{1}{2}\pi 40^2$ or $\frac{1}{2}\pi 20^2$</p> <p>A1 for area = 75.39 to 75.41 or 7539 to 7541</p> <p>and</p> <p>M1 dep for volume = <i>their</i> area \times thickness</p> |
| 10 | <p>(a) 475 or 465 to 485</p> <p>(b) Correct perpendicular bisector with two pairs of intersecting arcs</p> <p>(c) Compass drawn arc centre B radius 5.8</p> <p>Accurate angle bisector at C with correct intersecting arcs</p>  | <p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>1</p> | <p>B1 for 9.3 to 9.7 [cm] seen</p> <p>B1 for accurate with no/wrong arcs or M1 for correct intersecting arcs</p> <p>M1 for compass drawn arc centre B or B1 for 5.8 cm stated or used</p> <p>B1 for accurate with no/wrong arcs or M1 for correct intersecting arcs</p> <p>cao</p> |

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| <p>11 (a)</p> | $\frac{At}{t+r}$ <p>final answer oe nfw</p> | <p>4</p> | <p>B1 for $t(A-x) = xr$ or $tA - tx = xr$ or $A = \frac{xr}{t} + x$</p> <p>M1 for correctly completing multiplication by t (eliminating any bracket) and x terms isolated M1 for correct factorisation M1 dep for correct division</p> |
| <p>(b)</p> | <p>[a =] 64 [b =] -8</p> | <p>3</p> | <p>B1 for $2b = -16$ or $(x-8)^2$ B1 for $a = (their\ b)^2$ If 0 scored, SC1 for $x^2 + 2bx + b^2$ soi</p> |
| <p>(c)</p> | $\frac{13x+8}{(x-4)(3x-2)}$ <p>final answer nfw</p> | <p>3</p> | <p>B1 for $6(3x-2) - 5(x-4)$ or better seen B1 for $(x-4)(3x-2)$ oe seen as denom or SC2 for final answer $\frac{13x-32}{(x-4)(3x-2)}$</p> |